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ENVIRONMENTAL ASSESSMENT

WAUGH GULCH AND ANDREWS GRAZING ALLOTMENTS

Sula Ranger District, Bitterroot National Forest
Ravalli County, Montana

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CHAPTER 1.0
PURPOSE AND NEED

1.1 INTRODUCTION

The Bitterroot National Forest has prepared this Environmental Assessment (EA) to analyze the environmental effects of various alternatives regarding livestock grazing on the Waugh Gulch and Andrews Grazing Allotments. An important consideration for determining the purpose and need for action on the Waugh Gulch and Andrews Grazing Allotments was the passing of HR 1944. On June 30, 1995, the U.S. Senate passed HR 1944 (also known as the Rescission Bill) requiring each National Forest Unit to establish and adhere to a schedule for the completion of National Environmental Policy Act (NEPA) analysis and decisions on all allotments within the National Forest System unit for which NEPA analysis is needed. The Bitterroot Forest scheduled NEPA analysis for the Andrews and Waugh Gulch grazing allotments for the fiscal year 2003.

The Bitterroot Forest Plan (1987) and accompanying Final Environmental Impact Statement provide direction for all resource management programs and resource activities on the Bitterroot National Forest. The Forest Plan consists of Forest-wide and Management Area specific standards and guidelines for managing resources. Specific direction for managing grazing on the Waugh Gulch and Andrews Allotments is developed through this EA and documented in the Decision Notice (DN). The NEPA process includes identifying environmental issues specific to the proposed actions, considering alternatives to the proposed action, and disclosing the environmental effects. The analysis defines the appropriate level of grazing and identifies resource management needed to meet Forest Plan Standards.

This EA discloses the direct, indirect and cumulative environmental impacts and any irreversible commitment of resources that would result from the proposed action and alternatives. This EA is prepared according to the format established by the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) found in 40 CFR 1500-1508.

1.1.1 EA ORGANIZATION

Chapter 1

Chapter II describes three alternative ways (including No Action) of addressing or resolving environmental issues related to implementation of this proposal, as described in this chapter. The alternatives are displayed so that a comparison can be made of the environmental impacts and effects of each. This chapter also summarizes the development of the alternatives.

Chapter III contains two major sections. One of these sections is labeled “Affected Environment” and describes the current resource conditions of the project area and the effects of past management on each resource. The other section is labeled “Environmental Consequences” and disclosed the environmental effects of implementing the alternatives, using the descriptions in the Affected Environment section as the baseline for measurement. We discuss the direct, indirect and cumulative effects and evaluate the effectiveness of mitigation measures.

The Appendices contain analytical reports, site-specific information or pertinent supplementary documents that add depth and further understanding to the discussions in the main chapters.

The Project File contains background information and data used for the environmental analysis. It is available for review at the Sula Ranger Station, 7338 Hwy 93 South, Sula, Montana.

1.2 PROJECT AREA

The Waugh Gulch and Andrews Allotments make up the project area in the analysis. The project area delineates the geographic boundaries on the allotments as the area within which the proposed action would occur. The analysis area is the total area that resource specialists evaluate to determine the effects of the proposal. The boundaries of the analysis and project areas may or may not be the same depending on the resource and scope of effects. For example, the Fisheries Biologist may analyze data beyond the project area boundary to understand the cumulative effects on fish and their habitat.

The Waugh Gulch-Andrews Project Area covers about 10,520 acres and is located on the Bitterroot National Forest in Ravalli County, Montana (see Vicinity Map). The project area includes all or portions of the West Fork of Camp Creek, Waugh Creek, Maynard Creek, and Andrews Creek watersheds in T1N, R19-20W, and T1S, R19-20W. The area extends from Sula southward for about eight miles.

1.3 PROPOSED ACTION

A "proposed action" is defined early in the project-level planning process. This serves as a starting point for the interdisciplinary team (ID Team), and gives the public and other agencies specific information on which to focus comments. Using public and agency comments (see discussion of Key Issues later in this chapter), and information from preliminary analysis, the ID Team then develops alternatives to the proposed action. These are discussed in detail in Chapter 2.

The proposed action for the Waugh Gulch and Andrews Grazing Allotments is to reauthorize domestic livestock grazing. This includes reissuing a Term Grazing Permit for the project area with a reduced stocking rate and potentially installing several range improvement structures. The action would combine the currently separate Andrews and Waugh Gulch Allotments into one allotment which will simplify administration and enhance the adaptability of grazing management to changing resource conditions. This environmental analysis and proposed action involve only these two allotments. The proposed action complies with Forest Plan direction, the Rescission Bill, and laws, regulation and policy applicable to grazing management.

The initial scoping announcement for this project included mention of the adjacent Warm Springs Allotment which is used by the same permittee holding Term Grazing Permits on the Andrews and Waugh Gulch Allotments. The mention of the Warm Springs Allotment only identified a potential administrative opportunity to facilitate management of the allotments in the area. A current NEPA decision and associated allotment management plan (AMP) for the Warm Springs Allotment will remain unchanged regardless of the alternative selected from this environmental assessment.

More specific information on the proposed action is discussed in Chapter 2.

1.3.1 SCOPE OF THE PROPOSED ACTION

The scope of the Proposed Action is focused on whether grazing domestic livestock on the Waugh Gulch and Andrews Allotments is an appropriate use of the project area and if management activities will meet the Forest Plan standards and guidelines within a reasonable timeframe. If the responsible official selects an action alternative, implementation of the activities specifically identified in the alternative would begin

after all appeal regulation processes are met. No additional NEPA analysis and documentation would be required to reissue the grazing permit or implement the allotment management plan.

The scope of the analysis also includes cumulative effects of grazing management and past, present and reasonably foreseeable future activities on the resources of the project area. These include past harvesting and road construction, future timber harvesting, reforestation, and associated activities in the reasonably foreseeable future.

1.3.2 DECISIONS TO BE MADE

The Sula District Ranger, the responsible official, will decide whether grazing is appropriate on the Waugh Gulch – Andrews Grazing Allotment and, if so, the appropriate grazing strategies and practices based on the analysis in this Environmental Assessment. The decision will be documented in a Decision Notice with a Finding of No Significant Impact (DN and FONSI, respectively). The decision involves analyzing reasonable alternatives to the proposed action and the environmental effects of the proposed action and alternatives to achieve the goals of the Forest Plan. This EA and its supporting project file contain the necessary and pertinent information needed for the responsible official to make an informed decision. The Bitterroot National Forest Supervisor has delegated authority to the Sula District Ranger to reissue term grazing permits and approve allotment management plans. The decision will include:

- whether to approve livestock grazing on the Waugh Gulch-Andrews Allotment
- the amount of forage that livestock can consume on the project area and achieve resource objectives
- the necessary structural and/or non structural improvements
- the appropriate monitoring to determine the achievement of management objectives

1.4 PURPOSE AND NEED FOR ACTION

1.4.1 NEED FOR THE PROJECT

In 1995, Congress passed the Rescission Bill (Public Law 104-19, Section 504a), which required National Forests to schedule and complete NEPA analysis on all allotments where needed to support permitted grazing activity. After the Fires of 2000, the Bitterroot National Forest revised its schedule to reanalyze the Waugh and Andrews Allotments in 2003. The Bitterroot National Forest must respond to the direction Congress has given by completing the environmental assessment and accompanying allotment management plans for these areas. Livestock grazing is an authorized ongoing activity on the Waugh and Andrews Allotments.

Annual monitoring and trend monitoring results are compiled periodically and evaluated on these allotments. From this information, and other knowledge of the area, changes are proposed in site-specific grazing management in order to achieve the long-term desired conditions described in the Bitterroot Forest Plan. These changes should be considered for inclusion in an updated Allotment Management Plan.

1.4.2 PURPOSE FOR THE PROJECT

Some small sites along the West Fork of Camp Creek and its unnamed tributaries and a ten-acre riparian site along Waugh Creek were negatively affected by cattle prior to the recent change in permit holder (see Affected Environment section for Fisheries and Hydrology). An exclosure fence along a westslope

cutthroat trout occupied segment of Waugh Creek was constructed in 1997 to reduce domestic livestock impacts to fish habitat. A change in the permittee for the Waugh Gulch Allotment has created the opportunity to apply more progressive management tactics in the project area, such as those shown in the proposed action.
The purpose of the proposed action is:

- To comply with the Rescission Bill
- To define the appropriate level of grazing, identify resource protection needed to meet Forest Plan Standards and initiate or maintain improving resource condition trends where needed.

1.4.3 RELATIONSHIP TO FOREST PLAN

National Forest planning takes place at several levels: national, regional, forest and project. An EA is a project-level analysis. Its scope is confined to addressing the significant issues and possible environmental consequences of the project. It does not attempt to re-address decisions made at higher levels. It does, however, implement direction provided from those higher levels.

The Forest Plan embodies the provisions of the National Forest Management Act, its implementing regulations and other guiding documents. The Forest Plan sets forth, in detail, the direction for managing the land and resources of the Bitterroot National Forest. This EA tiers to the Forest Plan and FEIS where appropriate (40 CFR 1502.20).

The Forest Plan, based on the various considerations addressed in the Final EIS, guides all natural resource management activities and establishes standards for the Bitterroot National Forest. The Forest Plan delineates Management Areas (MAs) which respond to Forest goals and objectives and provide management standards to meet those goals and objectives. The Bitterroot Forest Plan is available at all four District Offices, the Bitterroot National Forest Supervisor's Office, and the Northern Region Office in Missoula, Montana.

A. Forest Plan Management Areas

The Forest Plan uses management areas to guide management of the national forest lands within the Bitterroot National Forest. Each management area provides for a unique combination of activities, practices and uses. The project area contains lands assigned to Management Areas 1, 2, 3a, 3b, and 8a. Management Areas are shown on Map 1-X and the goals and standards as they relate to range management in the project area are listed below. The Forest Plan contains detailed descriptions of each management area.

MA 1-GOAL: Emphasize timber management, livestock grazing and big game forage production. .
**** STANDARDS: a)*** *Schedule livestock use and range improvements which do not reduce stocking below the optimum level prescribed in silvicultural prescriptions.* ***b)*** *Limit livestock use to 50 percent of the forage production.*

MA 2- GOAL: Optimize elk winter range habitat using timber and other vegetation management practices. Provide moderate levels of visual quality, old growth, habitat for other wildlife species, and livestock forage.
**** STANDARDS****: **a)*** *Permit livestock use and range improvements which comply with winter range goals.* ***b)*** *Limit livestock use to 35% of annual forage crop.*

MA 3a – Maintain the partial retention visual quality objective and manage timber. Emphasize roaded dispersed recreation activities, old growth, and big game cover. Provide moderate levels of timber, livestock forage, and big game forage.
**** STANDARDS: a)*** *Livestock forage use will be limited to 35% on partial retention big game winter range and 50 % on big game summer range.* ***b)*** *All range improvements shall comply first with partial retention objectives and with elk winter range habitat objectives.*

MA 3b-GOAL: These are riparian areas that are inclusions within MAs 1, 2, and 3a. This area supports abundant and diverse vegetative conditions and the most productive sites on the Forest. It includes 100 ft. either side of smaller streams or the area defined by water-influenced vegetation, whichever is greater. Manage riparian areas to maintain flora, fauna, water quality and water-related recreation activities. Emphasize water and soil protection, dispersed recreation use, visual quality and old growth. Provide low levels of timber harvest, livestock forage, and big game forage on fisheries riparian areas, and moderate levels of timber harvest and forage on non-fisheries riparian areas.
**** STANDARDS: a)*** *All improvements shall comply with the riparian habitat and visual quality goals.* ***b)*** *Along fisheries streams, the current physical and biological characteristics will be maintained as a minimum. Management prescriptions will be formulated to encourage shrub regeneration and streambank cover.* ***c)*** *No new allotments will be created in fisheries riparian areas. Additional structural improvements will be scheduled to control cattle use.* ***d)*** *Range use will be coordinated with adjacent management areas so that use does not exceed 35% on big game winter range and 50% on big game summer range. Allotment management plans will establish specific utilization standards for shrubs and grasses within these standards.*

MA 8a- GOAL: Manage at the minimum level for elk security, old growth, and habitat diversity, but protect timber, soil, water, recreation, range and wildlife resources on adjacent management areas. Maintain existing uses and facilities.
**** STANDARDS: a)*** *Permit livestock use and range improvements which are required to meet allotment management plans and range standards in adjacent management areas.* ***b)*** *Livestock use will be limited to 50% on big game summer range.*

B. Project Area Desired Future Condition and Objectives

Desired Conditions

Commercial livestock grazing involves several elements of the desired future condition described in the 1987 Bitterroot Forest Plan. The elements that apply to the project proposal and area are as follows:

a) The short term (1st decade) and long term (5th decade) desired conditions for the range program in the Forest Plan describe a general trend to lower levels of grazing than occurred in 1987. While the Plan identified private land subdivision as the primary cause of reduced demand for public land forage in the area, the concerns about riparian/wetland condition and big game winter range also resulted in a decline in livestock levels on the Forest over the last eighteen years.

b) An increase in the amount and availability of winter forage for big game animals was identified as a long term desirable condition. Most of the increase was predicted to occur from timber harvest activities. The Fires of 2000, however, expanded the big game winter range forage base on all the pastures within the project area.

c) The application of soil and water conservation practices and output constraints (including livestock grazing tactics and levels) through the fifth decade will maintain fish production and water quality while holding sedimentation rates at acceptable levels.

Objectives

Objectives from the 1987 Forest Plan that apply to commercial livestock grazing in the project area are as follows (Forest Plan II-5, II-6):

a) Maintain or enhance fish habitat. For this item, the Forest Plan emphasizes the need to mitigate the effects of timber harvest and roads.

b) Provide forage for the current (1987) actual use level of 10,000AUMs Forest-wide. This stocking rate has since declined by almost 40%.

c) Implement control strategies to reduce the spread of noxious weeds.

d) Manage riparian areas to prevent adverse effects on channel stability and fish habitat.

e) Design management activities to maintain soil productivity.

1.5 PUBLIC INVOLVEMENT

Scoping is an ongoing public involvement process used to identify issues related to the proposed action, and to determine the scope of issues to be addressed in the EA.

The purpose of scoping was to actively seek and incorporate people's views into grazing management in the project area. We did this by:

- Describing the purpose and need for action and the proposed actions.
- Determining the environmental issues associated with the proposed actions.
- Involving the public in the development of alternatives that will address environmental issues in the Environmental Assessment.

The Waugh Gulch and Andrews Allotment management proposals have been listed in the Bitterroot National Forest Quarterly NEPA Schedule of Proposed Actions since January, 2003. We sent 179 letters that contained a map of the project area and described the proposed action and the purpose and need to individuals, organizations, and government agencies, including the Nez Perce and the Salish-Kootenai Tribes. We received three responses. Two from conservation organizations and one from an individual. The comments were analyzed for all relevant issues and concerns. The comments received did not generate any new alternatives.

1.5.1 ISSUES

The following Issue Statements were developed by the Interdisciplinary Team (ID Team) after reviewing the issues generated during public scoping of the proposed action for the Waugh Gulch and Andrews Allotments Environmental Analysis. Some of the issues and management concerns were developed by the resource specialists based on their inventories and knowledge of existing resource conditions. Similar issues were combined into one statement where appropriate. These issues were considered key issues because they drove the alternative development process or they highlighted different effects between

alternatives. The key issues are addressed through the proposed action and alternatives are described below.

Other issues were identified during the scoping process that would have similar effects between alternatives, or were outside the scope of the analysis. They would not provide a clear basis of choice between alternatives. A complete compilation of the public issues, questions, concerns and how they are addressed is located in the Project File at the Sula Ranger Station.

The key issues identified for this project are:

Issue 1: Livestock grazing adversely affects accessible riparian zones, wetlands and streams. Evidence of resource condition problems caused largely by past livestock practices are found in the Waugh Creek and West Fork of Camp Creek areas.

Issue 2: Livestock grazing can contribute to the spread and establishment of noxious weeds in upland and riparian sites largely through overuse that reduces the vigor and competitiveness of native and desirable vegetation. Past grazing practices may have accelerated the advance of spotted knapweed, for example, in the lower elevations of the allotments. Movement of livestock between pastures after spotted knapweed seed set (late July) can increase the likelihood of seed transport by this vector method.

Issue 3: Livestock grazing activities can increase soil compaction and erosion. Baseline soil and vegetation condition surveys conducted in the late 1990s and early 2000s indicated some soil compaction problems in the Waugh Creek and West Fork Camp Creek areas.

Issue 4: Livestock grazing poses a conflict of use with commercial big game hunting in the project area around Porcupine Saddle and upper Maynard Creek during late August and early September (archery hunting season).

Issue 5: Livestock management options result in different social and economic effects on a variety of stakeholders who include: the grazing permittee and family; natural resource advocacy groups, general recreationists and county government.

1.5.2 OTHER ISSUES

The following public concerns were important and considered in the analysis; however, they did not sharply define effects between alternatives or qualify as key issues that would drive alternatives. Each of these is discussed at the end of Chapter II in the section titled “Summary Discussion of Other Concerns / Issues”. In addition, the Forest Plan dictates the standard for addressing some of the concerns.

