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Arrastra Creek Allotment Grazing Lease Renewal

Location: T15N, R10W, Sec. 32 & 33
T14N, R10W, Sec. 3-5, 8-10, 14-17, 21-23, 27, 28
Powell County, Montana

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1 PURPOSE & NEED

1.1 Introduction

This Environmental Assessment (EA) has been prepared by the Bureau of Land Management (BLM) to disclose and analyze the environmental consequences of considering renewal of the term grazing lease for the Arrastra Creek allotment (#01499) in Powell County, Montana. The EA is a site-specific analysis of potential impacts that could result with the implementation of the proposed action or alternatives to the proposed action. The EA assists the BLM in project planning and ensuring compliance with the National Environmental Policy Act (NEPA), and in making a determination as to whether any "significant" impacts could result from the analyzed actions. "Significance" is defined by NEPA and is found in regulation 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of "Finding of No Significant Impact" (FONSI). If the decision maker determines that this project has "significant" impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a Proposed Decision may be signed for the EA approving the selected alternative. A Proposed Decision, including a FONSI, documents reasons why implementation of the selected alternative would not result in "significant" environmental impacts (effects) beyond those already addressed in the *Record of Decision for the Garnet Resource Management Plan and the Environmental Impact Statement* (USDI-BLM 1986a) and the *Garnet Resource Area Resource Management Plan* (USDI-BLM 1986b), as amended, hereafter referred to as the *Garnet RMP*.

1.2 Background

The Arrastra Creek allotment is located approximately 13 miles east of Ovando, Montana (T15N, R10W, Sec. 32 & 33; T14N, R10W, Sec. 3-5, 8-10, 14-17, 21-23, 27, 28) in Powell County (Figure 1-1). The allotment consists of BLM, Forest Service, State, and private lands.

In 2005, the BLM completed the *Blackfoot River Watershed LWCF Project – Marcum Mountain Land Acquisition Environmental Assessment* (EA) (#MT-100-2004-0009); the EA analyzed the acquisition of lands from The Nature Conservancy (TNC) and private entities by the BLM in the Marcum Mountain area. Through subsequent decisions based on the EA, the BLM began acquiring lands from TNC and private entities from 2005 through 2009. The decisions made the acquired lands available for grazing as long as it is consistent with the 1986 *Garnet Resource Area Resource Management Plan* (RMP) guidelines. The BLM acquired sections 5 and 17 in 2005 and issued a 5 year term grazing lease on 1,200 acres of BLM land with the same terms and conditions to the current lessee pursuant to 43 CFR 4110.1-1. As additional lands were acquired, the lessee was allowed to graze a total of approximately 1,724 (in addition to the authorized 1,200) acres based on "historical use" of the acquired lands pursuant to 43 CFR 4130.1-2 (a) (Figure 1-2).

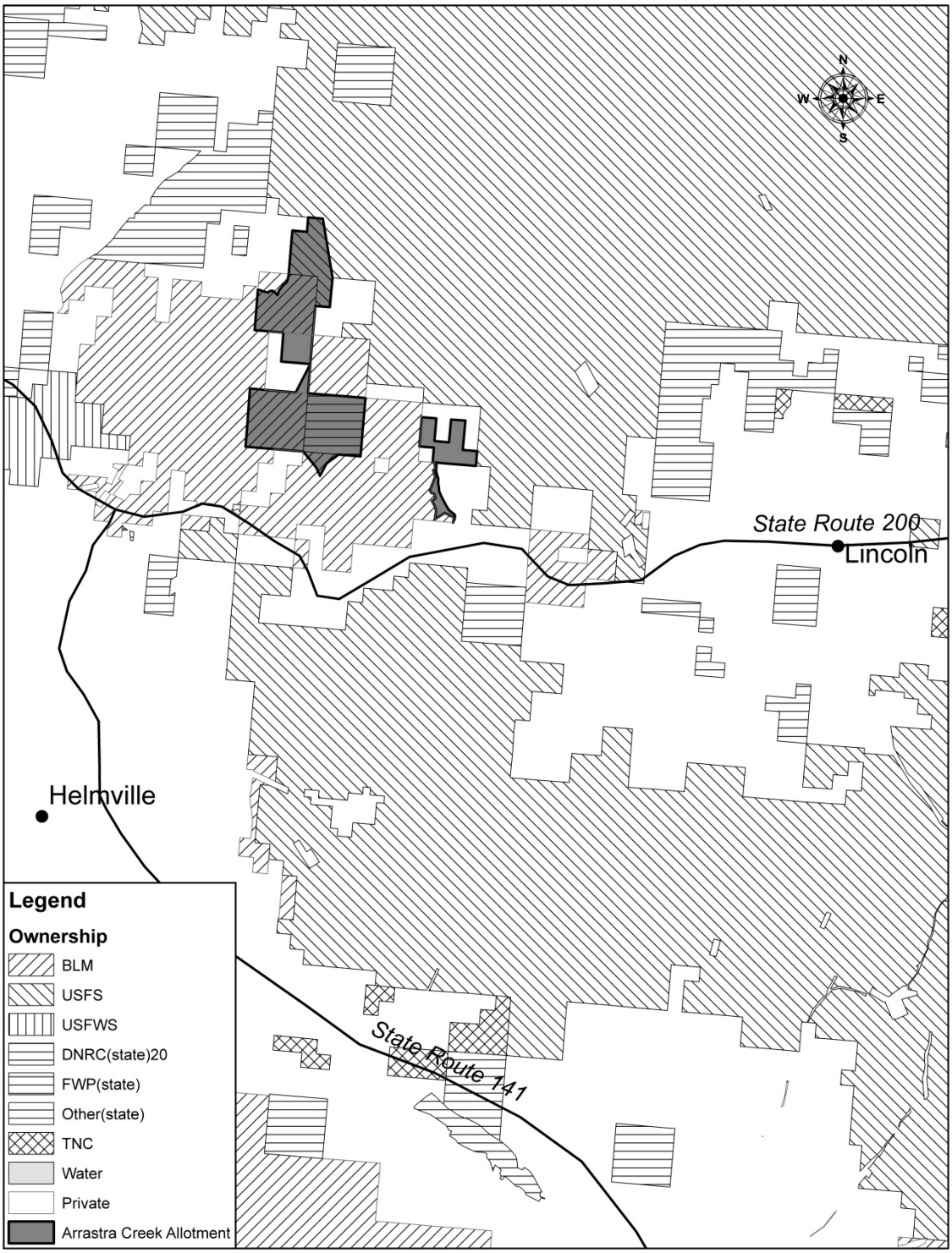

Figure 1-1. Location map.

TNC purchased the lands acquired by the BLM from the Plum Creek Timber Company and assumed management of resources. TNC leased the lands for grazing; however, stocking rate assessments were not conducted to determine the appropriate Animal Unit Months (AUMs) for current vegetation conditions. TNC calculated AUMs for the acquired lands by dividing leased acres by ownership to derive "relative" figures (TNC Email to BLM 2013). Based on information provided by TNC to the BLM, the "relative AUMs" were distributed evenly across all TNC lands throughout the Marcum mountain area without consideration of primary rangeland or forest understory. Through resource evaluations and assessments, the BLM found that the "relative AUMs" exceed the actual carrying capacity of preferred vegetation species for domestic livestock grazing in the allotment.

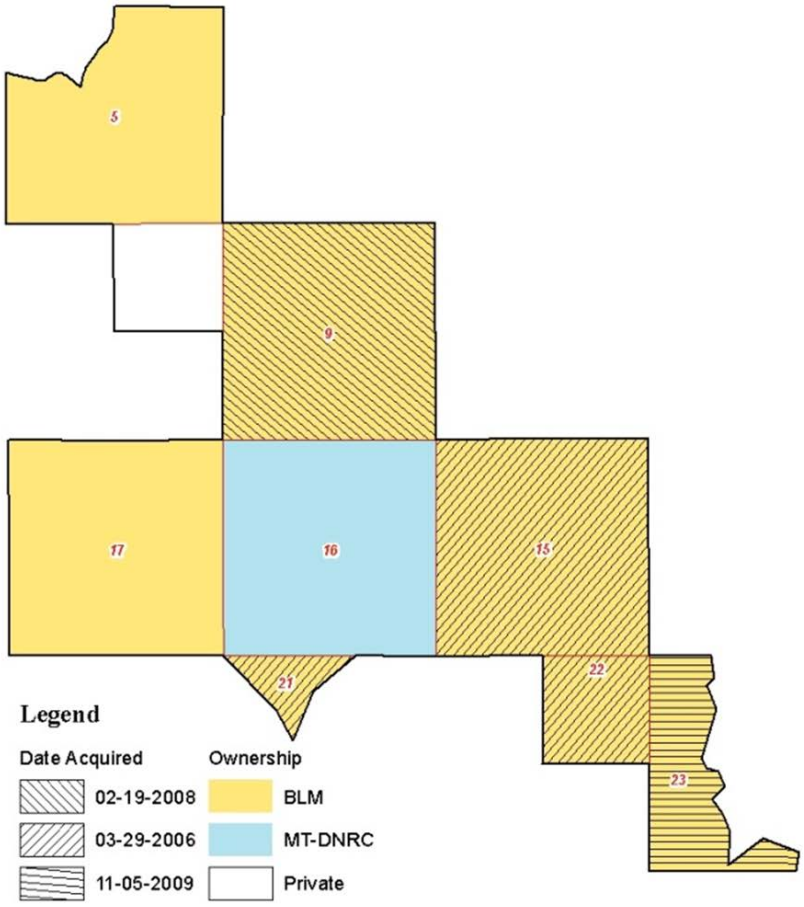

Figure 1-2. Historical use on acquired lands.

1.3 Need for the Proposed Action

The BLM needs to take action at this time to consider the renewal of the Arrastra Creek allotment term grazing lease; and to address issues associated with the proposed action on public land administered by the BLM. The current term grazing lease was due to expire on February 28, 2012. As an interim measure, the BLM reissued term grazing lease with the same terms and conditions under the authority of Section 416, Public Law 111-88. Renewing under public law affords the BLM additional time to complete the NEPA process, consultation, and remain in compliance with other laws.

A Rangeland Health Assessment was done in 2012 and the Evaluation Report (USDI-BLM 2012) documented that the following standards are currently functioning at risk or are currently not met:

Standard #2: *Riparian and Wetland Areas are in Proper Functioning Condition.*

Status: Functioning at Risk

A half-mile portion of main stem Arrastra Creek in Section 17 flows surface water intermittently from May through August through a 2-mile reach comprised of coarse porous glacial outwash and till. Water availability is a limiting factor for establishment and propagation of a riparian plant community. The lack of deep-rooting riparian plants leaves the streambanks susceptible to erosion and mechanical damage from livestock, recreational foot traffic, and equipment. This section of stream is rated Functioning-At-Risk (see further explanation in Standard #5).

Standard #3: *Water Quality Meets State Standards*.

Status: Not met

Arrastra Creek is located in the allotment and is on the State of Montana 303d list (MT76F002-070). According to the Montana Department of Environmental Quality's (Montana DEQ) Clean Water Act Information Center [Internet], all beneficial uses except Aquatic Life are 'fully supported'; the probable cause is identified as sedimentation/siltation, and the probable sources are agriculture, road runoff, and streambank modifications (Accessed 2013). The Blackfoot Headwaters TMDL (Montana DEQ et al. 2004) reports "…that physical habitat is impaired due to excess fine sediment (siltation), and excess sediment bed load (aggradation)."

Standard #5: *Provide habitat as necessary, to maintain a viable and diverse population of native plant and animal species, including special status species.*

Status: Not Met on Arrastra Creek

Spawning surveys and monitoring data, respective to fish habitat, indicating that the following standards are not met in spawning and rearing habitat for bull trout and the westslope cutthroat trout (resident and fluvial):

- Width-Depth Ratio in balance with landscape setting.
- Amount of altered stream banks.

- Reproduction and diverse age structure of vegetation.
- Streambank vegetation is comprised of those plants or plant communities that have deep binding root masses capable of withstanding high streamflow events.
- Utilization of trees and shrubs.
- Adequate vegetation cover present to protect banks and dissipate energy during high flows.
- Plant communities in the riparian area are an adequate source of large woody debris.

In addition to not meeting rangeland health standards, the BLM must take corrective action at this time to remain in compliance with the Inland Native Fish Strategy (INFISH) strategy as required by the Biological Opinion (BO) on effects of implementing the Garnet RMP on the federally listed bull trout (USDI–FWS 1998). The BO establishes terms and conditions for federal livestock grazing actions; INFISH incorporates standards and guidelines to address grazing management issues for Riparian Habitat Conservation Areas (RHCAs) and for projects that occur in or outside of RHCAs that would degrade RHCAs. Specifically, INFISH Standard GM-1 requires BLM to:

> *"Modify grazing practices (e.g. accessibility of riparian area to livestock, length of grazing season, stocking levels, timing of grazing, etc) that retard or prevent attainment of Riparian Management Objectives or are likely to adversely affect inland native fish."*

In order to comply with the requirements of INFISH and the BO, BLM has conducted streambank and riparian surveys in the Arrastra Creek Allotment since 2008. Results of these surveys indicate that Riparian Management Objectives (RMOs) for pool frequency and bank stability have not been attained. The BLM must evaluate causal factors for non-attainment of RMOs and, if grazing practices are determined to be a significant causal factor for non-attainment, then BLM must modify grazing practices in order to comply with INFISH Standard GM-1. BLM has made a preliminary determination that current livestock grazing practices are a significant causal factor not meeting rangeland health standards.

1.4 Purpose(s) of the Proposed Action

The purpose of this action is to ensure that livestock management on BLM administered land in the Arrastra Creek allotment meets resource condition and use objectives set forth in the RMP; *Montana/Dakotas Standards for Rangeland Health and Guidelines for Livestock Grazing Management* (USDI-BLM 1997); and to comply with policies regarding the conservation of special status species.

1.5 Decision to be made

The BLM will decide whether or not to renew 10 year term grazing lease for the Arrastra Creek allotment. The decision will include which grazing actions and activities the Authorized Officer intends to implement and enforce for the allotment in order to continue meeting rangeland health standards; resource condition and objectives set forth in the RMP (USDI-BLM 1986b); and to ensure consistency with special status species policies and conservation efforts. The BLM will also decide whether or not to implement stream restoration activities in Arrastra Creek, and if so, what design features will be incorporated. The BLM decision may incorporate various components of each of the alternatives described and analyzed in this EA. Therefore, the decision may not identically match any of the alternatives considered in detail.

1.6 Conformance with Land Use Plan(s)

In accordance with 43 CFR 1610.5-3(a), the proposed action and alternatives considered in detail in this EA are subject to and conform to the *Garnet Resource Area Resource Management Plan* (USDI-BLM 1986b), as amended.

1.7 Relationships to Statutes, Regulations, or Other Plans

Other applicable decisions, guidance and planning for these lands include:

- *Taylor Grazing Act of 1934* as amended and supplemented.
- *Federal Land Policy and Management Act of 1976*.
- *Public Rangelands Improvement Act of 1978.*
- *43 CFR Parts 4100, Grazing Administration Exclusive of Alaska*.
- *Montana/Dakotas Standards for Rangeland Health and Guidelines for Livestock Management (1997).*
- *Endangered Species Act of 1973,* as amended.
- *National Historic Preservation Act,* as amended.
- *Migratory Bird Treaty Act of 1918*, as amended.
- *E.O. 131186, "*Responsibilities of Federal Agencies to Protect Migratory Birds*," (2001).*
- *Safe Drinking Water Act*, as amended.
- *Clean Water Act of 1977.*

The following EAs and Decision Records (DR) provide context to the scope of this document and are incorporated by reference:

- *USDI-BLM. 2010. Marcum Mountain Resource Management Projects Environmental Assessment DOI-BLM-MT-B010-2009-0013-EA.* EA DOI-BLM-MT-B010-2009-0013-EA is an environmental analysis of proposed projects in and around the Marcum Mountain area conducted by the BLM Missoula Field Office. Proposed projects in the EA were designed to improve conditions for multiple resources. The EA discusses the most recent resource conditions for areas in and around the allotment as well as analysis to projects that are identical or similar to projects proposed within this document.

- *USDI-BLM. 2005. Blackfoot River Watershed LWCF Project – Marcum Mountain Land Acquisition MT-100-2004-0009.* MT-100-2004-0009 analyzes the acquisition of lands in the Marcum Mountain area from private land owners and The Nature Conservancy. The decision based on this EA set interim management guidelines on the lands acquired. The interim management guidelines are identical to those described in the RMP. The EA states: "Until such time as the RMP is formally amended, the lands acquired will be managed in accordance with interim MA designations…". The affected environment discussed the conditions and importance of the acquired lands and provided guidance on grazing management in the analysis of the proposed action.

- *USDI-BLM. 2010. Marcum Mountain Assessment: Resource conditions and management opportunities on BLM-administered public lands in the Marcum Mountain Watershed.* The purpose of the assessment was to provide a comprehensive and systematic analysis of the BLM-administered public lands in the Marcum Mountain watershed in Powell and Lewis and Clark Counties, Montana. The assessment considers past and present resource conditions, as well as

trends, identifies desired future conditions, and recommends actions that are needed to move towards or achieve desired future conditions. The recommendations incorporate Management Area direction and guidance found in the Resource Area Management Plan. This document brings together both published information and internal working documents. New information will be appended as it is collected or becomes available.

1.8 Identification of Issues

For the purpose of BLM NEPA analysis, an issue is a point of concern, disagreement, debate, or dispute with a proposed action based on some anticipated environmental or socio-economic effect. Issues identified in this EA point to anticipated environmental effects of the proposed action and enable the BLM to develop design features or mitigation measures if they are needed. An issue:

- has a cause and effect relationship with the proposed action or alternatives;
- is within the scope of the analysis;
- has not been decided by law, regulation, or previous decisions;
- is amenable to scientific analysis rather than conjecture.

By applying the criteria above to internal and external scoping and considering Critical Elements of the Human Environment, issues relevant to the proposed action were identified and are listed below by resource. Identifying relevant issues associated with the proposed action assists the BLM in the alternative design and decision-making process. Sections 6.2 and 6.3 lists the persons, groups, and agencies consulted and a summary of the external scoping process. Internal scoping was conducted by using a BLM interdisciplinary team comprised of resource specialists.

1.8.1 Issue 1: Habitat for Aquatic Special Status Species.

How will livestock grazing on Arrastra Creek affect the rate of recovery of streambanks and riparian vegetation?

Livestock grazing along Arrastra Creek could impede recovery or cause a further decline of riparian vegetation. The loss of riparian vegetation along Arrastra Creek from past management activities has destabilized stream banks resulting in a stream that is wider and more shallow than desired to provide for high quality aquatic habitat.

What is the likelihood of trampling of westslope cutthroat eggs and embryos in spawning beds if livestock are on the allotment during the spawning/incubation season?

If livestock use along Arrastra Creek occurs during the spawning and/or incubation period for westslope cutthroat trout, it is likely that cutthroat eggs and embryos could be trampled. This could result in reduced survival and recruitment of westslope cutthroat trout in Arrastra Creek.

How will stream bank restoration (installation of hedge brush layering and soil lifts) and instream restoration (placement of large woody material) affect aquatic species and habitat in Arrastra Creek?

Stream bank restoration (hedge brush layering and soil lifts) could stabilize the banks by using coir fabric and riparian vegetation. The placement of instream large woody material could also armor banks as

well as collect sediment and gravel resulting in aggrading the streambed. In addition to stabilizing the banks and reducing sedimentation, restoration efforts could also result in creating a narrower, deeper channel with more complexity and habitat for aquatic species.

1.8.2 Issue 2: Conifer Restoration

How would the alternatives, specifically the proposed water well/stock tank in the Proposed Action, affect conifer restoration in sections 21 and 22?

The proposed water well/stock tank location in section 21 is within a ¼ mile of 69 acres of recently planted conifer restoration in section 21, and 1.5 miles from a 17 acre restoration unit planted in section 22. Livestock use of this area facilitated by this water development could create adverse effects to planted confers such as trampling and browsing from concentrated livestock use.

1.8.3 Issue 3: Invasive, Non-native Vegetation Management

How would the proposed livestock grazing (intensity and season of use) and range improvements effect the management of invasive, non-native vegetation?

Livestock grazing and development of range improvements could increase the potential to spread invasive, non-native vegetation. Livestock can serve as a vector for seed distribution; and both livestock and the development of range improvements could result in ground disturbance, which would create new areas for weeds to establish.

1.8.4 Issue 4: Dispersed Camping and Hunting

How would the alternatives affect dispersed camping and hunting?

The Marcum Mountain area is a popular area for campers and hunters. Heavy forage utilization by livestock could reduce the presence of target wildlife species by reducing available forage and cover; thus affecting the overall hunting experience. Installation of fences to control livestock (jackleg and electric) could limit access to dispersed camping sites and areas.

1.8.5 Issue 5: Stream and Riparian Conditions

How would the alternatives affect stream and riparian conditions?

Stream and riparian conditions are functioning at risk on a segment of Arrastra Cr.

Through the Rangeland Management direction BLM is required to manage riparian areas to meet, or make progress toward meeting proper functioning condition. ‘At-risk’ elements have been identified through assessment and monitoring.

1.8.6 Issue 6: Water quality

How would the alternatives affect sedimentation and water quality?

Water quality does not meet State standards for beneficial use by aquatic life because of sedimentation from streambank destabilization, road runoff, and agriculture sources (Montana DEQ 2012).

Through an MOU with the Montana DEQ, the BLM agrees to manage the public lands so as not to contribute to listing on the Clean Water Act 303(d) list. Arrastra Creek is a listed waterbody by the State due to sedimentation from bank destabilization and roads. The 2004 TMDL has a restoration plan targeting reduced sediment from roads, in-channel sources, and degraded riparian areas, as well as a goal for restored channel morphology and healthy riparian community.

Scope of potential effects:

- Livestock trampling and caving of streambanks could create a wider, shallower channel. This could reduce transport capacity and increase streambed aggradation and channel braiding. An aggraded stream bed would extend the channel dewatering period in summer. Sedimentation of stream could be increased and water quality could be degraded.
- Livestock forage utilization and browse of woody plants (low vegetation reproduction, lack of deep rooting vegetation) could reduce shrub establishment and growth where rooting can provide added bank stabilization. Lack of deep-rooting vegetation would subject streambanks to higher erosion at high flows.

1.8.7 Issue 7: Lewis and Clark National Historic Trail

What would be the effects of the alternatives on the Lewis and Clark National Historic Trail?

The Lewis and Clark National Historic Trail is located in the Marcum Mountain area. Livestock management and design of range improvements could potentially impact the character of the landscape, recreation experience, or conservation of the trail.

1.8.8 Issue 8: Upland Vegetation

What are the effects of the alternatives on upland vegetation?

The development of range improvements within BLM administered lands will affect the grazing patterns of livestock. Existing fence exclosures in conjunction with new fence construction will constrict livestock movement and may increase grazing pressure on available key native grass species in the meadows and conifer understories.

1.8.9 Issue 9: Winter Range Forage Availability and Livestock Depredation

How would livestock use affect forage availability in big game (deer, elk, and moose) summer, fall, and winter range?

Livestock use could create competition for forage between cattle and big game species in summer, fall, and winter range in the allotment. Increased use of forage during the season of use from livestock use could affect the amount of forage available in winter range for elk, deer, and moose in sections 15, 17, 21, 22, and 23.

How effective would an electric fence be controlling livestock from using forage outside of the allotment boundary?

The proposed electric fence may not prevent cattle, especially calves, from leaving the allotment. Consequently, cattle grazing may occur outside the allotment. Competition for forage between cattle and elk, deer, and moose may occur outside of the allotment and affect forage availability during winter use.

What is the potential of depredation from the grizzly bear or gray wolf on livestock use in the Arrastra Creek allotment?

The grizzly bear (threatened) and gray wolf (sensitive) both inhabit the area of the Arrastra Creek allotment. Both species are known to prey on cattle, especially calves and have been lethally removed from other allotments due to livestock depredation. Livestock depredation has not been verified on the proposed allotment, but the potential is high. Reports of livestock depredation in Marcum Mountain, have been received, but not verified.

1.9 Issues Not Analyzed

1.9.1 Highway Safety

The issue of cattle getting into the right-of-way for Montana State Highway 200 and posing a risk to highway users was brought up during the development of the proposed action and alternatives. The issue was not analyzed because the state of Montana considers highway right-of-ways as open range. 81-4-203 of Montana Code Annotated (2013) defines open range as "…means all lands in the state of Montana not enclosed by a fence of not less than two wires in good repair. The term "open range" includes all highways outside of private enclosures and used by the public whether or not the same have been formally dedicated to the public."

1.10 Summary

This chapter has presented the purpose and need of the proposed project, as well as the relevant issues, i.e., those elements of the human environment that could be affected by the implementation of the proposed project. In order to meet the purpose and need of the proposed project in a way that resolves the issues, the BLM has developed a range of action alternatives. These alternatives, as well as a no action alternative, are presented in Chapter 2. The potential environmental impacts or consequences resulting from the implementation of each alternative are analyzed in Chapter 4 for each of the identified issues.

2 DESCRIPTION OF ALTERNATIVES

2.1 Introduction

This section provides a description of the proposed action and alternatives considered for the Arrastra Creek grazing lease renewal. The proposed action and alternatives were developed using an Interdisciplinary Team (IDT) of resource specialists; communications with The Nature Conservancy

(TNC), Forest Service (USFS), Montana Department of Natural Resources and Conservation (DNRC), and lessee; and using information from monitoring data, rangeland health assessments, and allotment visits.

Three alternatives have been brought forward for analysis. Alternative A (no action) would renew the term grazing lease with current allotment management and also provides a useful baseline for comparison of environmental effects (including cumulative effects) and demonstrates the consequences of not meeting the need for the action. The Alternative B (proposed action) and Alternative C would adjust allotment management per the Range Program Guidance Standard Operating Procedures of the RMP. The alternatives are discussed in more detail below.

2.2 Alternative A – No Action

Under this alternative, the term grazing lease would be renewed for 10 years with current allotment management (Table2-2) on approximately 1,200 acres of BLM managed land. An additional 1,724 acres are grazed pursuant to 43 CFR 4130.1-2 (a) due to the acquisition of lands (Table 2-1). The allotment boundary would not be adjusted (Figure 2-1).

Table 2-1. Acquired lands grazed under historical use.

Township	Range	Section	Acres	Currently Grazed
14N	10W	9	640	Yes
14N	10W	15	640	Yes
14N	10W	21 Portion	63	Yes
14N	10W	22 NE1/4	160	Yes
14N	10W	23 all BLM Managed Land	221	Yes

2.2.1 Allotment Management

Mandatory Terms and Conditions (Table 2-2):

Table 2-1. Mandatory Terms and Conditions under the No Action Alternative.

Allotment # and Name	Livestock Number and Kind	Season of Use	Type Use	AUMs
01499 Arrastra Creek	24 Cattle	06/01-09/30	Active	96

Other Terms and Conditions: There are no other terms and conditions.

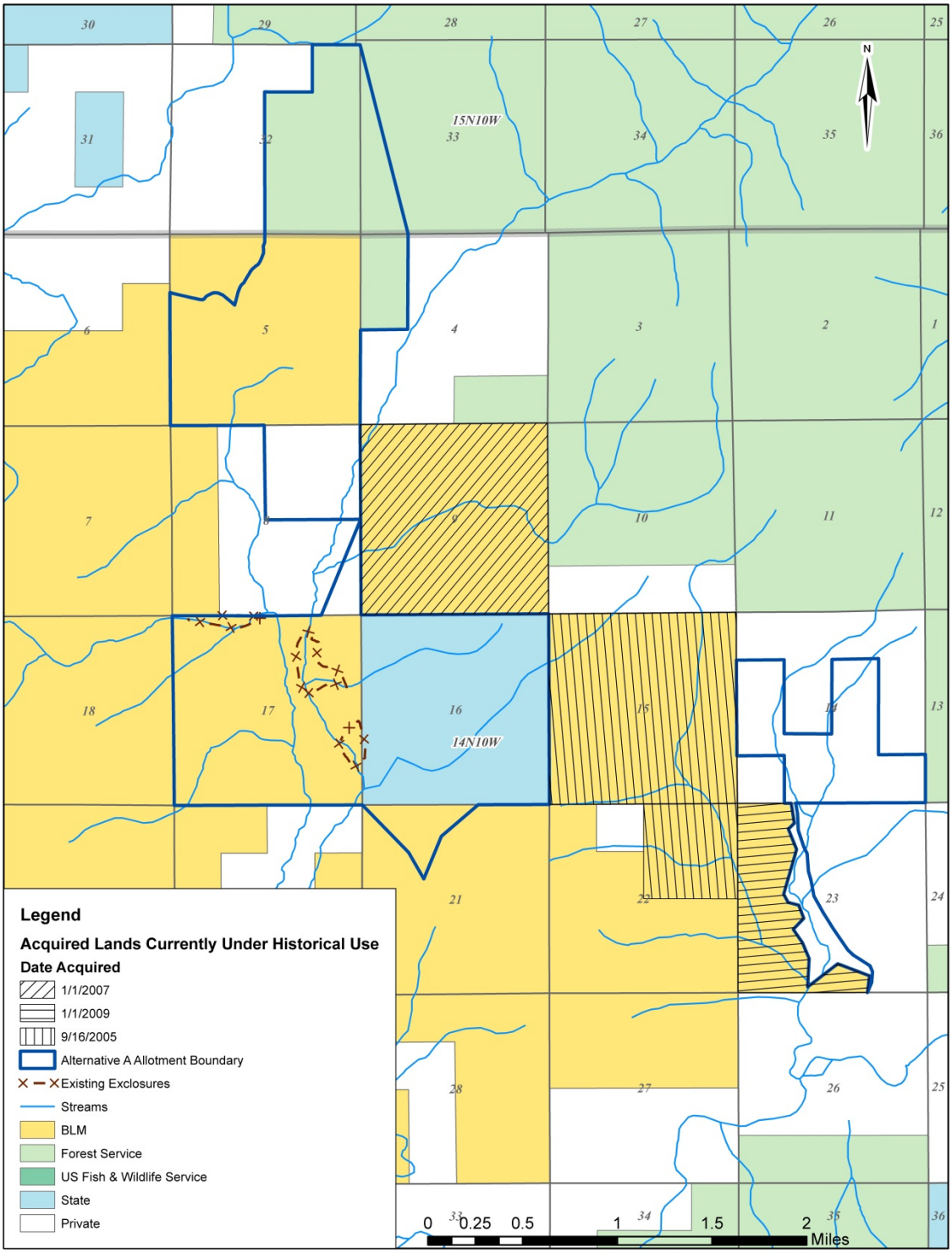

Figure 2-1. Alternative A allotment boundary and acquired lands grazed under historical use.

2.3 Alternative B – Proposed Action

This alternative was developed to address the purpose and need and incorporates input received from the lessee. Under this alternative, the grazing lease would be renewed for 10 years with adjustments to allotment management (Table 2-2). Grazing would be authorized on approximately 4,105 acres of BLM managed land (Figure 2-2).

2.3.1 Allotment Management

Addition of BLM lands would increase the total AUMs to 115 (Table 2-3). BLM managed lands west of Arrastra Creek (T14N, R10W, Section 17) would be rested for riparian recovery until the BLM determines through monitoring and evaluation that recovery has been achieved and compatible riparian grazing conditions exist. The rested portion west of Arrastra Creek would entail suspension of 27 of the 115 AUMs until grazing is authorized. Re-authorizing grazing BLM lands west of Arrastra Creek is based on the recovery criteria in section 2.3.2. The grazing lease would include the following Terms and Conditions below.

Mandatory Terms and Conditions (Table 2-2):

Table 2-2. Mandatory Terms and Conditions under the proposed action.

Allotment # and Name	Livestock Number and Kind	Season of Use	Type Use	Active AUMs	Suspended AUMS
01499 Arrastra Creek	23 Cattle	06/01-09/29	Active	88	27

Other Terms and Conditions: These terms and conditions would be included in the lease and implemented to assist in meeting management objectives, provide for range management or assist in the administration of the public rangeland pursuant to 43 CFR 4130.3-2.

- Browse on woody plants shall not exceed 50% of available annual leader growth.
- Utilization of upland forage shall not exceed 50% by weight on key grass species.
- Retain a minimum of 4” stubble height on riparian key species (e.g. Carex).
- Stream bank alteration of designated key riparian areas shall not exceed 15 percent on Arrastra Creek and West Fork Arrastra Creek.
- Livestock shall not utilize Section 17 west of Arrastra Creek if streambank stability on Arrastra Creek or West Fork Arrastra Creek is below 75% or if bank cover is below 79%.
- Salt shall be placed at least ¼ mile from water. Salt shall not be placed on any of the main traveled roads, and not within ¼ mile of new harvest areas or new tree plantation areas. Salt shall be placed at least ¼ mile from known populations of Special Status plant species to minimize impacts associated with grazing (i.e. trampling).
- When Arrastra Creek in Section 9 (~850’ of stream) has consistent flow and is connected to upstream and/or downstream fish-bearing habitats in September, the lessee shall exclude this portion of the stream and riparian area with an electric fence for the time livestock are in the pasture(s); or remove and keep livestock from the riparian area (such as with the use of a rider).

- If any grazing use term is met or exceeded, livestock shall be moved to the next un-grazed portion of the allotment. If any grazing use term is met or exceeded within the last portion of the allotment, livestock shall be removed from BLM administered lands for the remainder of the grazing season.
- Livestock trailing is authorized for a one day period through T14N, R10W, Section 17 at the beginning and/or end of the grazing season or use. Livestock trailing is limited to the main road and shall consist of the continuous movement of the herd through section 17.
- Lessee shall maintain BLM range improvements to ensure functionality.
- Lessee shall provide reasonable administrative access across leased private lands to the BLM for orderly management and protection of public lands.
- The authorized officer may delay livestock turn-out because of weather, to prevent compaction of wet soils and to adjust for lack of plant growth or for the protection of other rangeland resources and values, consistent with the objectives of applicable land use plans.
- In accordance with Title 43 CFR 4130.3-1(b), "All permits and leases shall be made subject to cancellation, suspension, or modification for any violation of these regulations or of any term or condition of the permit or lease."
- The authorized officer may modify terms and conditions of the permit or lease when active use or related management practices do not conform to provisions of Title 43 CFR 4180.
- The lessee is required to notify the BLM, as soon as is practical, of any grizzly bear depredation on livestock or conflicts between grizzly bears and livestock, even if the conflict does not result in the loss of livestock. The BLM will coordinate with Montana Fish, Wildlife and Parks, the United States Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS), and Wildlife service's personnel to determine the appropriate action(s).
- The lessee is required to properly treat or dispose of livestock carcasses to eliminate any potential attractant for bears. The lessee should contact the Missoula Office of Montana Fish, Wildlife and Parks as needed for carcass disposal assistance. Any carcasses should be randomly dispersed on the landscape, or suitable processing facility, and not placed in "bone yards".