These concerns included:

A) Altering natural fire and fuels patterns. Will livestock grazing affect the amount of fine fuels available to carry a ground fire?
B) How will livestock use affect big game winter range forage availability?
C) Tree seedling establishment and survival. Will livestock browsing or trampling of tree seedlings affect the restocking success of areas burned in the Fires of 2000?
D) Will habitat fragmentation be increased through livestock management practices?
E) Are soils and vegetation in areas that experienced high fire severity in 2000 at risk for increased erosion or slower vegetative recovery because of the presence of domestic livestock?

1.6 APPLICABLE LAWS AND EXECUTIVE ORDERS

Shown below is a partial list of federal laws and executive orders pertaining to project-specific planning and environmental analysis on federal lands. While most pertain to all federal lands, some of the laws are specific to Montana.

Multiple-Use and Sustained-Yield Act of 1960
National Historic Preservation Act of 1966 (as amended)
National Environmental Policy Act (NEPA) of 1969 (as amended)
Endangered Species Act (ESA) of 1973 (as amended)
Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)
National Forest Management Act (NFMA) of 1976 (as amended)
Clean Water Act of 1977 (as amended)
American Indian Religious Freedom Act of 1978
Archeological Resource Protection Act of 1980
Executive Order 11593 (cultural resources)
Executive Order 11990 (wetlands)
Executive Order 11988 (floodplains)
Executive Order 12898 (environmental justice)
Executive Order 12962 (aquatic systems and recreational fisheries)

CHAPTER 2.0
ALTERNATIVES

2.1 INTRODUCTION

This chapter describes and compares the three alternatives that address the purpose and need for action in the Waugh Gulch / Andrews Grazing Allotment Analysis Area.

Included is a discussion of three important aspects of the analysis and alternatives: 1) the scoping process and identification of issues and opportunities around which alternatives were developed; 2) descriptions of alternatives considered in detail; and 3) comparisons of the alternatives and how they respond to the issues.

The Comparison of Alternatives in this chapter, and the Chapter 4 disclosure of projected environmental effects, provide the information that allows the District Ranger to make an informed choice between alternatives.

2.1.1 DEVELOPMENT OF ALTERNATIVES

The ID Team developed a reasonable range of alternatives to address the key issues that surfaced through public scoping, internal discussions and examination of field data. These are: 1) current grazing management (no action), 2) the proposed action, and 3) no grazing. Each of the alternatives provides a different response to the key issues. The alternatives meet the purpose and need for the project to varying degrees.

Each alternative represents a site-specific proposal developed through an interdisciplinary evaluation of current and desired conditions, historic use, and field verification.

2.2 ALTERNATIVES CONSIDERED IN DETAIL

2.2.1 ALTERNATIVE 1 (NO ACTION)

Under the No Action Alternative, grazing would continue under the current Term Grazing Permit authorized numbers, season and duration. The permit allows a total of 343 Animal Unit Months (AUMs) on the Waugh Gulch Allotment over the period from June 1 to September 30. The Andrews Allotment permit allows 127 AUMs over the periods June 1 to June 30 and September 1 through September 15. The combined allowable stocking rate for the two allotments currently stands at 470 AUMs. The current allotment management plan direction on each allotment would not change.

2.2.2 ALTERNATIVE 2 (PROPOSED ACTION)

The Sula District Ranger would reissue a Term Grazing Permit for the combined Andrews and Waugh Gulch Allotments. This proposal would reduce the current total permitted Animal Unit Months (AUMs) on the combined Andrews and Waugh Gulch Allotments by about 30% and allow up to 330 AUMs of use. The duration of grazing on the combined allotments, with the maximum stocking rate applied, would drop from the currently permitted uninterrupted duration of seventeen (17) weeks to approximately nine (9) weeks. This diminishes the time span of livestock presence on the project area by about 50%.

The proposed action includes the following items:

- Reissue a Term Grazing Permit that combines the Andrews and Waugh Gulch Allotments.
- Reduce the maximum number of permitted livestock to no more than 330 Animal Unit Months (AUMs).
- Retain an entry date of no earlier than June 1 but introduce flexibility in both entry and exit dates that result in the regular deferment (delayed grazing) of all three pastures.
- Introduce periodic full season rest from domestic livestock grazing for each pasture in the project area.
- An adaptive management option to install several structures to improve livestock distribution and use patterns if effectiveness and/or implementation monitoring shows a pattern of non-compliance with Forest Plan objectives. The structural improvements (Map 1) may include: a) the construction of up to two miles of fence. About one and a half miles potentially in the West Fork Pasture and about a half mile in the Waugh Pasture. b) up to four new spring developments in the Waugh Pasture and c) possibly a small corral facility in the Waugh Pasture.

The proposed action supports the goals, objectives, standards and guidelines of the Bitterroot Forest Plan and the Rescission Bill.

A. Response to Issues

This alternative was designed to respond to issues related to determining the appropriate level of grazing while implementing resource protection measures. This alternative would address concerns related to protecting or improving watershed conditions, fisheries, soils, vegetation and fuels, visual quality, wildlife, sensitive plants and human uses and values. This alternative was developed to manage grazing activities consistent with Forest Plan direction. It establishes a new permitted stocking rate that reflects a more accurate carrying capacity in order to meet the Forest Plan objectives and standards (Project File).

B. Implementation

An Allotment Management Plan will be developed that will incorporate Forest Plan Standards and resource mitigation measures defined in this document. This AMP provides the direction for management of the allotment. Livestock grazing activities established in the AMP would be incorporated into the Terms and Conditions of the Term Grazing permit. The grazing strategy is typically defined in terms of season, duration, livestock numbers permitted, and appropriate use levels (standards). However annual adjustments (within the scope of this analysis) are often needed to appropriately manage grazing activities that respond to unforeseen conditions such as drought, fire, floods, etc. These annual adjustments are accomplished through Annual Operating Plans and are intended to further protect resources by, for example, such actions as holding cattle off of a pasture if conditions are too wet and may result in soil compaction. This can include, but is not limited to temporary changes for on/off dates or authorized non-use of a pasture or allotment.

2.2.3 ALTERNATIVE 3 (NO GRAZING)

This alternative terminates domestic livestock grazing and does not reissue any Term Grazing Permit for the project area. All interior allotment fences (2 miles), water developments (10 structures), and cattle guards (6) would be removed.

A. Response to Issues

This alternative was designed to respond to issues related to adverse impacts to resources, specifically those related to livestock grazing activities. This would address the concerns of those favoring the closure of the allotment to cattle grazing for the purpose of maximizing the rate and degree of resource recovery from the impacts of livestock.

B. Implementation

Since livestock grazing activities would no longer occur under this alternative, all range improvements normally maintained by permittees would be required to be removed. Fences, water developments, and cattle guards that are not maintained create hazards for wildlife and recreationists. Under this alternative, removal of 12 water developments, 7.7 miles of fence, and 6 cattle guards would be required. Riparian exclosures would continue to be maintained, as required, by Forest personnel, since the purpose of the exclosures is to protect sensitive areas from both big game and livestock use.

2.2.4 FEATURES COMMON TO ALTERNATIVES 1 AND 2

The alternatives provide varying levels of consistency with the Bitterroot Forest Plan. All applicable forest-wide and land-use designation standards and guidelines are incorporated into the grazing alternatives. The Forest Service uses many mitigation and preventative measures in the planning and implementation of land management activities. Additional direction comes from applicable Forest Service manuals, handbooks and amendments. The following items are listed to highlight some of the key direction from the Bitterroot Forest Plan.

A. Livestock Allowable Forage Utilization Limits

Forest plan standards for herbaceous forage consumption by livestock would apply as follows:

a) 35% average total forage utilization in big game winter range zones below approximately 6200 feet in elevation. Measurements and evaluation would occur separately for each of the three pastures (Waugh, West Fork Camp Creek and Andrews) contained in the allotments.
b) 50% average total forage utilization on all other sites that are not categorized as big game winter range. Compliance would be measured and determined separately on the three pastures.
c) Adaptive Management options would apply, as follows, at the five year monitoring checkpoint after the decision:

Table 2- 1- Adaptive Management Guide

Trend Monitoring Results	Permittee Compliance Status	Adaptive Management Options
Riparian and Upland Areas Are At or Moving Towards Desired Condition	Management is in compliance with current allowable use standards	Continue current stocking rate, grazing duration and management prescription
Riparian and Upland Areas are Not At or Moving Towards Desired Condition	Management is in compliance with current allowable use standards	1) Introduce more restrictive forage utilization standards 2) Alter the timing of grazing to avoid hot season use or employ some other timing / duration scenario that reduces resource impacts 3) Modify livestock management tactics (riding, herding, salting, etc) to reduce resource impacts and initiate an upward trend 4) Construct additional fencing or watering developments to limit cattle grazing in the area(s) with non-compliant resource trends.
Riparian and Upland Areas are Not At or Moving Towards Desired Condition	Management is repeatedly non-compliant with allowable use standards	1) Initiate action to suspend a portion of the Term Grazing Permit according to Forest Service Manual direction 2) Recurrent non-compliance may trigger a permanent reduction of the Term Grazing Permit

B. Mitigation Measures

The analysis documented in this EA discloses the possible adverse impacts that may occur from implementing the actions proposed under each alternative. Measures have been formulated to mitigate or reduce these impacts. These measures follow the direction from the Bitterroot Forest Plan.

In addition to Forest Plan requirements, the ID Team identified project-specific mitigation measures that would be required under any action alternative. Mitigation measures are applied to reduce or avoid adverse effects resulting from management activities. These requirements, constraints, and mitigation measures are listed below and are applicable to Alternatives 1 and 2, unless otherwise noted. Alternative 3 would have no actions to mitigate.

Many of the mitigation measures would be achieved through provisions specified in the Allotment Management Plans (AMP), Annual Operating Plans (AOP) and under the Terms and Conditions of the Term Grazing Permit (s). AMPs, AOPs and the Permit, which are referenced by permit/permittee number, are included in the Project File.

Fisheries / Hydrology / Soils / Vegetation

- Avoid trailing cattle along stream channels during gathering or herd move operations. Use existing roads and established game, cattle or National Forest system upland trails.
- Develop livestock watering sources so as to reduce cattle impacts on riparian zones and streams
- Avoid cattle herd trailing across steep slopes with high erosion potential

- Adjust livestock distribution patterns and grazing duration annually as needed to comply with Forest Plan standards

Heritage Resources

- Structural improvements will require site approval by the Forest Heritage Specialist.
- If previously unknown heritage resources are encountered during the installation or removal of range improvements, the Forest Archaeologist would be notified immediately.

Noxious Weeds / Invasive Plants

- Roadside shoulders and cut/fill slopes on the allotment, used as cattle distribution and trailing corridors, will continue to receive regular herbicide treatment to reduce weed seed transport potential.
- Continue biocontrol releases on the allotment to reduce spotted knapweed competition with native and desirable plant species.

C. Monitoring

Monitoring activities can be divided into Forest Plan Monitoring and project-specific monitoring. The National Forest Management Act requires that National Forests monitor and evaluate their forest plans (36 CFR 219.11). Chapter 4 of the Forest Plan includes the monitoring and evaluation activities to be conducted as part of Forest Plan implementation. There are three categories of Forest Plan monitoring:

- **Implementation monitoring.** Used to determine if the goals, objectives, standards and guidelines, and practices of the Forest Plan are implemented in accordance with the Forest Plan.

- **Effectiveness monitoring.** Used to determine if the Forest Plan standards and guidelines, and practices, as designed and implemented are effective in accomplishing the desired result.

- **Validation monitoring.** Used to determine whether the data, assumptions, and estimated effects used in developing the Forest Plan are correct.

Bitterroot National Forest staff annually conducts a review of implementation and effectiveness for various resource areas which includes range management activities and noxious weeds / invasive plant control. The results of this and other monitoring are summarized in a National Forest Annual Monitoring Report. This report provides information about how well the National Forest management direction is being carried out and measures the accomplishment of anticipated outputs, activities, and effects.

Effectiveness and validation monitoring are not typically done as part of project implementation. Implementation monitoring, and any additional project-specific monitoring, are however, important aspects of the project.

Implementation Monitoring Actions

- Perform range inspections during and after the grazing season to evaluate compliance with Forest Plan utilization standards.
- Check integrity of pasture and exclosure fences.

- Check cattle distribution, grazing duration and herd moves for compliance with annual operating instructions.

Effectiveness Monitoring Actions

- Perform fish habitat, stream channel and vegetation trend evaluations at ten year intervals at a minimum.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER STUDY

2.3.1 NO GRAZING WITH INTENSIVE SOIL AND VEGETATION REHABILITATION TREATMENTS

This alternative was eliminated because it duplicates the rehabilitation action of Alternative 3 (No Grazing). There are only a few potential microsites where soil and vegetation restoration practices would create benefits that would not occur rapidly with the suspension of all livestock grazing under Alternative 3.

2.3.2 COMBINE WARM SPRINGS ALLOTMENT WITH THE WAUGH GULCH AND ANDREWS ALLOTMENTS

The initial scoping announcement mentioned combining the Warm Springs Allotment with the Andrews and Waugh Gulch Allotments. Combining allotments is an administrative action and does not require a NEPA analysis (FSH 1909). The Warm Springs Allotment is operating under a current NEPA decision (Warm Springs Grazing Allotment EA 1995) and no changes in its management were proposed. Management of the Warm Springs Allotment would not affect management in the project area nor would it be affected by management in the project area. For these reasons, there was no point of including the Warm Springs Allotment in this analysis.

2.4 PAST, PRESENT AND REASONABLY FORESEEABLE FUTURE ACTIONS

2.4.1 PAST AND PRESENT ACTIONS:

1) Several timber sales have harvested timber and constructed both permanent and temporary roads in the analysis area.

2) Riparian/stream and aspen exclosures were constructed within the last ten years in the Waugh Gulch portion of the analysis area. The riparian exclosures have eliminated livestock impacts from key areas along Waugh Creek. The aspen exclosure prevents both wildlife and livestock from browsing a small aspen clone.

2.4.2 REASONABLY FORESEEABLE FUTURE ACTIONS:

1) Invasive plant biological control releases will increase in the area over the next few years in order to reduce the opportunity for spotted knapweed seed transport into the adjacent weed free grasslands above Warm Springs Creek. Herbicide treatment will continue with an increased emphasis on controlling less established species such as dalmatian toadflax and oxeye daisy. There may be some aerial herbicide treatment of infested upland grassland habitat within the Waugh Creek Pasture. All planned invasive plant treatment in the area was analyzed in the 2003 Bitterroot Forest Noxious Weed EIS or other prior NEPA documents.

2) About 0.25 miles of FSR 13334 and one mile of non-system road in the Waugh Creek Pasture is proposed for obliteration. The culvert on FSR 13334 would be removed with the stream crossing recontoured. The on-going Forest-wide travel management project will evaluate this obliteration action.

3) There may be some slash burning and reforestation work within the Alta Camp helicopter timber sale in a portion of the West Fork Camp Creek watershed in the next several years. Additional reforestation work may continue on timber habitat type sites in parts of the drainages within the allotment.

2.5 COMPARISON OF ALTERNATIVES

This section of Chapter 2 presents a comparison of alternatives with a focus on the issues for this proposal. This section explains why some alternatives affect resources differently than others, and what the trade-offs are between alternatives to provide a basis for choice among options for the decision maker and the public. Environmental effects of the alternatives are more fully displayed and discussed in Chapter 3.

2.5.1 COMPARISON BY PURPOSE AND NEED

All the alternatives respond in some fashion to the purpose and need for a decision. Alternative 1, No Action, meets the Recission Bill direction to complete an updated environmental assessment but allows a stocking rate that would need repeated annual downward adjustments in order to comply with current Forest Plan standards. Alternatives 2, Proposed Action, and Alternative 3, No Grazing, each comply with the Recission Bill direction and each can realistically comply with current Forest Plan standards although to different degrees.

The comparison of effects between alternatives, summarized in the next section by issue, provides the most meaningful information needed to reach a decision.

2.5.2 COMPARISON BY KEY ISSUE

Each alternative is evaluated below for its resource effects based on the key issues that drove the development of the alternatives. The “issue indicators” define the way the analysis compares the effects of each alternative on the key resources. These are summarized narratively for each issue in the table below. The recovery timeline is calculated from the time of implementation of this NEPA decision.

Chapter 3 (Environmental Consequences Section) presents a more detailed discussion of the environmental effects of the alternatives by specific resource area.