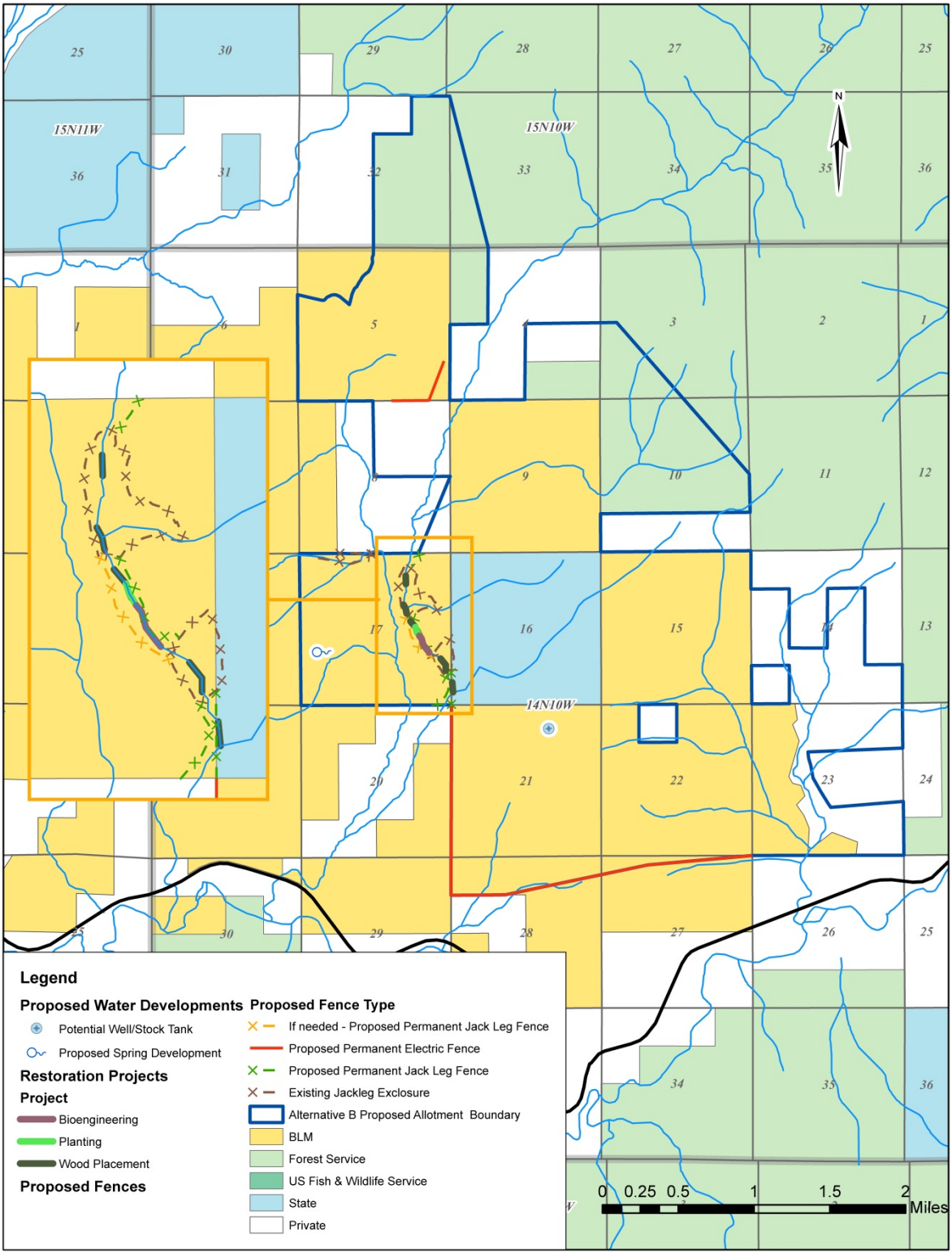

Figure 2-2. Alternative B proposed allotment boundary, range improvements, and stream/riparian restoration.

2.3.2 Section 17 Arrastra Creek Riparian Area Recovery Indicators

Appropriate indicators from the Multiple Indicator Monitoring Method (MIM) (Burton et al. 2011) would be utilized to provide quantitative information to assess when the area is considered to be recovered and suitable for grazing. Those sections of the stream available to grazing (outside exclosures) would have to meet the recovered standards before grazing would be considered. The MIM applies short and long-term indicators to monitor streambanks, stream channels, and streamside riparian vegetation.

A comparable riparian/stream segment along Arrastra Creek with similar characteristics to the riparian/stream segment of concern was measured to provide metric reference points for Mean Greenline-to-Greenline Width, Percent Stable Bank, and Percent Covered Banks. The reference riparian/stream segment is an area that has been subjected to minimal livestock grazing. With current vegetative and streambank conditions, the rest period in the degraded riparian area would be dependent on its ability to recover in the absence of livestock and given environmental conditions.

The BLM would consider re-authorizing grazing in the rested portion of section 17 when the following indicators have been met: Percent Stable Bank is at least 75% and Percent Covered Banks is at least 79%, as measured using the MIM protocol. However, if annual monitoring determines that the recovery potential of Arrastra Creek can't meet these criteria; the indicators could be modified to reflect the recovery potential of the stream. A design feature is in place to permanently exclose the riparian area of main Arrastra Creek if Percent Stable Bank is less than 75% after three active grazing cycles.

2.3.3 Design Features, Range Improvements and Aquatic/ Riparian Habitat Treatments

2.3.3.1 Range Improvements and Aquatic/Riparian Habitat Treatments

The following range improvements and treatments are designed to address the purpose and need; eliminate/minimize impacts of projects on resources; and/or minimize the effects of livestock grazing to resources. The BLM would supply materials for range improvement projects 1 and 3; and material/labor costs for projects 2, 5, 6, 7, 8. The lessee would be responsible for associated material/labor costs of range improvement project 4.

1) *Permanent Electric Fence*: Approximately ~4 miles of new electric fence would be installed. The electric fence would be installed at T14N, R10W, Section 5, SE boundary; T14N, R10W, West Section boundary of 21 north, N1/4 West boundary and north section 28 along property boundary following the existing power line through 27. Applicable design feature(s): 5,6,7,8.
2) *Permanent Jack Leg Fence*: Approximately 0.6 mile of jack leg fence would be installed on the east side of Arrastra Creek with gate access at existing roads. The jack leg fence would consist of three portions: The first portion ties into the existing boundary fence between sections 8 and 17 of the existing exclosure; The second portion is between the two existing exclosures; and the third portion is between the southern exclosure following the section boundary to the southeast corner of section 17 and on the west side of Arrastra Creek. The third portion would include walk in and gate access on the west side of Arrastra Creek for recreational use. Applicable design feature(s): 5,6,7,8.

3) *Conifer Restoration Electric Fence Exclosure*: Due to the concentrating effects of cattle use that come with a new water source, and the large investment that re-planted forest stands represent, if a new water source is developed in section 21, then plantations would be fenced off from livestock use. This fencing should be kept in place until the seedlings reach a sufficient height of approximately 4 feet so that they can withstand browse from ungulates without the presence of the Vexar seedling protectors and resist trampling from cattle. The total linear outline of the four planted units is approximately 14,234 feet.
4) A new spring development and exclosure fence would be constructed when the BLM determines the suspended portion of section 17 has recovered and is suitable for grazing. Applicable design feature(s): 5,6,7,8.
5) New water well/stock tank in T14N, R10W Section 21 NWNE. Applicable design feature(s): 5, 6,7,8,9.
6) Native shrubs would be planted along streambanks and floodplains. Species to be planted include Scouler's willow, snowberry, shrubby cinquefoil, Wood's rose, western serviceberry, red-osier dogwood and other appropriate species. In areas where soil conditions permit, native grasses would be seeded (Figure 2-1). Applicable design feature(s): 1,2,3,4,5,6,7,8.
7) In areas (gravel bars and banks) where gravels and sediments have accumulated (e.g., bank toes and mid-channel and meander-bend bars, bundles of dormant Drummond, sandbar and other appropriate willows would be planted. In addition, aspen and cottonwood may also be planted along the banks. Applicable design feature(s): 1,2,3,4,5,6,7,8.
8) If further studies identify a high probability of success from restoration activities, dense vegetation and woody structure could be restored on up to 550' of streambank. The following specific activities are identified in the proposed action on ~550' of stream:
    a. An excavator would temporarily remove bank soils approximately 4 feet back from the existing bank and temporarily set aside;
    b. A robust conifer fascine would be installed at the toe of the future bank;
    c. The original bank soils would be used to reconstruct the bank using 3 coir-wrapped soil-lifts;
    d. Up to 30,000 dormant willows would be installed with horizontal planting at the bank toe and between soil lifts (technique known as "Hedge Brush Layering");
    e. Native trees and woody shrubs would be planted at the top of the bank and on the upper terrace.
    f. Place large woody material along and adjacent to stabilized bank.

    Applicable design feature(s): 1,2,3,4,5,6,7,8.
9) Instream large woody material could be placed at appropriate locations within Arrastra Creek to increase deposition and scour adjacent to the structures, allowing for the formation of deep pool and off channel habitat. Down trees could be placed along the stream to help stabilize unstable and eroding streambanks. Up to 40 trees could be placed in and along 1 mile of Arrastra Creek. Trees could be placed individually or in up to 11 log/debris jams (Figure 2-2). The following materials/equipment would be used to promote instream habitat and bank stabilization:

a. An excavator would be used to place woody material in place.
b. Woody material would be a diameter, length and weight to help anchor structures in place;
c. Debris jams would be placed at locations where the channel naturally narrows and/or where existing features such as boulders, down wood or trees are located to help anchor placed material. If available, trees with rootwads attached would be used to help anchor down wood and provide instream habitat.

Applicable design feature(s): 1,2,3,4,5,6,7,8.

2.3.3.2 Design Features

1) Bank stabilization efforts would be implemented in early spring (mid-to-late April) or in August when there is no surface flow in the naturally intermittent portion of the channel. If snowmelt occurs earlier than normal or precipitation causes surface flow in the project area channel segment, a sediment fence with a sealed bottom would be installed to minimize soil delivery to the stream.
2) During placement of woody material, the use of equipment in the stream would be minimized and would only occur when there is no surface flow in the intermittent channel or when flow is intermittent and not connected to upstream and/or downstream fish-bearing habitat.
3) The excavator operator would be required to have a Spill Containment Kit and a Spill Prevention, Control, and Countermeasure Plan in case equipment leaks fuel or oil.
4) All equipment would be steam-cleaned prior to entry at the project site to prevent the introduction of noxious weeds.
5) All persons in the area who are associated with this project shall be informed that any person who, without a permit, injures, destroys, excavates, appropriates or removes any historic or prehistoric ruin, artifact, object of antiquity, Native American remains, Native American cultural item, or archaeological resources on public lands is subject to arrest and penalty of law (16 USC 433, 16 USC 470, 18 USC 641, 18 USC 1170, and 18 USC 1361).
6) Inadvertent Discovery: The National Historic Preservation Act (NHPA) [16 USC 470s., 36 CFR 800.13], as amended, requires that if newly discovered historic or archaeological materials or other cultural resources are identified during the proposed action implementation, work in that area must stop and the BLM Authorized Officer (AO) must be notified immediately. Within five working days the AO will determine the actions that will likely have to be completed before the site can be used (assuming in-place preservation is not necessary).
7) The Native American Graves Protection and Repatriation Act (NAGPRA) [25 USC 3001 et seq., 43 CFR 10.4] requires that if inadvertent discovery of Native American Human Remains or Objects of Cultural Patrimony occurs, any activity must cease in the area of discovery, a reasonable effort must be made to protect the item(s) discovered, and immediate notice be made to the BLM Authorized Officer, as well as the appropriate Native American group(s) (IV.C.2). Notice may be followed by a 30-day delay (NAGPRA Section 3(d)).
8) A literature and records search would be conducted for the area of potential effect (APE). The results would be reviewed to determine if above-ground structures or ruins are present or are highly likely to be present. Based on the results, one of the following options occurs:

9) If no above-ground structures or ruins are present or likely to be present, and no surface disturbing activities are proposed, then no field inventory is required. The undertaking will have no effect on cultural resources. The project may proceed after the cultural resource report is completed.
10) If above-ground structures or ruins are present or likely to be present, or surface disturbing activities are proposed then a Class II inventory would be required.
11) If MIM data indicates stream conditions and/or riparian vegetation on Arrastra Creek drop below recovered standards (<79% covered banks or <75% stable banks) for 3 consecutive active grazing cycles, a ½ mile jackleg fence with gate access would be installed to permanently exclude cattle on the west side of Arrastra Creek in Section 17 (T14N, R10W, S17).

2.3.4 Unleased Tracts

Acquired lands would be added to the allotment and the allotment boundary (Figure 2-2) would be adjusted to include the added tracts per 43 CFR 4110.2-4 (Table 2-3).

Table 2-3. Unleased Tracts proposed to be added to the Arrastra Creek allotment in Alternative B.

Township	Range	Section	~Acres	Currently Grazed
14N	10W	9; all BLM Managed Land	640	Yes
14N	10W	15; all BLM Managed Land	640	Yes
14N	10W	21; all BLM Managed Land	640	Yes, portion of northern half
14N	10W	22; all BLM Managed Land, excluding private portion	600	Yes, NE1/4
14N	10W	23; all BLM Managed Land	221	Yes, BLM portions
14N	10W	27; BLM Managed Portion north of the existing power line in the NW ¼.	31	No
14N	10W	28; North ¼ portion, following north side of existing power line	133	No

2.4 Alternative C

This alternative was developed to address the purpose and need, as well as the resource issues identified in response to the proposed action. Under this alternative, the grazing lease would be renewed for 10 years with adjustments to allotment management. Grazing would be authorized on approximately 2,291 acres of BLM managed land.

Under this alternative, AUMS would be adjusted to 61 and the livestock number would be adjusted to 15. The allotment boundary would be adjusted (Figure 2-3) per 43 CFR 4110.2-4 to reflect the added

lands (Table 2-5). This alternative would permanently eliminate grazing in section 17 west of Arrastra Creek. The season of use would be the same as described in the No Action alternative.

2.4.1 Allotment Management

The grazing lease would include the Terms and Conditions below.

Mandatory Terms and Conditions (Table 2-4):

Table 2-4. Mandatory Terms and Conditions under the Reduced AUMs Alternative.

Allotment # and Name	Livestock Number and Kind	Season of Use	Type Use	AUMs
01499 Arrastra Creek	15 Cattle	06/01-09/30	Active	61

Other Terms and Conditions: The other terms and conditions to be implemented under this alternative are the same as those listed in the proposed action.

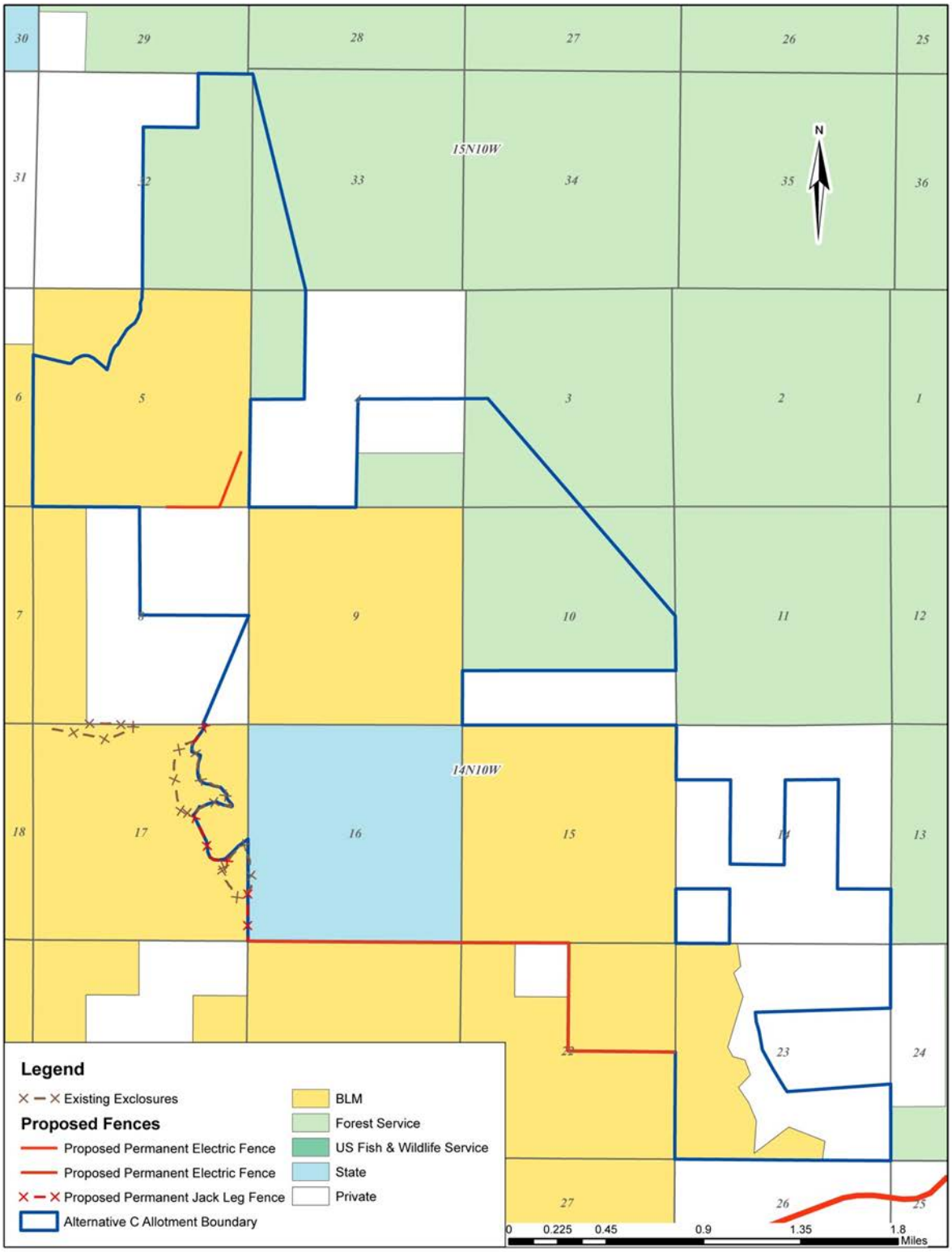

Figure 2-3. Alternative C proposed allotment boundary and range improvement projects.

2.4.2 Design Features, Range Improvements and Aquatic/ Riparian Habitat Treatments

2.4.2.1 Range Improvements and Aquatic/ Riparian Habitat Treatments

Range improvements 5,6,7,8 in section 2.3.3.1 would be implemented under this alternative. In addition, the following range improvements would be implemented.

- New electric fence T14N, R10W, Section 5, SE boundary (~½ mile).
- Permanent jackleg fence on east side of Arrastra Creek (~1¼ miles). There is a north and south portion to this fence. Both portions would tie into the existing riparian exclosures. Two gate access points would be constructed to allow passage to State land.
- New electric fence along north boundary of T14N, R10W, S21 and north west half boundary and NE1/4 of T14N, R10W, S22 (~3 miles).

2.4.2.2 Design Features

Design features 1 through 11 in Alternative B (section 2.3.3.2) would be the same under this alternative.

2.4.3 Unleased Tracts

Acquired lands would be added to the allotment and the allotment boundary (Figure 2-3) would be adjusted to include the added tracts per 43 CFR 4110.2-4 (Table 2-5).

Table 2-5. Unleased Tracts proposed to be added to the Arrastra Creek allotment in Alternative C.

Township	Range	Section*	~Acres
14N	10W	9	640
14N	10W	15	640
14N	10W	22 NE ¼	160
14N	10W	23; all BLM Managed Land	221

*****Note: These lands are currently grazed.

2.5 Alternatives considered, but Eliminated from Detailed Analysis

An alternative to eliminate grazing from BLM lands was considered but not analyzed in detail for several reasons:

- The *Federal Land Policy and Management Act of 1976* (FLPMA) requires that public lands be managed on a "multiple use and sustained yield basis" (FLPMA Section 302(a) and 102(7)) and includes livestock grazing as a principal or major use of these lands. While "multiple use" does not require that all lands be used for livestock grazing, complete removal of livestock grazing on these public lands would be arbitrary and would not meet the principle of multiple use and sustained yield.
- The *Final Environmental Impact Statement for the Garnet Resource Area RMP* (USDI-BLM 1985) did consider the "No Grazing" alternative but eliminated it from further detailed study due to technical, legal, and/or other constraints. The *Garnet RMP* did not identify any issues or conflicts that required complete elimination of grazing within these areas covered in this EA. The decisions to acquire lands in the Marcum Mountain area made the BLM lands available for

livestock grazing in the Arrastra Creek allotment so long as it is consistent with the Garnet RMP. Therefore, elimination of livestock grazing would not be consistent with the *Garnet RMP*.

- Elimination of livestock grazing would not be consistent with the Purpose and Need for this project. This action does not include changing land use plan allocations under the *Garnet RMP*.
- NEPA requires that agencies study, develop, and describe appropriate alternatives to recommended courses of action in any proposal that involves unresolved conflicts concerning alternatives. No issue or conflict has been identified during this lease renewal effort that requires the complete elimination of grazing within these allotments for resolution. The Proposed Action was developed to address resource concerns in these allotments and meet the Purpose and Need for this project.

2.6 Summary Comparison of Alternatives

Table 2-6 provides a comparison of the alternatives in this EA.

Table 2-6. Comparison of Alternatives.

Bold text indicates differences between Alternatives B and C as compared to Alternative A.

Alternative	Total AUMs	Active /Suspended AUMs	Season of use	Livestock Number and Kind	Terms and Conditions Revised or Added	Allotment Boundary Change	Approximate BLM Acres (Authorized/Historical Use)	Range Improvements	Riparian/Stream restoration Projects
A (No Action)	96	96	06/01-09/30	24 Cattle	No	No	2,924 (1,200/ 1,724)	None	
B (Proposed Action)	**115**	**88/27**	06/01-**09/29**	**23** Cattle	**Yes**	**Yes**	**4,105**	**4 Miles of Electric Fencing; 1 ¼ mile Jack leg fence; Spring Developments; Conifer Restoration Exclosure (3½ Electric Fence)**	**Floodplain Shrubs; Gravel Bars/Banks; Unstable Meander Bend**
C	**61**	**61**	06/01-09/30	**15** Cattle	**Yes**	**Yes**	**2,291**	**¾ Mile Jack leg fence; 3½ Miles of Electric Fencing**	

3 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter presents the potentially affected existing environment (i.e., the physical, biological, social, and economic values and resources) of the impact area as presented in Chapter 1 of this assessment. This chapter provides the baseline for comparison of impacts/consequences described in Chapter 4.

3.2 General Setting

The 2010 *Marcum Mountain Resource Management Projects* (DOI-BLM-MT-B010-2009-0013-EA) and *Blackfoot River Watershed LWCF Project – Marcum Mountain Land* Acquisition (MT-100-2004-0009) Environmental Assessments describe the current vegetative conditions, past/present actions, and a description of the lands that have been acquired.

Grazing on public land in Powell County sustains the culture and economic stability of the county and its citizens. The 2007 Census of Agriculture profile for Powell County reported the market value of agricultural products sold to be $25,745,000. Livestock production accounts for 90 percent ($23,123,000) of the overall market value of products sold. Over a five year period (2002 to 2007) the number of farms has decreased from 274 to 273 (USDA-NASS 2007). Ranching has historically been and continues to be a traditional way of life for this area.

3.3 Critical Elements of the Human Environment

Certain resources are protected by specific laws, regulations, or policies (e.g., Executive Orders). BLM refers to these resources as "Critical Elements of the Human Environment" (Table 3-1) and addresses them in this EA. The determination of effects the proposed action would have on the critical elements is presented with the supporting rationale below.

Table 3-1. Critical Elements of the Human Environment.

*Determination
NP = not present in the area impacted by the proposed or alternative actions
NI = present, but not affected to a degree that detailed analysis is required
PI = present and may be impacted to some degree. Will be analyzed in affected environment and environmental impacts. (NOTE: PI does not mean impacts are likely to be significant in any way).

CRITICAL ELEMENTS		
Determination *	**Resource**	**Rationale for Determination***
NI	Air Quality	Present
NP	Areas of Critical Environmental Concern	There are no Areas of Critical Environmental Concern in the area impacted by the proposed action or alternative actions.
PI	Cultural Resources	The Lewis and Clark National Historic Trail is located within the Area of Potential Effect (APE) for Alternative B. See the section Lewis and Clark National Historic Trail for Effects Analysis.
NP	Environmental Justice	Environmental justice is not impacted by the proposed action or action alternatives.
NP	Farmlands (Prime or Unique)	There are no farmlands (Prime or Unique) in the area impacted by the alternatives.
NI	Floodplains	No occupancy or modification of a floodplain would occur and the action would comply with Executive Order 11988.
PI	Invasive, Non-native Species	Several invasive, non-native species would be impacted by the alternatives.
NP	Native American Religious Concerns	There are no Native American Religious Concerns in the area impacted by the alternatives.
NP	Threatened, Endangered or Candidate Plant Species	There is no Threatened, Endangered or Candidate Plant Species in the area impacted by the alternatives.
PI	Threatened, Endangered or Candidate Animal Species	Fish: Potential effects to Bull Trout. Wildlife: No effect to Canada Lynx or Canada Lynx Critical Habitat. May affect, but not likely to adversely affect the grizzly bear. Not likely to jeopardize the continued existence of the wolverine.
NP	Wastes (hazardous or solid)	There are no wastes created or impacted by the alternatives.
PI	Water Quality (drinking/ground)	The alternatives would affect sedimentation.
PI	Wetlands/Riparian Zones	Present and potentially affected by alternatives. The project would comply with Executive Order 11990.
NP	Wild and Scenic Rivers	There are no designated Wild and Scenic Rivers in the area impacted by the alternatives.
NP	Wilderness	There is no designated wilderness in the area impacted by the alternatives.

3.4 Affected Environment of Elements and Issues Brought Forward for Analysis

3.4.1 Issue 1: Habitat for Aquatic Special Status Species

3.4.1.1 Methods of Analysis

Fish habitat and condition of INFISH Riparian Management Objectives (RMOs) were evaluated according to the R1/R4 Fish and Fish Habitat Standard Inventory Procedures (Overton et al. 1997), and the PACFISH/INFISH Biological Opinion (PIBO) Effectiveness Monitoring Protocol (Archer et al. 2012). Streambank condition and streambank/riparian vegetation have been evaluated annually from 2008 to the present using the Multiple Indicator Monitoring (MIM) protocol (Burton et al. 2011).

Aquatic species presence and distribution were determined from annual spawning surveys conducted by the BLM and US Forest Service staff from 2003 to the present, and snorkel and electrofishing surveys conducted by the BLM and Montana Fish Wildlife and Parks from 1989 to 2010.

3.4.1.2 Affected Environment

The fish-bearing streams in the Arrastra Creek Allotment are Arrastra Creek and West Fork Arrastra Creek (Figure 3-1). There are also several non-fish-bearing intermittent channels within allotment boundaries, including streams in the Patterson Prairie area that drain towards the Blackfoot River. These streams lack surface connection to fish-bearing waters and will not be discussed further in the fisheries analysis (Figure 3-1).

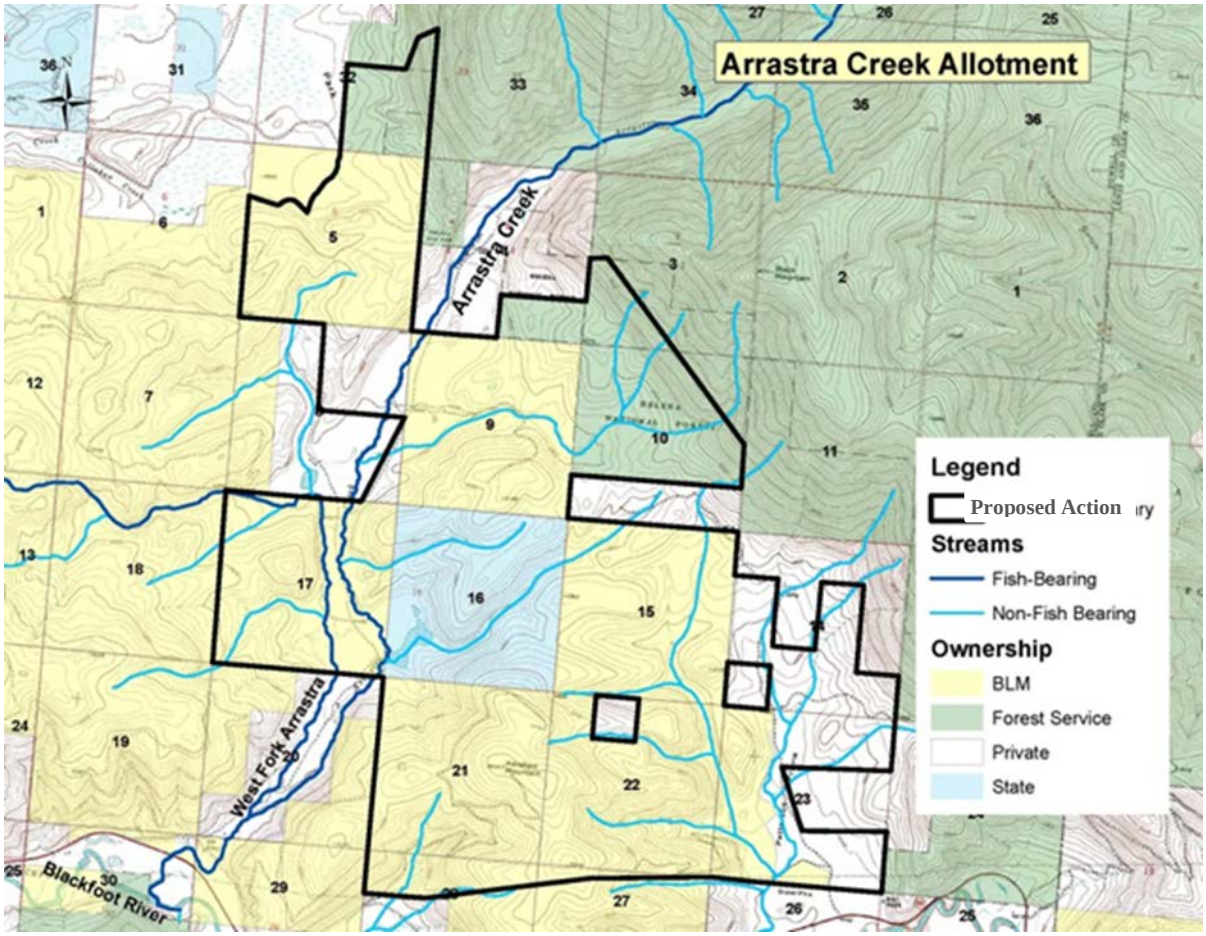

Figure 3-1. Fish and non-fish bearing streams in the Arrastra Creek allotment.

Table 3-2 gives an overview of the fish species present within the allotment and describes general patterns of use of all fishbearing streams.

Table 3-2. Overview of fish presence in the Arrastra Creek allotment.

Species	Origin	Management Status	Life History	Presence in Allotment Streams	Pattern of Use in Allotment	Data Source
Westslope cutthroat trout	Native	BLM: Sensitive	Fluvial, Resident	Arrastra W. Fk Arrastra	Migratory, spawning, rearing	1,2,3,4
Bull trout	Native	ESA: Threatened BLM: Special Status	Fluvial, Resident	Arrastra	Migratory, rearing (spawn in perennial flow upstream and immediately downstream of allotment)	1,2,3,4
Longnose sucker	Native	n/a	Resident	Arrastra	Migratory, rearing (spawn downstream of allotment)	1,2,3
Mountain Whitefish	Native	n/a	Resident	Arrastra	Migratory, rearing (spawn outside of allotment)	1,2,3
Sculpin	Native	n/a	Resident	Arrastra W. Fk. Arrastra	Migratory, rearing, spawning unknown	1,2,3
Brown trout	Introduced	n/a	Fluvial, Resident	Arrastra	Migratory, rearing (spawn downstream of allotment)	1,2,3
Brook trout	Introduced	n/a	Resident	Arrastra	Rearing; other use unknown	1,2,3

Data sources: 1 = MFISH (Montana Fish, Wildlife and Parks 2013); 2 = Missoula Field Office Surveys (data on file at the MiFO); 3 = R. Pierce, pers. comm. 6-8-2012; 4 = Pierce et al. (2007).

3.4.1.2.1 Arrastra Creek

Arrastra Creek originates on the steep slopes of Arrastra Mountain and, like many streams in the Blackfoot watershed, flows through a glaciated valley. As a result of glacial deposits many streams or stream reaches in the Blackfoot watershed, including Arrastra and West Fork Arrastra, are intermittent by nature. In these glaciated systems, streams are usually perennial in confined valley types but have intermittent reaches when the valley widens or enters a larger valley. This can be seen with Cottonwood, Dunham, Monture, Arrastra, and Landers creek systems. These types of environments often provide ideal spawning habitat near the lower end of the streams' intermittent reach. As the water "resurfaces" or "upwells" it is often clean and cold which are key criteria for spawning sites (USDA-FS 2013).

Arrastra Creek is important because:

- It is the only known tributary to the Blackfoot River "Middle" segment (river mile 54 to 108) that supports reproduction of ESA-listed bull trout (Pierce et al. 2006), and;
- It is the primary fluvial westslope cutthroat trout spawning stream in the Middle Blackfoot (Pierce et al. 2007).

Due to coarse, porous glacial outwash and alluvium, Arrastra Creek becomes intermittent at approximately river mile 2.2, with consistent, perennial flow occurring only during the spring and early summer (~May-July). The intermittent section of the channel is located from river mile 2.2 to approximately river mile 4.5 based on a report by the Blackfoot Challenge (2005), Montana Fish, Wildlife and Parks (MFWP) and observations by the BLM, Helena National Forest and local land owners. As seen in Figure 3-2, BLM lands in the allotment are located along Arrastra Creek from river mile 2.0 to river mile 4.2, within the intermittent section of the creek. The only portion of the stream with year-round flow on BLM lands is the lower 0.1 mile of stream from the boundary of BLM to ponds found at the boundary of State lands (Section 17).

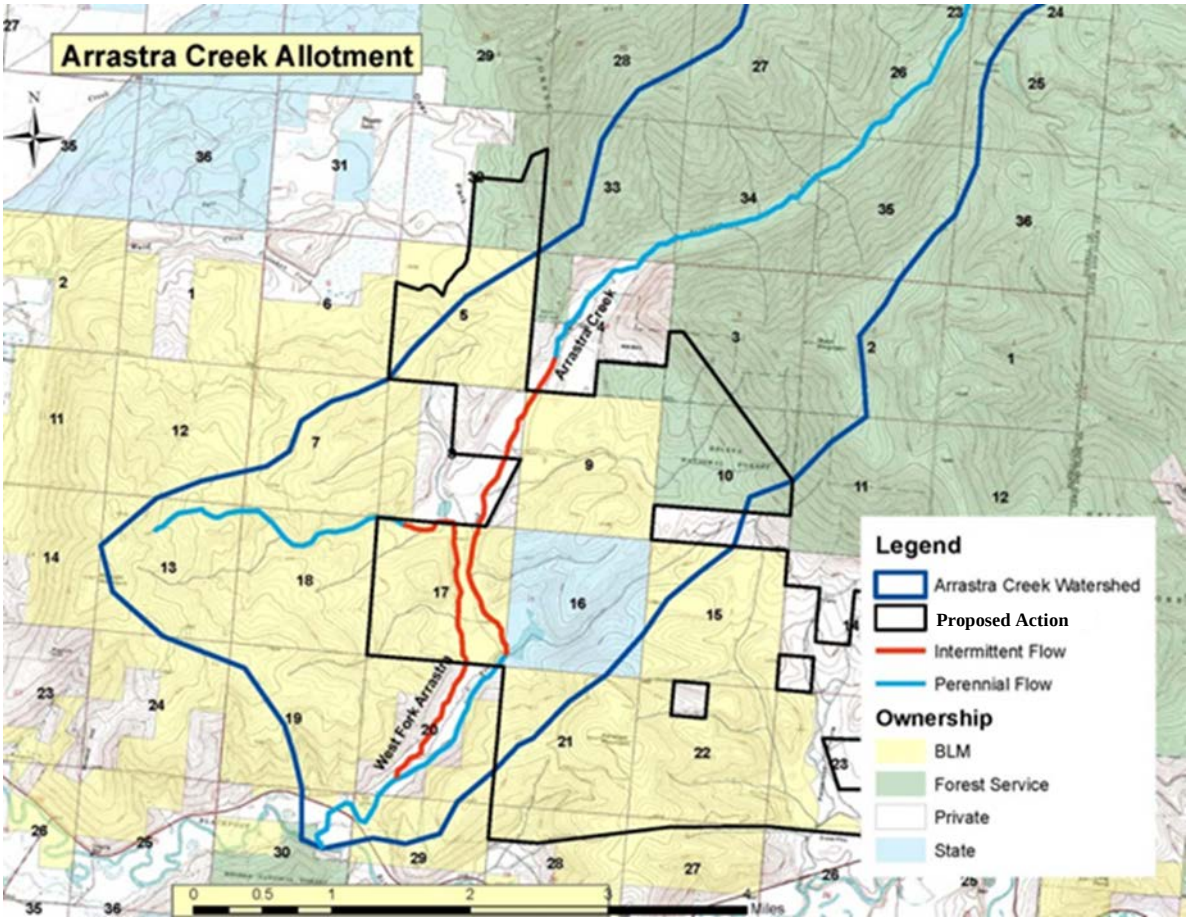

Figure 3-2. Perennial and intermittent streams in the allotment.