Table 2- 2 – Response of Alternatives to Key Issues

Issue and Issue Indicators	Alternative 1 (No Action : Current Permit)	Alternative 2 (Proposed Action)	Alternative 3 (No Grazing)
Issue 1: Adverse effects of livestock to accessible riparian zones, wetlands and streams Indicators: * estimated rate of achievement of Forest Plan objectives and DFC	Current permitted stocking rates and management tactics would require frequent adjustments annually in order to produce even a slow improving trend in riparian / wetland / stream livestock accessible problem sites. This alternative would take up to 25 years to reach Forest Plan desired condition and objectives on sites of concern	Steady improvement in trend on problem sites that would take up to 12 years to reach Forest Plan desired condition and objectives on livestock accessible sites of concern. Stocking rate reduced by 30% from currently permitted 470 AUMs to 330 AUMs.	Rapid improvement in trend that could reach Forest Plan desired condition and objectives on livestock accessible sites of concern within 5 years
Issue 2: Establishment and expansion of noxious weeds in upland and riparian sites Indicator: * estimated degree of achievement of Forest Plan desired condition and objectives	Soil disturbance and forage use by livestock, at the current permitted levels, would promote the opportunities for invasive plants to establish new infestations or expand their existing range of occupaton.	Soil disturbance and forage use by livestock would reduce the opportunities for new or expanded invasive plant infestations by 30% from current risk levels.	100% reduction in livestock-caused opportunities for invasive plant establishment and expansion.
Issue 3: Degree of soil compaction , erosion, and productivity loss caused by the continuation of grazing on accessible sites Indicator: *estimated rate of achievement of Forest Plan objectives and desired condition	Current permitted stocking rates and management tactics would require frequent annual adjustments. Achievement of Forest Plan desired condition and objectives on livestock accessible sites of concern would take 25 years	Forest Plan soils desired condition and objectives on livestock accessible sites of concern would be achieved within 12 years	Forest Plan soil desired condition and objectives on livestock accessible sites of concern would be achieved within 5 years.
Issue 4: Social conflict with commercial big game hunting in the Porcupine Saddle and Maynard Creek Areas	Forage utilization levels by livestock on numerous sites may reach maximum allowable levels. A fixed grazing period of	Forage utilization levels by livestock will fall well within the maximum allowable levels with numerous sites	All available forage is dedicated to wildlife use. No conflict of use between outfitter hunting and livestock operations.

Issue and Issue Indicators	Alternative 1 (No Action : Current Permit)	Alternative 2 (Proposed Action)	Alternative 3 (No Grazing)
Indicators: * past and estimated forage utilization levels on big game range * percent of overlapping use sites where timing of use conflicts might occur	use with low degree of flexibility creates potential conflict during the archery season on 100% of potential overlapping use sites	below the allowable maximum. A flexible season of use might see potential conflict occur on up to 30% of overlapping use sites	
Issue 5: Social / Economic Impacts to Stakeholders Indicators: * level of satisfaction to stakeholders * change in permitted AUMs of livestock grazing * revenue change to County	Permittee: Maintains current stocking rate of 470 AUMs. However, the alternative carries a high degree of uncertainty about the annual duration of grazing due to the high liklihood of frequent early exit dates or reduction in numbers each year. County Govt: No change in livestock based revenue General Recreationists: Low long-term satisfaction for most recreationists Natural Resource Advocacy Groups: Low satisfaction	Permittee: Reduces stocking by 30% to about 330 AUMs. Carries an acceptable level of uncertainty about curtailed season due to annual variations in forage production and range readiness. County Govt: Some loss of livestock based revenue General Recreationists: Moderate to high satisfaction for all recreationists as riparian quality is improved Natural Resource Advocacy Groups: Moderate to high long-term satisfaction as desired biophysical conditions are achieved	Permittee: Disrupts ranching operations. County Govt: Loss of livestock based revenue General Recreationists: High satisfaction for those who do not see a value to livestock on public lands. Moderate satisfaction for those who enjoy seeing livestock but who also value highest quality recreation opportunities Natural Resource Advocacy Groups: General high level of satisfaction

2.6 SUMMARY DISCUSSION OF OTHER CONCERNS /ISSUES

A) Alteration of fire and fuels patterns: Woody fuel density and distribution are the most significant biological factors in determining the fire patterns in the project area. Livestock grazing has not affected the woody fuel classes on these sites to a measurable degree. The distribution and amount of consumption of fine fuels in the project area by livestock does not does not reach a threshold of effect on either grassland or timber understory fire patterns (Bitterroot Fires of 2000 Assessment; Project File).

B) Availability of big game fall/winter forage: The Forest Plan establishes maximum allowable limits of forage utilization by livestock. These allowable limits guarantee an adequate reserve of winter range forage for big game on those sites that are accessible to cattle (1987 Forest Plan).

C) Tree seedling establishment and survival: Ocular examination of tree regeneration in harvest units in the project area indicates that the higher levels of grazing experienced in past years did not affect seedling establishment or survival (Project File).

D) Habitat fragmentation: Livestock grazing primarily influences the structure (height) and arrangement of palatable species of herbaceous vegetation. The Forest Plan established standards of utilization of these plant communities by livestock that meshes with the goals and objectives for habitat diversity and wildlife population viabililty (1987 Forest Plan).

E) Areas that experienced high fire severity in 2000. Post-2000 fire analyses do not indicate a connection between grazing and damage to soils or vegetation on sites exposed to high intensity fires during 2000. Most of the high intensity burned acreage lies in areas that are inaccessible to livestock (Project File).

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CHAPTER 3.0
AFFECTED ENVIRONMENT
AND ENVIRONMENTAL CONSEQUENCES

3.1 SOILS

3.1.1 INTRODUCTION

Soils within the analysis area have been mapped and are described in the Bitterroot National Forest Soil Survey. This inventory, which meets the standards of the National Cooperative Soil Survey, describes soil map units, landforms, and vegetation components, and provides interpretive information on soil use and management. The soils analysis focuses on current conditions and effects of proposed grazing activities on soil resources in the project area. Current condition of soil resources has been affected by activities such as road construction, past timber management activities, livestock grazing, as well as natural processes.

3.1.2 REGULATORY FRAMEWORK

Forest-wide soil quality guidelines that apply to this project are contained in the following documents:

- The Bitterroot Forest Plan (USDA Forest Service, 1986)
- Forest Service Manual Guidelines (FSM 2554)
- FSM 2500 – R-1 Supplement No. 2500-99-1
- FSM 2500 – Bitterroot National Forest Supplement No. 2550-01-1
- Montana State Guidelines for Best Management Practices (BMPs)
- Executive Order 11990

Bitterroot Forest Plan

The Bitterroot Forest Plan (1987) sets standards pertaining to soil conservation practices. Forest-wide Resource Standards related to soil protection are included on page II-25 of the Forest Plan (items 7 and 8), and are as follows:

Plan and conduct land management activities so that:

- Reductions in soil productivity potential caused by detrimental compaction, displacement, puddling, and severe burning are minimized; and
- Soil loss, accelerated surface erosion, and mass wasting caused by these activities will not result in unacceptable reductions in soil productivity and water quality.

The Forest Plan includes standards for soil protection for each Management Area (MA). This proposal includes livestock grazing activities in five MAs: MA 1,2, 3a, 8a and a very small inclusion of MA 11c. Applicable MA standards are:

- Soil technical support will be provided for all management activities that involve soil disturbance such as timber harvest, roading and mining, in areas where soils are identified as sensitive to management activities in the Forest soils inventory. Recommended design or protection measures

as needed to maintain soil productivity and stability, and to minimize soil erosion, surface disturbance, and stream sedimentation (Forest Plan pages III-18 and III-33).

Forest Service Manual Guidelines (FSM 2554)

The National Forest Management Act (NFMA) requires that lands be managed to ensure the maintenance of long-term soil productivity, soil hydrologic function, and ecosystem health. Soil quality is maintained when erosion, compaction, displacement, rutting, burning, and loss of organic matter are maintained within defined soil quality standards (FSM R1 Supplement 2500-99-1).

FSM R1 Supplement 2500-99-1 states in 2554.03:

"Design new activities that do not create detrimental soil conditions on more than 15 percent of an activity area (project area). When operations are planned in areas that do not meet soil quality standards due to prior activities, new activities should be planned to meet current standards. Detrimental conditions remaining from prior activities should be ameliorated as part of the current activities where feasible, with the net result being an activity area that is moving toward a net improvement in soil quality."

Recent guidance is a Bitterroot NF Supplement (BNF Supplement No. 2550-01-1) that states:

"Per 2550 letter dated June 14, 2000, from the Regional Forester, it was not the intent of the R1 Supplement to prohibit entry or activities in previously harvested areas, even if those areas do not currently meet soil quality standards as defined in the Supplement. The intent is to ensure that current harvest or other activities do not exceed soil quality standards, while at the same time using the entry to implement restorative treatments, where feasible, that will move the site toward an improved soil quality condition."

Montana State Guidelines

Best Management Practices (BMPs) for Grazing are designed to prevent soil erosion and protect water quality, as well as help prevent soil damage. Use of BMPs is the foundation of water quality standards for the State of Montana as documented in ARM 16.20.603. In a Memorandum of Understanding (MOU) with the State of Montana, the Forest Service has agreed to follow BMPs outlined by the Montana DNRC. Many BMPs are applied directly as mitigations for this proposal. Implementation and effectiveness monitoring for BMPs would be periodically conducted by a qualified individual, and during other implementation and annual monitoring events.

Executive Order 11990

Wetlands are protected under Executive Order 11990. This order directs federal agencies to "minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands..."

3.1.3 AREA OF ANALYSIS

The analysis area for soils encompasses all lands within the boundaries of the Waugh Gulch and Andrews Allotments. The cumulative soils effects will include the project area boundaries as well as the Warm Springs Allotment and adjacent State Lands. Effects on soils are closely interconnected with effects to

streams. The potential for runoff and surface soil erosion is addressed in the Watershed section of this document.

3.1.4 DATA COLLECTION

A review of soil condition inventory data and site visit data were collected in 1997 during planning for this project. Additional field data was collected in 2006 in the Waugh Creek and West Fork of Camp Creek to bolster past sampling efforts. The objective of the assessment was to evaluate current conditions and to relate observed soil impacts to past activities such as livestock grazing, timber management, road construction, recreation, and natural processes. This condition assessment also addresses soil resource issues relating to soil productivity and soil disturbance.

Condition class assessments conducted in 1997 (McBride 1997) used observable characteristics such as the condition of the litter and duff layer, vegetation, evidence of disturbance, as well as infiltration tests and soil pits to assess surface soils for platy structure and other characteristics. Soil pits depths generally ranged from 6 to 12 inches in depth. The inventory was completed on disturbed, as well as undisturbed areas to determine baseline information. Soil sampling completed in August 2006 (Mayn 2006) utilized cone penetrometer and shovel resistance measurements to derive soil compaction estimates.
Readily observable characteristics were recorded during the site visits to define soil disturbance. This information was related to soil damage criteria and Regional guidelines for soil quality for soil productivity. Soil damage criteria are related mostly to soil productivity which includes compaction and displacement, and their effects on infiltration, runoff, and erosion.

3.1.5 EXISTING CONDITION

Geology

The lands within the project area are located in the Bitterroot Lobe of the Idaho Batholith. The Idaho Batholith is composed of a large mass of granitic rock, which stretches almost unbroken from the Bitterroot Mountains to the western border of Idaho. Much of the project area is underlain by the granites and gneisses associated with the Idaho Batholith. Volcanics, tertiary deposits, and glacial till underlie the balance of the area. Landform features characterizing this portion of the Bitterroot National Forest reflect the uplifting and faulting of mountain forming processes. Glacial action and fluvial processes have further modified the landscape. Surface and mass erosion are also natural influences on the landscape.

Landforms in the project area that are listed in the Bitterroot National Forest Landtype Inventory (McBride, 2002 in-progress) include dissected mountain slopes, steep mountain slopes, fan remnants, and extremely bouldery moraines. These types of landforms used in soil surveys are described in Holdorf and Donahue (1990). Dissected mountain slopes are common at relatively low elevations in the Idaho Batholith and consist primarily of mountain slopes that parallel drainages. Steep mountain slopes often have convex ridge crests and shoulders and may extend far down mountainsides. Runoff is dispersed by convex slopes and absorbed on lower slopes. Most fans were formed by alluvial or colluvial deposition. Fans and toeslopes are located at the base of mountain slopes or breaklands and frequently extend on to terraces or floodplains. Bouldery moraines in the project area likely formed where alpine glaciers emerged from glacial troughs. Moraines tend to form stable watersheds with little runoff.

Parent Material and Soils

Soils within the Waugh and Andrews allotment boundaries form a mosaic across the landscape and reflect variations in topographic position, underlying bedrock, vegetation and climate. Soils associations found in

the project area are described in the Bitterroot National Forest Landtype Inventory (McBride, 2002 in-progress). For this inventory, soils were mapped to an Order III level that delineates soil-family associations. At the Order III level, mapping reflects landform, vegetative groupings (habitat type groups), and soil-parent material associations. Soils in the project area have been classified as Entisols, Inceptisols, Alfisols and Mollisols. Entisols are soils of recent origin and contain a dominance of mineral soil materials and absence of distinct pedogenic horizons. Many Entisols are found in steep, rocky settings in the project area (UI 2003). Inceptisols exhibit minimal horizon development, but are more developed than Entisols. Inceptisols are widely distributed and occur under a wide range of ecological settings. In the project area, they are generally found on fairly steep slopes, young geomorphic surfaces, and on resistant parent material (UI 2003). Alfisols are moderately leached forest soils that have relatively high fertility (UI 2003). Alfisols are described as gray to brown mineral soils with a horizon of accumulated silicate clays, and are more strongly weathered than Inceptisols. Mollisols are soils of grassland ecosystems. Mollisols are characterized by thick, dark surface horizons known as mollic epipedons. These epipedons are a result of long-term additions of organic materials derived from plant roots (UI 2003). In general, weathering of parent materials and soil development are considered relatively slow in the project area due to cold temperatures and relatively low moisture indicative of higher elevations in the upper Bitterroot Valley. Soils formed in highly weathered, coarse-grained granite (gruss), are the most infertile soils on the forest with low water holding capacity. Soils formed from gneiss and slightly to moderately weathered granite parent materials have a slightly finer texture and increased water-holding capacity, but they are still relatively infertile. Volcanic ash was wind-carried from past volcanic eruptions in the Cascade Range, and is the single most important feature enhancing productivity and watershed function in the forest soils. Volcanic ash surface layers offer a superior growth medium compared to soils formed in native parent materials. They have a high water holding capacity and a high production of air space; they function like a sponge, soaking up snowmelt and rain. This slows run-off, retaining water longer than soils without the ash component. Soils with the highest content of volcanic ash, a reddish-colored surface horizon, occur at high elevation on northerly aspects. Volcanic ash mixed with other parent materials also occurs on other aspects at lower elevations. (USDA December 2000).

Soil textures vary from gravelly to very gravelly sandy loams, fine sandy loams, bouldery and cobbly sandy loams, and some clay inclusions. The gravelly soil types have a moderate to high susceptibility to surface erosion due to soil particle sizes and lack of soil cohesion.

Soils family associations are described in the Soil Specialist Report in the Project File. In the Landtype Inventory, the potential hazards and management considerations are computer generated based on a combination of characteristics such as parent material, habitat type, soil texture, rock outcrops, elevation, slope, and aspect. They do not indicate that the hazard conditions have occurred, but rather, that the potential may exist and should be considered during project planning. GIS coverage of the most current soil mapping information is not available at this time. Essentially all of the soils in the project area have identified management considerations such as steep or dissected slopes, shallow or erosive soils, and compaction hazards. The management considerations for each of the soil types identified in the project area are described in the Soil Specialist Report (Project File).

Past Activities

Current soil conditions on the Waugh Gulch and Andrews Allotments are a reflection of past management activities and natural processes. Soil condition on the Andrews allotment was assessed on the suitable range and by comparing the use history to the soil types, potential hazards and management considerations listed in the Landtype Inventory. These types of activities and natural disturbances can alter soil productivity in various ways and can be difficult to restore. The best way to prevent reductions in productivity is to adopt forest management practices that minimize soil disturbance (Wilent 2003).

Waugh Gulch Allotment

The soil types in Waugh Creek vary in their characteristics and in their ability to withstand or recover from various uses as well as natural disturbance. The soils are derived from a variety of rock types including volcanics, granitics, dioritics and belt rocks. Characteristically, soils derived from granitics and dioitic parent materials are highly erosive on steep slopes. The volcanic rock is noted for slumping when disturbed.

Baseline soil condition surveys conducted in 1997 revealed compacted soils in Waugh Creek and at the base of Boot Hill, as demonstrated by infiltration and resistance tests (Project File). The overall physical appearance of the area immediately adjacent to the Waugh Creek exclosures is hummocky, with severely hedged or damaged willows. The predominant understory vegetation in the meadow, however, is native sedge, despite historic high use levels by grazing animals.

Soil condition surveyed at the base of the area known as Boot Hill, is a second level terrace in an outwash fan of clayey rhyolite. Surveys identified compaction through infiltration and resistance tests. Dominant species of Kentucky bluegrass and dandelion were also noted, indicating a soil condition below potential. The West Fork of Camp Creek was not surveyed in 1997, but vegetative conditions assessed during site visits in 2002 and 2003 provide some indication that soils may be compacted. Species such as Kentucky bluegrass, Orchard grass, and oxeye daisy are dominant, with a noticeable lack of native species diversity. Low shrubs such as snowberry were also noticeably more abundant inside the Indian Trees Campground as compared to outside the fence where grazing has occurred. Vegetative cover can be an indication of compaction, as compacted soils restrict rooting depth (USDA NRCS 1996), allowing shallow rooted species such as Kentucky bluegrass to dominate.