Fish presence and patterns of use in Arrastra Creek are highly seasonal and are largely determined by availability of surface flow. With the exception of the lowermost 0.1 mile at the downstream end of the allotment in Section 17, surface flow typically disappears in mid to late summer and reappears in May. As a result, spawning habitat in most of the allotment is available only for those species which reproduce in the spring (e.g. westslope cutthroat trout, sculpin, and longnose sucker). Annual spawning surveys by BLM personnel as well as telemetry studies conducted by MFWP (Pierce et al. 2004; 2007) have documented spawning in the allotment by fluvial westslope cutthroat trout. The telemetry studies

demonstrated that Arrastra Creek is the primary spawning stream in the Middle Blackfoot for fluvial cutthroat (Pierce et al. 2007).

Although lack of surface flow in the majority of Arrastra Creek during the fall prevents spawning by bull trout (with the exception of lowermost 0.1 mile at the downstream end of the allotment boundary in Section 17), Arrastra Creek may provide limited rearing habitat for the fish. Electrofishing surveys conducted by MFWP in 1996, 2009, and 2011 documented bull trout rearing within the allotment (Pierce et al. 1997; Pierce and Podner 2011; and Ron Pierce personal communication 6-8-2012). While surface flow exists, Arrastra Creek may also provide rearing habitat for westslope cutthroat trout, longnose sucker, mountain whitefish, and sculpin. Non-native brown and brook trout may also be present.

Surveys conducted by BLM staff have documented westslope cutthroat trout in West Fork Arrastra. Since the West Fork is an intermittent stream across BLM lands, bull trout would not have access to this stream for spawning.

3.4.1.2.2 Arrastra Creek – Section 17

Approximately 1.0 mile of Arrastra Creek is located within the Arrastra Creek Allotment in Section 17. Within the allotment boundary, Arrastra Creek consists of a Rosgen C4-type channel (Rosgen 1996) that flows through deposits of alluvium derived from glacial outwash. The channel is relatively low gradient (1.5-2.0%) with extensive point- and mid-channel bar formation. The glacial geology underlying Arrastra Creek is important for several reasons:

- Streambanks comprised of porous outwash soils with low cohesion are friable and are therefore more susceptible to erosion from both hydraulic processes and livestock trampling;
- Glacially derived soils have limited capacity to support deep rooted woody vegetation; after disturbance, woody vegetation is less likely to re-colonize and stabilize soils;
- Abundant bedload is highly permeable, resulting in an intermittent seasonal flow regime which limits moisture available for the growing season as well as extent of surface flow for aquatic species.

The abundant bedload in Arrastra Creek provides ample substrate for spawning; however, the relatively low abundance of instream structure to sort bedload limits the distribution of spawning in the allotment. Cutthroat trout redds are typically observed immediately adjacent to or downstream from instream structure such as woody debris or small vegetated islands.

Aquatic habitat conditions in this part of Arrastra Creek reflect a history of riparian logging and road-building. In particular, historic removal of conifers combined with the establishment of streamside roads and low-water crossings facilitated livestock access to the stream channel across much of the BLM-managed section of the stream. Currently, areas of Arrastra Creek heavily utilized by livestock do not meet BLM Riparian Standards for Proper Functioning Condition (PFC) surveys. The results of PFC surveys show the following BLM Rangeland Health standards are not met (see also Appendix 1):

- Width-Depth Ratio in balance with landscape setting

- Amount of altered streambanks
- Reproduction and diverse age structure of vegetation
- Streambank vegetation is comprised of those plants or plant communities that have deep binding root masses capable of withstanding high streamflow events
- Utilization of trees and shrubs
- Adequate vegetative cover present to protect banks and dissipate energy during high flows

In 2012, BLM Missoula Field Office Fisheries staff carried out detailed measurements of streambank and riparian conditions in a reach of Arrastra Creek subject to annual grazing pressure and compared them to conditions in an adjacent, geomorphically analogous reference reach subject to very light livestock use. Detailed results are contained in Appendix 1 and are summarized below:

- *Covered Banks*: The percentage of banks classified as "covered" was substantially greater in the reference than in grazed reaches.
- *Bank Stability*: Surveys on Arrastra Creek found 75% of the reference reach met the criteria for "stable bank," while grazed reaches were substantially less stable.
- *Channel Dimensions*: Width:depth ratios and greenline-to-greenline widths were substantially greater in grazed reaches when compared to the reference reach.
- *Plant Composition*:
    - Hydric stabilizers: The reference reach had a greater diversity of hydric species, and a substantially larger percentage of both the understory and overstory on the greenline was comprised of hydric plants with deep root masses demonstrated to protect streambanks against streamflow.
    - Seral Status: The reference reach had a substantially greater percentage of total plants in the seedling and young category, indicating successful reproduction and development towards later seral stages. In contrast, grazed reaches had relatively fewer seedlings (suggesting reduced reproduction) and substantially few young plants (indicating few plants achieve this developmental stage).

Within the allotment, Arrastra Creek meets the Riparian Management Objectives (RMOs) required by PIBO/INFISH (USDI-FWS 1998; USDA-FS 1995) for pool frequency, temperature and large woody debris. Objectives for bank stability, lower bank angle, and width/depth ratio are not met (Table 3-3).

As mentioned previously, evidence along Arrastra Creek (e.g., stumps along the channel and in the riparian area) indicates that many large conifers were removed from Arrastra Creek during historic logging. The existing stand is relatively young and has not reached the age where trees begin to fall and contribute large woody material to the stream channel. Currently, the system is in a transition stage where carry-over debris (left over from the time of logging) is disappearing, and the riparian forest has not yet generated significant new woody material. Although the abundance of wood in the stream technically meets the RMOs, most of the wood has been deposited on terraces where it interacts with streamflow only during peak run-off and therefore contributes little to year-round cover and complexity. As a result, overhanging bank vegetation, stable covered banks, and deep stable undercuts must provide the bulk of instream complexity and cover for fishes in Arrastra Creek.

Table 3-3. Condition of INFISH RMOs on Arrastra Creek within the Allotment.

Habitat Feature	Interim Objective	Current Condition
Pool Frequency	56 pools/mile (based on average wetted width 19.51')	66 pools/mile
Water Temperature	Max temp below 59F in adult holding habitat and below 48F within spawning and rearing habitat.	Temps for June/July/Aug (2009 data): Monthly Mean : 47.3/51.1/49.30 ^{O}F Monthly Max: 50.5/56.7/51.5 ^{O}F
Large Woody Debris (forested systems)	>20 pieces/mile >12" dia, >35' length	29 pieces/mile
Bank Stability[1]	>80% stable	Ranges from 38% in more heavily grazed segments to 75% in reference (lightly grazed) reach.
Lower Bank Angle (non-forested systems)	>75% of banks with <90 degree angle (i.e., undercut)	17% of banks
Width/Depth Ratio[1]	<10, mean wetted width/mean depth	Values 16-29 depending on location

[1] *Indicator was measured using a random stratified sampling method, with average values determined for each stratum.*

Values for both forested and non-forested systems were evaluated since Arrastra Creek is a combination of both. There are segments of the stream bordered by dense conifers but the majority of streambanks are stabilized primarily by vegetation associated with non-forested systems such as woody shrubs and forbs.

3.4.1.2.3 Arrastra Creek – Section 9

Roughly 0.16 mile of Arrastra Creek is located on BLM managed lands in Section 9. Although habitat features were not measured in this reach, visual observations during Rangeland Health and Riparian Assessments found this section of stream to be Properly Functioning due to healthy riparian vegetation and relatively undisturbed streambanks. This section of stream was not subjected to riparian timber harvest like much of the stream in Section 17 and livestock use appears to be minor in this reach. This section of stream also has intermittent flow but is close to the upstream location where the valley begins to narrow and Arrrastra Creek becomes perennial.

3.4.1.2.4 West Fork Arrastra Creek

Approximately 1.5 miles of West Fork Arrastra Creek is located on BLM managed lands in Section 17 (Figure 3-2). The stream is a tributary to Arrastra Creek and provides limited migratory, spawning, and rearing habitat for fluvial and resident westslope cutthroat trout. Like mainstem Arrastra Creek, the West Fork flows through coarse, porous glacial outwash and alluvium, and has intermittent flow typically between August and May.

Conditions along the West Fork met BLM Rangeland Health and PIBO/INFISH standards in 2012 and the stream was found to have healthy riparian vegetation and limited use by livestock. Although the majority of the channel is situated on a flat floodplain, there is little livestock access to the stream channel due to dense streambank vegetation on the east side and steep hill slopes on the west. With the exception of 2-3 isolated livestock-crossing areas, banks are completely stabilized by dense shrub communities (alder, Hawthorne, willow, and birch). The channel maintains a narrow, deep geometry

throughout the allotment. Habitats for fishes associated with well-vegetated streambanks are common, including undercut banks and dense overhead cover.

Although not highly impacted by livestock use, the West Fork was found to have a high percent of fines and low quality spawning habitat.

3.4.2 Issue 2: Conifer Restoration

The lands managed by the BLM that are contained within all three alternatives have an array of overstory tree species compositions in all stages of development. Much of the land was previously under the management of the Plum Creek Timber Company. During its ownership by private industry, the area experienced wide scale timber harvesting from the early nineteen seventies to the early two thousands. This management history has led to an area dominated by seedling (< 1 inch DBH), sapling (1-5 inch DBH), and pole sized (5-8.9 inch DBH) timber with only scattered legacy elements in the larger size classes. Some harvesting occurred in the high-energy Douglas-fir/ponderosa pine types on the face leading to regeneration failures and non-stocked stands. Figure 3-3 depicts two stands that were harvested historically and failed to regenerate. Those stands have been planted to ponderosa pine over during the last three years to reestablish over time a conifer overstory and return the stand to its historic forest type and structure.

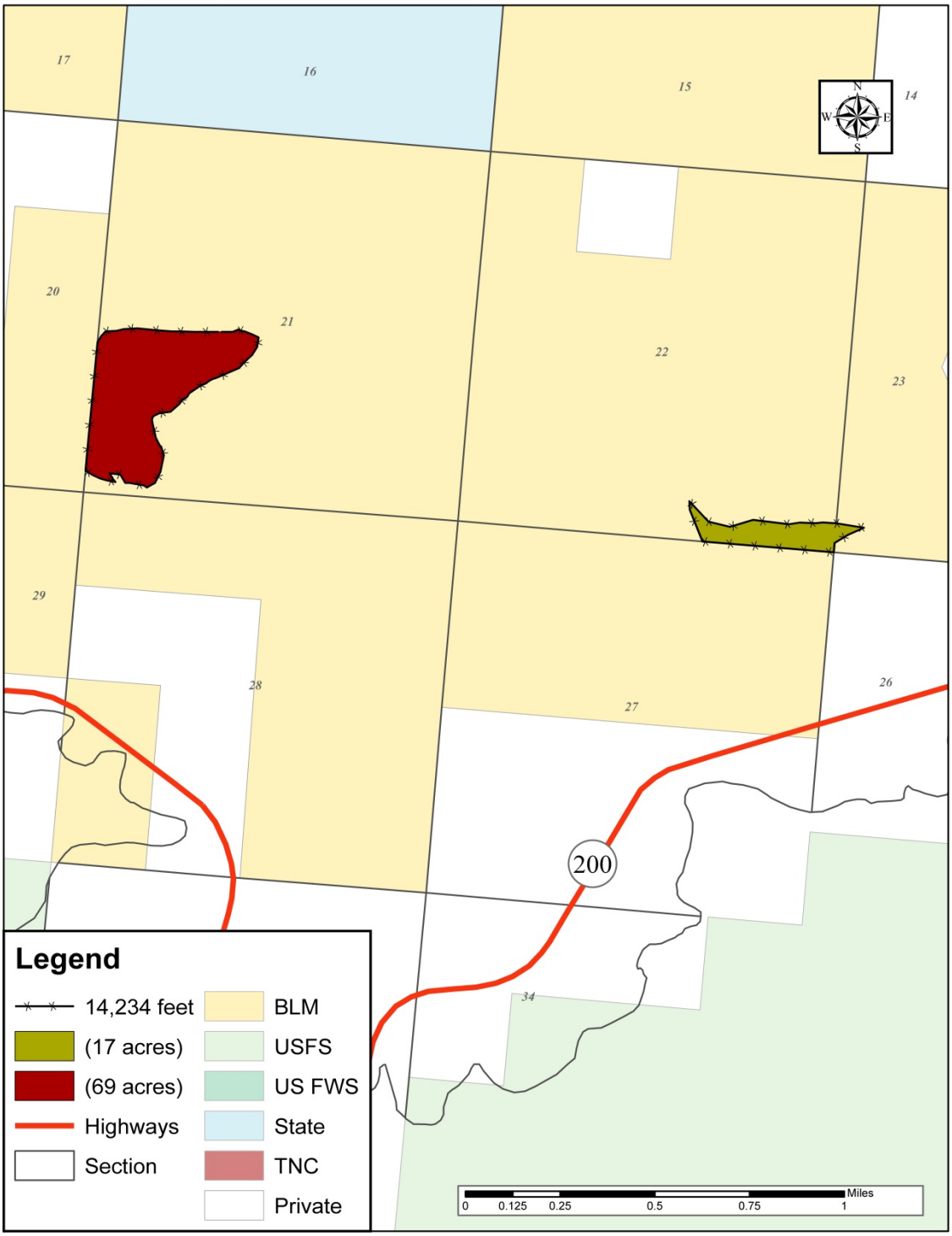

Figure 3-3. Conifer restoration units.

3.4.3 Issue 3: Invasive, Non-native Vegetation Management

Several invasive, non-native vegetation species have established in the allotment (Table 3-4).

Table 3-4. Invasive, Non-native vegetation species in the Arrastra Creek allotment, surrounding area, and approximate acreage of establishment.

Noxious Weed Species	Approximate Acres Infested
Orange hawkweed *(Hieracium aurantiacum)*	10
Meadow hawkweed *(Hieracium pretense)*	20
Yellow toadflax *(Linaria vulgaris)*	5
St Johnswort *(Hypericum perforatum* L.*)*	1
Sulfur cinquefoil *(Potentilla recta)*	5
Houndstongue *(Cynoglossum officinale)*	100
Spotted knapweed *(Centaurea stoebe* L.*)*	1,812
Musk thistle *(Carduus nutans.)*	100
Oxeye daisy *(Chrysanthemum leucanthemum)*	10

Spotted knapweed presently covers or has the potential to infest approximately 1,812 acres (40% of allotment) under the proposed action within the allotment on public lands and is the most abundant listed invasive species present. This level of infestation is expected to be at similar levels on adjacent lands. Spotted knapweed has caused significant loss of forage production for both wildlife and livestock.

Musk thistle and houndstongue are widespread and primarily found along spread vectors such as roads, trails, recreation sites and timber management sites. Both species have rapid widespread dispersal characteristics making management difficult, but do not have the potential for widespread dominance of invaded habitats.

Oxeye daisy is found scattered along roadsides and disturbed areas but is not widespread within the allotment. Oxeye daisy has high potential for widespread infestation and can dominate invaded habitats once established. Control is moderately difficult once established.

Sulfur cinquefoil and St Johnswort are scattered and patchy. Both species have characteristics for widespread infestation and can dominate invaded habitats. Sulfur cinquefoil is currently only found in T14N R10W sec 17. St Johnswort is found in only one location to date SE ¼ sec 17 along road #2846. Both species are currently being controlled under current IPM projects.

Yellow toadflax is found in scattered patches throughout the allotment along roads and in areas that have been disturbed. This species does not have characteristics for widespread infestation but can

dominate a site once established. Yellow toadflax is very difficult to control. Herbicide treatments can be effective with proper timing and long term monitoring. Herbicides used and rates needed to be effective often cause substantial damage to non-target vegetation. Biological control can be very effective if proper conditions exist.

Orange hawkweed and Meadow hawkweed occur on BLM managed lands at one site within the allotment. Orange hawkweed is known to occur on lands adjacent to BLM managed lands that have not been inventoried to date. Both hawkweed species are very aggressive invaders and difficult to control once established. Hawkweeds on BLM managed lands have been inventoried and are being managed under the 2009 *MiFO Integrated Weed Management Plan Environmental Assessment MT-100-2008-01*.

Orange hawkweed, meadow hawkweed and Yellow toadflax are species that are considered high priority species that pose a serious management threat. Both hawkweed species have very high potential for invading non-infested areas and once established become dominant.

3.4.4 Issue 4: Dispersed Camping and Hunting

The Arrastra Creek area is part of the Marcum-Kershaw Mountains Block Management (BMA) area which is a walk-in hunting area. And, hunting is the primary recreational activity conducted within the Arrastra Creek Grazing Allotment. Several roads off of Highway 200 can be used to access the allotment. Access is limited by a gates which are closed starting in September and opened in April. The closures are done to prevent wheel ruts and soil erosion, to protect wildlife winter range and to provide big game security. The lower part of the Arrastra Creek Road is one of the few roads that are accessible during hunting season and it is used to access the BMA. Hunters set up camps along Arrastra Creek in several locations near the road and there is at least one undeveloped camping area directly off the road.

3.4.5 Issue 5: Stream and Riparian Conditions

The highest concentration of streams and riparian habitat types occurs in Section 17. Sections 5, 9, and 15 contain small seasonally-ponded areas, and short sections of stream and seeps with varied perennial and intermittent flow. DNRC Section 16 has a large seasonal pond ("Frenchy's Pond") and intermittent stream segments.

Riparian areas were evaluated in Sections 9 and 17 during a 2012 Rangeland Health Assessment. Riparian conditions are good (Proper Functioning Condition) in the smaller headwater forested streams and bottomlands in the West Fork drainage. Livestock impacts in these areas were neither continuous nor widespread, but occurred in scattered small areas such as water crossings. A 1-mile segment of Arrastra Creek (Sec. 17) was not meeting PFC (Functioning-At-Risk). PFC evaluations and MIM monitoring from 2012 and 2013 identified the risk elements as: high width-depth ratio, altered banks, and high forage utilization and browse of woody plants. The causal factors are historic streamside logging, historic livestock use combined with recent and ongoing livestock use, and the natural hydrologic and geomorphic environment.

Perennial surface (or near-surface) water promotes the establishment of willow, cottonwood, dogwood, sedge, alder in the southeast corner of Sec. 17. The mainstem of Arrastra Creek above this point typically flows surface water from April through July, often going dry before August. The reach through

Section 9 retains surface water for a longer period, enough to sustain a more dense and diverse riparian plant community. Some intermittent flow may occur during wet autumns. From Sec. 9 downstream through Sec. 17. The valley bottom is comprised of loamy soils overlying coarse porous alluvium, outwash, and till. The coarse alluvial and glacial outwash soils have high porosity and transmissivity. Local well logs indicate water levels may drop as much as 50 feet below the surface during the summer (DNRC 2013). Water availability throughout the growing season is a natural limiting factor for establishment and propagation of a riparian plant community. The diversity and density of the riparian vegetation communities are dependent on the prevalence of water either at the surface or within the rooting zone. The lack of deep-rooting riparian vegetation makes the streambanks susceptible to erosion and mechanical damage from livestock, recreational traffic, and equipment. Riparian plant cover is sparse through most of Sec. 17. The West Fork, although intermittent, also retains enough surface or near–surface water in combination with finer soil textures and supports a good riparian plant community.

These natural factors are recognized in defining PFC potential. For this reach the potential natural vegetation community is most likely a mix of upland forest vegetation and riparian vegetation types such as willow, alder, and sedge in places where soil water availability is adequate.

In section 17, channel erosion and large gravel bars are evident back to 1930's and 1950's aerial photos. Water availability for riparian-dependent species is limited to the first part of the growing season. From mid-summer through the following spring water availability cannot support riparian species to the degree that continuous dense and diverse plant communities are possible. Historic aerial photos indicate the reach was sparsely timbered with little LWD evident in the stream channel. Potential natural condition is likely alluvial C-type channel with meander-pool riffles, bars, and braids with some willow, alder or cottonwood where they can become established. Native streambank vegetation is likely Douglas-fir, lodgepole pine, and Ponderosa pine overstory with fescue, bluebunch wheatgrass, needlegrass, elk sedge, twinflower, Woods' rose, shrub cinquefoil, mahonia, aspen, serviceberry, snowberry, and buffaloberry in the understory.

3.4.6 Issue 6: Water Quality

Arrastra Creek is on the State 303d list (MT76F002-070). All beneficial uses except Aquatic Life are "fully supported". The probable cause is sedimentation/siltation, and the probable sources are listed as agriculture, road runoff, and streambank instability/modifications. The Blackfoot Headwaters TMDL (Montana DEQ et al. 2004) reports that "…physical habitat is impaired due to excess fine sediment (siltation), and excess sediment bed load (aggradation)."

The TMDL states that runoff from roads contributes sediment to Arrastra Creek and tributaries. Other sediment loading sources include eroding banks and hillslope erosion from harvesting and/or grazing. The TMDL established the following management needs: noxious weed management, establishment of riparian buffer zones and healthy riparian vegetative cover, and replacement of undersized culverts which affect fish migration and limit the stream's sediment transport potential. The TMDL established the following goals: healthy aquatic invertebrate & periphyton communities, decreased levels of fine sediment on the streambed, restoration of channel morphology, and healthy riparian community.

The TMDL restoration plan targets the following:

- Reducing sediment contributed from roads, in-channel sources, and degraded riparian areas.
- A 30% reduction of sediment loading from all roads in the watershed
- A 30% reduction in sediment loading to the stream and sediment deposition within the channel
- Implementing a weed management plan.
- Encouraging riparian buffers.
- Replacing or modifying culverts as necessary to achieve flow/sediment conveyance.

The TMDL includes targets to address riparian health and channel indicators, with the overall goal to provide bank erosion protection via healthy riparian vegetation, and reducing sediment loading from banks and subsequent channel aggradation. Targets are: W/D ratio less than 25, 75% cover of desirable riparian species, 30% decrease in total sediment load from eroding banks and roads. (Montana DEQ et al. 2004).

Under a Memorandum-of-Understanding with Montana DEQ (2010c), BLM agreed to help meet water quality goals by managing nonpoint sources of pollution through the use of best management practices, soil and water conservation practices, and restoration. The BLM Montana-Dakotas follows an evaluation process for water quality actions as they relate to the MOU. In this instance, the State has determined that Arrastra Creek does not meet state water quality standards. The BLM then collected information related to potential pollutant sources and determined that BLM lands or management might be contributing to impairment to some degree, and riparian conditions were determined to be in a static or declining state. The evaluation leads the BLM to take action to improve water quality by addressing pollutant sources or pollutant-causing management practices on the public lands. These actions were proposed to be:

- Repair and maintenance of culverts and road ditches in West Fork Arrastra Creek (completed in 2011).
- Installation of livestock exclosure on 0.42 miles of West Fork Arrastra Creek/Grasshopper Meadow (completed in 2011).
- Installation of livestock exclosure on 0.37 miles of Arrastra Creek Section 17 (completed in 2012).

In addition, an exclosure was installed on 0.16 miles of Arrastra Creek in 2013 for the purpose of quaking aspen restoration and stream protection.

The proposed action and alternatives include livestock grazing, fencing and water development which may potentially affect water, soils, riparian resources in the allotment.

Current Conditions: For the purpose of comparative analysis, there are 2.67 miles of riparian/streams in the affected environment.

- *West Fork Arrastra Creek (1.42 miles in Sec. 17)*

- Rated overall PFC in 2012 - an improvement from a prior assessment for the 2010 Marcum Mountain EA which rated .31 miles (500m) of this segment as FAR for overwidening by livestock.
- A 2011 exclosure and shrub plantings allowed rapid recovery to PFC conditions in 2012.
- 0.42 miles are currently exclosed from grazing use

➢ *Arrastra Creek main stem (1.25 miles in Secs. 17 and 9)*

- 0.5 miles (40%) rated as FAR in 2012, occurring in discontinuous segments. These FAR segments also have sediment contributions from streambanks grazed by livestock.
- The 2010 Marcum Mountain EA noted 0.93 miles total length (including segments outside the Arrastra allotment) as 'functioning-at-risk'.
- Exclosures were built in 2012 and 2013 on 0.53 miles of stream resulting in a 42% reduction in streambanks subject to livestock use and potential sediment production.

3.4.7 Issue 7: Lewis and Clark National Historic Trail

On July 3, 1806, Lewis and Clark divided into two parties and left Travelers Rest, located near present day Lolo, Montana, to continue on their return trip home. Lewis, his party of nine men and several guides, travelling on horseback, began their journey through Hellgate Canyon (near present day Missoula, Montana), up the Blackfoot River and across the Continental Divide. Lewis and his men followed the "Cokahlaharishkit Trail". The "Cokahlaharishkit Trail" was a trail used for centuries prior to 1806 by Native Americans to access buffalo hunting lands east of the Continental Divide. The trail generally follows the Blackfoot River although segments veer away from the river. According to the General Land Office maps and maps created by Lewis and Clark expert Bob Bergantino, around the Ninemile Prairie area of the Lower Blackfoot River, the trail leaves the area next to the river and takes a more overland route heading towards the Clearwater River, then the trail begins to parallel Highway 200 or was covered by Highway 200 until around the turn off to Scotty Brown Bridge. At this point, the trail continues overland, north of the River, touches the northern tip of Kleinschmidt Lake and eventually meets up with Highway 200 near Ward Creek. From there it more or less follows the base of the mountains, along Highway 200 except near Kershaw Mountain. About a mile east of Arrastra Creek, the trail follows a ridge up to a hill that Mr. Bergantino interprets, using Lewis' and Gass' journals, as possibly being the "bald topped hill" and then down towards Patterson Prairie.

The Lewis and Clark Trail was designated a National Historic Trail after the National Parks and Recreation Act of 1978, Public Law 95-625, amended the National Trails System Act to include the new category of National Historic Trails. According to the Foundation Document (2012):

> "*The purpose of the Lewis and Clark National Historic Trail is to commemorate the 1804 to 1806 Lewis and Clark Expedition through the identification; protection; interpretation; public use and enjoyment; and preservation of historic, cultural, and natural resources associated with the expedition and its place in U.S. and tribal history*."

The Secretary of the Interior was given the trail administrator responsibility and long-term administration of the trail was delegated to the National Park Service (NPS). In the 1982 Comprehensive Management Plan, the NPS recommended 2 types of development for Lewis's return trip between

Traveler's Rest and Great Falls - a motor trail and a land trail. They proposed that the land trail would be located on the south side of the Blackfoot River between McNamara and Roundup Bridge and that Johnsrud Park and Ninemile Prairie Access were to be trailheads for the land trail.

The Lewis and Clark National Historic Trail (LCNHT) can be divided into 4 segments on BLM administered lands in the Missoula Field Office Area. Those segments are 1) Johnsrud Park to Whitaker Bridge; 2) Whitaker Bridge to Nine Mile Prairie; 3) Sperry Grade; and 4) Marcum Mountain. Recreational opportunities on BLM administered public lands differ depending on the segment. Segments 1 & 2 offer a wide variety of recreational opportunities for people seeking to experience the trail (i.e. hiking, mountain biking, floating, fishing, picnicking and camping). Because the LCNHT more or less follows Highway 200 through Segments 3 and 4 and because of the terrain in these segments, the main recreational opportunity on BLM administered lands for those seeking the LCNHT experience would be an auto tour.

In 2002, all four segments were inventoried for cultural resources at a Class III level – the most intensive level. The inventory not only looked for trail remnants, but also looked for historic sites associated with the trail. Trail remnants were identified on 3 of the segments. The only segment that trail remnants were not identified was Segment 3 – Sperry Grade.

The Arrastra Creek grazing allotment is north of Segment 4 of the LCNHT. The landscape of the grazing allotment consists of rolling mountainous terrain with wide creek valleys. Much of the grazing allotment is timbered and has had some sort of forest vegetation treatment on it (see section 3.4.2). Grazing has been permitted for 30 years. Approximately 40% of the grazing allotment has some level of weed infestation (See section 3.4.3). Several roads off of Highway 200 can be used to access the allotment. Access is limited by gates which are closed from September through April. Road closures are done to prevent wheel ruts and soil erosion, to protect wildlife winter range and to provide big game security. The allotment is in the Marcum-Kershaw Mountains Block Management Area and hunting is the primary recreational activity. The lower portion of the Grazing Allotment is located in a Visual Resource Management (VRM) Class III. The VRM system was developed to allow the BLM to meet its responsibility to maintain the scenic values of public lands. VRM class III objectives are "[t]o partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate" (USDI-BLM 1986c). A powerline goes through part of the allotment and may be near the location of the LCNHT in places.

3.4.8 Issue 8: Upland Vegetation

The public land administered by BLM within the Arrastra Creek allotment and recently acquired lands, is predominantly forested with small mountain meadows. Due to the area being predominately forested, the allotment and surrounding area offer limited grazing capacity (USDI-BLM 2005). Meadows, and what is considered rangeland, are limited (<100 acres) in the Marcum Mountain area as a whole (USDI-BLM 2005). Domestic livestock prefer to graze meadows due to the availability of preferred forage species. Livestock gain access to isolated meadows by traversing existing roads, timber harvest areas, and/or historic cattle trails through conifer stands. Topography in the area varies from valley bottoms to moderately steep mountain slopes.

Areas with past timber harvest and roadsides are typically dominated by introduced grasses. The most common introduced grass species found in the area are Timothy (*Phleum pratense*) and smooth brome (*Bromus inermis*). These non-native grasses may have been intentionally planted for site rehabilitation from timber harvest and possible roadside soil stabilization. These species alaos are found in meadows. Timothy and smooth brome are considered invaders on rangeland (Taylor 2007), although, both species provide adequate soil stabilization and livestock forage. Based on ocular field observations, Timothy is more prevalent in meadows and smooth brome more frequent along roadways.

Based on information received from TNC and field evaluations, the BLM determined that the stocking rate of the area needed to be adjusted to be in compliance with the RMP. To determine stocking rates, soil data (USDA-NRCS 2003) was referenced to determine vegetation types; this data was used in conjunction with the results of a forage sample production/species composition study completed by the BLM in 2013 to determine the stocking rates. See Appendix 2 for methodology to determine stocking rates.

BLM range improvements within the allotment were recently inventoried to document locations and functionality. A spring development located in section 23 NW ¼ is not functional and needs repair. In 2011, the Grasshopper meadow jackleg fence was constructed in section 17 NW ¼ to implement riparian restoration efforts on the West Fork Arrastra Creek. The Grasshopper fence encloses the major portion of the meadow and prevents livestock access to primary range. In 2012 and 2013, phase I & II aspen jackleg exclosures were constructed in Section 17 NE ¼ & SE ¼ along portions of the main stem Arrastra Creek to temporarily exclude livestock grazing and facilitate riparian restoration efforts. This area is a Lodgepole/dwarf huckleberry ecological site and is capable of producing adequate amounts of livestock forage in open overstory canopies.

3.4.9 Issue 9: Winter Range Forage Availability, Special Status Wildlife Species, and Livestock Depredation

Big game, such as elk, mule deer, white-tailed deer, moose, and black bear compete with cattle for forage during summer and fall. Elk may be affected by cattle grazing on elk winter range. Mule deer, white-tailed deer, and moose winter range is located on the allotment. Black bear may be affected by cattle grazing on big game winter range. Mountain lion is not analyzed since they do not compete with cattle for forage. Bighorn sheep and pronghorn antelope are not present and are not analyzed.

Grizzly bear and gray wolf are present and may prey on cattle, especially calves. Grizzly bear and cattle compete for summer/fall forage availability. Canada lynx is not known to be present. Verified reports have not occurred in Marcum Mountain during the past decade, Marcum Mountain is considered unoccupied habitat, a Lynx Analysis Unit is not established, and Canada lynx critical habitat is not designated (not part of Unit 3 – Northern Rockies). The wolverine is not known to be present. Rangeland Health Assessment Standard #5: Provide habitat, as necessary, to maintain viable and diverse populations of native plant and animal species, including special status species, was met for the allotment in 2012.

3.4.9.1 Special Status Species

3.4.9.1.1 Threatened, Endangered, and Candidate Species

3.4.9.1.1.1 *Grizzly Bear (Ursus arctos)*

The Grizzly bear (threatened) is a year-round resident of Marcum Mountain area, which includes the Arrastra Creek allotment (Figure 3-4). Grizzly bears, including sows and cubs, are reported regularly on Marcum Mountain. Evidence of denning has been reported outside the allotment at Marcum Mountain. During and prior to BLM acquisition of lands, the Arrastra Creek area has been grazed by cattle for over 20 years. Surrounding grazing allotments include the Marcum Mountain, Ward Creek, and Sawmill Creek allotments.

Sections 3.2, 3.3.7, and 4.2.7 of the *Marcum Mountain Resource Management Projects Environmental Assessment* (DOI-BLM-MT-B010-2009-0013-EA) provide descriptions of the Marcum Mountain planning area, wildlife habitat conditions, road densities, and importance of the area to grizzlies.

When the *Garnet Resource Area Resource Management Plan* (RMP) was written in 1986 Missoula Field Office lands were not occupied grizzly bear habitat. Currently, all BLM lands north of Interstate 90 are considered occupied grizzly bear habitat. Hiding and thermal cover recovery and better bear management favored lands south of the Northern Continental Divide Ecosystem (NCDE) Grizzly Bear Recovery Zone to be re-occupied with grizzly bears.

Over the last decade, Western Montana grizzly bear populations have increased and expanded their range. Bear biologists estimate that approximately 1,000 grizzlies inhabit the NCDE. Based on the success of conservation efforts, delisting efforts are planned to remove the grizzly from ESA protection (Dood et al. 2006).