Livestock Grazing

Livestock use history is an important consideration in assessing the current soil conditions. Livestock use history reveals the role livestock grazing has played in current soil conditions and it is equally important in determining what types of grazing schemes are compatible with soil protection measures. Historic grazing use has been disproportionate and grazing practices were not designed to meet soil quality guidelines. Grazing practices that have not consistently met guidelines have allowed very little improvement in soil conditions in these areas. Soil compaction related to grazing activities in the forested environments and upland grass ecosystems is minimal and limited to small, localized areas, such as the areas along roads, trails, and at salting sites.

Livestock use on the allotment has historically occurred on open timber types with grass/forb understory, grasslands, transitory ranges and riparian bottoms with more gentle topography (between 0-30% slope). Use by livestock between 1930 and 1991, did not include utilization standards as a component of the grazing strategy. Additionally there were no requirements in place for maintaining effective cattle distribution through salting and herding practices.

The duration of grazing and authorized cattle numbers has been variable. Heavier grazing occurred between 1930 and 1954 when higher cattle numbers combined with a long season of use occurred under management plans where utilization standards were not in place. Because of the duration of grazing during this period, cattle were present on the allotment during both the spring and fall wet period when soils are typically more vulnerable to trampling and compaction. Various adjustments in cattle numbers have occurred between 1930 and 1990 and were a result of an increase in transitory foraging areas created by timber harvest activities and the Saddle Mountain Fire (1960). The increases were authorized with the intent of using available transitory forage, however with no grazing standards or cattle distribution practices in place, heavy use occurred in the riparian areas of Waugh Creek and the West Fork of Camp Creek until

1991. Because of this, past grazing practices have probably contributed to soil resource concerns in Waugh Creek, the West Fork of Camp Creek and some of the unnamed tributaries of Camp Creek. A more complete description of the grazing history on the two allotments can be found in the Range section.

Exclosures

Vegetative conditions inside the two exclosures on Waugh Creek have improved dramatically with evidence of willow recovery and streambank amelioration. The improved condition within the exclosures provides a good indication of the resilience of these areas and the ability of the compacted soils to recover and improve productivity.

Three exclosures have been constructed in various areas of the allotment as authorized by the Camp Reimel Vegetation Management Project. An exclosure was built in 2002 on the north side of Waugh Gulch to protect aspen regeneration from grazing by wildlife and livestock. Two additional exclosures were constructed on Waugh Creek to eliminate livestock access along a 1400-foot reach of the stream and protect the streambank. These exclosures also provide protection for the soil resources and a reference area for the ability of the soils in the area to recover from past use.

Fires

The range of effects from the fires of 2000 on any particular soil property or process is quite large and is dependent on pre-fire soil conditions, fire intensity and frequency, and post-fire management activities. The pulse of erosion that often occurs after fire is short lived and fades as vegetation recovers (USDA 2000). Debris flows, resultant of the fires of 2000 are discussed in the Watershed Section. Specific areas identified in the Bitterroot Post Fire Assessment (USDA 2000) as being at high risk of significant soil loss did not include any areas within the Waugh Gulch Allotment. The fires of 2000 burned approximately 43% of this allotment, but the much of the burn severity was categorized as low. The allotment was rested during the grazing season of 2001, and conditions were monitored that fall. A team of Forest Specialists concluded that the majority of livestock use on the allotment occurs where the fire did not burn. Cattle/soil conflicts are therefore considered to be low in the burned areas. On-site observations determined that soil displacement in the burned areas was not attributed to grazing activities.

Roads

Road closures in the West Fork of Camp Creek were implemented in 1996 as part of the Camp Reimel Vegetation Management Project. This included the decompaction of several miles of road followed with reseeding. Monitoring of this project indicates there is no soil movement on decompacted surfaces.

Timber Harvest

Timber harvest activities have occurred within the Allotment boundaries between the 1960's and the 1990's. Road construction coincided with the harvest activities mostly during the 1960's. Residual compaction may exist in previously logged areas, but does not overlap with grazing activities, since no detectable use by cattle has been observed over a period of several years (Appendix X, Livestock Utilization Record) in the previously harvested areas.

Andrews Allotment

Soil types on this allotment vary in their characteristics and in their ability to withstand use. The soil types on the open ridge tops, transitory ranges, hillsides and roadsides are mostly gravelly sandy loams formed from granitic parent material. The characteristics associated with these soil types are that droughty

conditions are typical, surfaces on steep slope tend to be erodible, they exhibit low bearing strength, and there is a risk of surface compaction.

Current soil conditions on the Forest portion of the Andrews allotment have been influenced mainly by timber harvest, road construction and wildfire, with very little impact resulting from cattle use. Cattle use has historically been light to moderate in the transitory areas and open ridges, hillsides and roadsides. Heavier grazing has occurred on the State portion of the allotment where the terrain is gentler and more open. The use history for this allotment is provided in the Range section.

Livestock Grazing

Areas of transitory range, open ridgetops and grassy slopes provide the suitable grazing opportunities on the Forest. Cattle grazing activities have had only isolated impacts to riparian area soils on the Forest portion of the allotment, which include the Maynard Creek, Moose Bog and Two Trough Trib. There are isolated soil impacts in the headwaters of Maynard Creek at "watering holes", with the most use occurring at a headwater tributary known as Moose Bog. Overall light grazing has traditionally occurred in riparian areas is probably due to effective cattle distribution as a result of eight well-placed water developments, encouraging cattle use away from streams, minimizing the impacts to fragile soils.

Fires

Specific areas identified in the Bitterroot Post Fire Assessment (USDA 2000) as being at high risk of significant soil loss included some of the steeper slopes in the Maynard Creek area. The fires of 2000 burned through the Andrews allotment at varying intensities. The high severity burns occurred in the heavily forested areas. An 18.1 review of the allotment concluded that cattle grazing activities would not be detrimental, because the amount of downed woody debris has rendered the areas inaccessible. Subsequently grazing was authorized in 2001. Monitoring efforts during the 2001 grazing season revealed that cattle use was incidental in the burned areas, the fires did not create access to previously inaccessible areas (riparian), the fires did not create additional transitory range due to the amount of downed woody material, and soil disturbance in burned areas was limited to a small amount of cattle trailing.

Roads

Road construction within the boundaries of the Andrews Allotment coincided with timber harvest activities. The majority of the harvest occurred in the late sixties, however, some regeneration harvest did occur in the 1990's in the Maynard Creek watershed. Residual compaction may exist in previously logged areas, but does not overlap with grazing activities, since no detectable use by cattle has been observed over a period of several years (Appendix X -Livestock Utilization Record).

3.1.6 DESIRED CONDITION – WAUGH & ANDREWS ALLOTMENTS

The Forest Plan does not describe desired future condition relating to soils, but does provide Forest-wide management goals for soils and water: "maintain soil productivity, water quality, and water quantity."

Soil productivity as defined in FSH 2509.18 is "the inherent capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities." Soil productivity may be expressed in terms of volume, or weight/unit area/year, percent plant cover, or other measures of biomass accumulation.

Key Differences between the Desired Condition and Existing Condition—

Existing conditions are currently meeting Forest Plan Standards.

3.1.7 ENVIRONMENTAL CONSEQUENCES

A. Effects Analysis Methods

Significant changes in soil productivity of the land are indicated by changes in soil properties that are expected to result in a reduced productive capacity over the planning horizon. Based on available research and current technology, a guideline of 15 percent reduction in inherent soil productivity potential will be used as a basis for setting threshold values for measurable or observable soil properties or conditions. The threshold values, along with areal extent limits, will serve as an early warning signal of reduced productive capacity. Significant impairment of the productivity of the land includes changes in soil properties, which would result in significant changes in the inherent productive capacity that last beyond the planning horizon (FSH 2509.18).

The capacity of the soil to function affects ecological processes, including the capture, storage, and redistribution of water, the growth of plants and the cycling of plant nutrients. For example, compacted soils have a decreased infiltration capacity, affecting the amount of water available to plants. As the availability of water decreases, plant production declines, some plant species may disappear, and the less desirable species may increase in abundance. The ability of soil to resist compaction is a function of soil moisture, texture, structure and organic matter. Sandy loams, loams, and sandy clay loams are more easily compacted than other soils. Natural recovery of compacted soils is achieved through cycles of wetting and drying and of shrinking and swelling of compacted layers; plant roots help break up compacted layers by forcing their way between soil particles; and large soil organisms such as earthworms, ants and small mammals move soil particles by burrowing through them (USDA NRCS 2001).

In this project area, soil productivity, and soil disturbance are the criteria used to determine the effects to the soil resource.

Indicators of effects to long-term soil productivity are:

- Detrimental soil compaction and displacement – The potential for soil compaction and displacement, as well as surface disturbance is a concern in areas receiving historical heavy grazing pressure, past logging activities, and past road construction/use.
- Ground cover—including desirable vegetation, moss, cryptogram, and organic matter components.

Sources of information used for analyzing effects on the soil resource include:

- Soils data mapped and described in the Bitterroot NF Landtype Inventory. The Landtype Inventory was used to identify soil concerns for the project area (e.g., landslide prone areas, areas of steep slopes and erosive soils, and/or soil types that are sensitive to compaction or displacement).
- Maps of the allotments—including soil inventory, grazing utilization, and vegetation types.
- Several site visits to walk through the proposed treatment areas and assess soil conditions and past soil monitoring reports.
- Pertinent scientific publications, local knowledge, and professional judgment.

Soil Productivity

Soil productivity in the project area has been determined by examining organic matter and soil disturbance mechanisms.

Organic Matter

Moisture and nitrogen are limiting factors for soil productivity. Nutrient cycling and decomposition rates are slow in this cold-dry environment. Soil nutrients are primarily replenished through the decomposition of organic matter and root turnover (Brady 1990). Where the fires of 2000 burned with high severity, much of the nutrient capital was volatilized (especially nitrogen and sulfate) (DeBano 1990).

Organic matter (surface litter and duff) depth and ground cover percentages vary widely throughout the allotments. Prior to the fires, organic matter averaged 3 to 5 percent in the top 2 to 6 inches of soil. Duff layers at the surface range from 1 to 3 inches in thickness. In the areas burned at moderate and high severity, the entire duff layer was consumed (USDA December 2000).

Sheet, Rill, Gully and Landslide Erosion: Soil erodibility is a function of detachability, infiltration rate, permeability of lower horizons, uniformity of slope and slope percent, water concentration potential, distribution of annual precipitation, rainfall intensities, soil temperatures, and the density of effective ground cover. Soil erosion is a natural process that can be accelerated by land management activities. Soils on steep slopes with poor vegetative cover and lack of structural development are more susceptible to erosion than are soils on gentle terrain. Vegetation, including the organic horizon, protects the soil surface from raindrop impact, dissipates the energy of overland flow, and binds soil particles together (Brady 1990).

The Bitterroot Post-Fire Assessment (December 2000) identified landscapes within the 2000 fire perimeter that have inherent instabilities, including breaklands, convergent stream headlands, and glacial troughs. Fires can have an effect on slope stability (USFS December 2000). Tree mortality reduces evapotranspiration, altering soil moisture regimes. As roots decay, soil strength is further reduced. This combined with steep slopes can result in a loss of slope stability.

Soil Disturbance

Soil disturbance is defined as any forest management practice that results in soil compaction, puddling, displacement, severe burning, or the loss of ground cover (FSM 2500). Detrimental soil disturbance is the condition where established threshold values for soil properties are exceeded and result in significant change (FSH 2509.18). Previous entries into portions of the analysis area for timber harvest and road building have resulted in varying degrees of residual soil compaction. Road building, recreation activities, and livestock grazing are also probably related to isolated areas of soil compaction, displacement, and puddling. Information from the 2003 Soil Condition Field Survey (Project File—Soil Spec. Report) and assessment completed by Mayn 2006 indicate that both the Waugh Gulch and Andrews Allotments are below Forest Plan standards. Interpretations are based on knowledge and research of past uses, concurrence by the Forest Soil Scientist and on best professional judgment.

Table 3.1- 1 - Detrimental Soil Conditions in the Waugh/Andrews Planning Area

Allotment	**Relation to Forest Plan Guidelines** **At, Below, Above**
Waugh Gulch	Below
Andrews	Below

Note: The determination of whether an allotment is Above, At, or Below the Forest Plan Guideline is based on the percentage of the allotment in soil condition class 3, 4, and 5 and review of the allotments by a

Rangeland Management Specialist with education and training in soils (as reviewed by the Forest Soil Scientist and Forest Hydrologist). Forest Plan Guidelines for detrimental damage are exceeded when the total acreage of detrimentally impacted soil exceeds 15 % (Excluding landings and roads). Planned management activities must no add to detrimental soil conditions in activity areas that exceed 15% detrimental disturbance. Management activities must also provide for restoration measures when and where they are appropriate (R1 Supplement No. 2500-99-1, 11/12/99). The following definitions were applied.

Above: The allotment has greater than 17% detrimental soil conditions based on survey protocol. Soil damage is widespread with displacement exceeding 100 square feet and compaction depths greater than 6 inches. Soil productivity is reduced as indicated by low levels of organic matter and ground cover, surface erosion or loss of surface soil.

At: The allotment is between 13% and 17% detrimental soil conditions based on survey protocol. Soil damage is localized. Compaction is found primarily in the surface soil (0-6 inches depth) and areas of displacement are less than 100 square feet in areal extent. Compaction and displacement are being ameliorated by natural processes (for example, vegetative root expansion, ground cover root mass expansion, organic matter, leaf and litter layer development). Ground cover through the unit is good.

Below: The allotment is below 13% detrimental soil conditions based on survey protocol. Soil damage is localized. Compaction is found in the surface soil (0-6 inches depth) and areas of displacement are small and scattered. Compaction and displacement are being ameliorated by natural processes (for example, vegetative root expansion, ground cover root mass expansion, organic matter, leaf and litter layer development). Ground cover through the allotment is excellent. Mitigation measures have a high likelihood of success (prevention of additional detrimental soil disturbance).

As indicated in Table 1, both of the allotments are within Forest Plan soil quality guidelines. Most of the existing soil damage (compaction and displacement) can be related to timber harvest, roads, livestock grazing, wildfire and natural processes. The detrimental soil damage tends to be in accessible riparian areas from livestock compaction.

Soil Compaction and displacement are related to the water holding capacity of the soil, clay content, slope and surface root mass, soil organic layer, vegetative cover, and down large woody debris. Soil conditions in the project area, based on infiltration tests (see Project File) typically ranged from no compaction to areas that are identified as severely impacted. The inventory data suggests that the soils within the allotment boundaries are currently well within Region 1 guidelines for soil quality, with the exception of Waugh Creek. Areas with gentle terrain, primarily in the accessible riparian areas of Waugh Creek, exceed the standard for detrimental soil conditions.
Evidence of old compaction (plated surface soils with depths 0-6 inches) is being ameliorated by the established root systems of dominant vegetation such as pine grass, sedges, snowberry, and conifers in the Waugh Creek area.

Displacement is the movement of soil from one place to another by mechanical forces such as a wheel, blade or animal hoof. Widespread displacement considered to be detrimental was not identified in the allotments. Minor areas of displacement were noted in localized areas from rodent burrowing, runoff events, cattle trampling in wet areas, blowdown, and road cuts.

Puddling is an indicator of reduced infiltration capacity of the soil. Puddling can occur naturally due to complete water saturation during wet seasons and from soil compaction. Management activities that cause soil compaction can lead to puddling unsaturated soils due to the loss of pore space. Puddling is a concern in areas where management activities have occurred on moist soils when compaction impacts are the greatest. Puddling was only observed in isolated locations along roads where vehicles had used the unimproved road surface during wet conditions.

Severe Burning did occur on portions of the project area during the 2000 fires. On high severity burn areas, the heat of the fire modified the surface soil properties and removed the organic layer and vegetation cover. Since the fires of 2000 occurred, vegetation has re-established and the initial stages of soil organic matter development have occurred on these areas.

B. Direct and Indirect Effects

Alternative 1 – No Action, Current Grazing Plan

Alternative 1 would continue to authorize grazing under the same terms and conditions as in the past, with no consideration given to soil quality guidelines. This alternative would not allow for marked improvement in soil conditions or productivity and may result in additional soil damage (compaction and displacement) resulting from livestock grazing. Cattle use would continue to be disproportionate throughout the allotment boundaries; with the highest use occurring in the gentler terrain as it has in the past. Subsequently, compacted areas would have little opportunity to allow natural processes to trend towards improvement. The alternative would not comply with regulatory requirements for soil quality.

Alternative 2 – Proposed Action

Grazing management actions proposed under Alternative 2 would allow for improvement in soil conditions and productivity due to a change in timing and duration of grazing, incorporating rest into the management scheme, as well as the consideration for range readiness, utilization standards, livestock distribution measures, and soil protection measures.

Alternative 2 would lead to an improving trend in soil resource conditions in Waugh Gulch and Andrews. In comparison, an improving trend would not be likely in Alternative 1, and the greatest opportunity for improvement would occur under the No Grazing Alternative, as grazing would be eliminated as a potential impact.