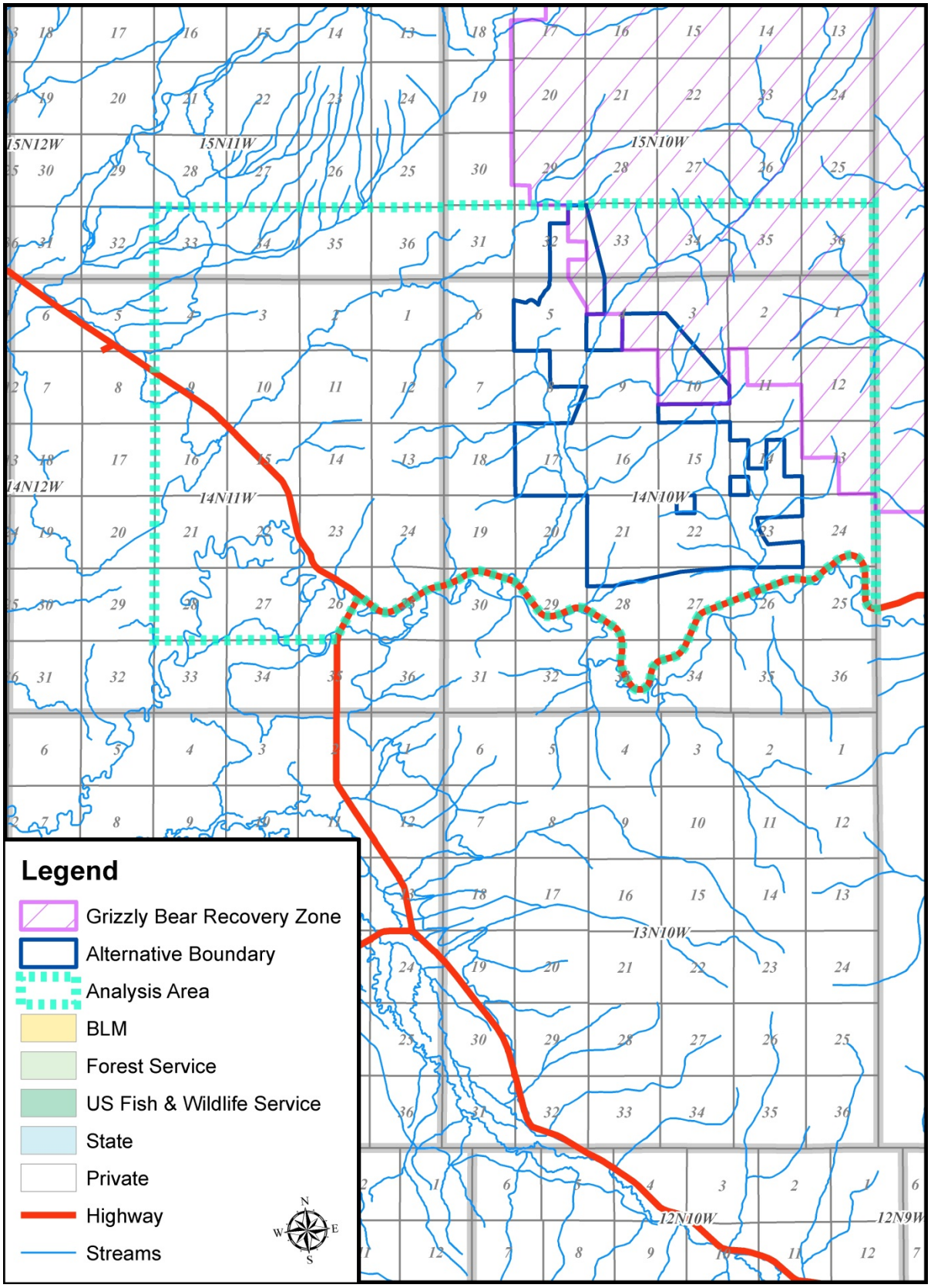

Figure 3-4. EA analysis area for the grizzly bear.

3.4.9.1.1.2 *Canada Lynx (Lynx Canadensis)*

Canada lynx (threatened) is not known to inhabit Marcum Mountain and the Arrastra Creek Allotment. Verified reports/records have not been documented. The action area is not part of a Lynx Analysis Unit and does not have Canada lynx critical habitat designation. Unit 3, Northern Rockies Canada lynx critical habitat is located adjacent to the action area. Vegetation management during the recent *Marcum Mountain Resource Management Projects Environmental Assessment* (2010a) considered Canada lynx potential habitat. Stem exclusion vegetation has been treated to produce stand initiation forage habitat for lynx. Thinning projects in previously harvested forests, which now express stand initiation and pole-sized structure, are non-traditional treatments. Variable density thinning, rather than pre-commercial thinning, has been implemented to retain snowshoe hare structure. All subalpine fir and Engelmann spruce are deferred from thinning. Snowshoe hares inhabit post-treatment thinned stands.

3.4.9.1.1.3 *Wolverine (Gulo gulo)*

Wolverine (candidate) is not known to inhabit Marcum Mountain and the Arrasstra Creek Allotment. Verified reports or records have not been documented. Copeland et al. (2007) found that wolverines used modestly higher elevation in summer versus winter, and they shifted use of cover types from whitebark pine in summer to lower elevation Douglas-fir and lodgepole pine communities in winter. Whitebark pine forests are not present in Marcum Mountain or on the Arrastra Creek Allotment. Douglas-fir and lodgepole pine would be available during summer. Elevation explained use of habitat better than any other variable in both summer and winter (Copeland et al. 2007). Excluding mountaintops, wolverines favored high elevations in nearly all of Copeland et al.'s (2007) models, 83% of all wolverine use points occurred above 7,200 feet elevation. The action area is below 6,000 feet elevation and therefore is not optimum wolverine habitat. Vegetation conditions in Marcum Mountain and the Arrastra Creek Allotment are diverse in composition, structure, and function.

3.4.9.1.2 Sensitive Species

3.4.9.1.2.1 *Gray Wolf (Canis lupus)*

The gray wolf is a year-round resident of the Marcum Mountain area, which includes the allotment. The allotment and surrounding area falls within the Arrastra Creek Wolf Pack territory (Figure 3-5). When the Garnet Resource Area RMP was written in 1986, the gray wolf was listed under the Endangered Species Act (ESA) as endangered, but MiFO lands were unoccupied at that time. Over the following 25 years, wolf populations increased in Montana from natural immigration and reintroduction efforts. Due to the success of conservation efforts, wolves were delisted in 2012 and removed from Endangered Species Act protection. As a result of ESA protection, the gray wolf currently occupies most of the BLM lands administered by the MiFO.

The Marcum Mountain area provides important winter range to wolf prey species such as elk, deer (muley and white-tailed), and moose. Four cattle allotments are in the area: Arrastra Creek, Marcum Mountain, Ward Creek, and Sawmill Creek. Of the four allotments with authorized grazing in the area, both the Marcum Mountain and Ward Creek allotments account for approximately 36% (3,070 acres) of elk winter range in the area. Mule deer and white-tailed deer winter range is also present (See section 3.4.9.1.3). Grazing is not authorized on elk winter range in the Sawmill Creek Allotment.

Montana Fish, Wildlife, and Parks (FWP) manage the gray wolf as a game species. In 2012, 160 wolves were harvested in Montana.

In Montana, from 1987 through 2004, there were 190 confirmed wolf depredations on cattle (FWP 2013). The USFWS and the State of Montana work with livestock producers to reduce the risk of wolf-caused losses and to resolve conflicts through a combination of non-lethal deterrents and lethal control. From 1987 through 2004, a total of 166 wolves have been lethally controlled in Montana (FWP 2013).

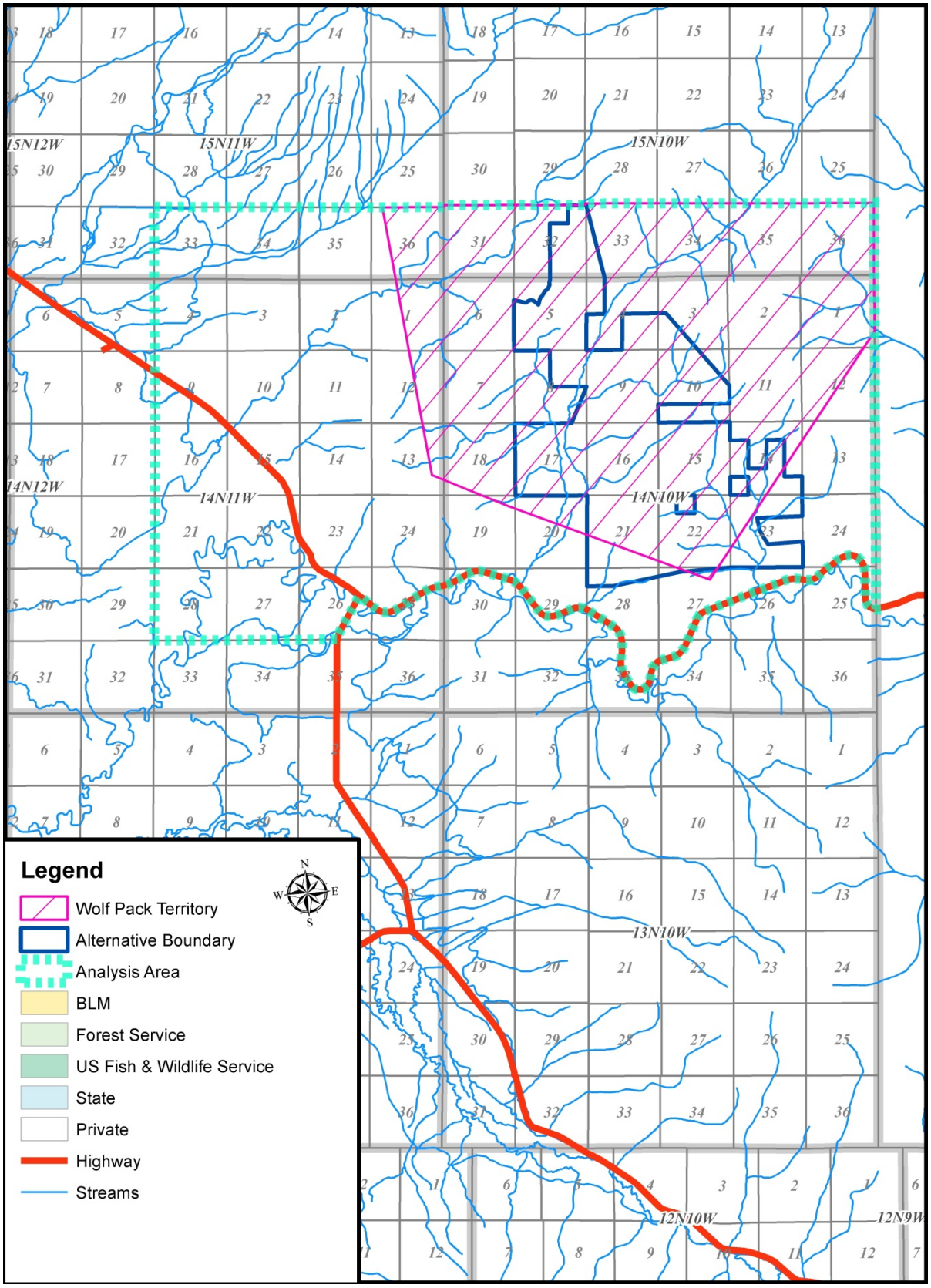

Figure 3-5. Pack territory and EA analysis area for the gray wolf.

3.4.9.1.3 Big Game Species

3.4.9.1.3.1 *Elk (Cervus Canadensis)*

The Marcum Mountain elk herd inhabits Marcum Mountain and the project area. Elk are found in Marcum and on the allotment during winter, spring, and fall, but summer to the north in the Scapegoat Wilderness, Helena National Forest. The elk herd, which numbers less < 100 head, is in a downward population trend, but the cause has not been determined (Jay Kolbe personal communication 2013). Open road density in Marcum Mountain is greatest during livestock grazing season-of-use (6/1 – 9/30). Open road density on BLM lands in Marcum Mountain and the Arrastra Creek Allotment during spring and summer is 3.02 mi/mi^2, during fall is 0.20 mi/mi^2, and during winter are 1.63 mi/mi^2. Elk avoid areas with high road density and FWP recommends an open road density for elk at <1 mi/mi^2 (Dood et al. 2006).

The Marcum-Face, west and north of Mineral Hill and east to Paterson Prairie is managed as elk winter range (8,351 acres). A portion of the winter range is managed as elk crucial winter range (3,215 acres). Crucial winter range should be available, relatively intact, and allow a population to survive the winter in adequate body condition to maintain average reproductive rates for population objectives (Wyoming Game and Fish Department 2009). Elk remain on Marcum Mountain until calves are born, and by mid-June migrate to the Scapegoat Wilderness; elk return to Marcum Mountain early in September during the rut (Jay Kolbe personal communication 2013). Elk are mixed feeders and browse and graze on available nutritious vegetation. Elk habitat and the EA analysis area are depicted in figure 3-6.

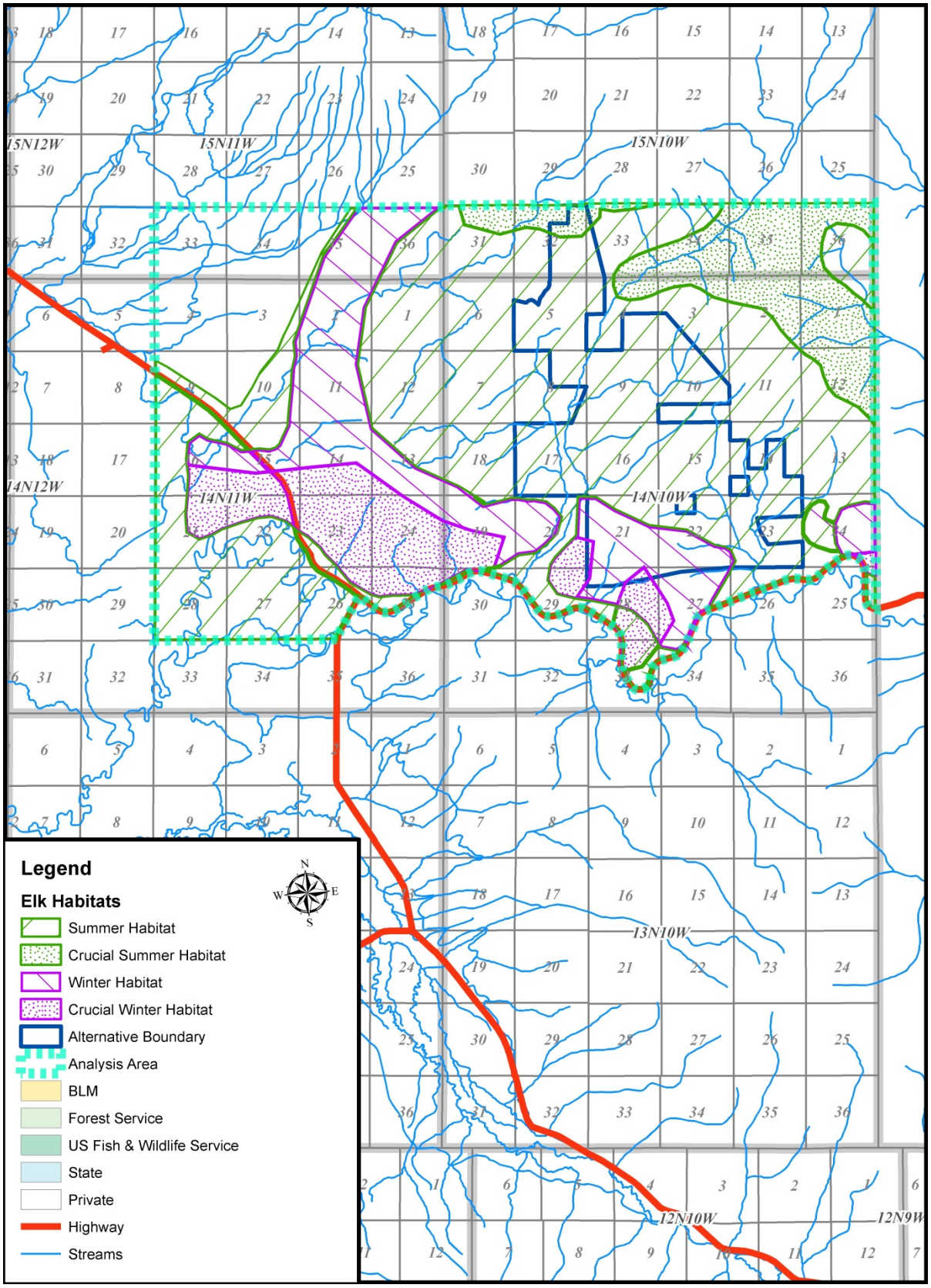

Figure 3-6. Elk habitat and EA analysis area.

3.4.9.1.3.2 *Moose (Alces alces)*

Shiras moose is a year-round resident. Moose are found in Marcum and on the allotment during winter, spring, and fall, but summer to the north in the Scapegoat Wilderness. Population numbers are unknown, but moose are regularly seen during winter on north slopes at higher elevation north of the Marcum-Face (Jay Kolbe personal communication 2013). Moose primarily browse on subalpine fir, willows, elderberry, and other shrubs. Early and late succession conifer forests with subalpine fir and riparian habitat with dense shrub growth is preferred winter habitat. Moose habitat and the EA analysis area are depicted in figure 3-7.

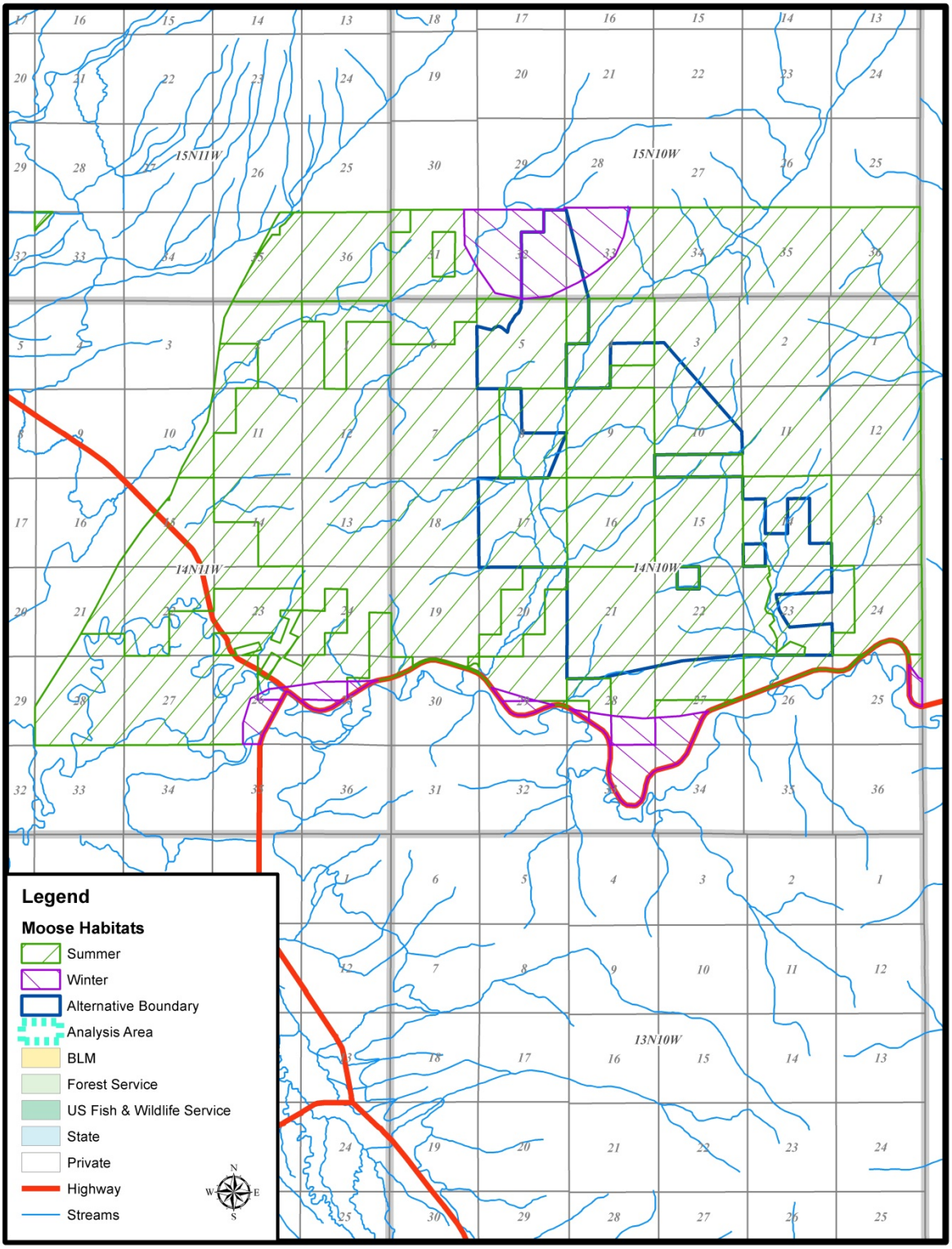

Figure 3-7. Moose habitat.

3.4.9.1.3.3 *Mule Deer (Odocoileus hemionus)*

Mule deer is a year-round resident (Figure 3-8). Mule deer are primarily found west of Arrastra Creek during winter, but may winter to the east and include the Arrastra Creek Allotment. Mule deer are more widely dispersed during spring, summer, and fall. Mule deer populations have declined in Marcum Mountain to the degree that FWP has stopped using the area as one of their aerial survey routes. The cause of the decline has not been determined (Jay Kolbe personal communication 2013). Mule deer typically inhabit dry-upland sites on southern aspects and primarily browse on shrubs, such as serviceberry, chokecherry, bitterbrush, sagebrush, and Rocky Mountain juniper.

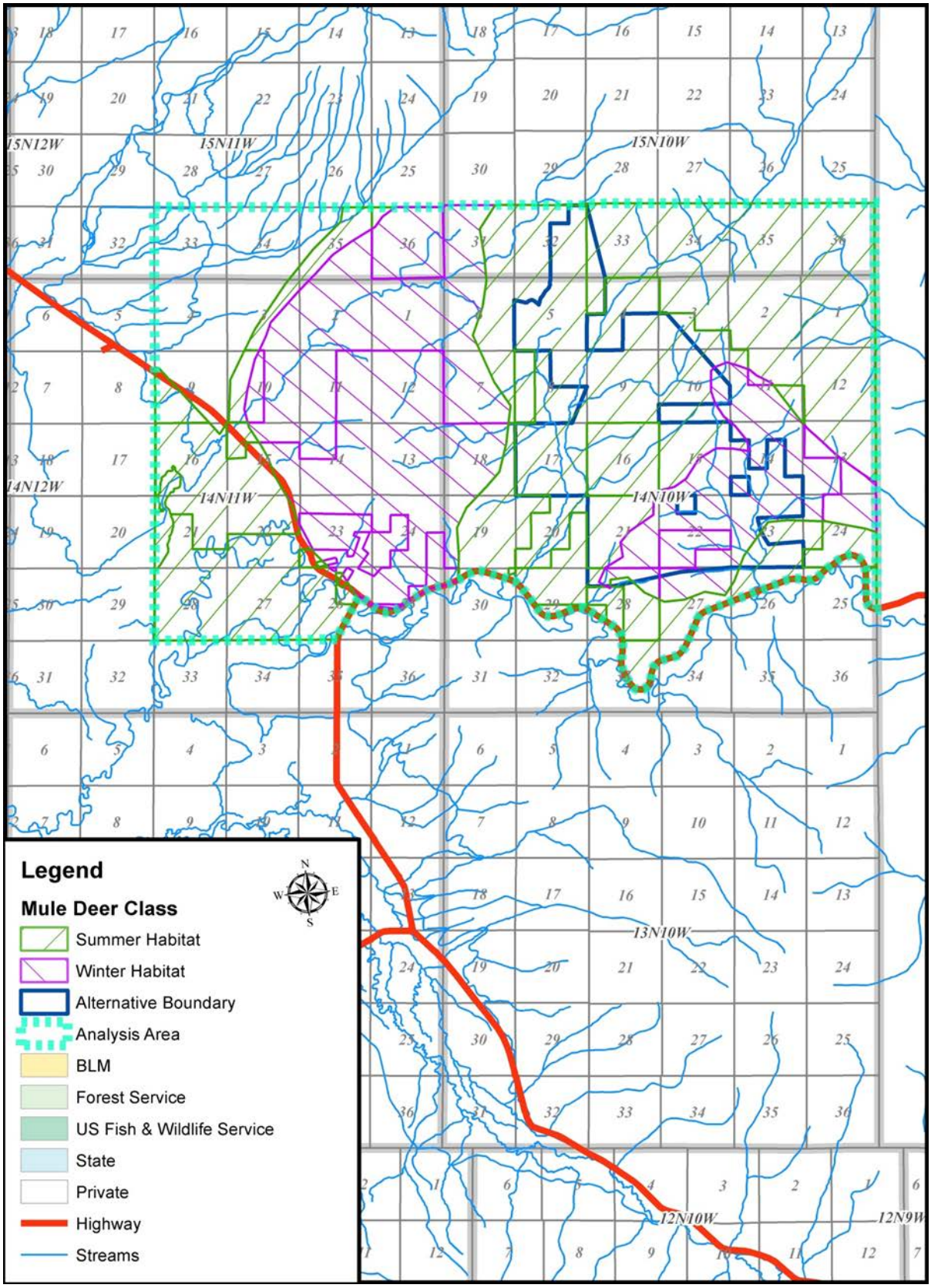

Figure 3-8. Mule deer habitat and EA analysis area.

3.4.9.1.3.4 *White-tailed Deer (Odocoileus virginianus)*

White-tailed deer is a year-round resident. White-tailed deer population numbers are low, but are increasing (Jay Kolbe personal communication 2013). White-tailed deer are found throughout the Marcum-face during winter where they inhabit low elevation mixed coniferous forest. They often develop heavily used snow-trails vertically linking upland cover with riparian forage. White-tails are more widely dispersed during spring, summer, and fall and are found throughout Marcum Mountain and the Arrastra Creek Allotment. White-tailed deer primarily browse and compete with mule deer for forage. White-tailed deer habitat and the EA analysis area is depicted in figure 3-9.

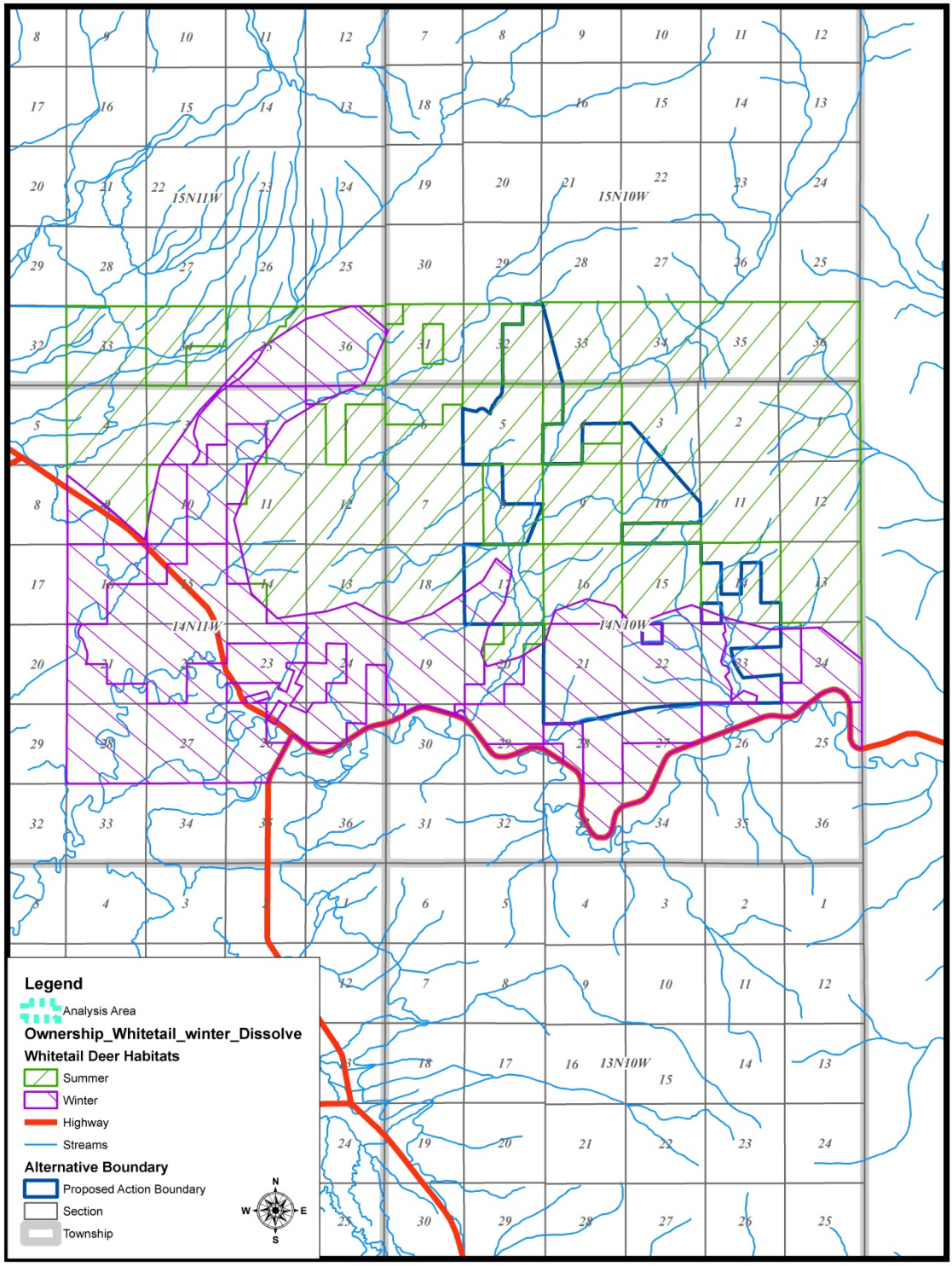

Figure 3-9. Whitetail deer habitat and EA anlaysis area.

3.4.9.1.3.5 *Black Bear (Ursus americanus)*

Black bear is a year-round resident and is distributed throughout Marcum Mountain. Black bears forage and may den on the Arrastra Creek Allotment. Population numbers are unknown, but appear to be stable. Black bears are feeding generalists and eat a wide variety of foods from grasses, forbs, and berries to elk calves, deer fawns, and carrion. Coniferous forests, with diverse composition, structure, and function are preferred habitat.

4 ENVIRONMENTAL IMPACTS

4.1 Introduction

This section discusses the impacts (direct and indirect) on resources affected by the alternatives. Impacts of each alternative are presented under each issue heading.

4.2 Environmental Impacts

4.2.1 Issue 1: Habitat for Aquatic Special Status Species

4.2.1.1 Alternative A – No Action

4.2.1.1.1 Livestock Grazing

Direct effects are those which immediately affect individual fish or eggs. The most likely source of direct adverse effects is from cattle trampling of redds when eggs and alevins are in benthic gravels. Eggs and alevins are considered most susceptible to mortality from trampling livestock because they are immobile. Additionally, redd locations tend to be in wider, shallower channel locations where livestock preferentially cross streams.

The likelihood of trampling is related to timing (whether livestock are in the allotment at the same time eggs and alevins are in gravels) and access (the degree of access livestock have to stream channels and spawning beds).

Research evaluating the potential for livestock to trample trout redds indicates that when livestock have access to stream channels containing trout redds, the risk of trampling exists. Gregory and Gannett (2008) documented high rates of cattle trampling on artificial redds within Federal grazing allotments in southwestern Montana, raising concern that direct mortality from trampling may contribute to imperilment of native westslope cutthroat trout.

Mortality from the direct crushing or physical disturbance of trout embryos that may occur during trampling can be substantial. Roberts and White (1992) conducted a set of laboratory experiments to measure effects of angler wading and found that twice-daily wading throughout the time of embryo development killed at least 83 percent of eggs and pre-emergent fry of three trout species. It is reasonable to conclude, therefore, that mortality of eggs and alevins also occurs if livestock were to step on eggs or fry because they are substantially larger and heavier than humans.

Recent research on the population-level effects of redd trampling (Peterson et al. 2010) used a modeling approach to demonstrate that cattle trampling was an additional source of mortality (beyond natural mortality) when egg-to-fry mortality was modeled across a range of trampling rates (25–125% per month) and for scenarios assuming low, moderate, and high natural mortality. Natural mortality rates for westslope cutthroat trout or bull trout in Arrastra Creek are not currently known.

Indirect adverse effects to aquatic habitat and fishes are those which occur at a later time, changing habitat abundance and quality and may, ultimately, affect the size and resilience of fish populations.

Indirect effects resulting from livestock grazing on streambanks and riparian areas typically result from removal (browse) of streambank vegetation and physical damage to streambanks. When livestock over-utilize existing mature woody plants and remove early successional stages, the results are less diverse and often less productive biotic communities (Chaney et al. 1990, Elmore and Kauffman 1994). Removal of streambank and riparian vegetation can result in reduced dissipation of stream energy, increased bare soil and soil loss through accelerated erosion, stream channel degradation resulting in reduced floodplain recharge and/or lowered water table and subsequently reduced riparian community size. Erosion and stream channel degradation also affect water quality by increasing suspended sediments and, in conjunction with absence of vegetation shading, water temperature.

Improperly managed livestock grazing can degrade aquatic habitat by removing riparian vegetation, destabilizing streambanks, widening stream channels, promoting incised channels and lowering the water table, reducing pool frequency, increasing soil erosion, and altering water quality (Mullan et al. 1992, Overton et al. 1993, and MBTSG 1995). These effects reduce overhead cover, increase summer water temperatures, and promote formation of anchor ice (ice attached to the bottom of an otherwise unfrozen stream, often covering stones, etc.) in winter, and increase sediment in spawning and rearing habitats.

Elevated levels of fine sediment in stream gravels pose a threat to salmonid egg, fry, and juvenile survival (Waters 1995, Suttle et al. 2004 and Fraley and Shepard 1989, and USDI-FWS 2010). Fine sediment can affect fish in several ways. One of the most likely ways is through effects on egg incubation and fry emergence. The magnitude of negative impact is closely related to timing of activity and whether the sediment is delivered immediately to or above spawning sites.

Sediment delivery to streams during times when eggs or fry are in stream gravels elevates the risk of adverse effects substantially (USDI-FWS 2010). However, there are instances when increased sediment delivery during times when fry are not in the gravels could still result in adverse effects based on the magnitude of sediment delivery that occurs. High levels of sedimentation can reduce food production and thereby reduce bull trout growth.

Rearing habitat may also be affected by sedimentation through the filling of interstitial spaces of stream rubble (Suttle et al. 2004) and filling of pool habitat (Waters 1995). If the intensity and duration of ground disturbance is great enough in a limited area, large amounts of sediment delivered to stream channels could also potentially affect channel structure and stability.

Negative effects of livestock grazing on aquatic habitats can be minimized if grazing is managed appropriately for conditions at a specific site. Practices generally compatible with the preservation and restoration of aquatic habitats include fences to exclude livestock from riparian areas, rotation schemes, relocation of water and salting facilities away from riparian areas, and use of herders.

Intact riparian vegetation provides numerous benefits to instream fish habitat, including shading, bank stabilization and inputs of fine organic matter and large woody material (Gregory et al. 1991). Because of widespread losses of riparian vegetation across the west (Armour et al. 1994 and Belsky et al. 1999) and the multiple benefits streamside vegetation provides, riparian restoration has been promoted as a key strategy for restoring processes that create and maintain critical fish habitat (Roper et al. 1997, Beechie and Bolton 1999, Roni et al. 2002). Riparian restoration can be done passively by removing activities that prevent or limit natural regeneration (such as removing livestock use or fencing) or restoration can be done actively through planting and/or by using bioengineering techniques.