Alternative 3 – No Grazing

Alternative 3 would eliminate all grazing in the Waugh and Andrews allotments. This alternative would provide for the most unimpeded and rapid improvement of soils impacted as a result of livestock grazing, but would not eliminate soil impacts resulting from other uses. Areas of localized disturbance along streambanks and in wet meadows would heal, and natural processes of recovery would be achieved through cycles of wetting and drying, and shrinking and swelling of compacted layers. Plant roots that help break up compacted layers by forcing their way between soil particles; and large soil organisms such as earthworms, ants and small mammals that move soil particles by burrowing through them would prevail. Evidence of old compaction (plated surface soils with depths 0-6 inches) would continue to be ameliorated by the established root systems of dominant vegetation such as pine grass, sedges, snowberry, and conifers.

C. Cumulative Effects

The cumulative effects analysis area encompasses the area within the boundaries of the Waugh Gulch and Andrews Allotments incorporated into the grazing scheme.

Alternative 1

This alternative would not likely result in improvements in soil condition and may further degrade soil conditions in high use areas. Lack of cattle distribution practices and season-long grazing would magnify the overall impacts from cattle grazing and other uses.

Alternative 2

Changes in the grazing scheme would allow movement towards improved soil conditions under this alternative. The increased cattle distribution practices would discourage cattle concentration in areas with gentler terrain. This combined with the shorter duration grazing and built-in rest would allow more of an opportunity for natural soil processes to work towards improvement in areas of concern.

Alternative 3

This alternative would produce the most rapid improvement in the analysis area where past activities have resulted in varying degrees of soil disturbance.

3.1.8 PAST, ONGOING AND REASONABLY FORESEEABLE ACTIVITIES

The following list of potential activities is considered to have very low risk of contributing to the cumulative effects when combined with the Waugh and Andrews grazing management activities. The low-risk rating is based on the low potential for these activities to result in long-term soil disturbance or contribution to declining soil conditions based on 1) the size of the activity and the magnitude of its effects, and 2) the mitigation that would be applied during the implementation:

- Personal Use Firewood and Christmas Tree Cutting
- Hunting, Fishing, Dispersed Recreation
- Mushroom and Special Products Harvest
- Waugh Gulch Burned Interface Demonstration Project
- Fish Stocking by the MDFWP
- Fish Stocking
- Forest Service facilities construction and reconstruction
- Forest Trail construction and maintenance
- Facilities maintenance
- Outfitter and Guide Activities
- Use of Developed Recreation Sites
- Grazing on private lands
- Ditches, Diversion, and Irrigation Dewatering
- Highway 93 Construction
- Bull Trout Recovery Plan
- Lost Trail Ski Area Construction and Expansion
- Lost Trail Hot Springs Resort Operation and Use
- Maintenance of Indian Trees Campground

Activities that have been identified as having potential to contribute to cumulative effects, even if to only a small degree include:

Timber Sales: Timber harvest has occurred on most on lands within the allotment and cumulative effects area. Residual compaction may exist in previously logged areas, but has not historically overlapped with

grazing activities, since no detectable use by cattle has been observed over a period of several years. However, with increased cattle distribution practices, some light to moderate grazing may occur in harvested units, but the duration of such grazing will be limited.

BAR Projects: BAR related harvest activities have occurred throughout the Camp Creek and Maynard Creek areas. Several smaller projects have been sold or are pending sale that will salvage additional burned timber in the future. These BAR related projects are expected to result in only small amounts of ground disturbance, and the projects do incorporate soil protection measures.

In addition to harvest, the BAR Project decision identified additional projects such as graveling stream crossings, upgrading roads, and replacing several culverts in the Waugh Gulch, West Fork Camp Creek areas and on several tributaries to the West Fork Camp Creek. This work has not been completed due to lack of funding, but it is still planned. Some short-term soil disturbance will result from these activities, but soil protection measures will minimize the potential for any long-term problems.

Waugh Gulch Burned Interface Project: This project is located within the allotment boundaries near Waugh Gulch. Harvest activities occurred in the spring of 2001 to demonstrate the ground effects from winter ground based yarding. The project produced very little ground disturbance (USDA, 2001). Timber harvest activities are likely to continue on adjacent private and State Land. A considerable amount of harvest has already occurred near Camp Creek since the fires of 2000. On State and Federal lands, the application of Best Management Practices (BMPs) is required. Soil disturbance resulting from future harvest activities would vary dependent upon steepness of slope, and the yarding system used.

Road Construction and Maintenance: Most road construction in the area coincided with the timber harvests in the late 1960's. Maintenance on the existing roads will be ongoing and would produce localized soil disturbance associated with the use of heavy equipment. Some roads will receive little or no maintenance.

Noxious Weed Treatments: noxious weed treatments are planned (Bitterroot Noxious Weed Project 2003) within the boundaries of the allotments. The reduction of noxious weeds in the project area boundary would have long-term positive effects on the soil resource. Soil stability and productivity would be greatly improved and the expectant return of native vegetation will reduce the erosion potential along roadsides, riparian areas, open grassy ridgetops and on the steeper grassy slopes.

Fire Suppression: Fire suppression contributed to the heavy fuel loading in the project area. This heavy fuel loading was a contributing factor in the size and severity of the fires of 2000. Fire suppression is expected to continue, especially along wildland-urban interface areas. Fire suppression activities often result in varying degrees of soil disturbance, depending on suppression tactics. The incorporation of M.I.S.T (Minimum Impact Suppression Tactics) reduces the potential for long-term soil disturbance. Any soil disturbance is typically followed by land rehabilitation and is supervised by a resource advisor. High severity fire often produce surface fires with deep flame fronts, and considerable soil heating resulting in soil features likely to increase the potential for runoff and erosion, e.g., absence of duff layer, hydrophobic soils, and soil discoloration (USDA 2000).

Prescribed Fire: Prescribed fires have not constituted a significant part of the management within the analysis area. Low intensity fires, such as those produced by prescribed burns, typically burn ground fuels but do not burn hot or deep enough to produce those soil features that contribute to runoff and erosion (see Fire Suppression, above).

Wildland Fire: Wildland fires are a natural component of the Bitterroot Forest ecosystem and will continue to occur. The Saddle Mountain Fire of 1960 was the largest to occur within the analysis area,

until the fires of 2000. Summary reports prepared by BAER soils teams after the fires of 2000 suggest that burn severity varied widely across burned slopes. Although it is likely that all types of fire behavior occurred, surface fires with deep flame fronts were the norm. North facing basins, flat stream benches and pine forests under fire suppression management had thicker layers of needles and duff. A combination of surface fire, topography that holds heat longer, and accumulations of organic matter on the forest floor resulted in the most severe effects to soils. Water repellant studies conducted after the fires of 2000, revealed areas where soil temperatures were severe (USDA 2000).

Off-Highway Vehicle Use: OHV trails are reported on old abandoned roads and along ridgetops. The OHV EIS analysis resulted in the restriction of off-road vehicles to existing roads and trails and reduces the risk of soil disturbance because it limits the development of user-made trails. Hiking and horse trail construction and maintenance cause only minor ground disturbance and there are no known problem trails from a soil resources standpoint.

Vegetation Improvement Projects: The Camp Reimel Vegetation Management Project (USDA 1997) decision called for aspen exclosure fences in Waugh Gulch, a stream exclosure around Waugh Creek and the decommissioning and storage of seven roads in the Camp Creek area. This was partially implemented in 1998. The Camp Creek Watershed Restoration Project (USDA 1995) was implemented in 1995 and included 8.5 miles of road obliteration and 6.6 miles of road designated as yearlong closures. The closures included decompaction and culvert removal on roads in the West Fork of Camp Creek. These projects resulted in temporary soil disturbance, but have rapidly recovered.

3.1.9 CONSISTENCY WITH THE BITTERROOT FOREST PLAN AND OTHER REGULATORY DIRECTION

Forest Plan Standards

Alternatives 2 and 3 provide consistency with the Forest Plan. Each of these alternatives would allow for improvement of the soil resource and avoid significant adverse effects through a no grazing (Alternative 3) or change of grazing strategy and incorporation of soil protection measures (Alternative 2).

Alternative 1 is inconsistent with the Bitterroot Forest Plan, because it prove difficult to provide adequate soil protection measures. The level of livestock use in sensitive areas is expected to continue, and subsequently would not allow the natural processes of soil recovery to improve soil productivity.

Forest Service Manual Guidelines (FSM 2554)

Approximately 4% of the Waugh allotment area has soil conditions considered to be at or near the threshold for being considered detrimental condition. Less than 1% of the Andrews allotment has detrimental soil conditions. Alternative 2 and 3 are not expected to contribute to further impacts to the soil resource due to either no grazing (Alternative 3) or the incorporation of soil protection measures (Alternative 2). Grazing activities, as described in alternative 2, are not expected overlap significantly with past timber harvest or fire disturbance. Because of this, it is expected that the grazing activities proposed under Alternative 2 would meet the intent of the FSM guidelines by not contributing to a cumulative detrimental conditions that would exceed soil quality guidelines.

Alternative 1 has the most potential to contribute to future detrimental conditions, but the total area is not likely to exceed the current 4%.

Montana State Guidelines

Best Management Practices (BMPs) for Grazing are designed to prevent soil erosion and protect water quality, as well as help prevent soil damage. Alternative 3 would not incorporate the BMPs as no grazing is proposed under this alternative. Alternative 2 does incorporate many of the BMPs for grazing and makes them a requirement under the terms and conditions of the term grazing permit. Implementation and effectiveness monitoring for BMPs would be conducted by a qualified individual during other implementation and annual monitoring events.

Executive Order 11990

Alternative 3 would provide the most protection for wetlands and their values. The incorporation of soil protection measures under Alternative 2 would meet the intent of this executive order. Riparian exclosures would continue to be maintained under all the alternatives to protect sensitive areas.

3.2 FISHERIES

3.2.1 REGULATORY FRAMEWORK

The regulations and standards that govern the fisheries resource on the Bitterroot National Forest are contained in several documents. The primary document is the 1987 Bitterroot Forest Plan (USDA Forest Service, 1987) as amended by the 1995 Inland Native Fish Strategy (INFISH, USDA Forest Service, 1995). Other supplementary documents include:

- The Montana Streamside Management Zone Law (Montana DNRC, 1994)
- The Endangered Species Act (bull trout listed as Threatened in 1998)
- The Bull Trout Biological Opinion (USDI Fish and Wildlife Service, 1998)
- The Bull Trout Recovery Plan (USDI Fish and Wildlife Service, 2002)
- The Montana Bull Trout Restoration Plan (Montana Bull Trout Restoration Team, 2000)
- The Westslope Cutthroat Trout Conservation Agreement (Montana FWP, 1999)

For more detailed information on these documents and their specific standards and recommendations, please consult the expanded fisheries report in the Project File.

3.2.2 AREA OF ANALYSIS

The analysis area for fisheries includes the West Fork of Camp Creek and its unnamed tributaries, Waugh Creek, Andrews Creek, Maynard Creek, the main stem of Camp Creek, and the East Fork of the Bitterroot River downstream of Camp Creek. There are six streams that contain fish within the Waugh Gulch and Andrews allotments. These are:

- The West Fork of Camp Creek
- Unnamed tributary to the West Fork of Camp Creek, milepost 0.1
- Unnamed tributary to the West Fork of Camp Creek, milepost 0.9
- Unnamed tributary to the West Fork of Camp Creek, milepost 1.0
- Waugh Creek
- Maynard Creek

There are no fish in Andrews Creek within the boundaries of the Andrews allotment, but westslope cutthroat trout (*Oncorhynchus clarki lewisi*) are in its lower reaches on state land, downstream of the allotment. Camp Creek and the East Fork of the Bitterroot River are located downstream of the Waugh Gulch and Andrews allotments, and collect all of the water and sediment exiting the allotments. The rest of the streams in the Waugh Gulch and Andrews allotments do not support fish. These non fish-bearing streams provide seasonal habitat for other aquatic species, such as reptiles, amphibians, and macroinvertebrates. This fisheries analysis focuses on the current condition and effects on bull trout (*Salvelinus confluentus*) and westslope cutthroat trout populations, which are the two native trout species in the Bitterroot River drainage.

3.2.3 AFFECTED ENVIRONMENT

Landscape Scale

Bull trout and westslope cutthroat trout populations are considered to be “depressed” across the Bitterroot River basin. On National Forest land, westslope cutthroat trout are usually common to abundant, while bull

trout are uncommon. Westslope cutthroat trout occupy about 75% of their historic habitat in the Bitterroot River basin, and nearly 100% of their historic habitat on National Forest land. Bull trout occupy about a third of their historic habitat in the Bitterroot River basin, with nearly all of the bull trout occurring on National Forest land. Habitat fragmentation and displacement by introduced non-native trout species are key problems at the basin scale. The Montana Bull Trout Scientific Group identified the presence of introduced fish and the dewatering of streams as the two highest risks to bull trout recovery in the Bitterroot River basin (Montana Bull Trout Scientific Group, 1995).

Project Scale

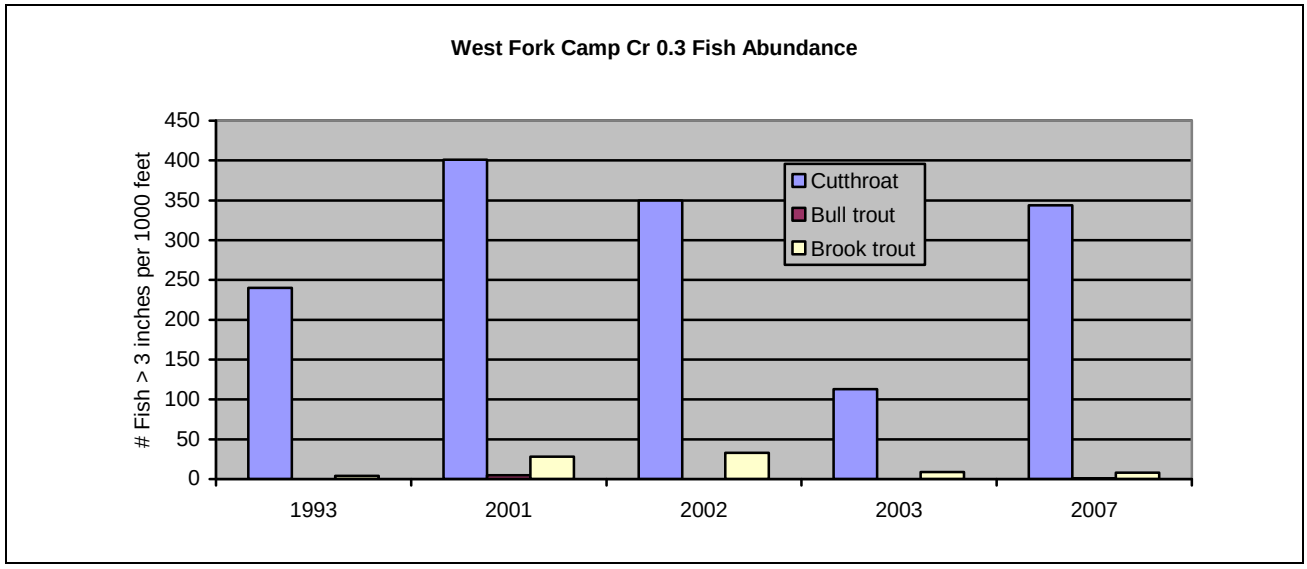
Westslope cutthroat trout are common in all of the fish-bearing streams in the Waugh Gulch and Andrews allotments, and occupy close to 100% of their historic habitat in the analysis area. Bull trout, in contrast, are present in only two streams in the Waugh Gulch and Andrews allotments: (1) the West Fork of Camp Creek; and (1) the extreme lower end of Maynard Creek. Densities of bull trout are very low in both the West Fork of Camp Creek and Maynard Creek, and their distribution is limited to the lower mile of the West Fork of Camp Creek, and the lower 1000' of Maynard Creek near its mouth. Both streams provide a limited amount of spawning and rearing habitat for bull trout. Bull trout are uncommon-to-rare in Camp Creek and the East Fork of the Bitterroot River downstream of Sula. It is difficult to say how much historic bull trout habitat is still occupied in the analysis area, but it probably ranges between 50-75%. Overall, the present number of bull trout in the analysis area is much lower than historic numbers.