4.2.1.1.1.1 *Arrastra Creek - Section 9*

Under the No Action Alternative, livestock grazing would be allowed along 0.16 mile of Arrastra Creek in Section 9 immediately after the lease is issued (summer 2014) but, unlike the action alternatives, there would be no mandatory Terms and Conditions to protect instream habitats.

This 0.16 mile stretch of stream is located in coarse, porous glacial alluvium that causes wide fluctuations in the water table and surface flows. Since this section of Arrastra Creek is typically dry or has intermittent flow during late summer and/or early fall, the likelihood of direct impacts from livestock grazing to bull trout are lower than in those portions of the stream with perennial flow. However, this portion of Arrastra Creek is close to where the stream becomes perennial upstream. Due to the close proximity of perennial flow and the variability of annual snowmelt and precipitation, this section of Arrastra Creek, could be available to spawning bull trout in some years.

Although livestock use along this stretch of stream has previously been light, allowing cattle to graze along the stream could result in direct adverse effects to the threatened bull trout through harassment, displacement and redd trampling during those years that bull trout have access to this section of stream in September.

Surveys indicate that westslope cutthroat spawning occurs in late May to late June in Arrastra Creek, with eggs and alevins in the gravel through June and July, depending on water temperatures. Allowing livestock use in and along Arrastra Creek in Section 9 would increase the likelihood of redd trampling and subsequent mortality of embryos and alevins. Although livestock use along this section of stream was found to be minimal, the No Action Alternative could still have direct adverse effects to westslope cutthroat trout by displacing spawning adults and/or causing direct mortality to eggs or alvins by trampling.

Vegetation along this 0.16 mile of Arrastra Creek in Section 9 is currently meeting riparian standards and livestock use has previously been light along this section of creek. Under the No Action Alternative, however, there would be no mandatory Terms and Conditions or monitoring to ensure that healthy, stable riparian and instream conditions are maintained over the long-term.

Under the No Action Alternative, there could be minor to moderate indirect effects to bull trout, westslope cutthroat trout and other aquatic species from a decline in riparian vegetation and bank erosion from hoof action. The indirect effects could be minor if livestock continue to use the riparian area at the same level. If livestock use or duration increases in this area, there could be a greater loss of riparian vegetation and destabilization of banks which could ultimately lead to an overwidened and shallower channel as well as a source of fine sediment and nutrients to aquatic species within the stream reach and downstream.

4.2.1.1.1.2 *Arrastra Creek - Section 17*

Under the No Action Alternative, livestock grazing would be allowed along Arrastra Creek in Section 17 immediately after the lease is issued (summer 2014). Unlike the action alternatives, there would be no rest from livestock grazing in Section 17 or mandatory Terms and Conditions to restore or protect riparian and instream habitats.

Under the No Action Alternative, two existing exclosures would continue to provide temporary protection to roughly 0.5 mile of Arrastra Creek from trampling of westslope cutthroat trout redds (Figure 4-1). These exclosures were constructed as part of the *Marcum Mountain Resource Management Projects Environmental Assessment* (USDI-BLM 2010a) to protect and restore aspen. Once aspen has reached a height and density to withstand livestock and wildlife browse, the exclosures would be removed (approximately 5-10 years). After the exclosures are removed, the entire length of Arrastra Creek, 1 mile, in Section 17 would be available to livestock use.

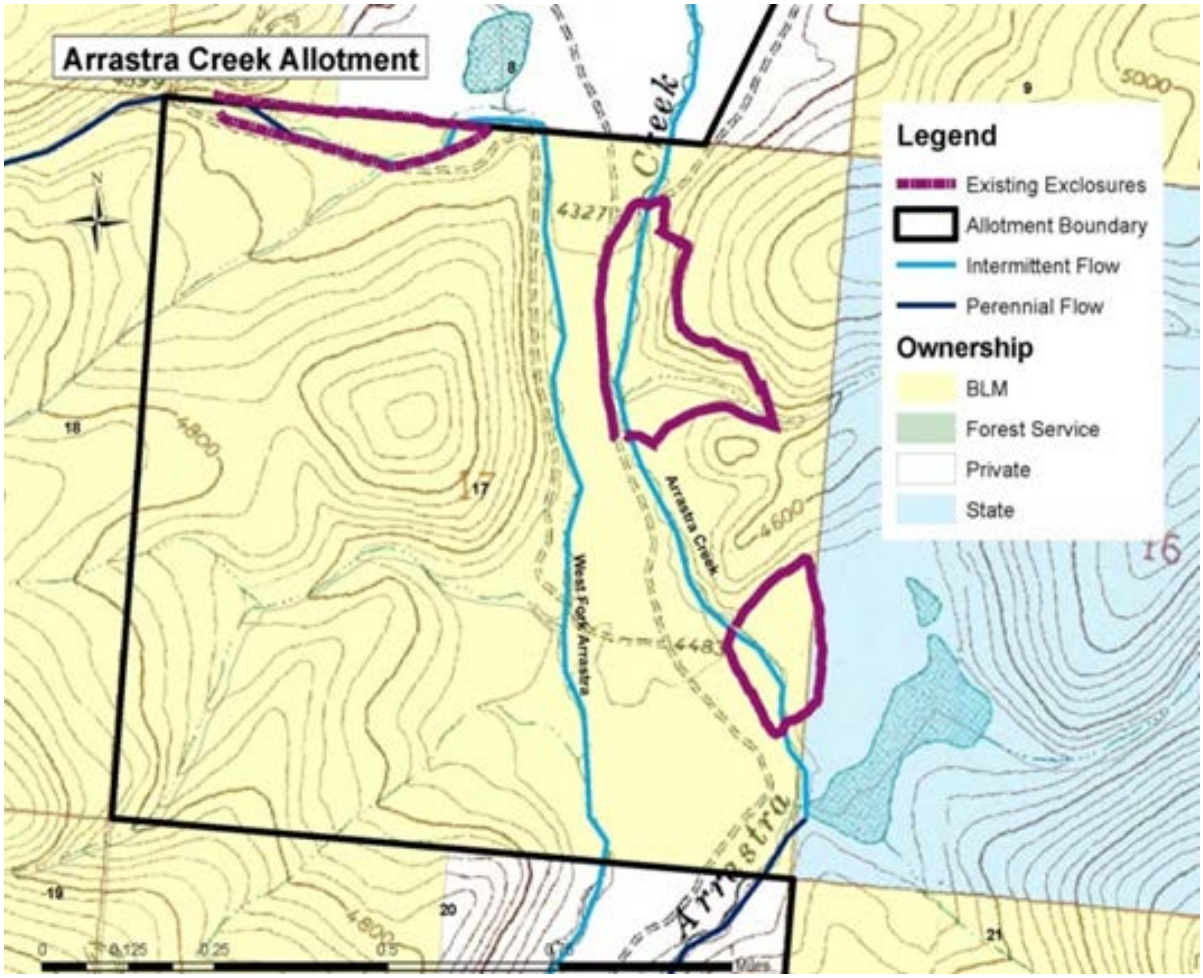

Figure 4-1. Existing exclosures along Arrastra and West Fork Arrastra Creeks.

There is a lack of vegetation along Arrastra Creek due to historic timber harvest as well as historic and current livestock grazing practices. The lack of riparian vegetation along many sections of stream in Section 17 allows cattle easy access to the stream. Under the No Action Alternative, there would be no potential for riparian vegetation to recover along the 0.5 mile of stream outside of existing exclosures and no protection or restoration of riparian vegetation after existing exclosures have been removed in 5-10 years.

Surveys of Arrastra Creek in Section 17 show that westslope cutthroat trout spawn in mid to late May to late June, with eggs and alevins in the gravel through July, depending on water temperatures. Allowing livestock use in and along Arrastra Creek in Section 17 would increase the likelihood of redd trampling and subsequent mortality of embryos and alevins in 0.5 mile of stream immediately after the lease is authorized and along 1.0 mile of stream after the temporary exclosures were removed in 5-10 years. The No Action Alternative would likely have direct adverse effects to westslope cutthroat trout by displacing spawning adults and/or causing direct mortality to eggs and/or alvins by trampling. The extent of these effects is unknown and would likely vary from year to year.

Arrastra Creek is located in a wide valley within porous, glacial alluvium. Typical of this geology, stream flow becomes intermittent typically between July and May. The exception is the lowermost 0.1 mile in Section 17 where the stream flows back into a steeper, more confined valley. Here, the stream has consistent year-round flow and the potential for bull trout spawning. Under the No Action Alternative, the lowermost 0.1 mile with perennial flow and potential of bull trout spawning would not be excluded from livestock grazing. The No Action Alternative could have substantial direct adverse effects to bull trout by harassment and displacement of adults, trampling of redds and associated mortality of eggs, alvins or fry.

Although the existing exclosures are providing temporary protection and passive recovery of riparian vegetation and instream habitats, livestock use is currently concentrated in a smaller area along the stream. The concentrated livestock use is causing bank alteration, bank erosion and preventing riparian vegetation from becoming established. Under the No Action Alternative, there would be no rest from livestock grazing in Section 17 to allow recovery of riparian vegetation and instream habitats. When the existing exclosures are eventually removed in 5-10 years, the entire 1 mile of Arrastra Creek within Section 17 would be accessible by livestock.

With the levels of livestock use proposed under the No Action Alternative and without rest, instream conditions and riparian vegetation would most likely not recover in and along Arrastra Creek in Section 17. Shrubs would not be able to become established, mature or propagate.

Riparian recovery also depends on conifer development along Arrastra Creek. In addition to livestock use, where past timber harvest removed trees up to and along the stream, banks have destabilized causing the stream to widen. Livestock grazing would be expected to impede recovery of conifers along the banks.

The continued lack of shrubs, trees and other riparian species along the creek would not only prevent recovery of riparian and instream conditions but would likely result in further degradation of these habitats. Bank erosion from hoof shear would continue to prevent stabilization of streambanks and maintain a chronic source of fine sediment to aquatic habitats, including spawning gravels, both in the immediate stream reach and downstream

Concentrated livestock use of Arrastra Creek streambanks under the No Action Alternative would be expected to have considerable indirect adverse effects to aquatic habitats as well as water quality both within and downstream of the allotment. Destabilized streambanks devoid of vegetative cover to protect banks and dissipate energy from high flows during late winter and early spring snowmelt would continue to be a source of fine sediment. Without protective vegetative cover, stream flows would likely continue to erode streambanks and mobilize sediment, transporting it downstream. Transport of sediment is a concern for the bull trout occupied waters immediately downstream and for westslope cutthroat trout spawning habitat within the stream reach as well as downstream.

The No Action Alternative could have moderate to high adverse direct and indirect effects to westslope cutthroat trout, bull trout and other aquatic species in Arrastra Creek. The No Action Alternative would

have a "***May Affect, Likely to Adversely Affect***" determination for the threatened bull trout in Arrastra Creek.

4.2.1.1.1.3 *West Fork Arrastra Creek*

Under the No Action Alternative, livestock grazing would be allowed along West Fork Arrastra Creek in Section 17 immediately after the lease is issued (summer 2014). Unlike the action alternatives, there would be no mandatory Terms and Conditions to protect riparian or instream habitats.

Under the No Action Alternative, an existing exclosure would provide permanent protection to roughly 0.5 mile of West Fork Arrastra Creek from trampling of redds. The remainder of the West Fork, 1.0 mile, would not be restricted from livestock grazing. Due to dense riparian vegetation, however, access to the stream channel from livestock would be limited, with the exception of 2-3 isolated crossings.

Bull trout have not been documented using the West Fork for spawning, rearing or migration by either MFWP or the BLM but there are no barriers to prevent bull trout from moving into this tributary from Arrastra Creek (Jo Christensen personal communication, November 2013). Like the mainstem, the West Fork has intermittent flow in mid to late summer through early spring, making it unavailable for bull trout spawning. Because of this, there would be no direct adverse effects to bull trout from livestock grazing along this tributary.

Currently, riparian vegetation along the West Fork is dominated by thickets of willow, Hawthorne and other shrubs that protect the stream from livestock use with the exception of 2-3 crossing locations. Under the No Action Alternative, there would be no Terms and Conditions or riparian triggers to ensure that riparian and instream conditions remain in a healthy and stable condition. Because livestock are currently restricted from accessing the stream in most areas of the West Fork, there would be minimal direct adverse effects to westslope cutthroat trout. However, without adequate regulatory measures in place to maintain riparian and instream conditions, riparian habitats could degrade, allowing livestock greater access to spawning sites in the future.

The lack of mandatory Terms and Conditions or riparian triggers could result in a reduction of riparian vegetation and increased bank alteration. This could ultimately lead to increased sediment production, a loss of riparian and instream habitats and adverse indirect effects to westslope cutthroat trout, bull trout and other aquatic species.

The No Action Alternative could have minor to moderate adverse direct and indirect effects to westslope cutthroat trout and other aquatic species in West Fork Arrastra Creek. In addition, the No Action Alternative could have minor adverse indirect effects to downstream occupied bull trout habitat from livestock grazing in the West Fork.

4.2.1.1.2 Range Improvement Projects

No range improvement projects are proposed under the No Action Alternative. There would be no direct or indirect adverse impacts to fish or other aquatic species from range improvement projects under the No Action Alternative.

4.2.1.1.3 Restoration Projects

No restoration projects are proposed under the No Action Alternative. There would be no direct, indirect adverse or beneficial effects to fish or other aquatic species from restoration activities under the No Action Alternative.

4.2.1.2 Alternative B – Proposed Action

4.2.1.2.1 Livestock Grazing

4.2.1.2.1.1 *Arrastra Creek - Section 9*

Under Alternative B, livestock grazing would be allowed along 0.16 mile of Arrastra Creek in Section 9 immediately after the lease is issued (summer 2014) with the following mandatory Terms and Conditions included to protect aquatic species from direct and indirect impacts of livestock use (refer to the Project Description for a full list of Terms and Conditions):

- Streambank alteration shall not exceed 15 percent.
- Browse on woody plants shall not exceed 50% of available annual leader growth.
- Livestock shall not be moved onto the allotment if streambank stability on Arrastra Creek or West Fork Arrastra is below 75% or cover is below 79%.
- Salt shall be placed at least ¼ mile from water.
- Retain a minimum of 4” stubble height on riparian key species (e.g. Carex).
- When Arrastra Creek has consistent flow in Section 9 (~850’ of stream) in September connecting upstream and/or downstream fish-bearing habitats, the lessee shall exclude this portion of the stream and riparian area with an electric fence for the time livestock are in the pasture(s) or the lessee could remove and keep livestock from the riparian area (such as with the use of a rider).
- If any grazing use term is met or exceeded, livestock shall be moved to the next un-grazed portion of the allotment. If any grazing use term is met or exceeded within the last portion of the allotment, livestock shall be removed from BLM administered lands for the remainder of the grazing season.

Since the riparian area along this 0.16 mile of stream would not be subjected to livestock grazing when the stream is flowing in September and connected to upstream and/or downstream fish-bearing habitats (making it available for bull trout spawning), there would be no adverse direct effects to bull trout from harassment, disturbance or redd trampling from livestock grazing under Alternative B in Section 9.

Allowing livestock use in and along Arrastra Creek in Section 9 during June and July, however, would increase the likelihood of redd trampling and subsequent mortality of westslope cutthroat trout embryos and alevins. Although livestock use along this section of stream was found to be minimal, Alternative B could still have minor direct adverse effects to westslope cutthroat trout by displacing spawning adults and/or causing direct mortality to eggs or alvins by trampling. The direct effects to westslope cutthroat trout under Alternative B would be expected to be less than those under the No Action Alternative since this alternative would maintain healthy, productive riparian vegetation that would help limit livestock access to this stream reach. Maintaining vigorous riparian vegetation with a

diversity of age and size classes would also provide a source of woody material to the stream that could provide cover, collect spawning gravels, and protect redds, incubation and rearing habitat.

Vegetation along this 0.16 mile of Arrastra Creek is currently meeting riparian standards and livestock use has been minimal along this section of creek in past years. The Terms and Conditions of the lease were developed to maintain or improve existing riparian and instream conditions, although livestock grazing along the creek could result in localized bank erosion at crossings or watering sites as well as supply nutrients to the creek. There could be minor indirect effects to bull trout, westslope cutthroat trout and other aquatic species from fine sediment input and nutrients generated by cattle watering or crossing the stream.

Annual monitoring of riparian and instream conditions would occur by the BLM along this 0.16 mile of Arrastra Creek to determine when triggers in the Terms and Conditions have been met and when livestock would be moved as well as to determine if triggers are adequate to maintain riparian and instream habitats. If pre-season monitoring shows that streambank stability is below 75 percent or bank cover is below 79 percent, livestock would not be allowed to use Arrastra Creek until the banks and vegetation had recovered.

4.2.1.2.1.2 *Arrastra Creek - Section 17*

Riparian vegetation is currently not meeting riparian standards along Arrastra Creek. To address poor quality riparian vegetation and instream conditions, the majority of Section 17 would be rested from livestock use until recovery objectives have been met. Under Alternative B, livestock grazing could be re-considered in Section 17 when Arrastra Creek is found to have 75 percent stable streambanks and 79 percent covered banks. When livestock grazing is re-authorized in Section 17, the following mandatory Terms and Conditions would be implemented to protect riparian and instream habitats (refer to the Project Description for a full list of the Terms and Conditions):

- Browse on woody plants shall not exceed 50% of available annual leader growth.
- Streambank alteration shall not exceed 15 percent.
- Livestock shall not be moved onto the allotment if streambank stability on Arrastra Creek or West Fork Arrastra Creek is below 75% or bank cover is below 79%.
- Salt shall be placed at least ¼ mile from water
- Retain a minimum of 4” stubble height on riparian key species (e.g. Carex).
- If any grazing use term is met or exceeded, livestock shall be moved to the next un-grazed portion of the allotment. If any grazing use term is met or exceeded within the last portion of the allotment, livestock shall be removed from BLM administered lands for the remainder of the grazing season.

It is expected that the Terms and Conditions of the lease would allow maintenance of healthy riparian vegetation and bank stability once livestock grazing resumes in Section 17. The best available science indicates that 10-20 percent bank alteration (depending on channel type) are appropriate in preventing bank destabilization and protecting habitats critical to listed fish (Bengyfield and Svoboda 1998, Cowley 2002). Preventing greater than 15 percent bank alteration along Arrastra Creek is expected to maintain

stable banks but if monitoring indicates otherwise, livestock would be permanently excluded from the riparian area.

Under Alternative B, two existing exclosures would become permanent exclosures and provide long-term protection for spawning, incubating and rearing fish on 0.53 mile of Arrastra Creek. There would be no direct effects to westslope cutthroat trout or other aquatic species within this 0.53 mile of stream under Alternative B.

Arrastra Creek is located in a wide valley within porous, glacial outwash and alluvium. Typical of this geology, stream flow becomes intermittent typically between July and May. The exception is the lowermost 0.1 mile in Section 17 where the stream flows back into a steeper, more confined valley. Here, the stream has consistent year-round flow and the potential for bull trout spawning. Under Alternative B, the lowermost 0.1 mile with perennial flow and potential of bull trout spawning would be permanently excluded with a jackleg fence. The fence would not be constructed until livestock are allowed back in Section 17. The exclosure would ensure no direct impacts to bull trout, westslope cutthroat trout or other aquatic species in the lower 0.1 mile of Arrastra Creek from livestock grazing under Alternative B.

After riparian and instream conditions have recovered (based on the riparian and instream indicators identified and monitored using the MIM protocol), approximately 0.48 mile of Arrastra Creek in Section 17 would be accessible to livestock use. Unlike the No Action Alternative, riparian vegetation would be allowed to recover under Alternative B, creating potential barriers to livestock use of the stream. Although healthy riparian vegetation would be expected to provide some protection from livestock accessing Arrastra Creek along 0.48 mile of stream, there would still be a likelihood of westslope cutthroat trout redd trampling and subsequent mortality of eggs, embryos and/or alevins.

Even with maintaining stable banks, localized bank erosion could be expected to occur at livestock crossings and watering locations. In addition, cattle use in and adjacent to the stream could result in nutrients being supplied to the stream. Therefore, minor adverse indirect effects to bull trout and westslope cutthroat trout could occur from fine sediment input in adjacent stream reaches as well as to downstream occupied habitats.

Annual monitoring of riparian and instream conditions would occur along Arrastra Creek to determine when triggers in the Terms and Conditions have been met and when livestock would be moved as well as to determine if triggers are adequate to maintain desired and necessary riparian and instream habitats. If pre-season monitoring shows that streambank stability is below 75 percent and bank cover is below 79 percent, livestock would not be allowed to use Arrastra Creek or West Fork Arrastra Creek until banks recover. If monitoring data reports that long-term indicators such as bank stability and bank cover drop below recovered standards for 3 consecutive *active* grazing seasons, a fence would be constructed to exclude the entire length of Arrastra Creek in section 17. If a fence is constructed along Arrastra Creek, there would be no adverse direct or indirect effects to bull trout, westslope cutthroat trout or other aquatic species from livestock grazing along Arrastra Creek in Section 17.

Alternative B could have minor adverse direct and indirect effects to westslope cutthroat trout and other aquatic species in Arrastra Creek. The effects would be less than under the No Action Alternative but greater than Alternative C.

Under Alternative B, there could be minor adverse indirect effects to bull trout in Sections 9 and 17. Alternative B would have a "***May Affect, Not Likely to Adversely Affect***" determination for the threatened bull trout.

4.2.1.2.1.3 *West Fork Arrastra Creek*

Approximately 1.5 miles of West Fork Arrastra Creek is located in Section 17. Approximately 1 mile of West Fork Arrastra Creek would be available to livestock once grazing resumes in Section 17 (after recovery objectives are met for Arrastra Creek).

Bull trout have not been documented using the West Fork for spawning, rearing or migration by either MFWP or the BLM but there are no barriers to prevent bull trout from moving into this tributary from Arrastra Creek (Jo Christensen personal communication, November 2013). Like the mainstem, the West Fork has intermittent flow in mid to late summer through early spring, making it unavailable for bull trout spawning. Because of this, there would be no direct adverse effects to bull trout from livestock grazing along this tributary under Alternative B.

Under Alternative B, one existing exclosure would provide permanent protection to 0.5 mile of West Fork Arrastra Creek from trampling of westslope cutthroat trout redds. The remainder of the West Fork, 1.0 mile, would not be restricted from livestock grazing.

Currently, riparian vegetation along the West Fork is dominated by thickets of willow, Hawthorne and other shrubs that restrict livestock access to the stream with the exception of 2-3 crossing locations. Resting the allotment under Alternative B, could also benefit the West Fork by allowing isolated areas currently impacted by livestock to recover. In addition, once grazing is again authorized, mandatory Terms and Conditions (the same as identified for Arrastra Creek) and riparian triggers should ensure that riparian and instream conditions remain in a healthy, productive and stable condition. Because livestock are currently restricted from accessing the stream in most areas of the West Fork and Terms and Conditions would maintain riparian cover, there would be minor direct adverse effects to westslope cutthroat trout.

Although the Terms and Conditions were designed to maintain healthy riparian vegetation and prevent bank erosion, after grazing is again authorized in Section 17 there could be localized bank erosion at livestock crossings and watering locations. This could result in minor adverse indirect effects such as fine sediment delivery to adjacent westslope cutthroat trout habitat and downstream occupied bull trout habitat.

Alternative B could have minor adverse direct and indirect effects to westslope cutthroat trout and other aquatic species and minor indirect adverse effects to bull trout from livestock grazing along West Fork Arrastra Creek. The effects would be less than under the No Action Alternative but greater than under Alternative C.

4.2.1.2.2 Range Improvement Projects

There would be no direct effects to fish or other aquatic species from the construction of fences, (including riparian fences), the spring development in Section 17 or the well and stock tank in Section 21.

There would be no indirect effects to fish or other aquatic species from the construction of fences, (including riparian fences), the spring development in Section 17 or the well and stock tank in Section 21.

There would be beneficial effects from fencing the eastside of Arrastra Creek to exclude livestock until riparian and instream habitats have recovered. There would also be beneficial impacts from fencing the lower 0.1 mile of Arrastra Creek to prevent livestock use of the riparian area and stream.

4.2.1.2.3 Restoration Projects

Alternative B proposes planting native shrubs and trees; 550' of bank stabilization using bioengineering techniques; and instream placement of large woody material.

4.2.1.2.3.1 *Planting*

There would be no direct adverse effects to fish, fish habitat or habitat for other aquatic species from vegetation planting.

Planting trees and shrubs along Arrastra Creek would have beneficial indirect effects to Arrastra Creek by stabilizing streambanks, dissipating energy during high flows, trapping sediment, creating barriers to livestock, and providing a source of future down woody material to the creek.

4.2.1.2.3.2 *Bank Stabilization*

Alternative B proposes stabilizing up to 550' of streambank using a bioengineering technique that includes 3 coir-wrapped soil-lifts and planting willows between lifts. To prevent direct impacts to aquatic species, the excavator would stay on the floodplain during excavation and reconstruction of the streambanks.

To prevent contaminants (fuel and oil) from entering the stream, the excavator operator would be required to have a spill containment kit and a spill prevention, control, and countermeasure plan.

Since heavy equipment would not be used in the stream and measures would be in place to respond to an equipment leak, there would be no direct impacts to fish or other aquatic species from stabilizing the streambanks using bioengineering techniques.

Stabilizing roughly 550' of streambank using 3 coir-wrapped soil-lifts and planting willows between lifts would have both beneficial and potentially short-term adverse indirect effects. To minimize fine sediment delivery to the stream, bank stabilization would occur in early spring (mid-to-late April) or in August when there is no surface flow in the naturally intermittent channel. If snowmelt occurs earlier than normal or precipitation causes surface flow in the project area, a sediment fence with a sealed bottom would be installed to minimize soil from entering the stream.

All equipment would be steam-cleaned prior to entry at the project site to prevent the introduction of noxious weeds.

There could be both long-term indirect beneficial effects and short-term adverse indirect effects from bank stabilization. Although expected to be minor, short-term indirect effects could result from fine sediment generated during excavation of the streambanks. Long-term beneficial effects are expected to outweigh short-term effects by reducing chronic sources of fine sediment from eroding and sloughing banks.

Increasing riparian vegetation along the streambanks would also provide a long-term beneficial indirect effect by protecting streambanks, dissipating high flows, collecting sediment, as well as creating a source of woody material to the stream.

4.2.1.2.3.3 *Instream Large Woody Placement*

Under Alternative B, instream large woody material would be placed at appropriate locations within Arrastra Creek to increase deposition and scour adjacent to structures and promote the formation of deep pools and off channel habitat. Down trees would also be placed along the stream to help stabilize unstable and eroding streambanks. Up to 40 trees could be placed in and along Arrastra Creek. Trees could be placed individually or in up to 11 log/debris jams.

Trees would be placed in and along the stream using an excavator but the banks would not be excavated. Woody material would be a diameter, length and weight to help anchor structures in place. Debris jams would be placed at “knick points” in the channel and/or where existing features such as boulders, down wood or live trees are located to help anchor placed material. If available, trees with rootwads would be used to help anchor down wood and provide instream habitat.

To minimize direct impacts to aquatic species, the use of equipment in the stream would be minimized and would only occur when there is no surface flow in the intermittent channel or when flow is intermittent and not connected to upstream or downstream fish-bearing habitats.

To prevent contaminants (fuel and oil) from entering the stream, the excavator operator would be required to have a spill containment kit and a spill prevention, control, and countermeasure plan.

Heavy equipment would only be allowed to operate in the stream channel when there are no other options for wood placement or for crossing the stream. Since placement of woody material would occur during a time when the channel is dry or during intermittent flow, there would be no direct adverse effects to fish or other aquatic species under Alternative B from this activity.

During positioning of trees into the stream channel, disturbance to the banks or streambed could create a source of fine sediment that could become mobilized when flows return; creating a short-term minor adverse indirect effect to westslope cutthroat trout, bull trout and other aquatic species.

The volume of large wood would immediately increase in the stream, on floodplains, and within the riparian area, resulting in a beneficial indirect effect by stabilizing and rebuilding streambanks, and creating pools and cover for migrating bull trout. The installation of instream woody material would

also be expected to increase and improve spawning and migration habitat for westslope cutthroat trout by collecting gravel, scouring pools, creating overhead cover and slower water refugia sites.

4.2.1.3 Alternative C

4.2.1.3.1 Livestock Grazing

4.2.1.3.1.1 *Arrastra Creek - Section 9*

Under Alternative C, livestock grazing would be allowed along 0.16 mile of Arrastra Creek in Section 9 immediately after the lease is issued (summer 2014) with the following mandatory Terms and Conditions included to protect fish and other aquatic species from direct and indirect impacts of livestock use (refer to the Project Description for a full list of Terms and Conditions) (these are the same as under Alternative B):

- Browse on woody plants shall not exceed 50% of available annual leader growth.
- Streambank alteration shall not exceed 15 percent.
- Livestock shall not be moved onto the allotment if streambank stability on Arrastra Creek is below 75% and bank cover is below 79%.
- Salt shall be placed at least ¼ mile from water.
- Retain a minimum of 4" stubble height on riparian key species (e.g. Carex).
- If any grazing use term is met or exceeded, livestock shall be moved to the next un-grazed portion of the allotment. If any grazing use term is met or exceeded within the last portion of the allotment, livestock shall be removed from BLM administered lands for the remainder of the grazing season.
- When Arrastra Creek has consistent flow in Section 9 (~850' of stream) in September connecting upstream and/or downstream fish-bearing habitats, the lessee shall exclude this portion of the stream and riparian area with an electric fence for the time livestock are in the pasture(s) or the lessee could remove and keep livestock from the riparian area (such as with the use of a rider).

Since the riparian area along this 0.16 mile of stream would be permanently excluded from livestock grazing when the stream is flowing in September and connected to upstream and/or downstream fish-bearing habitats (making it available for spawning), there would be no adverse direct effects to bull trout from harassment, disturbance or redd trampling from livestock grazing under Alternative C.

Allowing livestock use in and along Arrastra Creek in Section 9 during June and July, however, would increase the likelihood of redd trampling and subsequent mortality of westslope cutthroat trout embryos and alevins. Although livestock use along this section of stream was found to be minimal, Alternative C could still have minor direct adverse effects to westslope cutthroat trout by displacing spawning adults and/or causing direct mortality to eggs or alvins by trampling.

The direct effects to westslope cutthroat trout under Alternative C would be the same as Alternative B but expected to be less than those under the No Action Alternative. Due to mandatory Terms and Conditions, both Alternatives C and B would likely restore and maintain healthy, productive riparian vegetation that would armor banks and would limit livestock access to the stream. Maintaining vigorous

riparian vegetation with a diversity of age and size classes would also provide a source of woody material to the stream to protect spawning fish as well as spawning, incubating and rearing habitat.

Vegetation along this 0.16 mile of Arrastra Creek is currently meeting riparian standards and livestock use was found to be minor along this section of creek. The Terms and Conditions of the lease were developed to maintain or improve the existing riparian and instream conditions, although livestock grazing along the creek could result in localized bank erosion at crossings or watering sites as well as supply nutrients to the creek. There could be minor indirect effects to bull trout, westslope cutthroat trout and other aquatic species from fine sediment input and nutrients generated by cattle using streambanks, at watering sites or crossing the stream.

Annual monitoring of riparian and instream conditions would occur by the BLM along this 0.16 mile of Arrastra Creek to determine when triggers in the Terms and Conditions have been met and when livestock would be moved as well as to determine if triggers are adequate to maintain riparian and instream habitats. If pre-season monitoring shows that streambank stability is below 75 percent and/or bank cover is below 79 percent, livestock would not be allowed to use Arrastra Creek until banks recover.

Like Alternative B, Alternative C could have minor adverse direct and indirect effects to westslope cutthroat trout and other aquatic species in Arrastra Creek.

Alternative C could have minor indirect adverse effects to bull trout leading to a "***May Affect, Not Likely to Adversely Affect***" determination for the threatened bull trout.

Under Alternative C, only 0.16 mile of Arrastra Creek would be affected by livestock grazing. Because of this, the effects to fish and other aquatic species would be less than under Alternative B.

4.2.1.3.1.2 *Arrastra Creek and West Fork Arrastra - Section 17*

To address poor quality riparian vegetation and instream conditions under Alternative C, the majority of Section 17 would be permanently excluded from the Arrastra Creek Allotment and no longer available to livestock grazing.

The entire length of Arrastra Creek (1.0 mile) and West Fork Arrastra Creek (1.5 miles) in Section 17 would be permanently excluded from livestock grazing. There would be no direct effects to bull trout, westslope cutthroat trout or other aquatic species within 1.0 mile of Arrastra Creek or 1.5 miles of West Fork Arrastra Creek under Alternative C.

Because the majority of Section 17 would be permanently excluded from livestock grazing, there would be no indirect effects to bull trout, westslope cutthroat trout or other aquatic species from livestock grazing in this area.

There would be long-term beneficial effects to Arrastra Creek and West Fork Arrastra by allowing recovery and maintenance of riparian vegetation and instream habitats. Under Alternative C, no sediment or nutrients would be delivered from livestock grazing to Arrastra Creek or West Fork Arrastra Creek.

4.2.1.3.2 Range Improvement Projects

The only range improvement projects proposed under Alternative C would be fences along the allotment boundary and a fence along the eastside of Arrastra Creek to exclude livestock use in Section 17.

There would be no direct or indirect impacts to fish or other aquatic species from fence construction under Alternative C.

4.2.1.3.3 Restoration Projects

Alternative C proposes the same restoration projects as under Alternative B. The effects to aquatic species would be the same as described under Alternative B.

4.2.2 Issue 2: Conifer Restoration

4.2.2.1 Alternative A – No Action

Alternative A restricts grazing to the BLM managed section numbers 5 and 17. Sections 5 and 17 have had no restoration planting associated with the Marcum Mountain EA. Natural seedlings do have the potential to be trampled and or browsed upon by cattle (Graham et al. 1990); however, the harvested stands in these sections have reached a suitable level of maturity and stocking to tolerate grazing. Taking this into account, the no action alternative does not represent a threat to the future development of the timbered stands.

4.2.2.2 Alternative B – Proposed Action

Alternative B would add part or all of sections 9, 15, 21, 22, 23, 27, and 28 to the lands currently in the allotment. Forest restoration tree planting has occurred over the last three years in the portions of sections 21 and 22 proposed for inclusion in the grazing allotment. The seedlings have been fitted with Vexar tubing to protect them from browsing by large ungulates. With the proposed well/stock tank in section 21 acting to draw cattle into the area, it is probable that if these sections are included in the allotment, damage would occur to the plantations from cattle pulling off or knocked down (Evans 1988) Vexar seedling protectors and subsequent browsing from large ungulates would occur along with browsing and trampling from cattle. These effects would be mitigated by putting up temporary electrified (or other type) fencing. This fencing should remain in place until the seedlings reach a suitable height of 4 feet enabling them to no longer need Vexar tubing protection from ungulates and allowing them to grow large enough to resist trampling by cattle. The BLM planted 69 acres in section 21 less than a quarter mile from the proposed new water well/stock tank location and planted 17 acres in section 22. The total linear outline of the two units is approximately 14,234 feet. Assuming a labor and material cost for polyrope electric fence that is capable of resisting big game damage and cattle is estimated at $2.72 per foot (Kees 2004) the cost for installation of fencing around both units would be $38,716. This cost estimate is only for installation and does not represent the per year maintenance costs. If the above mitigation measure is taken then no adverse effects to the BLM investment and the restoration of the stands would be anticipated, as long as fencing is effectively maintained during the grazing season.

4.2.2.3 Alternative C

Alternative C would officially add all or part of sections 9, 15, 23, and the NE corner of section 22 to the current grazing allotment boundary. As section 21, and the majority of section 22 would not be included in the allotment as in Alternative B, then the restoration plantings would not be subject to damage by cattle. As such, Alternative C does not represent a threat to the future development of forest stands and the restoration efforts undertaken by the BLM.

4.2.3 Issue 3: Invasive, Non-native Vegetation Management

4.2.3.1 Alternative A – No Action

Under the No Action Alternative, no range improvements would be constructed. No construction-related impacts would occur from invasive plant species. However, invasive plant species are likely to continue to be introduced and may continue to spread as a result of natural dispersal or from various land-disturbing activities, in this case livestock grazing. Increases in the numbers or extent of invasive plant species would be restricted by monitoring and control measures implemented by weed control boards, federal land management agencies, and private landowners. For some species and areas there may be a reduction in weeds compared to current conditions, but others may increase and could cause degradation of natural and agricultural systems. Noxious weed treatments would continue on public lands within the allotment as described in the *Integrated Weed Management EA* (USDI-BLM 2009).

4.2.3.2 Alternative B – Proposed Action

4.2.3.2.1 Construction of Range Improvements

The establishment of invasive plant species can affect the quality of habitat through competition with, and eventual replacement of, desirable native species. Replacement of native species can have various environmental effects including changes in the nutrient regime of soils, and increased soil erosion. Invasive plant species can negatively impact vegetation community structure by creating, changing the density of, or eliminating vegetation layers or canopy cover (DiTomaso 2000). In wildlife winter range, invasive plant species have the potential to reduce the quality, quantity, and value of forage and can increase land management procedures and costs. In addition, disturbance in riparian areas can provide favorable growing conditions for invasive plant species that require regular moisture, and the hydrological movement in these areas can spread these species to downslope or downriver areas.

The proposed spring development T14N, R10W, in Section 17 NESW could provide favorable growing conditions for invasive plant species such as Orange Hawkweed and Meadow Hawkweed that require regular moisture to become established, and are transported by hydrological movement downstream or are moved by livestock and wildlife (DiTomaso 2000).

Vegetation removal and soil disturbance during fence construction and spring development could create optimal conditions for the establishment of invasive plant species. Spotted knapweed, musk thistle and oxeye daisy are species that typically produce an abundance of seed, thrive in disturbed areas, and have few natural competitors; therefore, once established they spread quickly and can overtake desirable plant communities (DiTomaso 2000).

Vehicles and construction equipment traveling from areas that contain invasive species into "weed-free areas" could disperse invasive plant seeds and fragments, resulting in their establishment in previously undisturbed areas that may not have contained invasive species, as well as increasing the distribution or abundance of existing populations in previously disturbed areas.

Furthermore, disturbed areas may be seeded by airborne seeds originating from plants within adjacent areas; therefore, direct contact between infested areas and construction equipment is not required for invasive plant species to spread to new areas. In addition, the transportation of materials into areas disturbed by construction (e.g., borrow materials, mulch, gravel, as well as native seed mixtures and/or saplings used during re-vegetation efforts) may contribute to the spread of invasive plant species. If measures are not taken to prevent and control newly established infestations resulting from construction, then invasive plant species can persist in disturbed and reclaimed areas, and those that are present in the construction area may spread into adjacent areas. However, measures would be implemented to reduce the potential for introduction or spread of invasive plant species; these measures are discussed in *Integrated Weed Management EA* (USDI-BLM 2009).

4.2.3.2.2 Grazing

Increase in livestock grazing under alternatives B and C would contribute to the spread of existing infestations and could introduce noxious weed species not already present in the allotment. The effect of livestock grazing on noxious weed spread has been well documented and a large body of data exists (DiTomaso 2000; Callawaway et al. 1999; Vavra et al. 2007).

4.2.4 Issue 4: Dispersed Camping and Hunting

4.2.4.1 Alternative A – No Action

Recreational activities would not be directly affected by the No Action alternative. However, grazing at current levels could lessen the forage available for the species that are hunted, thus affecting quality hunting.

4.2.4.2 Alternative B – Proposed Action

Recreational activities would not be directly affected by Alternative B; however, they would be indirectly affected. Although AUMs would be greater in this alternative compared to Alternative A, the AUMs would be spread over more acreage. In addition, Range Terms and Conditions would be implemented, which might increase available forage for species that are hunted. A jackleg fence is proposed to be built next to the Arrastra Creek road. Hunters might be inconvenienced by the fence and having to open a gate to access the undeveloped hunting area.

4.2.4.3 Alternative C

AUMs are less in this alternative compared to the other two alternatives and Range Terms and Conditions would be implemented, both of which would increase available forage for species that are hunted. In addition, the fence blocking the dispersed camping area would not be built. Overall, Alternative C would have a beneficial effect to recreation.

4.2.5 Issues 5 and 6: Streams and Riparian Conditions, Water Quality

The "at-risk" elements identified in PFC evaluations and MIM monitoring would not likely trend toward PFC with ongoing livestock use at current levels. Portions of the stream were exclosed from livestock use in 2012 and 2013 and these areas are expected to trend toward PFC. Other streams in the allotment are meeting PFC, but have some livestock impacts in scattered small areas such as watering crossings, and the impacts are not characteristic of entire reaches. Streambank trampling (direct effect) and browsing (indirect effect) have and continue to be a sediment source along the unexclosed portion of Arrastra Cr. Sec. 17. Bank trampling and sedimentation have been occurring, and continue to occur, to a much smaller degree along the West Fork in smaller areas associated with watering areas and crossings.

<u>Stream and riparian conditions</u>

The geographic scope is streams accessible to livestock within the allotment boundary because no effects are anticipated outside this area. Temporal scope of the effects is the 10-year lease period since no livestock use would occur without a lease. The effects Indicator(s) are: Condition and trend of riparian/stream segments ***length*** not meeting PFC or risk elements (w:d ratio, altered banks, vegetation reproduction, deep root masses on streambanks, tree and shrub utilization).

<u>Water quality</u>

The geographic scope of effects is Arrastra Creek and connected tributaries and source areas for pollutant sediment (affected environment) within the allotment boundary that are accessible to livestock. Temporal scope of the effects is the 10-year lease period since no livestock use would occur without a lease. The effects indictor is stream length with identifiable sediment sources.

4.2.5.1 Alternative A – No Action

A total of 0.53 miles of riparian (recently-built exclosures) on the Arrastra main stem would continue to have FAR segments move toward PFC. Reduced bank trampling and browse inside the exclosures would increase likelihood of riparian vegetation establishment and growth, increased likelihood of deep-rooting vegetation and long-term bank stabilization, and a lower width:depth ratio. FAR segments within the non-exclosed portion (0.72 miles) would likely continue as functioning-at-risk with continued livestock use at present and recent levels. The exclosed areas would continue to have reduced sediment contributions from livestock use because of elimination of bank trampling. The unexclosed portion (.72 miles) would likely continue to have sediment contributions with continued livestock use at present and recent levels.

The exclosed portion of the West Fork Arrastra Creek (0.42 miles) would continue to meet PFC.

The unexclosed portion (1 mile) would likely continue to meet PFC overall with the present level of effects continuing at watering sites and crossings.

4.2.5.2 Alternative B – Proposed Action

In addition to 0.53 miles of existing exclosures on the Arrastra mainstem, 0.24 miles would be exclosed from grazing near the southeast corner of Sec. 17, resulting in a total 0.77 miles exclosed from livestock use, and any FAR segments moving toward meeting PFC. Reduced bank trampling and browse inside exclosures would increase likelihood of riparian vegetation establishment and growth, increased likelihood of deep-rooting vegetation and long-term bank stabilization, and a lower width:depth ratio. The removal of bank trampling would also decrease sediment production. The remaining 0.48 miles would be unexclosed but managed with livestock use standards that limit annual streambank damage, browse and forage utilization. These FAR segments may progress toward PFC as standards are adjusted as needed, however it is likely that progress toward PFC would be slower than ungrazed exclosed segments. Likewise, with limited streambank damage the sediment production would also likely decrease. PFC conditions in the West Fork Arrastra Creek are likely to continue through the recovery period. With riparian use standards in place thereafter, PFC conditions have a higher likelihood of being maintained over the long term. The addition of the spring development to the west may help relieve some grazing use on the riparian of the West Fork Arrastra Creek. Riparian plantings and LWD placement would help accelerate streambank and riparian recovery toward PFC conditions. LWD placement would likely result in some sediment movement during placement, as well as during higher flows as channel materials are resorted and deposited.

4.2.5.3 Alternative C

In addition to 0.53 miles of existing exclosures on the Arrastra mainstem, 0.72 miles would be removed from grazing. In addition to 0.42 miles of existing exclosure in West Fork Arrastra Creek, an additional 1 mile would be removed from grazing. This would result in all FAR segments in Section 17 progressing toward PFC. Reduced bank trampling and browse inside exclosures would increase likelihood of riparian vegetation establishment and growth, increased likelihood of deep-rooting vegetation and long-term bank stabilization, and a lower width:depth ratio. The removal of bank trampling would also decrease sediment production.

4.2.6 Issue 7: Lewis and Clark National Trail

4.2.6.1 Alternative A – No Action

Grazing would continue as is and no projects would be proposed. The LCNHT would not be directly or indirectly affected by the No Action Alternative.

4.2.6.2 Alternative B – Proposed Action

As proposed, the grazing allotment size would be increased and new fences would be built. The proposed permanent electric fence is in the general area of the LCNHT in Sections 27 and 28 and would directly affect the trail corridor. Although the 2002 Class III cultural resource inventory did not find remnants of the trail in this area, the remaining viewshed of the trail would be affected by the permanent electric fence. Mitigation measures, such as moving the fence to the north, would be recommended in order to protect the LCNHT. In addition, the fence would be visible from the potential "bald topped hill" as interpreted by Mr. Bergantino using Lewis' and Gass' journals (Bob Bergantino,

personal communication, 2013). In order to mitigate the visual intrusion, fence posts should blend in with the natural environment and the fence should follow natural contours and avoid straight lines.

4.2.6.3 Alternative C

As proposed, the grazing allotment size is increased and less range improvements are proposed. No range improvements are near the LCNHT. Thus, the LCNHT would not be directly or indirectly affected by Alternative C.

4.2.7 Issue 8: Upland Vegetation

Under all alternatives, livestock grazing would result in the direct reduction of available biomass. Species-specific effects from grazing are variable, with some species increasing in population under the influence of grazing and other species decreasing. Bluebunch wheatgrass, mountain brome, and rough fescue are native species that decrease in abundance with excessive grazing pressure (Taylor and Lacey 1994). High use levels and length of time an area is grazed can reduce plant recovery during the remaining growing season.

The BLM range staff began collecting forage utilization data for this allotment in 2008. In reference to 43 CFR 4100.0-5 Definitions, "*Utilization* means the percentage of forage that has been consumed by livestock, wild horses and burros, wildlife and insects during a specified period." Two methods were used to determine the percent utilization during the grazing season. Utilizing the *Paired Plot Method* (USDI-BLM 1999), forage from protected and unprotected plots are clipped and weighed at the end of the use period. This method is a simple and direct way of measuring graminoid utilization by weight however it is time consuming. The *Grazed Plant Method* obtained from the *United States Department of Agriculture, Forest Service Range Analysis Handbook FSH 2209.21 – R1*, involves selecting a random line transect in a key area and tallying specific key grazed and un-grazed plants at predetermined intervals. Tally results are compared to the appropriate key species chart to determine estimated percent weight utilization. This method is rapid and several transects can be conducted in a short time period. The *Grazed Plant Method* may also be referred to as *Utilization Pace Transect*.

Forage utilization data was collected in various areas within historic leased grazing boundaries on BLM land. The Paired Plot was conducted in Grasshopper meadow (section 17 NENW) with percent utilization indicating in 2008 at 30% and in 2009 at 55%. It was noted that later in the summer of 2009 after the measurement was completed, livestock again gained access to grasshopper meadow and utilization was estimated (ocular) at 70% use. The *Grazed Plant Method* was used from 2009 – 2011 in various areas of section 17 in the allotment (Table 4-1).

Table 4-1. Percent utilization by location.

Year	Percent Utilization	Location
2009	63	T14N, R10W, Sec. 17 NWSE
	65	T14N, R10W, Sec. 17 NENW
	70	T14N, R10W, Sec. 17 NENW
2010	15	T14N, R10W, Sec. 17 NENW
	25	T14N, R10W, Sec. 17 NENW
2011	60	T14N, R10W, Sec. 17 NESW
	65	T14N, R10W, Sec. 17 NENW

Utilization intensity and patterns will vary throughout the allotment. Roath and Krueger (1982) found, "Cattle use on mountainous habitats is controlled by an interaction of factors including topography, vegetation type, climate, availability of water, and livestock behavior."

The grazing lessee completed three, end of the year Actual Use reports for 2011, 2012 and 2013. These reports reflect the number and kind of livestock and grazing period for the season. It is important to note the BLM grazing lease is used in conjunction with private, state and Forest Service lands during the grazing season. Livestock numbers reported are not exclusive use on BLM land because there are no physical barriers or fencing that border the majority of these lands. Actual use has been summarized from 2011-2013 (Table 4-2).

Table 4-2. Actual use summary.

Year	Number of Livestock and Kind (Pairs/Bulls)	Grazing Period		AUMs
		Begin	End	
2011	104/5	06/23	07/20	366
2012	249/9	7/21	09/24	558
2013	253/9	07/11	08/30	439

4.2.7.1 Alternative A – No Action

The direct and indirect effects of livestock grazing under this alternative would remain relatively unchanged during the life of the term lease. Livestock utilization and distribution are expected to continue with the same results as they have in the past. Livestock would not have access within the exclosure in Grasshopper Meadow. Arrastra Creek aspen exlosures would remain in place, temporarily excluding livestock grazing until objectives have been met. Specific terms and conditions to guide livestock management would not be included in the term lease under this alternative. Utilization would likely be similar to the values displayed in Table 4-1.

4.2.7.2 Alternative B – Proposed Action

The proposed action allows livestock grazing on 1,724 acres of BLM lands outside the original allotment boundary (Figure 2-2). It is evident that livestock have had access to these lands in the past due to a lack of physical barriers and minimal herd management. With the addition of the lands, total active preference for the allotment would increase from 96 AUMs to 115 AUMs.

This alternative includes constructing several range improvements to improve management capabilities for vegetative resources and livestock use.

Section 5 and southern boundary – Electric Fence: The construction of a permanent electric fence would create a physical barrier and pasture to contain livestock in this area. The construction of a second permanent electric fence along the southern end of the new allotment boundary would create a physical barrier to prevent livestock from drifting down slope or traveling on existing roads and trails to highway 200. The vegetation along the fence boundary would be impacted from possible livestock trailing. Estimated fence cost is $31,980.

Section 17 – Jack Leg Fence: A permanent jack leg fence would be installed along the east side of Arrastra Creek, by connecting to the two existing aspen exclosures and to include a separate fence extension at the north end of the existing northern aspen exclosure. Some trailing along the fence line may become apparent in low elevation areas. The construction of the fence would fully contain the western majority of section 17 and the portion of Arrastra Creek within this section. Section 17 would be rested from livestock grazing until riparian improvement objectives are met. This proposal would have a direct impact on the term lease by placing 27 AUMs in suspension leaving 91 active AUMs for the remaining portions of BLM lands within the allotment. When riparian recovery objectives are met, the suspended 27 AUMs would be placed as active use. Arrastra Creek and section 17 would be authorized for livestock grazing. Estimated Cost is $3,168.

Section 17 – Spring Development: Upon the reauthorization of grazing in section 17, a spring development and small riparian fence exclosure would be constructed to provide livestock access to water and prevent livestock trampling of the spring source. Impacts to upland vegetation within the vicinity may remain the same as in the past or may slightly increase due to the easier access to water. Estimated project cost is $4,764.

Section 21 – Water Well Development: A well would be drilled in the NWNE portion of section 21 along an existing road to provide an additional water source for livestock. Providing a water source in this location would allow livestock to range further in southward in areas that have had limited or light use in the past. Livestock impacts to upland vegetation in section 21 and 22 are expected to increase. Estimated cost to the lessee is figured to be between $18,000 and $36,000. The cost is based on the nearest established well ENE of proposed site is at approximate elevation of approximately 4,531’ with a well depth of 140’ deep. Elevation of proposed well is approximately 5,111’. Consulting with BLM Engineer Kent Satterlee, well cost is estimated at $60/foot for drilling the well only and does not include: pump, drop pipe, power source, pipeline, stock tank, valves, storage tank, etc.

Additional terms and conditions would be implemented on the lease to facilitate and guide future livestock management operations. Key upland grass forage and browse on woody plants would be limited up to 50% utilization. This would reduce future impacts on these species compared to past grazing practices. Riparian terms and conditions would allow limited livestock use and improve riparian conditions in the future. The one day livestock trailing term in section 17 at the beginning and end of

the season would have minimal impacts due to the time limit and restricted trailing route on the main road.

4.2.7.3 Alternative C

Alternative C would allow livestock grazing on all historical leased lands with the exception of the majority of section 17 west of main Arrastra Creek which would not be within the allotment boundary and not available for livestock use. Under this alternative the total active preference would be adjusted to 61 AUMs. The additional terms and conditions would be the same as listed under alternative B. The direct and indirect impacts from livestock under the terms and conditions are the same as analyzed under Alternative B.

Range improvements under this alternative include the following:

Section 5 SE Boundary and Section 21 Northern Boundary – Electric Fence: Approximately 0.5 miles of new electric fence would be constructed to hold livestock in section 5. This action would enhance the control of livestock within this area and prevent drift into other areas of the allotment. Approximately 3 miles of new electric fence would be constructed along the southern portion of the allotment. The fence would provide a physical barrier to livestock and to prevent access to BLM lands in section 21 and a major portion of section 22. In addition, the construction of this fence would prevent livestock drift down slope toward highway 200 and would require extra stress panels due to topography (Slight to moderate slopes). Some points of where the fence would be installed are clear and accessible by road; other areas would require heavy brushing and light/moderate tree felling. Estimated cost is $39,320.

Section 17 – Jack Leg Fence: A permanent jack leg fence would be installed along the east side of Arrastra Creek, by connecting to the two existing aspen exclosures and to include a separate fence extension at the north end of the existing northern aspen exclosure. Estimated Cost is $3,168.

Implementation of fences mentioned above would have direct impacts to vegetation due to possible livestock trailing along the fence lines. Some livestock trailing may be more noticeable in low, flat lying areas due to ease of movement and livestock behavior. It is expected with the construction of these fences that it would improve livestock herd management and improve management for upland vegetation.

4.2.8 Issue 9: Winter Range Forage Availability and Livestock Depredation

The analysis area for Alternatives A, B, and C direct and indirect impacts are limited to BLM lands within the specific alternative allotment boundary. The temporal scale for each alternative is 10 years, which is the length of time of the life of the grazing permit before review for the next renewal.

4.2.8.1 Alternative A – No Action

The existing grazing lease would be renewed with existing allotment management. The allotment would include: BLM, FS, DNRC, and private lands. Grazing would occur on 2,924 acres of BLM lands. Section 17 would be grazed by livestock. Livestock grazing would not be permitted on elk winter range. Mandatory terms and conditions include: 24 cattle, 96 AUMs, a season of use of 06/01-09/30.

Cattle grazing would be permitted in Section 17 (640 acres). Resource specialists at the MiFO have identified a number of impacts related to cattle grazing in Section 17. Approximately 300 acres of aspen and shrubs have been enhanced for wildlife in the last three years through silvicultural treatments. Browsing from cattle has impacted aspen and shrub restoration. Three jackleg fences have been constructed in the last three years on 50 acres of riparian habitat. Fences were constructed to exclude cattle from impacting riparian habitat and vegetation in Grasshopper Meadow of the West Fork of Arrastra Creek, and along the main stem of Arrastra Creek. Shrubs and conifers have been planted in these exclosures. Mechanical damage to streams, seeps, and springs has occurred from cattle trampling. Mountain meadows adjacent to riparian areas are typically over-grazed by cattle, which typically leaves stubble height < 2 inches. White-tailed deer and moose winter range is present; cattle, white-tailed deer, and moose compete for forage.

4.2.8.1.1 Special Status Species

4.2.8.1.1.1 *Grizzly Bear (Threatened)*

Under this alternative, there are no changes to livestock management. Cattle grazing would continue to impact grizzly bears by competing for forage, and increasing the risk of depredation (Dood et al. 2006).

Grizzlies may be displaced from habitat when cattle and lessees are on the allotment from 6/1 to 9/30. The lessees would continue to have access behind locked gates and could displace grizzlies. The risk is greatest from 6/1 through 8/31 when open road density is 3.02 mi/mi^2; risk of displacement decreases on September 1 when road densities drop to 0.20 mi/mi^2. The greater the open road density, the greater the long-term displacement, and the greater potential for bear mortality. Montana Department of Fish, Wildlife, and Parks (FWP) recommends an open road density for grizzlies at <1 mi/mi^2 (Dood et al. 2006). Prey species may be displaced by cattle.

Livestock would compete with bears and the bears prey base for forage. Jacoby et al. (1999) concluded that in the NCDE, diets for adult grizzly females and sub-adults grizzly diets were 100% and 94% plant matter, while male diets were 77% plant matter and 33% meat. Over grazing of grasses and forbs, and browsing of shrubs, Section 17 in particular, reduces forage for grizzlies and their prey; repeated cattle grazing at the current level of use could result in a change of plant community composition over the long-term. Preferred plant forage species such as rough fescue and bluebunch wheatgrass, decreases with repeated cattle grazing (Steve Bell, personal communication. Prey species may be affected by changes in plant communities. In contrast, grizzlies may displace cattle, influence how cattle use the allotment, and may cause weight loss in adults and calves.

As the NCDE grizzly bear population increases the potential for cattle depredation may increase. Direct impacts may occur from cattle depredation. Grizzly bears may kill cattle. The allotment would be occupied by cattle the first two weeks of June when elk, deer, and moose are birthing. Grizzlies prey on big game calves and fawns, which may make livestock calves more vulnerable to depredation. Anderson et al. (2002) studied grizzly bear-cattle interactions in the Yellowstone Ecosystem and found that of 182 cattle deaths on two grazing allotments, grizzlies killed 51 calves and six adults. Knight and Judd (1983) reported that grizzlies rarely killed cattle when they coexisted around Yellowstone National Park. Claar

et al. (1986) proposed that most grizzlies were not cattle depredators. Grizzlies exhibit a wide variety of behaviors and may or may not result in cattle depredation. To date, there are reports of cattle depredation by grizzlies in the allotment.

4.2.8.1.1.2 *Canada Lynx (Threatened)*

Direct impacts to lynx would not occur for the following reasons: the area is not considered occupied by the Canada lynx; there are no verified reports of Canada lynx or this species reproducing; there is no Lynx Analysis Units (LAU); there is no critical habitat in the allotment; long-term grazing in the Arrastra Creek allotment has not appreciably altered snowshoe hare habitat; and habitat (cover and forage) for snowshoe hares would be available post-livestock grazing.

The snowshoe hare makes up a large portion of the Canada lynx diet and this species has habitat within the allotment and the surrounding area; however, the area is not considered occupied by the Canada lynx nor are there records verifying such.

The Marcum Mountain area was assessed in 2000 for LAU designation using the *Canada Lynx Conservation Assessment and Strategy* (LCAS) criteria for LAU designation, which recommends an area to be >25,000 acres in non-contiguous, naturally fragmented habitat (Ruediger et al. 2000). Based on the review, it was determined the area (Marcum Mountain is <25,000 acres) is too small to support a female lynx home range and that potential habitat was patchy.

Depredation on cattle is not anticipated because Canada lynx do not prey on cattle.

Indirect impacts would not occur. Livestock grazing would not impact snowshoe hare or Canada lynx habitat. Shrubs and conifers would provide adequate browse for summer and winter snowshoe hare forage, respectively.

4.2.8.1.1.3 *Wolverine (Candidate)*

Direct impacts would not occur. The Arrastra Creek Allotment is located below 5,500 feet. Copland et al. (2007) found a positive correlation between increasing elevation and wolverine presence. In this study, wolverines favored high elevations above 7,200 feet in whitebark pine during summer. Wolverines may not be present on the allotment during summer. Wolverines are not known to prey on cattle. Indirect impacts would not occur. Wolverine may be present during winter when cattle are not present on the allotment. Habitat conditions for prey species and carrion would be available for wolverine during winter.

4.2.8.1.1.4 *Gray Wolf (Sensitive)*

Under Alternative A, livestock management would remain the same. Direct impacts to the Arrastra Creek Wolf Pack may include: denning in early June (when cattle are released into the allotment, which may disrupt wolf reproduction and productivity); displacement or abandonment from foraging, denning, and rendezvous sites; prey base displacement (elk, deer, and moose); and utilization of pack territory (Laporte et al. 2010).

Indirect impacts from livestock grazing such as altered plant communities and how prey base (elk, deer, and moose) utilize the allotment may occur.

In contrast, wolves may displace cattle, influence how cattle use the allotment, and may cause weight loss in adults and calves (Laporte et al. 2010). Although wolves feed primarily on big game animals, they occasionally prey on cattle. Depredation of cattle has occurred on private land in the area and has resulted in one member of the pack being lethally removed (Liz Bradley personal communication 2013). Depredations have not occurred on BLM lands, but potential depredations may occur.

4.2.8.1.2 Big Game Species

4.2.8.1.2.1 *Elk, moose, mule deer, white-tailed deer, and black bear*

Big game impacts are similar by species and are therefore analyzed together.

Under this alternative, impacts from current authorized cattle grazing within the Arrastra Creek allotment and the lands grazed under historical use would continue. Impacts anticipated to continue are: altered plant communities; forage competition; decreased forage quality; displacement; and declining population trends.

Repeated cattle grazing at current levels over many years may alter plant community composition due to continued removal of vegetation biomass and overgrazing of flora species preferred by big game. Alteration of plant community composition could make the allotment and surrounding landscape less desirable for big game. Elk and black bears would compete more with cattle for forage than deer and moose.

Reduced forage, caused by yearly livestock grazing, may alter big game behavior. Big game may be displaced from areas previously grazed by livestock. As vegetation recovers from livestock grazing, big game would return to these areas for foraging opportunities.

Elk and deer populations in Marcum Mountain are experiencing downward population trends. Elk migrate to summer range a few weeks after allotment on-date. Space may be compromised for elk and deer while birthing, which peaks during the first two weeks of June.

4.2.8.2 Alternative B – Proposed Action

The alternative was developed to address the purpose and need and incorporate input from the lessee. The allotment would include: BLM, FS, DNRC, and private lands. Grazing would be authorized on 4,105 acres of BLM lands. Analysis of direct and indirect impacts is limited to BLM lands within the Alternative B allotment boundary. Mandatory terms and conditions include: 23 cattle, 115 AUMs, a season of use of 06/01-09/29. Section 17 would be rested until the riparian area recovered. Resting Section 17 would make 91 AUMs active for Alternative B. Section 17 would be reauthorized for grazing when riparian areas have recovered. Livestock grazing after riparian area recovery is likely to again result in impacts.

Alternative B would permit livestock grazing on 1,044 acres of elk winter range. Elk winter range is located in T12N, R10W, Section 21 (480 acres), Section 22 (384 acres), Section 27 (20 acres, and Section 27 (160 acres). Approximately 40 acres of the winter range is managed as crucial winter range.

Alternative B crucial winter range is located in T14N, R10W, Section 21 (20 acres) and Section 28 (20 acres). Livestock grazing on crucial winter range may impact grizzly bears, gray wolves, elk, and other big game.

Proposed spring developments would increase cattle grazing in Sections 17 and 21. The permanent spring proposed for development in Section 17 has previous cattle damage, such as trampling of banks and shrub browsing. The meadow above the spring development and the seeps and springs below the proposed spring development may be impacted by cattle browsing, grazing, and mechanically damaging the riparian area. The proposed spring development located in Section 21, which is elk winter range, may be impacted by livestock. The spring development would augment grazing impacts to winter range by attracting cattle.

Installation of an electric fence may not prevent cattle, especially calves, from leaving the allotment. If cattle leave the allotment and forage on winter range, less forage would be available for big game. The electric fence would not be a barrier to grizzlies, wolves, and big game.

4.2.8.2.1 Special Status Species

4.2.8.2.1.1 *Grizzly Bear (Threatened)*

The effects for displacement of the grizzly bear and cattle, forage competition, and cattle depredation are similar to those described in section 4.2.8.1.1.1.

Under this alternative, there are changes to livestock management in the Arrastra Creek Allotment. Changes in terms and conditions, range improvements (fence and water developments), resting section 17, and stream/riparian restoration would be implemented. Additional BLM lands in winter range would be added to the allotment.

New or revised conditions would be added to the lease for livestock and administrative management. Implementation of the terms and conditions would benefit the forage (prey base and plants) conditions in the area. The FWS updated the *Missoula Field Office (MiFO) Incidental Take Statement for Backlog Consultation Biological Opinion for grizzly bears* (USDI-FWS 2012) with the following terms and conditions pertaining to livestock grazing permits: 1) The lessee is required to notify the BLM, as soon as practical, of any grizzly bear livestock depredation or conflicts, and 2) The lessee is required to properly treat or dispose of livestock carcasses to eliminate any potential attractant for grizzly bears. The lessee is required to comply with the 2006 *BLM Missoula Field Office Food/Attractant Storage Strategy for Conservation of the Grizzly Bear and other Wildlife* strategy.

Fences would not be a barrier for grizzlies. Grizzlies would be able to cross the electric fence along the eastside of Section 17 without problems (Jamie Jonkel personal communication 2013).

Resting Section 17 would improve habitat conditions for grizzlies by removing the impacts of cattle grazing (displacement, completion for forage and space, and depredation). Resting Section 17 would reduce the AUMs of Alternative B (115 to 91 AUMs), below the AUMs proposed in Alternative A (96

AUMs). This would provide more forage for wildlife. Reauthorizing cattle grazing once Section 17 has recovered would again reduce forage available for wildlife.

Indirect impacts would occur from cattle grazing on elk winter range. Big game may be displaced from winter range as a result of previous cattle grazing in spring, summer, and fall. If big game is displaced from winter range, then there may be less winter kill for grizzlies to scavenge in spring.

Marcum Mountain is summer/fall grizzly bear habitat. Grizzlies den in Marcum and when emerging in spring move to lower elevations and big game winter range located outside of the stream/riparian restoration sites. Effects to grizzly bears are considered minor.

4.2.8.2.1.2 *Canada Lynx (Threatened)*

The direct and indirect effects under this alternative are the same as described in section 4.2.8.1.1.2.

4.2.8.2.1.3 *Wolverine (Candidate)*

Direct impacts would not occur and are similar to Alternative A.

4.2.8.2.1.4 *Gray Wolf (Sensitive)*

Under Alternative B, livestock management would be adjusted; however, the direct and indirect effects would be the same as those described for Alternative A.

The proposed fences (electric, jackleg, and barbed wire) under this alternative would not be a barrier for wolves. Dropdown locations along the proposed fences should be identified to provide better winter big game movement and less fence damage from big game.

Cattle grazing during spring, summer, and fall on winter range would reduce forage and affect big game use. Big game species may be displaced and wolf activity may diminish as a result of prior livestock grazing on winter range.

Resting Section 17 would enhance cover/forage conditions for big game species, which would enhance prey base conditions for wolves. As wolf pack members increase, the potential for cattle depredation may increase.

4.2.8.2.2 Big Game Species

4.2.8.2.2.1 *Elk, moose, mule deer, white-tailed deer, and black bear*

Alternative B big game impacts would be similar by species and are therefore analyzed together.

Under this alternative, livestock management would be adjusted by including additional terms and conditions, adjusting the allotment boundary, installing range improvements (springs and fences), and implementing restoring projects for riparian and aquatic habitat. Grazing intensity levels (96 AUMs) are the same as Alternative A.

Impacts described in section 4.2.8.1.2.1 are the same under this alternative.

Impacts to big game in section 17 would be reduced due to the area west of main stem Arrastra Creek being rested until it meets riparian recovery objectives. Resting section 17 from cattle grazing would benefit big game by removing competition for forage and space as well improving the quality of preferred forage flora species.

Livestock grazing would be permitted on elk winter range and may result in less than suitable forage conditions on elk winter range. Winter range previously grazed by cattle lowers productivity and compromises the quality and quantity of forage for elk and deer. If areas previously grazed by livestock do not recover before winter, big game may move to less desirable locations. Repeated livestock grazing big game winter range over many years may alter plant community composition making the landscape less desirable for big game.

The Marcum-Face, west and north of Mineral Hill and east to Paterson Prairie is managed as elk winter range (8,351 acres). A portion of the winter range is managed as elk crucial winter range (3,215 acres). Alternative B addition of Sections 21, 22, 27, and 28 (T14N, R10W) represents livestock grazing on 1,044 acres (13% of total) of available elk winter range. Elk crucial winter range for Alternative B is 40 acres (1% of total) and is located in Section 21 (20 acres) and Section 28 (20 acres). Since the Arrastra Creek elk herd is < 100 head and in a downward population trend, livestock grazing on elk winter range may compound impacts by lowering the elk population. Mule deer and white-tailed deer are experiencing low population numbers, with white-tails showing an upward trend.

Riparian and aquatic habitat restoration may cause temporary displacement of big game.

Electric fences and other fences may be a barrier for big game, which disrupts movement and causes fence damage. Dropdown locations would be established to facilitate big game movement and result in less big game fence damage. Dropdown sections would be located along ridges, saddles and riparian areas.

4.2.8.3 Alternative C

Alternative C was developed to address the purpose and need, as well as the resource issues identified in response to the proposed action. The allotment would include: BLM, FS, DNRC, and private lands. Grazing would be authorized on 2,291 acres of BLM lands, which is 633 acres fewer than are grazed under Alternative A, and 1,814 less acres as Alternative B. Analysis of direct and indirect impacts is limited to BLM lands within the Alternative C allotment boundary. Mandatory terms and conditions include: 15 cattle, 61 AUMs, a season of use of 06/01-09/30. Four sections of unleased BLM lands totaling 1,096 acres would be added to the allotment in Alternative C. Most of Section 17 would be closed to livestock grazing except for 100 acres east of Arrastra Creek. Livestock grazing would not be authorized on elk winter range.

4.2.8.3.1 Special Status Species

4.2.8.3.1.1 *Grizzly Bear (Threatened)*

Under this alternative, there are changes to livestock management in the Arrastra Creek Allotment. Changes in terms and conditions, range improvements (fences), removing section 17 from grazing, and stream/riparian restoration would be implemented.

The effects for displacement of the grizzly bear and cattle, forage competition, and cattle depredation are similar to those described in section 4.2.8.1.1.1. Effects for changes in terms and conditions, range improvements (fence and water developments), and stream/riparian restoration would be the same as described in 4.2.8.2.1.1.

The west side of Arrastra Creek would be removed from cattle grazing. Removing this portion of section 17 would increase forage and space for grizzlies.

Indirect impacts would occur. Alternative C would not authorize cattle grazing on elk winter range, which may be important for this declining elk herd. Big game would utilize winter range without the reduced forage impacts of cattle grazing thus big game may not be displaced from winter range. Winter killed elk and deer may be available for grizzlies to scavenge once they emerge from dens in the spring.