Six long-term Forest Plan fish population monitoring sections were established in the analysis area between the early 1990's and the present. These monitoring sections are located at:

1. West Fork of Camp Creek, 0.3 miles upstream of the West/East Camp confluence
2. Waugh Creek, 0.7 miles upstream from the mouth
3. Andrews Creek, on state land 0.5 miles upstream from the mouth
4. Camp Creek, in the reconstructed channel upstream of the Sula Ranger Station
5. Maynard Creek, 0.1 miles upstream from the East Fork
6. East Fork of the Bitterroot River, in the canyon near Maynard Creek

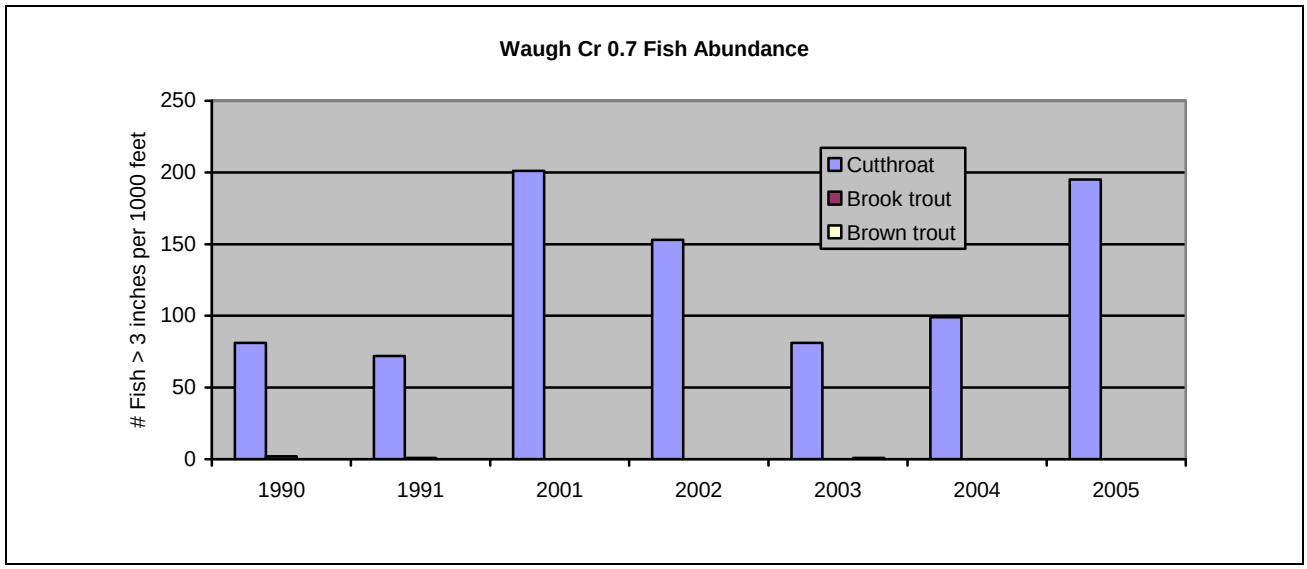
In the West Fork of Camp Creek section, fish populations were monitored in 1993, 2001, 2002, 2003, and 2007 (Figure 3.2-1). The data indicates that westslope cutthroat trout abundance has varied over the past 15 years. Abundance levels since 2000 have generally been higher than those of 1993, with the exception of 2003, which was lower. Bull trout are incidental (0-3 fish captured per year) in the section, and have never been captured in large enough numbers to calculate a statistically valid population estimate. Brook trout (*Salvelinus fontinalis*) are uncommon, but more numerous than bull trout. Brook trout also have not been captured in large enough numbers to calculate a statistically valid population estimate. Brook trout numbers have remained low since monitoring began in 1993.

Figure 3.2- 1 - Fish Abundance in the West Fork Camp Creek 0.3 Monitoring Section



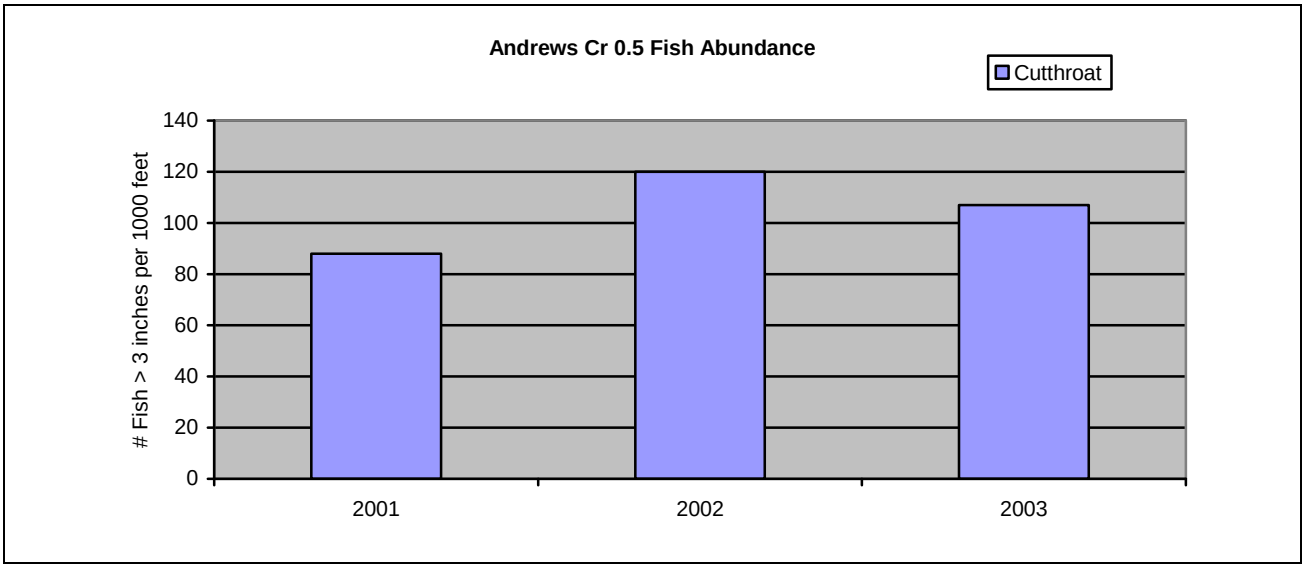
In the Waugh Creek section, fish populations were monitored in 1990, 1991, 2001, 2002, 2003, 2004, and 2005 (Figure 3.2-2). The 2000 fires did not cause a noticeable fish kill in Waugh Creek. In fact, westslope cutthroat trout abundance post-2000 was considerably higher than in 1990-91. During high flows in June 2003; however, an unusually large amount of bedload movement (which was likely fire-influenced) caused Waugh Creek to abandon 600 feet of its historic channel for a couple of weeks (USDA Forest Service, 2003: pg 74). This temporary channel abandonment resulted in the death of at least half of the adult cutthroat in the section in 2003. Since then, the cutthroat population has steadily recovered back to its pre-2003 level. Cutthroat numbers have been higher since riparian exclosure fence construction (1998) than before the riparian area was fenced. Very few non-native trout have been captured in the Waugh Creek monitoring section over the years. Three brook trout were captured in the 1990 and 1991 surveys, and one brown trout (*Salmo trutta*) was captured in the 2003 survey.

Figure 3.2- 2 - Fish Abundance in the Waugh Creek 0.7 Monitoring Section



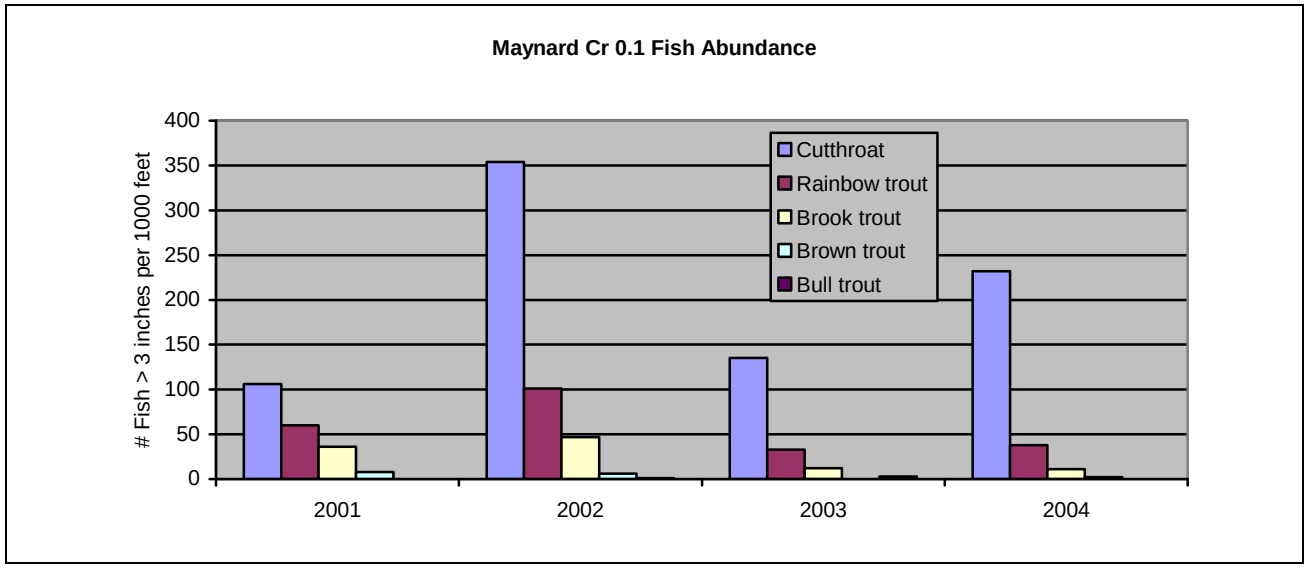
In the Andrews Creek section, fish populations were monitored in 2001, 2002, and 2003 (Figure 3.2-3). Pre-fire fish population estimates were not available for Andrews Creek. The fires of 2000 burned 80% of Andrews Creek at moderate and high severity (USDA Forest Service, 2001: pg 3-276), and a fish kill occurred on state land (USDA Forest Service, 2001: pg 3-279). Without pre-fire data, it is difficult to assess the true magnitude of the kill. The 2001-03 monitoring data indicates that the westslope cutthroat trout population in Andrews Creek has experienced a solid recovery since the fires. Non-native trout have not been detected in the Andrews Creek monitoring section.

Figure 3.2- 3 - Fish Abundance in the Andrews Creek 0.5 Monitoring Section



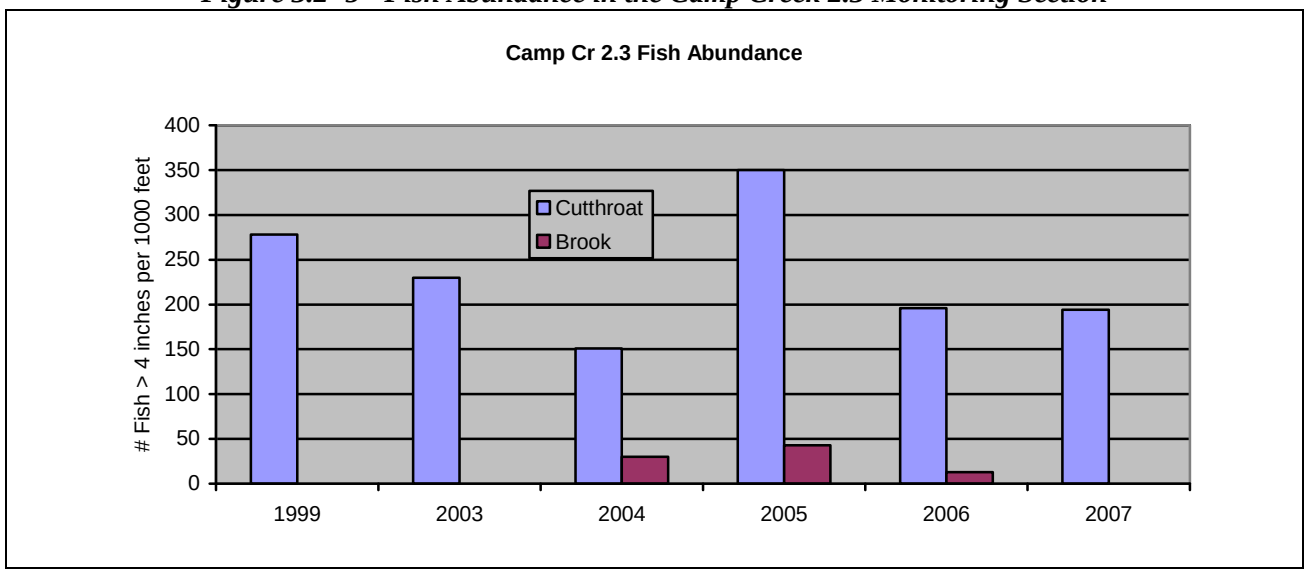
In the Maynard Creek section, fish populations were monitored in 2001, 2002, 2003, and 2004 (Figure 3.2-4). Pre-fire fish population estimates were not available for Maynard Creek. The data indicates that the 2000 fires did not cause a noticeable fish kill. Westslope cutthroat trout, rainbow trout (*Oncorhynchus mykiss*), and westslope X rainbow hybrids are all common in Maynard Creek. Their abundance has varied between 2001 and 2004 without a clear trend. A large class of 3-4 inch juvenile cutthroat trout was recruited to the population in 2002. Most of the rainbow trout in this section appear to be hybridized with the westslope cutthroat trout. Bull trout were documented for the first time in Maynard Creek in 2002, when one 5-inch fish was captured. In the 2003 survey, three 7-inch bull trout were captured. No bull trout were captured in the 2004 survey. Brook trout were common in the 2001 and 2002 surveys, but uncommon in the 2003 and 2004 surveys. Brook trout abundance has declined since 2002. Brown trout are uncommon and incidental in this section.

Figure 3.2- 4 - Fish Abundance in the Maynard Creek 0.1 Monitoring Section



In the Camp Creek section, fish populations were monitored in 1999, when the stream was still located in the ditch of U.S. Highway 93, and in 2003, 2004, 2005, 2006, and 2007, after the stream was moved out of the highway ditch and into a reconstructed channel that meanders across the historic floodplain. The Camp Creek section is predominantly a westslope cutthroat trout section (Figure 3.2-5). Westslope cutthroat trout have recolonized the reconstructed channel in stable numbers. The reconstructed channel also provides much better habitat for large, adult cutthroat trout than the highway ditch did. In 1999, when the stream was still in the highway ditch, there were only 10 cutthroat > 9 inches in length in the section. In 2007, there were 51 cutthroat > 9 inches in length in the section. Bull trout were rare in the section prior to channel relocation, and have not been captured since. The last time that a bull trout was seen in this section was 1999 when the stream was still located in the highway ditch. Brook trout are present in the section in large enough numbers to calculate statistically valid estimates in some years, but not all. Rainbow trout and brown trout are incidental and uncommon, with too few individuals to calculate a statistically valid estimate.

Figure 3.2- 5 - Fish Abundance in the Camp Creek 2.3 Monitoring Section



In the East Fork of the Bitterroot River section near Maynard Creek, fish populations were monitored in 1995, 1997, 2000, 2001, 2002, 2003, 2004, 2005, 2006, and 2007 (Figure 3.2-6). The fires of 2000 did not cause a detectable fish kill in this section. The fish community in the East Fork near Maynard Creek has traditionally been dominated by rainbow trout. However, the community has been changing since the early 2000's as the number of rainbow trout has declined, and brown trout have increased to at least partially fill the niche vacated by rainbow trout. Whirling disease infection rates have been increasing in the East Fork downstream of Sula and may be responsible for the decline of rainbow trout. Westslope cutthroat trout are present in the reach at relatively low numbers – too few to calculate a statistically valid estimate. A few juvenile bull trout are captured in the East Fork 12.0 monitoring reach each year, but usually none > 12 inches in length, and never in any large numbers. Brook trout are also rare in the East Fork near the Spring Gulch campground, with numbers similar to that of juvenile bull trout. Brook trout have never been captured at high enough numbers to calculate a statistically valid estimate. The whirling disease situation in the lower East Fork is dynamic, and more years of monitoring are needed to discern the eventual outcome.

Figure 3.2- 6 - Fish Abundance in the East Fork Bitterroot River 12.0 Monitoring Section

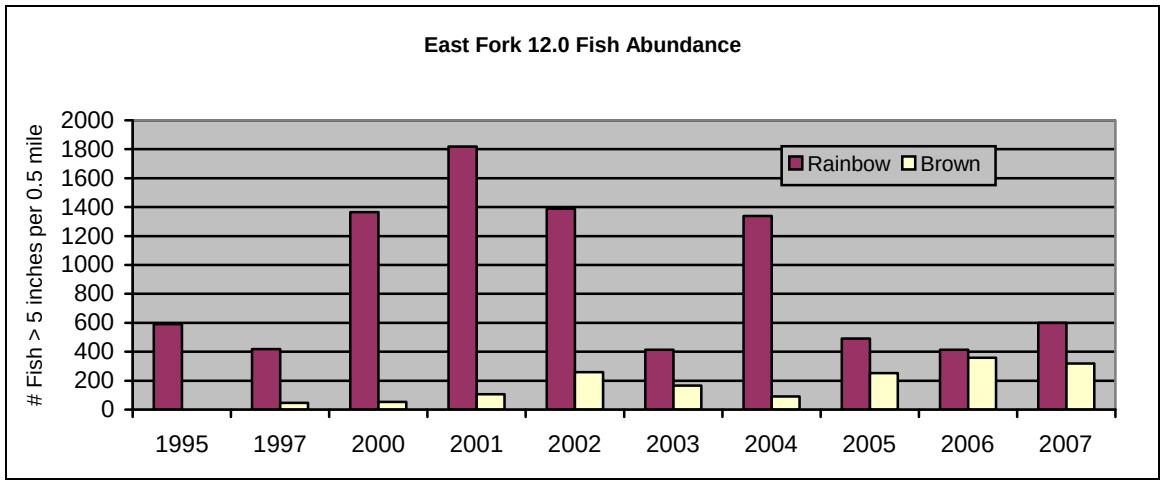


Table 3.2-1 and Map 3 summarize the fish species distribution and relative abundance in the fish-bearing streams in the analysis area.

Table 3.2- 1 - Fish Species Distribution and Relative Abundance in the Analysis Area

Stream	Species	Suspected Lower Limit of Distribution	Suspected Upper Limit of Distribution	Relative Abundance
West Fork Camp Creek	WS BT EB	Mouth Mouth Mouth	Headwaters < 1.5 miles above mouth < 1.5 miles above mouth	Common Rare Uncommon
WF Camp, trib 0.1	WS EB	Mouth Mouth	Below FSR 13340 crossing Below FSR 13340 crossing	Common Uncommon
WF Camp, trib 0.9	WS	Mouth	500 feet above the mouth	Common
WF Camp, trib 1.0	WS EB	Mouth Mouth	Below upper FSR 8112 xing Lower end near the mouth	Common Rare
Waugh Creek	WS EB	Mouth Mouth	Headwaters Below the Forest boundary	Common Rare

Stream	Species	Suspected Lower Limit of Distribution	Suspected Upper Limit of Distribution	Relative Abundance
	LL	Mouth	Near Forest boundary	Rare
Andrews Creek	WS	Mouth	On state, < 1 mile abv mouth	Common
	EB	Mouth	Near mouth	Pres/unknown
Maynard Creek	WS	Mouth	Falls 2.9 miles above mouth	Common
	EB	Mouth	Lower end near the East Fork	Uncommon
	RB	Mouth	Lower end near the East Fork	Common
	LL	Mouth	Lower end near the East Fork	Rare
	BT	Mouth	Lower end near the East Fork	Rare
Camp Creek	WS	Mouth	East/West Camp confluence	Abundant
	BT	Mouth	East/West Camp confluence	Rare
	EB	Mouth	East/West Camp confluence	Common
	LL	Mouth	Near the Camp Creek Inn	Uncommon
	RB	Mouth	Near the Camp Creek Inn	Uncommon
	SS	Mouth	Near the Camp Creek Inn	Pres/unknown
East Fork Bitterroot River	WS	Mouth	Star Falls	Common
	BT	Mouth	Star Falls	Rare
	EB	Mouth	Near Martin Creek	Uncommon
	RB	Mouth	Near Martin Creek	Common
	LL	Mouth	Near Jennings Campground	Common
	MW	Mouth	Near East Fork trailhead	Common
	SS	Mouth	Star Falls	Pres/unknown
	LND	Mouth	Near Jennings Campground	Common
	LNS	Mouth	Near Jennings Campground	Common
	LSS	Mouth	Near Springer Memorial	Common

Pres/unknown = species is documented or assumed present, but relative abundance is unknown
WS = westslope cutthroat trout
BT = bull trout
EB = brook trout
LL = brown trout
RB = rainbow trout
SS = slimy sculpin (*Cottus cognatus*)
MW = mountain whitefish (*Prosopium williamsoni*)
LND = longnose dace (*Rhinichthys cataractae*)
LNS = longnose sucker (*Catostomus catostomus*)

Habitat Conditions

Fish habitat conditions in the analysis area can be classified into three general categories:

- Streams where fish habitat is well below its desired condition
  - Andrews Creek (state land)
  - Camp Creek (private land)
  - East Fork of the Bitterroot River downstream of Camp Creek

- Streams where fish habitat is in good condition, but is still below its desired condition to some degree
  - West Fork of Camp Creek
  - West Fork Camp Creek unnamed tributaries 0.1, 0.9, and 1.0
  - Waugh Creek
- Streams where fish habitat is at or near its desired condition

- Maynard Creek

Table 3.2-2 summarizes the existing condition of the INFISH Riparian Management Objectives (RMOs) in the fish-bearing streams on National Forest land. A more detailed description of the status of the RMOs is available in the expanded fisheries report in the Project File.

Table 3.2- 2 - Existing Condition of the INFISH Riparian Management Objectives

Stream	Method of Survey	Width class (feet)	Pools per mile	LWD pieces per mile	Mean-maximum water temp (°Celsius)	Wetted width-depth ratio
West Fork Camp Creek	BNF habitat inventory	< 10	157	116	12.9° (2007) *	28 *
West Fork Camp Creek, trib 0.1	BNF habitat inventory	< 10	243	16 *	13.2° (2007) *	23 *
West Fork Camp Creek, trib 0.9	BNF habitat inventory	< 10	211	58	14.6° (2007) *	23 *
West Fork Camp Creek, trib 1.0	BNF habitat inventory	< 10	238	95	11.6° (2007) *	28 *
Waugh Creek	BNF habitat inventory	< 10	164	42	12.9° (2007) *	31 *
Andrews Creek	Not surveyed – state land	< 10	No data	No data	17.5° (2007) *	No data
Maynard Creek	BNF habitat inventory	< 10	174	24	19.5° (2007) *	27 *

* = RMO is not meeting the default value in the INFISH Decision Notice (USDA Forest Service, 1995)

The areas in the Waugh Gulch and Andrews allotments where livestock can easily access streams and potentially trample banks on National Forest land are displayed on Map3. In these areas, stream bank impacts generally tend to be localized to short, easily accessible spots along the West Fork of Camp Creek, three of its unnamed tributaries (tributaries 0.1, 0.9, and 1.0), and the short section of Waugh Creek between the Forest boundary and FSR 13334. Most of the accessible sections of Waugh Creek are protected from livestock grazing by a riparian exclosure fence. The exception is a 300-foot long section of Waugh Creek between the Forest boundary and FSR 13334 that is not fenced.

Prior to the initiation of rest-rotation grazing in 2002 and seasons of rest in 2001 and 2007, the accessible areas displayed on Map 3 were grazed all summer long for decades. The impacts to fish habitat that resulted from this concentrated use consisted of over widened and shallower-than-normal stream channels, with reduced or removed shrub vegetation, and minimal hiding cover for fish. We do not have data on how many cutthroat and bull trout redds were annually trampled by livestock, but it was certainly higher in the years prior to rest-rotation grazing. As a result of these impacts, fewer trout fry emerged from their redds, and fewer juvenile and adult trout were able to live in the heavily grazed spots than would typically occur in an ungrazed stream. The heavily grazed areas of stream also receive higher-than-normal amounts of direct solar radiation due to reductions in canopy shade. In some of the smaller streams that were heavily grazed such as West Fork Camp tributaries 0.1 and 0.9, stream temperatures appear to be warmer than natural due to the legacy effects of grazing. Not surprisingly, those two streams also received the most

trampling prior to 2000. It is important to note that since the season of rest in 2001 and the start of the rest-rotation grazing system in 2002, less livestock grazing is occurring along all of the streams, and stream bank conditions have improved. Continued restoration of the areas that were heavily grazed in the past is needed for the fishery to recover to its full potential and achieve the desired condition.

Prior to 2000, the most extensive stream bank trampling in the Waugh Gulch allotment typically occurred along West Fork Camp tributary 0.1, upstream from the Indian Trees Campground Map 3. In 1999, the last year that the Waugh Gulch allotment was grazed at full strength with no rest-rotation, 26% of the fish-bearing length of tributary 0.1 was trampled. Since then, stream bank conditions have substantially improved along tributary 0.1, so much so that what was once an over-widened braided stream channel has now narrowed back down to a deep and narrow single thread channel with nice cutthroat habitat. These improvements are the result of the rest-rotation grazing system that was initiated in 2002, and seasons of complete rest in 2001 and 2007. The lighter livestock use and improved bank conditions in the Waugh Gulch allotment were documented in the following Forest Plan monitoring reports (USDA Forest Service, 2002: pg 77; USDA Forest Service, 2003: pgs 75-76; USDA Forest Service, 2004: pg 87; USDA Forest Service, 2005: pg 62; and USDA Forest Service, 2006: pg 75).

From highest to lowest, the rest of the fish-bearing streams where bank trampling can potentially occur on National Forest land are:

- West Fork Camp tributary 0.9 = 12% trampled in 1999; < 6% trampled in 2006
- West Fork of Camp Creek = 7% trampled in 1999; about 4% trampled in 2006
- West Fork Camp tributary 1.0 = 4% trampled in 1999; < 2% trampled in 2006
- Waugh Creek = 4% trampled in 1999; near zero trampling in 2006

These four streams are located on the Waugh Gulch allotment. Again, it is important to emphasize that 1999 was the last year that the Waugh Gulch allotment was grazed at full strength with no rest-rotation system. Since the season of rest in 2001 and the initiation of the rest-rotation grazing system in 2002, the amount of bank trampling along the fish-bearing streams has declined (USDA Forest Service, 2002: pg 77; USDA Forest Service, 2003: pgs 75-76; USDA Forest Service, 2004: pg 87; USDA Forest Service, 2005: pg 62; and USDA Forest Service, 2006: pg 75). Another positive change was the construction of 700 additional feet of riparian exclosure fence along Waugh Creek in 2004-05 (USDA Forest Service, 2004: pg 85; USDA Forest Service, 2005: pg 60).

There are no fish-bearing streams that are grazed by livestock on the Andrews allotment. Also, livestock grazing on the Andrews allotment does not have a detectable impact on downstream fish habitat. Livestock do not graze the fish-bearing portions of Maynard Creek, and there are no fish-bearing portions of Andrews Creek within the Andrews allotment.

In the Maynard Creek drainage, all of the livestock grazing occurs in the non-fish bearing upland headwaters of Maynard Creek. Grazing of non-fish bearing riparian areas occurs where a couple of small tributaries to Maynard Creek cross FSR 728. These spots are generally located on, or a short distance down hill from FSR 728. The most heavily used spot occurs along an unnamed, non-fish bearing headwater tributary to Maynard Creek known as “Moose Bog” (T 1 N, R 19 W, S 30, SW ¼). A stock tank is present at this site to limit the extent of bank trampling. The fires of 2000 have not increased livestock access to the fish-bearing portions of Maynard Creek. Long, steep slopes and distance are the two factors that continue to keep livestock away from the fish-bearing portions of Maynard Creek.
Andrews Creek is a fish-bearing stream (westslope cutthroat trout) downstream of the Andrews allotment, but none of its fish-bearing reaches occur on National Forest land within the Andrews allotment. In the Andrews allotment, upland livestock grazing occurs on National Forest land in the headwaters of Andrews Creek. Similar to the situation in the Maynard Creek drainage, grazing occurs in a couple of non-fish

bearing riparian areas near unnamed tributary crossings of FSR 728. The most heavily used spot occurs along an unnamed, non-fish bearing headwater fork of Andrews Creek known as "Two Trough tributary" (T 1 N, R 19 W, S 30, NE ¼). Stock tanks are present along this small tributary to limit the extent of bank trampling. In addition, one other small tributary crossing of FSR 728 has been fenced off with a post-and-rail exclosure. A stock tank is present along the road shoulder to limit riparian use.

Overall, the limited riparian grazing that occurs on National Forest land in the Andrews allotment is believed to have a negligible impact on downstream fish habitat and populations in Andrews and Maynard Creeks. This is because the grazing occurs at least a couple miles from the nearest fish habitat, the affected tributaries are very small and often intermittent, and the bank trampling is spotty and isolated.

The fish-bearing portions of Andrews Creek are located entirely on state and private lands. They are grazed annually with a state lease, and the amount of bank trampling that occurs is often more extensive than what would occur on a Bitterroot National Forest allotment. During summer 2007, the Department of Natural Resources and Conservation (DNRC) constructed a 0.6 mile long riparian exclosure fence around a fish-bearing reach in lower Andrews Creek. This fence allowed bank conditions to improve along lower Andrews Creek in 2007. These improvements are expected to continue in future years as the exclosure fence allows the damaged stream banks and stream channel to heal.

3.2.4 ENVIRONMENTAL CONSEQUENCES

A. Effects Analysis Methods

Healthy bull trout and westslope cutthroat trout populations require clean substrates, cold water, complex hiding cover (i.e. pools and large woody debris), and populations that are connected to each other. Collectively, these key habitat characteristics have been coined "the four C's" (Montana Bull Trout Restoration Team, 2000). In this project, the criteria used to evaluate effects to fisheries include:

- Clean = sedimentation caused by stream bank trampling and erosion
- Cold = water temperature increases caused by the removal of shrubs, shade, and channel widening
- Complex = future reductions in woody debris recruitment caused by the loss of tree seedlings
- Connected = potential barriers to fish movement caused by prohibitively high water temperatures (i.e. thermal barriers)

These evaluation criteria relate closely to "the four C's". Each of the alternatives has been analyzed for its potential to affect these criteria. A detailed description of these evaluation criteria and their supporting research in the fisheries literature is available in the expanded fisheries report in the Project File.

B. Direct and Indirect Effects

Alternative 1 – Graze at Levels Authorized in the Current AMP

Alternative 1 is expected to increase the trampling of trout habitat and revert riparian conditions back to pre-2000 levels. This would result in more widespread habitat damage and negative impacts on the fishery. In the West Fork of Camp Creek, a few bull trout redds could get trampled by livestock each year, and the number of westslope cutthroat trout redds trampled by livestock would almost certainly be higher than what would occur with Alternative 2. Of the three alternatives, Alternative 1 would clearly have the most negative impacts on the fishery.

Alternative 2 – Proposed Action

Alternative 2 is expected to continue the improving riparian trend that has been gained since the rest-rotation grazing system was initiated in 2002. Since 2002, the Waugh Gulch and Andrews allotments have been voluntarily grazed in a rest-rotation system similar to what would occur with Alternative 2. Our monitoring has shown that this system has produced less bank trampling and riparian impacts along the West Fork of Camp Creek, its unnamed tributaries, and Waugh Creek because livestock had access to those areas for only three weeks instead of the usual four months (USDA Forest Service, 2002: pg 77; USDA Forest Service, 2003: pgs 75-76; USDA Forest Service, 2004: pg 87; USDA Forest Service, 2005: pg 62; and USDA Forest Service, 2006: pg 75).

With Alternative 2, some bank trampling along fish habitat would still occur in the usual spots, but its extent and duration would be considerably less than Alternative 1. Over time, Alternative 2 would produce more stable banks, not as much bank erosion, lower sediment inputs, deeper pools, and a better chance of narrowing stream channels and increasing riparian shade. These changes would be beneficial to the westslope cutthroat trout populations in the West Fork of Camp Creek, its unnamed tributaries, and Waugh Creek. For bull trout, livestock grazing would only occur along the West Fork of Camp Creek for about three weeks in mid summer, with periodic rest during some years. No livestock grazing would occur during the bull trout spawning period (September), which would ensure that no trampling of bull trout redds occurs. The shorter grazing period along the West Fork of Camp Creek would still result in the trampling of some cutthroat redds, but the number trampled would be fewer than that of Alternative 1, which would increase the number of cutthroat surviving from egg to fry.

Alternative 2 would have a negligible effect on the fishery in Maynard Creek and Andrews Creek. Those areas are currently not grazed, and would not be grazed in the future. The positive habitat changes caused by Alternative 2 in the West Fork of Camp Creek and Waugh Creek would be invisible in Camp Creek and the East Fork of the Bitterroot River. Those are large stream systems that drain large watersheds, and any small reductions in sediment exiting the Waugh Gulch and Andrews allotments would be masked by the effects of more influential features such as U.S. Highway 93, numerous other roads, and widespread livestock grazing on state and private lands. Despite this masking, the overall watershed trend of Alternative 2 would still be positive.

Alternative 3 – No Grazing

Of the three alternatives, Alternative 3 would produce the greatest and most rapid improvements in the fishery. There would be no livestock trampling of trout redds, which would produce the best possible egg-to-fry survival. Areas of trampled banks would heal over time, resulting in reduced bank erosion and sediment inputs, better pool volumes, narrower stream channels, and more riparian shading along the smaller streams. Based on the monitoring of the recovery that has occurred inside other riparian exclosure fences on the Forest, these improvements would begin immediately and accrue rather quickly (USDA Forest Service, 2003: pgs 73-75: USDA Forest Service, 2004: pgs 85-87; USDA Forest Service, 2005: pgs 59-62; and USDA Forest Service, 2006: pgs 73-75). Within five years, fish habitat in the trampled areas could approach the healthy conditions found in non-grazed channels (USDA Forest Service, 2006: pg 75). Shrub and woody vegetation recovery would be well underway at five years, but would take several decades to begin contributing large woody debris to stream channels. All of these improvements would be very positive for bull trout and westslope cutthroat trout in the West Fork of Camp Creek, its unnamed tributaries, and Waugh Creek. Measurable improvements to the fishery in the East Fork and Andrews, Maynard, and Camp Creeks probably would not occur for the reasons described for Alternative 2; however, the overall trend for watershed health would be the best of the three alternatives.

C. Cumulative Effects

Cumulative Effects Analysis Area

For fisheries, the cumulative effects analysis area consists of the East Fork drainage downstream of and including the Cameron Creek drainage. This area was chosen because sediment and water coming out of the Waugh Gulch and Andrews allotments has the potential to combine with other sediment and water sources to alter fish habitat in Camp Creek, Maynard Creek, and the East Fork below the mouth of Camp Creek. The Cameron Creek drainage was included in the cumulative effects analysis area because it is the largest sediment-producing tributary to the lower river. Upstream of Cameron Creek, the East Fork tributaries contribute colder water and lower amounts of sediment to the river. Man-caused sediment and temperature alterations in the East Fork drainage upstream of Cameron Creek have a minimal effect on the fishery as compared to those that occur in the lower river below Cameron Creek. For those reasons, that portion of the East Fork drainage upstream of Cameron Creek is not included in the cumulative effects analysis area.