4.2.8.3.1.2 *Canada Lynx (Threatened)*

The direct and indirect effects under this alternative are the same as described in section 4.2.8.1.1.2.

4.2.8.3.1.3 *Wolverine (Candidate)*

Direct impacts would not occur and be similar to Alternatives A and B.

4.2.8.3.1.4 *Gray Wolf (Sensitive)*

Under Alternative B, livestock management would be adjusted; however, the direct and indirect effects would be the same as those described for Alternative A. The effects of fences proposed are the same as those described in Alternative B.

Alternative C would not authorize cattle grazing on elk winter range. Not permitting cattle grazing on elk winter range maybe important for this declining elk herd. Big game would utilize winter range without the impacts of cattle grazing. Elk and deer would be available for wolves to hunt and scavenge during winter.

Eliminating section 17 would enhance cover/forage conditions for big game species, which would enhance prey base conditions for wolves.

4.2.8.3.2 Big Game Species

4.2.8.3.2.1 *Elk, moose, mule deer, white-tailed deer, and black bear*

Alternative C big game impacts are similar and species are therefore analyzed together.

Under this alternative, livestock management would be adjusted by including additional terms and conditions, adjusting the allotment boundary, installing range improvements (springs and fences), and

implementing restoring projects for riparian and aquatic habitat. Grazing intensity levels (61 AUMs) would be less than Alternatives A and B.

The area west of main Arrastra Creek in section 17 and big game winter range would not be authorized for grazing. Eliminating these areas from grazing would provide more forage and space for big game, improve forage quality, benefit elk and deer productivity. Not permitting cattle grazing would meet FWP winter range objectives: Winter range should be available, relatively intact, and allow a population to survive the winter in adequate body condition to maintain average reproductive rates for population objectives.

Not permitting cattle grazing in Sections 21, 22, 27, and 28 (T14N, R10W) represents 1,044 acres of winter range being available for elk and deer. Since the Arrastra Creek elk herd is < 100 head and in a downward population trend, not permitting livestock grazing on winter range would mitigate impacts and may stabilize the elk population.

The effects of fence installation (electric and jackleg) and restoration projects are the same as described in Alternative B.

4.2.9 Monitoring and/or Compliance

4.2.9.1 Compliance Monitoring

Monitoring within the allotment (i.e. livestock counts, utilization, etc.) would be conducted to ensure compliance with the terms and conditions of the proposed action. When forage utilization levels approach forage limits, the lessee would be notified and instructed to move cattle to an area with additional forage, or if any grazing use term is met or exceeded within the last portion of the allotment, livestock shall be removed from BLM administered lands for the remainder of the grazing season.

Riparian and streambank surveys using the MIM protocol would be conducted by the BLM to monitor changes in bank alteration, stubble height, and browse of shrubs by livestock along those portions of Arrastra and West Fork Arrastra that are open to livestock grazing.

4.2.9.2 Effectiveness Monitoring

In uplands, per RMP guidance, the pace (USDI-BLM 1969) transect method would be utilized to assess long-term trends in native species composition and foliar cover. Other BLM approved methods may be used in place of or in addition to these methods.

Using the MIM protocol, the following long-term indicators would be measured before and after the grazing season along Arrastra Creek and West Fork Arrastra Creek: streambank stability; streambank cover; and greenline to greenline width.

5 CUMULATIVE IMPACTS

"Cumulative impacts" are those impacts resulting from the incremental impact of an action when added to other past, present, or reasonably foreseeable actions regardless of what agency or person undertakes such other actions.

5.1 Issue 1: Habitat for Aquatic Special Status Species

It is appropriate to use watershed boundaries when addressing cumulative impacts because land management activities throughout an entire watershed can result in adverse impacts and changes to riparian and instream habitats. The degree of management within a watershed is an index of the potential to experience adverse effects to aquatic resources (USDA-FS 1993). As a general rule, the probability to experience adverse effects increases as the percentage of the watershed affected by management increases.

The cumulative effects analysis boundary for fish and other aquatic species for the Arrastra Creek Allotment Grazing Lease Renewal is the Arrastra Creek watershed (16,201 acres) and face drainages (6,934 acres) to the Blackfoot River located in the allotment (Figure 5-1).

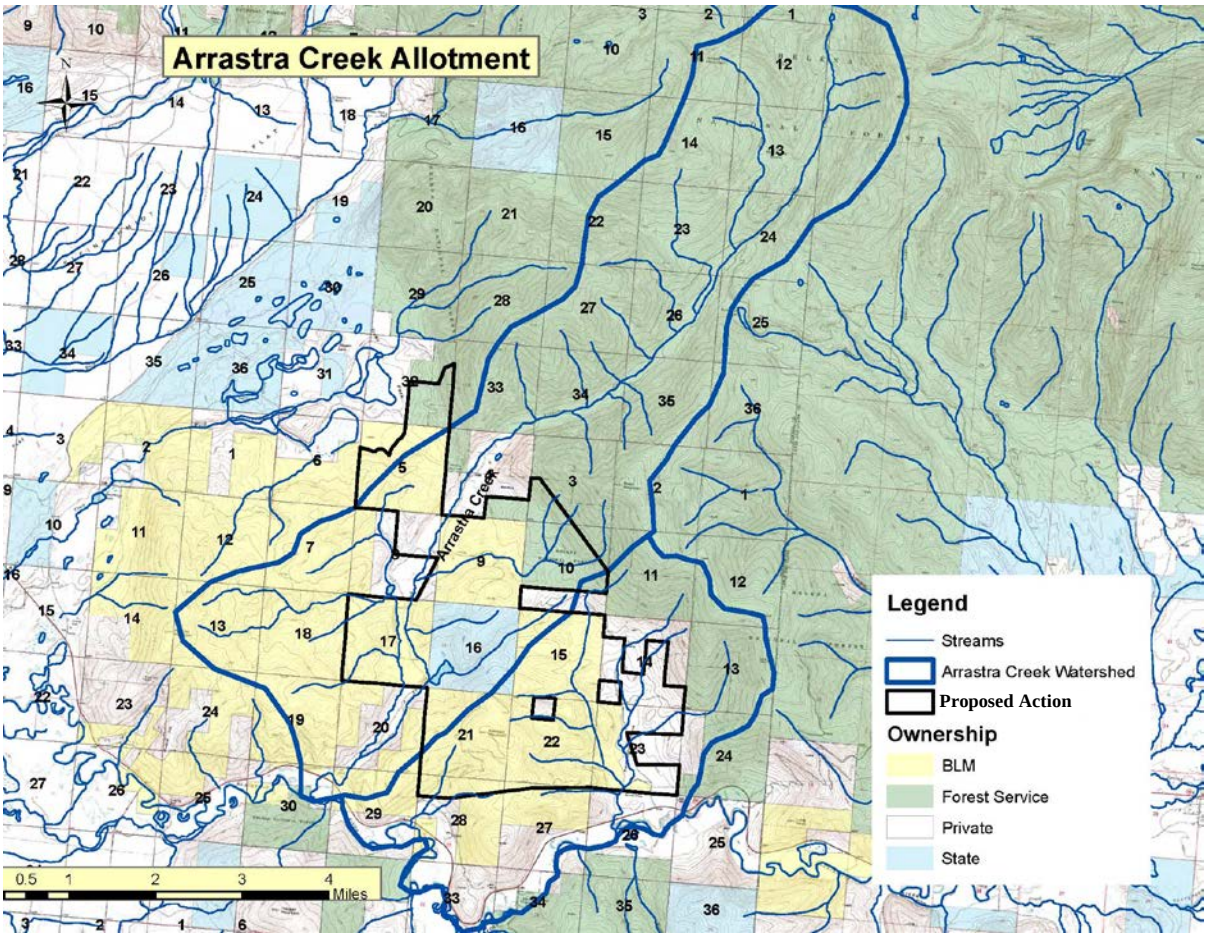

Figure 5-1. Arrastra Creek Watershed.

The Arrastra Creek allotment is located in the Arrastra Creek watershed, a 16,201 acre watershed that drains into the Blackfoot River at river mile 88.8. Land ownership in the watershed consists of 4,593 acres of BLM, 9,529 acres of Forest Service, 1,439 acres of private lands and 640 acres of State managed lands.

The Arrastra Creek Allotment is also located in face drainages to the Blackfoot River (Figure 5-1). Within these face drainages, there are 2,776 acres of BLM, 1,468 acres of Forest Service, and 2,990 acres of private lands.

Land use in the watershed consists of commercial timber harvest and associated roading, livestock grazing, and recreation.

Various land-use and management activities can affect fish and aquatic habitats. Although the activities themselves may differ, the environmental changes they produce generally affect fish and aquatic habitats in similar ways. The effects of increased sedimentation on spawning gravels, for example, will be the same whether the sediment resulted from road construction, timber harvest, livestock grazing or mining. The same is true for other habitat variables such as water quality, temperature, quantity and distribution of instream cover, channel morphology, and dissolved oxygen concentrations (Meehan et al. 1991).

Undisturbed forest and rangelands typically have low rates of erosion and sedimentation (Stednick 2010), because much of the precipitation falls as snow, soil infiltration rates are relatively high, riparian vegetation protects streambanks, and rates of mass wasting are typically low. However, land management activities have the potential to alter the nature of sediment delivery from upslope and in riparian areas, increasing the rate of sedimentation in perennial and fish-bearing streams. In particular, unpaved roads can present a major source of sediment affecting stream channels (Elliot 2000). Roads have lower infiltration rates and can generate increased runoff over bare surfaces, factors that can lead to increased flow and more sediment from altered hillslopes reaching channels.

Riparian areas occupy only 0.5 to 2.0 percent of the landscape in the western U.S., yet they are disproportionately important for maintenance of water quality and quantity (water storage and aquifer recharge), habitat for aquatic and terrestrial biota, sediment retention, and streambank building and maintenance. Because stream-riparian corridors are located at the lowest point within drainage basins, they are vulnerable to the effects of land use conducted upslope and upstream in the watersheds. In the past, undesirable changes in riparian areas and instream habitats have resulted from unsustainable management or the failure to recognize linkages among streams, riparian areas, and uplands. Ongoing issues surrounding the management of riparian areas in the western U.S. include the impacts of forest harvest, livestock grazing, road construction, inadequate road maintenance, and recreation on the structure and function of riparian ecosystems (NCASI 2005). More recently, increasing interest has focused on the influence of natural disturbances such as wildland fire and insect outbreaks, altered hydrologic regimes (dams and diversions), and fuel reduction treatments on riparian and instream characteristics and functions.

The geology of a watershed determines background levels of sediment supplied to the streams as well as the sensitivity of the watershed to management activities. Arrastra Creek is comprised of glacial outwash material that is characterized by a high percentage of rock and low moisture and nutrient holding capacity. Streambanks comprised of porous outwash soils with low cohesion are friable and are therefore more susceptible to erosion from management activities.

5.1.1 Timber Harvest

Timber harvest may change the distribution of precipitation that reaches the ground (and the evaporation rate from the ground), the amount that is intercepted or evaporated by foliage, and the amount that can be stored in the soil. These hydrologic properties, as well as the density of road or surface drainage networks and the physical structure of the soil, govern the rate and pathways of movement of water to stream channels (Meehan et al. 1991).

The watershed and cumulative effects from removal of trees and associated yarding and roading can change the rates of sediment and nutrient delivery as well as altered levels of temperature and dissolved oxygen. Harvest activities upslope can alter soil structure as soils are disturbed, exposed to the elements and compacted. Cutting trees can reduce soil strength by eliminating root structures and yarding can expose mineral soil to accelerated surface erosion. The effects of these activities to instream habitats are especially noticeable when they are immediately adjacent to stream channels.

Streamside vegetation stabilizes streambanks and channels, provides cover and maintains stream temperatures. When streamside vegetation is removed, summer water temperatures generally increase. The breakdown of streambanks is among the most persistent results of riparian timber harvesting.

Many of the BLM lands recently acquired in the Arrastra Creek watershed and face drainages to the Blackfoot River were previously managed for commercial timber harvest. Many of these acres have been previously logged, including clear-cutting and thinning. Roughly 3,000 of the 4,593 acres of BLM in the Arrastra Creek watershed have been previously harvested at various intensity levels. The majority of acres were treated before 1985 so many stands on BLM have older forest regeneration between 30-50 years, reducing the risk of increased run-off and sedimentation to stream channels. One of the exceptions is along the mainstem of Arrastra Creek where forest regeneration is still in the early stages.

Timber harvest also occurred on roughly 600 acres of private land and 400 acres of State managed land in the lower part of the Arrastra Creek watershed as well as on approximately 1,200 acres of Forest Service lands in the upper part of the watershed.

As with in the Arrastra Creek watershed, BLM acquired lands in the face drainages to the Blackfoot River have also been previously managed for commercial timber harvest. Of the 2,776 acres of BLM in this area, roughly 2,000 have been harvested (at various levels of intensity) with the majority of harvest occurring before 1995. Most of the acres have forest regeneration between 20-50 years and are of an age and size where the risk of increased run-off and sedimentation has likely declined.

Timber harvest also occurred on roughly 400 acres of Forest Service managed lands and 1,100 acres of private lands in the face drainages of the Blackfoot River.

Although many acres of BLM lands in the Arrastra Creek watershed and the face drainages to the Blackfoot River have been previously harvested, and timber harvest is currently occurring on 105 acres of BLM lands, future commercial timber harvest on BLM lands is not expected to occur in the foreseeable future. Thinning previously harvested stands is expected to continue but the effects of

thinning would be expected to be beneficial to aquatic habitats by promoting stand development and improving riparian conditions.

Timber harvest recently occurred on State managed lands so it is not expected that additional timber harvest would occur on State lands in the foreseeable future. Timber harvest on private or Forest Service lands could be expected to occur.

5.1.2 Roads

There are roughly 76 miles of road in the Arrastra Creek watershed (road density of 3 mi/sq. mi) with the majority of the roads located in the lower half of the watershed.

There are roughly 53 miles of road in the face drainages to the Blackfoot River (road density of 4 mi/sq. mi) with the majority of the roads located on BLM, private and State lands.

Roads can harm fish and aquatic habitats due to the sediment supplied to streams. Culverts on roads can be barriers to fish migration and movement (Meehan et al. 1991). Roads within riparian areas can also reduce the amount and availability of shade and large woody material to streams.

There are no culverts that are barriers to fish on BLM lands in the watershed. The BLM is not proposing any new road construction in the foreseeable future. It is not expected that the State would construct new roads in the foreseeable future but new road construction could occur on Forest Service or private lands.

5.1.3 Livestock Use

The effects of livestock use were documented under the Environmental Impacts section (Refer to Section 4.2.1). Livestock grazing would continue on Federal, State and private lands in Arrastra Creek and the face drainages to the Blackfoot River.

5.1.4 Water Quality

Arrastra Creek is on the State 303d list and aquatic life was identified “partially supported” due to sedimentation/siltation. The source of sediment was listed as agriculture, road runoff, and streambank instability/modifications. Siltation was found to be more pronounced in downstream reaches.

Runoff from roads was found to contribute sediment to Arrastra Creek and tributaries. Other sediment loading sources include eroding banks and hillslope erosion from timber harvesting and/or grazing was also identified as reducing water quality and habitat for aquatic species. The TMDL established the following management needs: noxious weed management, establishment of riparian buffer zones and healthy riparian vegetative cover, and replacement of undersized culverts which affect fish migration and limit the stream’s sediment transport potential. The TMDL established the following goals: Healthy aquatic invertebrate and periphyton communities, decreased levels of fine sediment on the streambed, restoration of channel morphology, and healthy riparian community.

Under a Memorandum-of-Understanding with Montana DEQ (2010c), BLM agreed to help meet water quality goals by managing nonpoint sources of pollution through the use of best management practices,

soil and water conservation practices, and restoration. To improve water quality, the BLM addressed pollutant sources or pollutant-causing management practices on the public lands by:

Repairing and maintaining culverts and road ditches in West Fork Arrastra Creek (completed in 2011).
Installing a livestock exclosure on West Fork Arrastra Creek in Grasshopper Meadow (0.5 mile of stream) (completed in 2011).
Installing two livestock exclosures on 0.5 mile of Arrastra Creek in Section 17 (completed in 2012 and 2013).

To improve fish distribution in the Arrastra Creek watershed, a culvert that blocked fish passage on BLM lands on Arrastra Creek was removed and replaced with a bridge in 2005.

5.1.5 Alternative A – No Action

The No Action Alternative would contribute to the on-going effects of high road densities, past and future timber harvest, and current and future livestock grazing more than the action alternatives in the Arrastra Creek watershed.

Because the face drainages along the Blackfoot River are either intermittent or ephemeral systems, the risk of sediment delivery from past or future timber harvest, roads, or livestock grazing are expected to be minimal to the Blackfoot River. Although sediment delivered to these intermittent and ephemeral systems could eventually move downstream to the Blackfoot River, the contribution of sediment would be expected to be slower and less over the long-term than in streams with perennial flow. Continued livestock grazing in the face drainages to the Blackfoot River would be expected to have negligible cumulative impacts to occupied fish-bearing habitat downstream in the Blackfoot River under all alternatives.

Under the No Action Alternative, livestock grazing would continue without restrictions in riparian areas of the Arrastra Creek watershed. This would result in direct and indirect cumulative effects in the watershed by maintaining a source of chronic and potentially high level of sediment to Arrastra Creek. High sediment loads would be long-term and deposited immediately adjacent to eroding banks as well as to downstream habitat for bull trout, westslope cutthroat trout and for other species in Arrastra Creek and, potentially, the Blackfoot River.

The State of Montana, the Blackfoot Challenge and the Conservation Strategy for Bull Trout on USFS Lands in Western Montana (2013) all identify elevated sediment levels as an issue for fish (including threatened bull trout) and other aquatic species in the Arrastra Creek watershed. The Conservation Strategy for Bull Trout on USFS Lands in Western Montana (2013) states that "the primary benefit to bull trout in this watershed could be derived from nonnative fish control in the lower reaches below the National Forest, correcting any flow issues that may be present due to irrigation, removing a potential culvert barrier on nonfederal lands, improving pool conditions on non-federal lands, and *adjusting grazing practices on both BLM and nonfederal lands.*" The No Action Alternative would not move towards meeting the goal of adjusting grazing practices on Federal Lands to improve habitat for aquatic species.

The No Action Alternative would continue to contribute to long-term direct and indirect cumulative effects in the Arrastra Creek watershed by preventing recovery of riparian vegetation, allowing continued bank erosion and preventing restoration of riparian and instream conditions.

5.1.6 Alternative B – Proposed Action

Alternative B would allow recovery of riparian and instream conditions of Arrastra Creek and maintain healthy, productive and stable riparian and instream habitats in the allotment. Because of this, Alternative B would contribute to improving watershed conditions and function. Although there may always be higher background levels of sediment in Arrastra Creek due to the geology of the watershed and from persistent sediment sources on private lands, high road densities and historic upslope timber harvest in the watershed, chronic sedimentation from bank erosion on BLM lands would be substantially reduced under Alternative B. This would move towards meeting goals identified in the Conservation Strategy for Bull Trout on USFS Lands in Western Montana (USDA-FS 2013) and toward meeting the BLM's Rangeland Health Standards.

Allowing recovery of riparian and instream habitats in Section 17, mandatory Terms and Conditions, adaptive management and restoration activities would reduce long-term, chronic sediment delivery in the Arrastra Creek watershed.

Alternative B would contribute to long-term beneficial cumulative effects in the Arrastra Creek watershed by allowing recovering of riparian vegetation, reducing bank erosion and restoring riparian and instream conditions.

5.1.7 Alternative C

Like Alternative B, Alternative C would allow recovery of riparian and instream conditions in the Arrastra Creek watershed and maintain healthy, productive and stable riparian and instream habitats. Because of this, Alternative C would contribute to improving watershed conditions and function.

Excluding the majority of Arrastra Creek and all of West Fork Arrastra Creek on BLM lands in the allotment from livestock grazing along with restoration activities would move towards improving watershed function and condition and reduce adverse cumulative effects. Alternative C would allow for long-term recovery and maintenance of healthy, productive and stable riparian vegetation as well as stabilize stream banks and improve the quality of instream habitats.

This alternative would move towards meeting the goal of reduced sediment loading to the stream more than the other alternatives. Only 0.16 mile of Arrastra Creek would be available to livestock grazing and mandatory Terms and Conditions as well as annual monitoring and adaptive management of the allotment would be expected to minimize sediment delivery to this section of the stream.

Alternative C would contribute to long-term beneficial cumulative effects in the Arrastra Creek watershed by allowing recovering and maintenance of riparian vegetation, reducing bank erosion and restoring riparian and instream conditions. The beneficial effects would be greater than under Alternative B.

Table 5-1. Fisheries effects comparison.

Effects	Alternative A No Action	Alternative B Proposed Action	Alternative C
Direct Effects to Bull Trout	Moderate to substantial direct adverse effects to bull trout from livestock use on up to 0.26 mile of spawning habitat. ESA determination "*May Affect, Likely to Adversely Affect*"	No direct adverse effects from livestock grazing to bull trout.	Same as Alternative B
Indirect Effects to Bull Trout	Moderate to substantial indirect adverse effects from livestock use along 0.26 mile of spawning habitat. ESA determination "*May Affect, Likely to Adversely Affect*"	Minor indirect adverse effects from livestock use on up to 0.16 mile of spawning or potential spawning habitat. ESA determination "*May Affect, Not Likely to Adversely Affect*"	Same as Alternative B
Direct Effects to Westslope Cutthroat Trout	Minor to substantial direct adverse effects from livestock use on up to 2.16 miles of spawning or potential spawning habitat.	Minor direct adverse effects from livestock use on up to 1.54 miles of spawning or potential spawning habitat.	Minor direct adverse effects from livestock use on up to 0.16 mile of spawning habitat
Indirect Effects Westslope Cutthroat Trout and Other Aquatic Species	Moderate to substantial indirect adverse effects from loss of riparian vegetation and bank erosion along 2.16 miles of creek as well as indirect adverse effects to downstream habitats.	Minor indirect adverse effects from loss of riparian vegetation and bank erosion on up to 1.54 miles of stream.	Minor indirect adverse effects from loss of riparian vegetation and bank erosion on up to 0.16 mile of stream.
Beneficial Effects	No beneficial effects.	Beneficial effects to 0.26 mile of bull trout spawning or potential spawning habitat. Restored riparian vegetation and reduction of sediment along 2.16 miles of stream would improve bull trout and westslope cutthroat habitats, including downstream habitats.	Same as Alternative B. In addition, 2 miles of stream would be fully protected from even minor adverse effects to riparian vegetation and sediment generation due to livestock use.

5.2 Issue 2: Conifer Restoration

5.2.1 Alternative A – No Action

No cumulative effects to the forest resources are anticipated as a result of the No Action alternative.

5.2.2 Alternative B – Proposed Action

No cumulative effects are anticipated as a result of the proposed action alternative with the installation of sub-item 3 in section 2.3.3.1.

5.2.3 Alternative C

No cumulative effects are anticipated as a result of Alternative C.

5.3 Issue 3: Invasive, Non-native Vegetation Management

There are a number of activities within the allotment and adjacent areas that could result in the spread of invasive/non-native species into and out of the allotment (Table 5-2). The Missoula Field Office's Integrated Weed Management Plan (BLM 2008) includes a number of prevention activities as well as mitigation measures for fence construction and other ground disturbing activities.

Table 5-2. Effects comparison of the alternatives on invasive, non-native vegetation.

Effects	Alternative A No Action	Alternative B Proposed Action	Alternative C
Direct effects to noxious weeds	Slight direct effect on noxious weed populations. Continued management under Missoula Field Office IPM plan.	Moderate to substantial direct effect to noxious weed populations. Increase in grazing acres from 2,924 (historical) to 4,105 acres and 5 ¾ miles of fence construction.	Slight to moderate direct effect on noxious weed population increase grazing acres from 2,924 acres to 2,291. ¾ mile of Jack leg fence 3½ miles of electric fence.
Indirect effects	Slight direct effect on noxious weed populations. Continued management under Missoula Field Office IPM plan.	Slight to moderate indirect effect on noxious weed populations.	Slight direct effect on noxious weed populations. Continued management under Missoula Field Office IPM plan.

Recreational uses such as hunting, fishing and off road use would have an impact on noxious weed populations. Recreation activities have the potential to spread noxious weeds from roads and trails into non-infested areas by seeds being transported by vehicles, foot traffic, and dispersed recreation.

Right of way use and maintenance of power line corridors would further increase the spread of noxious weeds into and out of the allotment under the proposed action. Power line corridors have the potential to spread noxious weeds not only from adjacent lands but from areas outside the region by maintenance equipment and vehicles.

Areas within the allotment and surrounding area have had roadside and aerial herbicide treatments done by the BLM and other agencies (Federal and State) to control and prevent weed establishment. Collectively, the active weed management (past, present, future) done in the area by the BLM and other agencies is anticipated to reduce weeds as a whole in the area.

5.4 Issue 4: Dispersed Camping and Hunting

No cumulative effects are expected from any of the action alternatives.

5.5 Issues 5 and 6: Streams and Riparian Conditions, Water Quality

5.5.1 Effects of past and present actions

Livestock use along stream resulted in trampling, bank caving, browse of riparian shrubs, lowered bank stability, and sediment delivery from bank erosion on 1 mile of Arrastra Creek.

Past (1960's) timber harvest along stream removed trees and reduced rooting along the banks, resulting in lowered bank stability and likely sediment delivery increases from bank erosion on about .7 miles of Arrastra Creek.

Two vehicle ford crossings on Arrastra Cr have localized road-width effects (about 50 feet total) on bank stability, erosion, and sediment delivery.

Road drainage maintenance has had no effects evident on riparian areas, but has reduced sediment delivery from road surfaces and drainage structures.

Riparian exclosures (2012, 2013) eliminated bank trampling, caving, and browse by livestock on .53 miles of stream. Long-term bank stability is likely to improve, and likely to reduce long-term sediment delivery.

Present timber harvests and thinning are not located near streams due to Montana SMZ and INFISH design features.

5.5.2 Effects of Reasonably Foreseeable Future Action's

Ongoing road drainage maintenance would continue to have no observable effects to streams or riparian areas. The maintenance would indirectly reduce sediment delivery hazards associated with drainage capture and mass failure. Maintenance would keep road drainage structures functioning in order to avoid road erosion and sediment delivery.

5.5.3 Alternative A – No Action

Past and present actions are included in the existing condition baseline for direct and indirect effects. The past, present, and RFFA's would combine with Alt A. to result in:

a 42% reduction in sediment-producing banks subjected to livestock use.
2.17 of 2.67 miles (81%) in PFC

5.5.4 Alternative B – Proposed Action

Past and present actions are included in the existing condition baseline for direct and indirect effects. The past, present, and RFFA's would combine with Alt B. to result in:

62% reduction in sediment-producing banks subjected to livestock use. (0.53 miles plus 0.24 miles out of 1.25 miles of mainstem Arrastra Creek)
2.4 of 2.67 miles (90%) in PFC, or progressing toward PFC within exclsoures. The remainder moving toward PFC with annual use standards.

5.5.5 Alternative C

Past and present actions are included in the existing condition baseline for direct and indirect effects. The past, present, and RFFA's would combine with Alt C. to result in:

A 100% reduction in sediment-producing banks subjected to livestock use.
100% of riparian in PFC, or progressing toward PFC, removed from grazing use.

5.6 Issue 7: Lewis and Clark National Historic Trail

5.6.1 Effects of past and present actions

Timber harvest, road building including the building of Highway 200, and other developments (i.e. powerlines, railroad) have obliterated the LCNHT in many places. Much of this was done prior to federal laws and regulations that protect and preserve cultural resources. In addition, much of the trail was on private property.

Because of current federal laws and regulations and because the BLM acquired a significant portion of the Lower Blackfoot Corridor, the LCNHT is better protected and present actions on public land typically do not negatively affect it because impacts are either avoided or mitigated (i.e. visual design features).

5.6.2 Effects of Reasonably Foreseeable Future Action's

On public land, the LCNHT would continue to be protected and preserved and impacts from future actions would be avoided or mitigated.

5.6.3 Alternative A – No Action

Past, present, and RFFA's combined with Alternative A would not result in any cumulative effects to the LCNHT.

5.6.4 Alternative B – Proposed Action

Past, present, and RFFA's combined with Alternative B would result in another development near the LCNHT although visual intrusions would need to be mitigated.

5.6.5 Alternative C

Past, present, and RFFA's combined with Alternative C would not result in any cumulative effects.

5.7 Issue 8: Upland Vegetation

The cumulative effects assessment area for upland vegetation is the allotment boundary for each alternative. The analysis period for cumulative effects is 10 years, at which time resource conditions would be re-assessed and additional modifications of management would occur at the end of that period if necessary.

The effects of past and present actions of livestock grazing have resulted in the direct removal of biomass. Forage utilization has varied in previous years from light to heavy grazing use. Historic logging and rehabilitation efforts may have introduced non-native grass species such as smooth brome and Timothy which has changed the species composition in several areas.

5.7.1 Alternative A – No Action

The cumulative effects of livestock grazing in the reasonable and foreseeable future under this alternative are the continuation of upland vegetation removal. Livestock grazing would relatively remain unchanged during the life of the term lease. Key grass species (i.e. rough fescue, bluebunch wheatgrass, mountain brome) would be subject to various levels of grazing use. Continuation of forage use levels under this alternative has the potential to reduce populations of native key grass species selected by livestock.

5.7.2 Alternative B – Proposed Action

It is expected under this alternative that the implementation of range improvement projects in combination with specific terms and conditions would improve livestock herd management and sustained yield of vegetative resources. The electric fences would provide some containment for the livestock herd. Spring developments would allow a greater distribution of livestock over an area. Livestock forage utilization would increase in sections 21 and 22 due to the well development and close proximity to water. However, implementation of the terms and conditions would regulate the use of available forage in these areas.

5.7.3 Alternative C

The cumulative impacts under this alternative are similar to those of Alternative B. Constructing electric fences provides barriers for herd containment and herd management. The terms and conditions are the same as in Alternative B and provides for management of vegetative resources. AUMs are reduced under this alternative.

No cumulative impacts from grazing are expected in section 17, 21, or 22 because these areas would be fenced to prevent access by livestock.

5.8 Issue 9: Winter Range Forage Availability and Livestock Depredation

The cumulative impacts analysis boundary is the BLM, state, and private lands in the Marcum Mountain area. The analysis boundary was selected based on the area having the largest block of BLM lands, with a one mile buffer (see mule deer class, page 52). The temporal scale is 10 years, which is the timeframe when the grazing lease would be renewed.

For over 100 years, private timber companies have owned every other section and harvested the area for timber. Land ownership over this time period included: Northern Pacific Railroad, Anaconda Timber Company, Champion International Corporation, and Plum Creek Timber Company (PCTC). Over the last several years, the lands in the area have changed ownership from PCTC to TNC. Through the Blackfoot Legacy land exchange (see section 1.2 for land acquisition discussion), the BLM acquired lands from TNC and Private Owners in the area. The Helena National Forest and Montana Department of Natural Resource and Conservation own lands within the allotment and the surrounding area.

Over time the area has been subjected to vegetation management such as timber harvesting and associated activities (road building, pre-commercial thinning, etc.), fuels treatments (prescribed burning, WUI fuels reduction), travel management, and grazing.

The analysis area has been subjected to recent mountain pine beetle outbreaks that have affected both lodgepole and ponderosa pines. Wildfire has occurred in the area in the past.

Reasonably foreseeable future actions on all lands in Marcum Mountain include: Timber harvest, pre-commercial thinning, prescribed burning, road closures, livestock grazing, wild-land urban interface fuels treatments, and scientific research.

5.8.1 Alternative A – No Action

5.8.1.1 Special Status Species

5.8.1.1.1 Grizzly Bear (Threatened)

Under this alternative, the effects for displacement of grizzly bear and cattle, forage competition, and cattle depredation are similar to those described in section 4.2.8.1.1.1.

Past timber harvest and associated road construction by private timber companies resulted in impacts to grizzly bears. Loss of hiding and thermal cover, and the effects of open road density, reduced grizzly bear presence in Marcum. Most of the private timberland sections were clearcut from section corner to section corner. Timber stand improvement by private timber companies often included aerial spraying to kill shrubs that competed with conifers for growing space; as a result, berry producing shrubs that grizzlies depend on, were reduced on the landscape. Vegetation management coinciding with livestock grazing has impacted the grizzly bear.

Wildfire contributed to forest structure and has had a positive effect on grizzly bear summer habitat. Huckleberries, serviceberries, and other berries are plentiful as a result of past wildfires. Grasses and forbs with underground tubers would be enhanced and grizzlies would benefit. Wildfire has had a positive impact on grizzly bears.

Elk winter range would not be permitted for grazing under Alternative A in the allotment and is also not authorized in the Sawmill Creek allotment. However, grazing is authorized on winter range in the Ward Creek (1,120 acres) and Marcum Mountain (1,950 acres) allotments; grazing in these allotments may impact winter range for mule and white-tailed deer by reducing potential forage. Overall, cattle grazing on the Arrastra Creek, Marcum Mountain, Sawmill Creek, and Ward Creek allotments would diminish

forage for bears in the area. Grizzly bear behavior may have been influenced by repeated years of cattle grazing and may avoid the allotments during the cattle grazing season-of-use.

Lodgepole pine mountain pine beetle mortality occurring in the past decade has increased huckleberry production, which has had a beneficial effect on grizzly bear summer forage. Pine beetle mortality functions similarly to wildfires by opening the overstory to sunlight and increasing water availability for understory vegetation utilized by bears. Increased large woody debris from snags falling over provides hiding cover, thermal cover, and a variety of insects for bears to feed on.

The effects of Alternative A, when combined with past, present, and reasonably foreseeable future actions has been determined to "***May affect, but is not likely to adversely affect the grizzly bear and its habitat***".

5.8.1.1.2 Canada Lynx (Threatened)

Direct and indirect effects would not occur. Therefore, cumulative effects would not occur. Alternative B would have "no effect" to Canada lynx and their habitat.

5.8.1.1.3 Wolverine (Candidate)

Direct and indirect effects would not occur. Therefore, cumulative effects would not occur. Alternative A is not likely to jeopardize the continued existence of the wolverine.

5.8.1.1.4 Gray Wolf (Sensitive)

Timber harvest and road building occurred in the past and contributed to loss of hiding and thermal cover, and den and rendezvous sites for wolves; these past actions changed how elk, deer, and moose prey base used the Marcum Mountain area (including the allotment) as a whole. Hiding and thermal cover recovery from these actions coupled with increased conservation management of wolves, improves preferred den and rendezvous sites which in turn favors wolf recovery. Vegetation management has impacted the gray wolf.

Road systems are managed; however, the summer open road density is 3.02 mi/mi^2. The summer road density level impacts how the prey base (elk, deer, and moose) utilizes the area which in turn impacts gray wolves.

Wildfire has occurred in the area and has contributed to forest structure. Because of this, the forest structure has had a positive effect on the gray wolf.

As discussed in section 3.4.9, there are four allotments in the Marcum Mountain area. Livestock grazing during summer on all four allotments has had impacts on wolves. The presence of cattle on the four allotments may exacerbate potential cattle depredations and diminish forage for the wolf's prey base (elk, deer, and moose). Elk and other big game would be displaced from productive summer areas when cattle and lessees are present. Elk and deer are giving birth at the time cattle are on the allotments. Wolves prey on elk calves and deer fawns and may prey on livestock calves. Livestock grazing may impact gray wolves.

When combined with the effects described in section 4.2.8 and subsequent sections, the aforementioned past, present and past, present, and reasonably foreseeable future actions would result in cumulative effects to the gray wolf.

5.8.1.2 Big Game Species

5.8.1.2.1 Elk, moose, mule deer, white-tailed deer, and black bear

Big game impacts are similar by species and are therefore analyzed together

Direct and indirect impacts would occur (see direct and indirect impacts section). Direct impacts include: big game displacement when cattle are on the allotment and the potential to disrupt big game reproduction. Indirect impacts are related to potential changes in plant community composition affecting how big game utilize the allotment and Marcum Mountain. Direct and indirect impacts from cattle grazing have resulted in impacts to big game.

Timber harvest occurring in the past may have contributed to loss of hiding and thermal cover for elk, deer, moose, and black bears and changes in how big game used the area. Hiding and thermal cover recovery has occurred and presently the allotment and Marcum Mountain provide suitable big game cover and forage. Wildfire has contributed to forest structure and has had a positive effect on big game habitat.

Open road density prior to the RMP (1986) was 3.62 mi/mi^2 on BLM lands and 5.13 mi/mi^2 on all ownerships. When road management was implemented in Marcum after 1986 open road density was reduced to: spring and summer, 3.02 mi/mi^2; fall, 0.20 mi/mi^2, and winter, 1.63 mi/mi^2. Road management is currently an improvement over the pre-1986 era, but open road density falls short of FWP recommendations, which is <1 mi/mi^2 (Dood et al. 2006). Open road density of 3.02 mi/mi^2 during summer has impacted the elk and other big game.

Marcum Mountain has four cattle allotments (no other allotments): Arrastra Creek, Marcum Mountain, Ward Creek, and Sawmill Creek. Marcum Mountain and Ward Creek Allotments permits cattle grazing on elk and other big game winter range. Elk winter range would not be permitted for grazing under Alternative A. Sawmill Creek Allotment is not permitted to graze on elk winter range.

Cattle grazing on the Arrastra Creek, Marcum Mountain, Sawmill Creek, and Ward Creek Allotments would diminish big game forage. Cattle grazing in Section 17 would have an impact on big game. Elk and other big game would be displaced from productive summer areas when cattle and lessees are present. Elk and deer are giving birth at the time cattle are on the allotments, which may impact big game production. Livestock grazing during summer on all four allotments has impacted big game.

Vegetation management, open road density, and livestock grazing have impacted big game, such as elk, deer, moose, and black bears. The effects of Alternative A, when combined with these past, present, and reasonably foreseeable future actions, would result in cumulative effects to big game and their habitat.

5.8.2 Alternative B – Proposed Action

5.8.2.1 Special Status Species

5.8.2.1.1 Grizzly Bear (Threatened)

The effects for displacement of the grizzly bear and cattle, forage competition, and cattle depredation are similar to those described in sections 4.2.8.1.1.1 and 4.2.8.2.1.1. Past, present and reasonably foreseeable future actions associated with timber harvest, road construction, open road density, pre-commercial thinning, and livestock grazing are similar to those described in 4.3.8.1.1.1.

Alternative B would permit cattle grazing on elk winter range. Alternative B would result in cattle grazing on approximately 4,114 acres (49%) of elk winter range. Elk winter range not grazed by cattle would be 4,237 acres (51%). Authorizing cattle grazing in winter range would leave the Sawmill Creek allotment as the only allotment without grazing in winter range in the analysis area. The presence of cattle on the four allotments may exacerbate potential cattle depredations and may have cumulatively influenced how grizzly bears utilize habitat in Marcum Mountain. Authorizing cattle grazing on elk winter range, with the additive impacts of livestock grazing on Marcum Mountain and Ward Creek Allotments, would lower the carrying capacity for elk and deer, which would decrease potential winter range carrion for spring scavenging.

Section 17 would be rested and available for livestock grazing once permit terms and conditions would be achieved. Impacts to the grizzly bear would be reduced during the rest period; however, impacts would increase when cattle are allowed to graze in the rested area.

The water developments would have wildlife impacts. The water development proposed in Section 17 would degrade riparian habitat once cattle resume grazing. The water development in Section 21 would compound elk winter range issues by attracting cattle.

When the effects of Alternative B are combined with past, present, and reasonably foreseeable future actions, it has been determined to "***May affect, but is not likely to adversely affect the grizzly bear and its habitat***". The U.S. Fish and Wildlife Service concurred with this determination on February 6, 2014.

5.8.2.1.2 Canada Lynx (Threatened)

Direct and indirect effects would not occur. Therefore, cumulative effects would not occur. Alternative B would have "no effect" to Canada lynx and their habitat.

5.8.2.1.3 Wolverine (Candidate)

Direct and indirect effects would not occur. Therefore, cumulative effects would not occur. Alternative B is not likely to jeopardize the continued existence of the wolverine and their habitat.

5.8.2.1.4 Gray Wolf (Sensitive)

Cumulative effects from past, present, and reasonably foreseeable future actions (vegetation management, road density, and livestock grazing) are similar to those discussed in section 4.3.8.1.2.1.

As discussed in section 3.4.9, there are four allotments in the Marcum Mountain area. Alternative B would authorize cattle grazing on elk winter range; therefore, increasing the amount of winter range already utilized in the area and decreases available forage for the prey base. Cattle may avoid preferred foraging areas due to wolf pack activity.

Section 17 would be rested and available for livestock grazing once recovery criteria for the riparian area has been achieved. The effects of authorizing section 17 for grazing and the proposed water developments are discussed in section 4.2.8.2.

When combined with the effects described in section 4.2.8 and subsequent sections, the aforementioned past, present and past, present, and reasonably foreseeable future actions would result in cumulative effects to the gray wolf.

5.8.2.2 Big Game Species

5.8.2.2.1 Elk, moose, mule deer, white-tailed deer, and black bear

Big game impacts are similar by species and are therefore analyzed together.

Direct and indirect impacts would occur (see direct and indirect impacts section). Direct impacts include: big game displacement when cattle are on the allotment and potential to disrupt big game reproduction. Indirect impacts, related to potential changes in plant community composition, affect how big game use the allotment and the Marcum Mountain area. Direct and indirect impacts have resulted in impacts to big game. Past, present, and reasonably foreseeable future actions associated with timber harvest, road construction, open road density, pre-commercial thinning, and livestock grazing are similar to cumulative impacts, Alternative A, big game (please see for further information).

Marcum Mountain has four cattle allotments. Marcum Mountain and Sawmill Creek Allotments permit cattle grazing on elk and other big game winter range. Alternative B would permit livestock grazing on elk winter range. Sawmill Creek Allotment does not permit livestock grazing on elk winter range. Elk, mule deer, and white-tailed deer populations are lower than FWP objectives. Section 17 would be grazed by cattle once vegetation and stream banks recover. Resource problems may reoccur and impact big game. The Marcum Mountain elk population is <100 head and both deer populations are low, but with an upward trend for white-tailed deer.

Vegetation management, open road density, and livestock grazing have impacted big game, such as elk, deer, moose, and black bears. The effects of Alternative B, when combined with these past, present, and reasonably foreseeable future actions, would result in cumulative effects to big game and their habitat. Expanding the allotment into 1,044 acres of big game winter range under Alternative B when elk and mule deer populations are declining would potentially be a compounding cumulative effect.

5.8.3 Alternative C

5.8.3.1 Special Status Species

5.8.3.1.1 Grizzly Bear (Threatened)

The effects for displacement of the grizzly bear, cattle, forage competition, cattle depredation, and restoration projects are similar to those described in sections 4.2.8.1.1.1 and 4.2.8.2.1.1. Past, present and reasonably foreseeable future actions associated with timber harvest, road construction, open road density, pre-commercial thinning, and livestock grazing are similar to those described in 4.3.8.1.1.1.

Section 17 and elk winter range would not be authorized for grazing, which would reduce impacts to grizzly bears.

Vegetation management, open road density, and livestock grazing have impacted grizzly bears. The effects of Alternative C, when combined with these past, present, and reasonably foreseeable future actions, would not result in the level of cumulative effects associated with alternatives A and B. Alternative C in addition to cumulative effects has been determined to "***May affect, but is not likely to adversely affect the grizzly bear and its habitat***".

5.8.3.1.2 Canada Lynx (Threatened)

Direct and indirect effects would not occur. Therefore, cumulative effects would not occur. Alternative C would have "no effect" to Canada lynx and their habitat.

5.8.3.1.3 Wolverine (Candidate)

Direct and indirect effects would not occur. Therefore, cumulative effects would not occur. Alternative C is not likely to jeopardize the continued existence of the wolverine and their habitat.

5.8.3.1.4 Gray Wolf (Sensitive)

Cumulative effects from past, present, and reasonably foreseeable future actions (vegetation management, road density, and livestock grazing) are similar to those discussed in section 4.3.8.1.2.1.

When combined with the effects described in section 4.2.8 and subsequent sections, the aforementioned past, present and past, present, and reasonably foreseeable future actions would not result in cumulative effects to the gray wolf.

5.8.3.2 Big Game Species

5.8.3.2.1 Elk, moose, mule deer, white-tailed deer, and black bear

Big game impacts are similar by species and are therefore analyzed together

Direct and indirect impacts would occur (see direct and indirect impacts section). Direct impacts include: big game displacement when cattle are on the allotment and potential to disrupt big game reproduction. Indirect impacts, related to potential changes in plant community composition, affect how big game uses the allotment and the Marcum Mountain area. Direct and indirect impacts have resulted in impacts to big game. Past, present, and reasonably foreseeable future actions associated with timber

harvest, road construction, open road density, pre-commercial thinning, and livestock grazing are similar to cumulative impacts, Alternative A, big game (please see for further information).

Marcum Mountain has four cattle allotments. Marcum Mountain and Ward Creek Allotments permit cattle grazing on 3,070 acres (36%) of elk winter range. Alternative C would not permit livestock grazing on elk winter range. Sawmill Creek Allotment is not permitted to graze on elk winter range. Winter range not grazed by livestock would amount to 5,281 acres (64%). Section 17 would not be permitted for grazing, which would reduce impacts to big game.

Vegetation management, open road density, and livestock grazing have impacted big game, such as elk, deer, moose, and black bears. Eliminating grazing in Section 17 and not permitting livestock grazing on elk winter range would have a positive effect on big game. The effects of Alternative C, when combined with these past, present, and reasonably foreseeable future actions, would not contribute to cumulative adverse effects to big game and their habitat as much as Alternatives A and B.

6 CONSULTATION AND COORDINATION

6.1 Introduction

The issue identification section of Chapter 1 identifies those issues analyzed in detail in Chapter 4. The critical elements table in section 3.3 provides the rationale for issues that were considered but not analyzed further. The issues were identified through the public and agency involvement process described in sections 6.2 and 6.3 below.

Persons, Groups, and Agencies Consulted

Table 6-1. List of all Persons, Agencies and Organizations Consulted for Purposes of this EA.

Name/Affiliation (if any)	Purpose & Authorities for Consultation or Coordination	Findings & Conclusions
U.S. Fish & Wildlife Service (US FWS): Katrina Dixon (ESA Consultation Biologist) and Dan Brewer.	Information on Consultation, under Section 7 of the Endangered Species Act (16 USC 1531).	The USFWS concurred (February 6, 2014) with the BLMs determination that the proposed action is not likely to adversely affect the grizzly bear. The USFWS also concurred (February 5, 2014) on BLMs determination that the proposed action may affect, but is not likely to adversely affect the bull trout.
Montana State Historic Preservation Office (SHPO)	Consultation for undertakings, as required by the National Historic Preservation Act (NHPA) (16 USC 470)	No cultural resources have been located in the area. A Class III cultural resource inventory will be conducted.
Confederated Salish and Kootenai Tribes	Consultation as required by the American Indian Religious Freedom Act of 1978 (42 USC 1531) and NHPA (16 USC 1531)	A meeting was held on March 14, 2012 to describe and discuss the concerns of the Tribe concerning the proposed action. No concerns were brought forth at that time. Consultation will occur on all future projects.
U.S. Army Corps of Engineers	Apply for 124 and/or 404	Application for permits will be submitted

Montana Department of Fish, Wildlife & Parks	permits for projects that may impact water ways.	upon the NEPA decision.
Montana Department of Fish, Wildlife & Parks: Jay Kolbe (Wildlife Population Manager); Liz Bradley (Wolf Biologist); Jamie Jonkel (Grizzly Bear Biologist).	Consult with MTFWP as the agency with expertise on impacts on game species. Consultation on stream channel modification (124/404 permit).	Data and analysis regarding big game species incorporated into Chapters 3 and 4.
U.S. Fish and Wildlife Service – Dan Brewer, Fishery Biologist	Information on Consultation, under Section 7 of the Endangered Species Act (16 USC 1531).	Field Trip on 11/13/13 to discuss project effects on bull trout and address bull trout Section 7 ESA consultation issues.

6.2 Summary of Public Participation

During preparation of the EA, the public was notified of the proposed action by posting on the Field Office NEPA Register on December 31, 2012. The process used to involve the public included notice on the NEPA register and a formal comment period that included mailings to the interested public, Federal, State, County, and Tribal governments and agencies. A 15 day public comment period is being offered because of the nature of the project.

6.3 List of Preparers

Name	Title	Responsible for the Following Section(s) of this Document
John Hill	Natural Resource Specialist	Preparer, Special Status Plants
Steve Bell	Range Management Specialist	Range and Range Vegetation
Steve Flood	Hydrologist	Riparian, Water Quality, Soil
Jim Sparks	Wildlife Biologist	Wildlife
Sarah LaMarr	Fisheries Biologist	Fisheries
Maria Craig	Recreation	Recreation
Lonna Sandau	Realty Specialist	Lands and Realty
Joshua Jackson	Forester	Forest Vegetation
Ken Cook	Range Technician - Weeds	Non-native, Invasive Vegetation (Weeds)

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Appendix 1: Information Supporting Fisheries Determinations

Arrastra Creek Allotment Rangeland Health Standards and Guidelines

Monitoring data collected from 2008-2012 indicate that Rangeland Health Standards with particular significance to fishes are "not met" on segments of Arrastra Creek subject to livestock grazing. This report includes a description of the data sampling and analysis conducted to support those determinations. *The following is a brief summary. Detailed descriptions of assumptions, sampling methodology, and methods of analysis are available from the Missoula Field Office (MiFO) Fisheries program files.*

PART I Methods

SAMPLING PROCEDURES-DMA MONITORING

In 2008, a "Designated Monitoring Area (DMA) was established on Arrastra Creek within the Arrastra Creek Allotment. The DMA was selected according to criteria in the Multiple Indicator Monitoring protocol (MIM) (Burton *et al* 2011), which the BLM is required by Instructional Memoranda to use on INFISH Category I streams.

Selection of the DMA strictly followed criteria established in the MIM protocol. In 2012, Tim Burton and Evrin Cowley, authors of the MIM Protocol, conducted a field review of MiFO's application of MIM monitoring on Arrastra Creek. Among other things, the review was intended to determine whether the DMA was located appropriately and according to the MIM protocol. After evaluating geomorphic and riparian conditions on Arrastra Creek and MIM procedures as applied by MiFO staff, it was determined that the DMA was located appropriately. Burton and Cowley's detailed report is available from the MiFO Fisheries staff).

MIM protocols have been used annually since 2008 to evaluate streambank and vegetative conditions in the DMA. The following short-term, annual-use indicators of current season's livestock utilization have been collected to track annual utilization along Arrastra Creek and to help explain changes in riparian vegetation and channel conditions over time:

- Stubble height
- Woody species use
- Streambank alteration

Data for annual use indicators were collected 3-5 times per grazing season, including pre-turnout, multiple times within-season, and immediately following removal of livestock.

Staff also collected data from which long term (3-10 years) resource condition information can be derived, including:

- Greenline plant composition
- Streambank stability and cover
- Greenline-to-greenline width

The long term indicators were collected in 2008 and 2012, and were intended to provide data to assess the current condition and trend of streambanks, channels, and streamside vegetation.

LONGITUDINAL SAMPLING

Reach Designation
In order to better interpret/apply the results obtained from sampling the DMA, MiFO fisheries staff conducted detailed quantitative sampling of streambank and channel conditions on all of Arrastra Creek within BLM ownership.

Sampling was conducted using a random stratified sampling design, with strata assigned according to riparian vegetative complex, soil type, channel gradient, valley-bottom width. Evaluation of these indicators revealed that, within the allotment, Arrastra Creek is fairly homogenous with respect to the physical indicators. Thus, the feature determining reach stratification was existing vegetation patterns. These appear to be largely depending on historic land use and livestock accessibility (one exception was Reach 5, where one side of the stream was constrained by a hillslope).

In order to interpret and understand the results of the data collection on the DMA as well as to determine what streambank and vegetative conditions are possible on Arrastra Creek given its glacial history and soil types (e.g., potential natural condition), MiFO fisheries staff identified a "reference reach." The furthest downstream reach of Arrastra Creek within the allotment ("Reach 1") was designated as the Reference Reach. Woody vegetation in this area was not disrupted by logging or roadbuilding, making it very difficult for livestock to access the channel. For that reason, it has experienced very little livestock influence and is therefore representative of the potential vegetation within the physical/geomorphic template of Arrastra Creek. During subsequent sampling and data analysis, differences in observed vegetative parameters and channel conditions between the Reference and Grazed (e.g., "Treatment") reaches would be attributed to the presence/absence of livestock grazing.

During the 2012 review of MIM procedures on Arrastra Creek referenced above, Burton and Cowley also evaluated the validity of MiFO Fisheries staff reach stratification and designation of the proposed Reference Reach. The review determined that the designation of the Reference Reach was valid based on geomorphic and other considerations. Burton and Cowley's detailed report of their evaluation is available from the MiFO Fisheries staff.

Sampling Procedures
In 2012, MiFO fisheries staff conducted a detailed longitudinal survey of streambank/floodplain vegetation, streambank condition, and channel width on the entire length of Arrastra Creek within the allotment. Using the sampling protocols described above, random quadrat-based independent samples of a variety of indicators were collected from each of the delineated reaches. The sampling protocol specified taking a minimum of one sample every ten steps on the greenline; however, the final number

of samples was determined as sampling was carried using a Power Analysis function installed in the data recorder. Power analysis is a statistical tool which calculates the amount of variability that sampling data is generating and calculates/recalculates the sample size required for a 75% confidence interval. If higher levels of variability were encountered, additional samples were taken in order to ensure significance at the 95% confidence level.

During longitudinal sampling, measurements of streambank vegetative and bank conditions were measured according to MIM protocols. Width:depth ratios were calculated according to the PIBO protocol (Heitke et. al. 2008). Channel width was evaluated using the MIM greenline-to-greenline method. Additional details on methods of analysis are given in following sections.

PART II. RESULTS AND S&G DETERMINATIONS

Width-Depth Ratio in balance with landscape setting: Not met.

The presence of a "reference reach" provides insight as to the capability of the "landscape setting." Width:depth ratios and greenline-to-greenline widths were substantially greater in grazed reaches when compared to an ungrazed reference (Table 1). Note: although the S&Gs specify width:depth ratio as an indicator, the greenline-to-greenline width is included because this metric is associated with less observer error and less environmental variation through time than measurement of width:depth (Clary 1999; Burton et. al. 2011).

Table 1. Width-depth ratios and mean greenline-to-greenline width in an ungrazed reference and grazed reaches. Reaches were delineated according to PIBO procedures (Heitke *et al* 2010) and Moore *et al* (2004). Within each reach, mean wetted width calculated from 22-28 randomly selected cross sections.

REACH	REFERENCE	Reach 1[1]	Reach 2	Reach 3[1]	Reach 4
Total Width/Depth Ratio (m)	16.70	26.15	28.63	28.92	20.63
Mean Greenline-to-Greenline Width (m)	6.31 (+/- 0.27)	12.54 (+/- 0.91)	8.45 (+/- 0.42)	9.20 (+/- 0.46)	7.53 (+/- 0.11)

[1]Note: These data do not include the DNRC low-water fords present in these reaches. The ford sites were excluded from sampling.

Amount of altered streambanks: not met.

No numeric standard for streambank alteration has been specified by the Rangeland Health Standards. Scientific literature suggests that annual streambank alteration should be limited to the amount that natural processes of streambank recovery can "repair" during the off season (Cowley 2002; Heitke et. al. 2008; Burton et. al. 2011). The most effective method of determining potential streambank repair potential is to compare measurements of stability along the reach of interest (in this case, reaches subject to livestock grazing) with a comparable reach within a reference area (Burton et. al. 2011). Surveys on Arrastra Creek found 75% of the ungrazed reference met the criteria for "stable bank," while

grazed references reaches were less stable (Table 2). These data suggest that annual streambank alteration is limiting the natural bank repair potential on grazed segments of Arrastra Creek.

Table 2. Comparison of streambank stability between referenced and grazed reaches on Arrastra Creek. Stability metrics collected according to Burton and Cowley (2011) and Winward (2000).

	Reference	Reach 1	Reach 2	Reach 3	Reach 4
Percent stable banks	75	38	39	33	59[1]

[1]The east bank of Arrastra Ck in Reach 4 is bordered by a steep hillslope with a substantial component of rock at the toe).

Woody Debris adequate to dissipate energy: met.

Wood surveys were conducting using a modified Hankin and Reeves methodology (Moore et. al. 2004). Results indicate that large woody debris meeting the INFISH size criteria of > 35' length and >12" diameter in Arrastra Creek totals 29 pieces per mile throughout the BLM-administered reaches. This exceeds the INFISH Riparian Management Objective of 20 pieces/mile.

Reproduction and diverse age structure of vegetation: not met.

The number of woody age-classes were compared between grazed reaches and an ungrazed reference reach using the MIM protocol. The reference reach had a substantially greater percentage of total plants in the seedling category, indicating successful reproduction (Figure 1). The reference reach also had a higher percentage of plants in the young category indicating development towards later seral stages. In contrast, grazed reaches had relatively fewer seedlings (suggesting reduced reproduction) and substantially few young plants (indicating few plants achieve this developmental stage). See Figure 1.

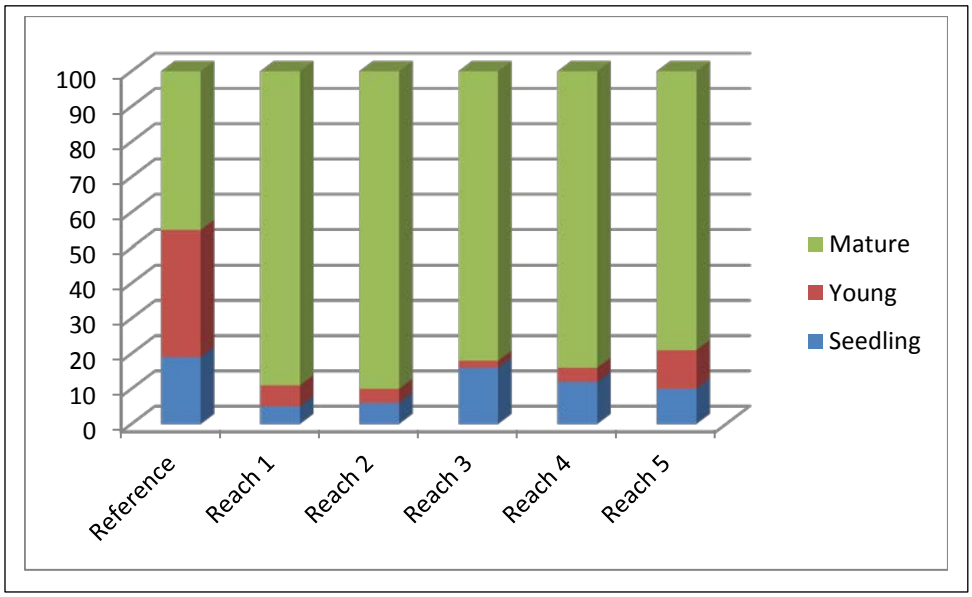

Figure 1. Age-class distribution of woody plants on the greenline in reference and grazed reaches on Arrastra Creek.

Streambank vegetation is comprised of those plants or plant communities that have deep binding root masses capable of withstanding high streamflow events: not met.

Unstable banks were prevalent along all reaches of Arrastra Creek except for the reference reach (Table 2). Because the primary difference between the reaches is vegetative composition, unstable banks in grazed reaches suggests that there are insufficient plants present with deep binding root masses capable of protecting banks from erosion. In particular, those data suggest that there are insufficient "hydric stabilizers," which are streambank/floodplain plant species with deep root masses demonstrated to protect streambanks against streamflow.

To evaluate the bank-protection potential of the current vegetative community, plant composition on the greenline and floodplain were compared against expected communities given channel type and soil composition. The capacity of existing streambank and floodplain vegetation in reference and grazed areas were also evaluated according to Winward's "Riparian Capability Groups," which is another method of determining the amount of vegetatively stabilized banks that may be expected on a given stream type. Finally, the relative abundance of "hydric stabilizer" plants was compared between reference and grazed reaches.

Expected Plant Community

The potential riparian community type along much of the stream in this area is described by Hansen et. al. (1995) as a disturbed *Pseudotsuga menziesii* (Douglas fir)/*Cornus stolonifera* (red osier dogwood) habitat type. The streambanks should have a fairly continuous stand of red osier dogwood, Bebb willow, chokecherry, sandbar willow, Booth's willow, Drummond willow, yellow willow, Woods rose, western serviceberry, and common snowberry. In the reference area, all of the above species are common (with the exception of chokecherry and yellow willow, which are rare or absent). According to Winward's stability classifications, the species which predominate along the reference are highly effective stabilizers.

Hansen et. al. also indicate that a decrease in the shrub community will result in a drier site allowing for snowberry, timothy, Kentucky bluegrass, and smooth brome to increase. As expected, these species comprise much of the greenline along Arrastra Creek outside of the reference area where vegetation is dominated primarily by upland plants, common snowberry, with greater amounts of timothy, Kentucky bluegrass, smooth brome, and a number of forb species. With the exception of snowberry, which is classified as a moderately effective stabilizer, the species that predominate in grazed segments have very low stability ratings.

Bank Stability Potential

"Greenline riparian capability groups" (GRCG) approximates the amount of potentially stable banks that may be expected on a given stream type (Winward 2000). Capability groups provide the amount of late seral riparian community types that may be expected along the greenline on streams that are functioning properly. They are based on the stream gradient and general soil types. Late-seral riparian vegetation communities are deep-rooted and presumed to provide stable streambanks.

According to the Winward protocol, 85+% of the greenline on Arrastra Creek should be represented by late-seral community types when the riparian area is functioning properly.

On Arrastra Creek, plants on the greenline were surveyed and classified as early-, mid-, or late-seral according to classifications by Winward (1989 and 2000) and Burton et. al. (2011). Analysis revealed that 75% of vegetation on the reference reach on Arrastra Creek is comprised of late-seral vegetation, while the percentages of late-seral vegetation on the 4 grazed reaches were lower. See Table 3.

Table 3. Percentage of late-seral plants on the greenline in reference and grazed reaches on Arrastra Creek. Seral stage classifications were assigned according to Winward (2000) and Burton and Cowley (2011).

	Reference	Reach 1	Reach 2	Reach 3	Reach 4
Percent late-seral vegetation	75%	44%	35%	45%	58%

Relative Abundance of Hydric Stabilizers

A combination of stabilizing overstory and understory species provides the highest amount of protection possible from a vegetation standpoint (Winward 1989). Many hydric plants have deep roots and the abundance of hydric species indicates erosion control.

The abundance of hydric species was evaluated in reference and grazed reaches (see Table 4). The reference reach had a greater diversity of hydric species, and a substantially larger percentage of both the understory and overstory on the greenline were comprised of hydric plants. The percentage of banks classified as "stable" are included in Table 4 to illustrate the correlation between abundance of hydric plants and bank stability. Reach 4 is an interesting exception. Although there were relatively few hydric plants, the reach had a greater percentage of stable banks than other grazed reaches. This is due to the prevalence of a steep hillslope on one side of Arrastra Creek where topography excludes livestock and the toe of the slope is armored with bedrock.

Table 4. Percentage of greenline plants classified as "hydric stabilizers" in reference and grazed reaches. Percent stable banks is included to illustrate the correlation between hydric stabilizers and bank stability. Reach 4 is an exception; despite low percentages of hydric stabilizers, it has a relatively high percentage of stable banks due to the presence of a steep hillslope (blocking livestock use) and rock at the toe.

	Reference	Reach 1	Reach 2	Reach 3	Reach 4
Greenline	**66%**	**11%**	**14%**	**10%**	**10%**
Overstory	**70%**	**11%**	**11%**	**2%**	**19%**

Utilization of trees and shrubs: not met.

Shrub utilization has been measured according to Multiple Indicator Monitoring protocols from 2008 to the present. Annual utilization levels in the five years were 44% (2008), 40% (2009), 40% (2010), 51% (2011), and 15% (2012).

Shrub utilization is a short-term indicator of grazing utilization on woody shrubs and does not completely address the Rangeland Health S&Gs which state that "*heavy utilization by livestock and/or wildlife can prevent the regeneration or establishment of woody species and, thus block succession of the plant community toward a later seral stage. As with herbaceous species, excessive use of these woody species may cause their elimination from the site and their replacement by disturbance-induced species or undesirable invaders.*"

As described above (see Figure 1), the percentage of woody plants in the seedling and young categories were fewer than an ungrazed reference, suggesting reduced reproduction and blocking of plant development towards a later seral stage.

Adequate vegetative cover present to protect banks and dissipate energy during high flows: not met.

The percentage of banks classified as "covered" by vegetation, rocks, or large wood were measured in reference and grazed reaches using the MIM methodology. The percentage of banks classified as "covered" were substantially greater in the reference than in the grazed reaches (Table 5). An exception was Reach 4, where the presence of a steep hillslope on the east bank blocked livestock access, protecting existing vegetation. Additionally, there was a substantial bedrock component at the toe which contributed bank cover.

Table 5. Percentage of banks classified as "covered" in reference and grazed reaches.
Cover classifications were assigned according to the MIM protocol.

METRIC	REFERENCE	Reach 1	Reach 2	Reach 3	Reach 4
Percent Covered Banks	79%	41%	44%	36%	61% (rock toeslope)

Measurements of factors that indirectly relate to the presence of adequate vegetative cover discussed previously included:

Streambank stability: fewer stable banks in grazed reaches suggest insufficient cover to prevent bank erosion (Table 2).

Abundance of hydric plants: hydric plants are closely associated with bank stability. There were fewer hydric plants in areas with lower bank stability when compared to the reference (Tables 2 and 4).

Channel dimensions: increased width:depth ratio and greenline-to-greenline widths in grazed reaches where vegetative cover is reduced (Table 1).

Plant communities in the riparian area are an adequate source of large woody debris: not met.

Tree species in the area that could serve as potential large woody debris for Arrastra Creek include conifers (lodgepole pine, Douglas-fir, and ponderosa pine) and cottonwood. Currently, Arrastra meets the INFISH Riparian Management Objectives for large woody debris; however, the wood pieces that make up the bulk of instream wood in Arrastra Creek are very old (remnants of historic logging).

The amount and size of LWD in streams is a function of the age and size of woody material that the riparian forest can contribute. Evidence (stumps along the channel and in the riparian area) indicate that many large conifers were removed from Arrastra Creek during historic logging. The existing stand is relatively young and has not reached the age where trees begin to fall and LWD is contributed to stream channels. Currently, the system is in a transition stage where carry-over debris (left over from the time of logging) is disappearing, and the riparian forest has not yet generated significant new debris. This is not a function of livestock grazing.

Large cottonwoods are also a potential source of woody debris on Arrastra Creek. Although there are some remnant large cottonwoods that will eventually topple and provide woody debris, levels of browse on seedling and young plants appear to be preventing the replacement and future supply of cottonwood woody debris.

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Appendix 2: Comparison of forestland and rangeland productivity and percent composition.

Based on resource conditions of the acquired lands, an assessment of forage productivity for forest and rangeland was conducted to determine a carrying capacity is consistent with BLM grazing standards. The assessment considered soil types, expected vegetation, and a productivity and species composition study.

The Soil Survey of Powell County, Montana (Part II) references each soil type and associated ecological site with expected characteristic plant community and productivity under climax conditions. The soil survey provides an example productivity and species composition comparison of forestland and rangeland.

Current plant communities on BLM land may not reflect characteristic species composition as referenced in the soil survey due to historical management practices and introduced grass species. Comparing preferred grasses and composition of each ecological site, a livestock carrying capacity analysis was calculated using the percent composition and production under a normal year. For example, the 298F Trapps soil (DF/twinflower ecological site) indicates bluebunch wheatgrass has the potential to make up 5% of the species composition. Calculating 5% bluebunch wheatgrass times 500 lbs/acre (normal year production) equals 25 lbs/acre of total production for this grass species. Multiplying 25 lbs/acre by 50% forage utilization equals 12.5 lbs/acre of available livestock forage. The number of acres in the ecological site was multiplied by 12.5 lbs/acre and the product divided by 900 lbs/month livestock forage consumed to determine Animal Unit Month (AUM).

The NRCS National Range and Pasture Handbook provides a guide depicting that a cow with a calf consumes 26 pounds of oven dried weight per day equivalent to 790 pounds of oven dry weight per month (i.e. one AUM). A mature bull is equivalent to 1.35 AUMs consuming 35 pounds oven dried weight per day resulting in 1,067 pounds of oven dried weight of forage per year. The handbook also identifies a cow's forage intake varies with the nutritional level of plants. "In areas where the nutritional plant value is low, the stomach of a mature cow may become large enough to hold 40-50 lbs. of air-dry forage per day to meet the nutritional needs of the animal. In areas where the nutritional level of vegetation is high, the cow's stomach is small because only 20-30 lbs. of air-dry forage is required per day" (NRCS 1997). In consultation with Walter Lujan with the Missoula NRCS, their common practice is to calculate air-dry forage at 915 pounds per month (30 pounds per day) for a cow with calf.

Example:

> 5% bluebunch wheatgrass x 500 lbs/ac normal year = 25 lbs/ac potential production.
>
> 25 lbs/ac x 50% forage utilization = 12.5 lbs/ac of available forage.
>
> 100 acres x 12.5 lbs/ac = 1,250 lbs of total available forage.
>
> 1,250 lbs ÷ 900 lbs/month forage consumed = 1.39 Animal Unit Months.

Using the formula discussed above, calculations were carried forth for BLM lands to determine Animal Units Months (AUMs) within the analysis area. Preferred grass species such as bluebunch wheatgrass, rough fescue, and Idaho fescue, as well as elk sedge were selected to calculate AUMs. Slope and distance from water not calculated for adjustment of AUMs. The table below illustrates the AUMs, by section for each alternative in this EA.

SECTION	**ALTERNATIVE**	**AUMS**
	ALTERNATIVE A	
Section 5		8.94
Section 9		20.06
Section 15		8.63
section 17		28.5
Section 21 NW		1.24
Section 22 NE		2.6
Section 23 W1/2W1/2		19.45
	Total AUMs:	**89.42**
	ALTERNATIVE B	
Section 5		8.94
Section 9		20.06
Section 15		8.63
section 17		28.5
Section 21		13.79
Section 22		8.97
Section 23 W1/2W1/2		19.45
Section 27		0.4
Section 28		6.34
	Total AUMs:	**115.08**
	ALTERNATIVE C	
Section 5		8.94
Section 9		20.06
Section 15		8.63
Section 17		1.65
Section 22 NE		2.6
Section 23 W1/2W1/2		19.45
	Total AUMs:	**61.33**