A cumulative effects worksheet is included in the expanded fisheries report in the Project File. This worksheet describes the activities and natural events that already have, or will likely occur in or near the cumulative effects analysis area in the next three years, and documents the rationale for the following cumulative effects predictions.

Alternative 1 – Cumulative Effects

Alternative 1 would have a negative cumulative effect on the fishery. The combination of Alternative 1's higher sediment inputs, high redd trampling, and poorer habitat conditions are likely to combine with other negative impacts such as road sediment input, global warming, and riparian grazing on private lands to suppress bull trout and westslope cutthroat trout populations in the West Fork of Camp Creek and Camp Creek. These factors would create the kinds of degraded habitat conditions that favor the eventual displacement of bull trout and westslope cutthroat trout by brook trout. No measurable changes from the existing condition are likely to occur in the East Fork, Andrews Creek, Waugh Creek, and Maynard Creek. Any sediment increases entering the East Fork from Camp Creek would get diluted and masked in the much larger river, and would be invisible.

The bull trout and westslope cutthroat trout populations in the cumulative effects analysis area are part of the larger meta-populations that include fluvial fish from the East Fork of the Bitterroot River and upper main stem of the Bitterroot River (USDA Forest Service, 2000). The viability of these meta-populations is considered to be depressed in the lower half of the East Fork downstream of Meadow Creek, and strong in the upper half of the East Fork upstream of Meadow Creek (USDA Forest Service, 2000: pgs 37-45; USDI Fish and Wildlife Service, 2001: pgs 26-27). Viability is depressed primarily because of habitat alternations (USDA Forest Service, 2006: pg 111) and displacement by non-native trout species (Rieman et al. 1993).

The cumulative effect of Alternative 1 is likely to weaken the depressed viability of bull trout and westslope cutthroat trout populations in the Camp Creek drainage, and it could contribute to the replacement of bull trout with brook trout in the West Fork of Camp Creek. It would not improve the viability of those native trout populations.

Alternative 2 – Cumulative Effects

Alternative 2 would have a small positive cumulative effect on the fishery. The improved habitat conditions and lesser amounts of livestock redd trampling produced by Alternative 2 would help to slightly offset the negative impacts caused by other activities in the Camp Creek drainage such as road sediment inputs, global warming, and riparian grazing on private lands.

The cumulative effect of Alternative 2 is likely to strengthen the viability of bull trout and westslope cutthroat trout populations in the Camp Creek drainage. The cumulative effect of Alternative 2 would maintain the viability of the native fish populations in the East Fork of the Bitterroot River.

Alternative 3 – Cumulative Effects

Alternative 3 would have the most positive cumulative effect on the fishery. The improved habitat conditions and elimination of livestock redd trampling produced by Alternative 3 would help to offset the negative impacts caused by other activities in the Camp Creek drainage such as road sediment inputs, global warming, and riparian grazing on private lands. Improvements in bull trout and westslope cutthroat trout habitat and populations would be most pronounced in the West Fork of Camp Creek and its unnamed tributaries.

The cumulative effect of Alternative 3 is likely to strengthen the viability of bull trout and westslope cutthroat trout populations in the Camp Creek drainage, and maintain the viability of the native fish populations in the East Fork of the Bitterroot River. Of all the alternatives, Alternative 3 would have the best chance of strengthening the viability of native trout populations.

Determination of Effect for Sensitive Species (Westslope Cutthroat Trout)

The westslope cutthroat trout is designated as the management indicator species for fisheries changes in the Bitterroot Forest Plan (USDA Forest Service, 1987: II-20, e (7)). The westslope cutthroat trout is also designated as a Sensitive Species by the Regional Forester. A Biological Evaluation has been incorporated into this fisheries report. The following paragraphs summarize the rationale for making the determination of effects that are displayed in Table 3.2-3.

Alternative 1 "may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species". With Alternative 1, stream bank and redd trampling is expected to revert back to pre-2000 levels. Along the West Fork of Camp Creek, cows would be allowed to graze for four months instead of one, which would increase trampling of cutthroat redds and decrease egg-to-fry survivorship. Brook trout are present in the West Fork of Camp Creek, and cutthroat must compete against them for food and space. Having fewer cutthroat successfully emerge from their redds gives brook trout a competitive advantage. In the long-term, this could weaken the viability of the westslope cutthroat trout population in the West Fork of Camp Creek drainage and facilitate its replacement with brook trout. Whether Alternative 1 would result in large enough negative effects to lead to federal listing is debatable. Westslope cutthroat trout were common in the West Fork of Camp Creek and its tributaries throughout the 1990's, despite the heavier grazing pressure that the population had been subjected to for several decades. They have also had to compete against brook trout for at least the past 30 years and possibly much longer. Our fish population monitoring data in the West Fork of Camp Creek indicates that cutthroat and brook trout numbers have not changed much since the early 1990's, which supports the notion that the population is currently not trending towards Federal listing. Compared to the other alternatives, Alternative 1 is the most negative course of action that could be selected for westslope cutthroat trout, and could weaken the viability of the local westslope cutthroat trout population in the Camp Creek drainage. Elsewhere in the Bitterroot River basin, the viability of westslope cutthroat trout would be maintained.

Alternative 2 would have a "beneficial impact" on westslope cutthroat trout because the rest-rotation grazing system would result in improved habitat conditions for the species, and fewer redds trampled in the West Fork of Camp Creek. Alternative 2 is likely to strengthen westslope cutthroat trout viability at the

local population scale (the Camp Creek drainage). Alternative 2 would maintain westslope cutthroat trout viability elsewhere in the Bitterroot River basin.

Alternative 3 would have the most "beneficial impact" on westslope cutthroat trout because all livestock grazing impacts would cease. Alternative 3 would produce the greatest and most rapid improvements in westslope cutthroat trout habitat. Alternative 3 is likely to strengthen westslope cutthroat trout viability at the local population scale (the Camp Creek drainage), and maintain it elsewhere in the Bitterroot River basin.

Table 3.2- 3 - Fisheries Sensitive Species Biological Evaluation - Summary of Determination of Effects

SPECIES	STATUS	Alt 1	Alt 2	Alt 3
Westslope Cutthroat	Sensitive	MIIH	BI	BI

- **NI=** No Impact
- **BI=** Beneficial Impact
- **MIIH=** May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species
- **LIFV=** May Impact Individuals or Habitat with a consequence that the action may contribute towards Federal listing or result in reduced viability for the population or species

3.2.5 CONSISTENCY WITH THE BITTERROOT FOREST PLAN AND OTHER REGULATORY DIRECTION

Alternatives 2 and 3 are consistent with the Bitterroot Forest Plan as amended by INFISH and the other regulatory direction. Alternatives 2 and 3 would comply with the INFISH grazing standards (GM-1, GM-2, and GM-3), would improve attainment of the RMOs, and would avoid adverse effects to native fish.

Alternative 1 is inconsistent with the Bitterroot Forest Plan as amended by INFISH because it would not meet INFISH standard GM-1. The high level of bank trampling that would occur along the West Fork of Camp Creek and its tributaries in Alternative 1 would retard the attainment of the width-depth ratio, water temperature, and pool frequency RMOs, and would adversely affect native fish. In order to meet INFISH standard GM-1 and be consistent with the Forest Plan, the selected alternative needs to reduce the amount of bank trampling, not increase it.

3.3 HYDROLOGY

3.3.1 INTRODUCTION

The watershed analysis evaluates watershed health by focusing on the conditions in streams as they relate to upland watershed influences. It includes evaluation of sediment sources, past activities that have contributed to sediment sources and the effects of livestock upon streambank stability and sediment sources and how these influences affect stream channel conditions and water quality.

3.3.2 REGULATORY FRAMEWORK

Forest Plan Standards

The Bitterroot National Forest Land Management Plan describes Forest-wide standards that apply to the water resource. This standard direct management to maintain soil productivity, water quality and water quantity (p. II-3).

Forest-wide Management Objectives state that riparian areas will be managed to prevent adverse effects on channel stability and fish habitat (p. II-6).

Soil and water conservation practices (also called BMP's) will be part of the project design to ensure soil and water resource protection.

The Forest Plan also directs management to actively reduce sediment from existing roads. This includes such actions as graveling in sediment contributing areas, stabilizing or vegetating cut and fill slopes, straw bales or slash filter windrows to filter sediment in sediment contributing areas and cross drains into vegetated filters away from streams.

In Bitterroot Supplement 2, Riparian Management Guidelines directs mapping and classification of streams within allotments and their conditions.

Clean Water Act

Section 303(d) directs states to list water quality impaired streams (WQLS) and develop total maximum daily loads (TMDL) to control the non-point source pollutant. Camp Creek and Waugh Gulch are tributary to the East Fork Bitterroot River that is included in the Water Quality Restoration Plan and Total Maximum Daily Loads for the Bitterroot Headwaters Planning Area (TMDL) that was completed by Montana Department of Environmental Quality and approved by Environmental Protection Agency in 2005. The East Fork of the Bitterroot is listed for flow alteration, other habitat alterations and siltation. This proposal will need to show that the proposed activities would lead to improved conditions in these tributary watersheds.

Best Management Practices (ARM 16.20.603) are the foundation of water quality standards for the State of Montana. The Forest Service together with other Montana land management agencies developed Best Management Practices for Grazing and has agreed in a Memorandum of Understanding with the State of Montana to follow these BMP's. BMP's are applied directly as mitigation and project design. Implementation and effectiveness monitoring for BMP's would be routinely conducted by range managers and during other implementation and annual monitoring events.

3.3.3 AREA OF ANALYSIS

The allotment analysis area for direct and indirect effects is a portion of the Camp Creek watershed, and consists of State and National Forest lands with adjacent private land inclusions. Boundaries are the west side of the Camp Creek watershed to the south and bounded on the north by the northern Andrews Creek watershed boundary. It also includes Maynard Creek. The lower portion of Camp Creek and the East Fork of the Bitterroot is also included because sediment produced because of allotment activities has the potential to affect sediment levels in Camp Creek and the East Fork of the Bitterroot.

3.3.4 EFFECTS ANALYSIS METHODS

Existing conditions will be evaluated using field visits, and stream surveys. Gross watershed conditions will be evaluated and summarized using information found in recent environmental documents and from GIS database layers (including wetlands layer and burn severity overlay) that address the local area.

Stream surveys followed the protocols described in the Bitterroot Watershed Evaluation Process (Decker, 1993) and included channel geometry measurements, Rosgen (1996) stream type classification, substrate composition and productivity and channel stability measurements. Pre-fire stream surveys have been conducted in Waugh Gulch, Andrews and West Fork of Camp Creek. PF-WAT-20 describes locations of stream survey sites. These stream reaches are typically short lengths of stream located in lower gradient reaches where channels respond to upstream influences.

Rosgen (1996) describes the method of classifying streams into groups of similar form and function. The stream type is determined by measuring stream widths, depths, gradients, sinuosity, entrenchment and substrate. Classifying a stream allows for comparison of measured parameters between streams of the same class. PF-WAT-19 displays streamtypes.

The Tarswell Substrate Ratio (TSR) is a measure of productivity of the stream. The survey looks at substrate composition and assigns a value based upon the dominant substrate: sand, clean gravels/cobbles/boulders, or moss. Sand is the least productive, moss the most productive. Sediment deposition in the substrate of the stream reduces fish spawning areas and insect productivity. The greater the Tarswell Substrate Ratio is, the more productive the stream. (USDA Forest Service, 1993)

The Channel Stability Ratio (CSR) evaluates the stability of the stream channel. It considers stream bank composition, vegetation and slope, valley bottom shape and slope, and substrate conditions. Lower numbers indicate a more stable stream reach.

The percent fines in the substrate are an indication of the amount of deposition in the substrate and is determined by a variation of the Wolman Pebble Count (Wolman, 1954). This count measures the size of 100 pieces of sand, gravel, cobbles or boulders from the substrate of the stream and includes a variety of habitat types. It provides a “picture” of the of the stream substrate composition. This picture can change as streamflows or the availability of sediment (such as from fires, bank erosion or road inputs) change.

3.3.5 EXISTING CONDITION

Wetlands

Wetlands are present throughout the analysis area with the largest areas being in the Waugh Allotment because it has more areas of gentle land slope and wide valley bottoms than does the area within the Andrews allotment.

Wetlands, as defined in the Corps of Engineers Wetlands Delineation Manual (1987), are "those areas that are inundated or saturated by surface water at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." According to this source, an area is considered wetland if it has wetland hydrology (high water table, inundated or frequently flooded), hydric soils (soils that are saturated in the upper layers, flooded or ponded for significant lengths of time), and a predominance of hydrophytic vegetation (plants adapted to water or wet soils). All three criteria must be met. Wetlands in the analysis area were determined using infrared aerial photos and field visits. Wetland locations have been mapped and are on file in the project records PF-WAT-15 and WAT-16.

Wetlands were classified using the publication Classification of Wetlands and Deepwater Habitats of the United States, 1979. In this classification system, wetlands are differentiated by form, substrate and vegetation.

Typical wetlands within the project area are mostly flow-through systems where snowmelt and rainwater runoff flow through them as surface or subsurface flow. They are important regulators of water flow and help moderate peak flow events. Ground water flowing through thermally insulating organic materials help to keep water temperatures cool when it surfaces downstream. Floodplains filter and trap sediment from upland sources during floods. Wetlands increase the biodiversity found because the gradient from dry to wetland sites provide for many different types of species, plants, animals and insects for example. These areas have high productivity and are the most productive sites on the forest. The wetlands map is located in the project file.

A field review of wetlands in July of 2003 indicates that most wetlands in the analysis area are in fair to good condition (PF-WAT-18). There are isolated locations where wetlands have experienced degradation such as at road crossings where culverts and filling for roadbeds have reduced function, where roads provide access to isolated wetlands, and in the lower elevations of Waugh Gulch where livestock have typically spent too much time and high ground water tables make soils susceptible to compaction. Included in this list is an area below the crossing of FDR 73492 and in the switchback area of FDR 8112 above the junction with Rd 729 Historic overuse of livestock has affected the function of these wetlands by compacting and disturbing vegetation. Observation of wetland conditions during rest years (2001 in Waugh Gulch) indicates that vegetation recovery is quick in most wetland areas. Disturbed locations are mapped on PF-WAT-14).

The existing stage of vegetative development has changed in some of the wetland areas of the allotment because of 2000 fire activity. In these areas, high and moderate severity fire has resulted in vegetative mortality or as in the case of woody vegetation such as willows and alder, burning of the above-ground portions of the vegetation. This is not entirely an undesirable consequence. Where the woody vegetation has been burned, sprouting since the fires has rejuvenated the riparian vegetation and many of the plants are several feet tall. Maps in the project file (PF-WAT-15 and 16) show fire severity as it relates to known stream and wetland locations.

The Riverine subsystem of wetland is found near streams with relatively high velocity flows. These consist of mainly those associated with linear stream features and are narrow forested wetlands. Riverine wetlands within the analysis area are those associated with both perennial and intermittent streams. Analysis area-wide, these are the most common wetland type.

Paulstrine (or spring associated) wetlands are present in the wider valleys such as Waugh, West Fork of Camp and isolated areas scattered throughout the Waugh allotment. The Palustrine subsystem includes wetlands dominated by trees, persistent emergents and mosses in non-saltwater systems and includes marshy, wet areas. These are typified by the wet areas found in the wide valley portion of Waugh Gulch.

This area is highly saturated and has locations of standing water throughout. Other smaller pockets of Paulustrine wetlands are present in the lower elevations of West Fork Camp Creek. These areas are typified by willow, aspen or alder and often have an overstory spruce forest, and are typically larger in size.

Past Activities

An exclosure fence located in the north side of Waugh Gulch was built in 2002 as part of the Camp Reimel Vegetation Management Project to provide protection for an aspen population. Prior to the construction of the exclosure, new sprouts of this clone were being consumed each year by livestock and wildlife. This eight foot tall fence will remain in place until the sprouts reach the size that is woody and not very palatable to livestock and wildlife. Monitoring of this site each fall since completion has shown that the aspen have grown from three feet high the first growing season to the majority being over 6 feet tall in 2007.

Debris flows have been documented in the allotment as well as within the Camp Creek watershed since the fires. One debris flow occurred in a small dry draw in Waugh Creek that deposited coarse gravel and cobble below the mouth of the draw and down the non-system road on the north side of the creek. It doesn't appear that large amounts of material from this flow entered Waugh Creek but some fine suspended sediments may have flowed into Waugh Creek during the event. No other debris flows have been documented within the allotment. Larger debris flows have occurred on the east side of Camp Creek and are outside of the allotment boundaries. Water and sediment from these debris flows have entered Camp Creek and based upon turbidity sediment has been transported to the East Fork of the Bitterroot River.

Wildfire has been the greatest source of change in within the allotment in the recent past. Because of the 2000 Fires, the Waugh Gulch Allotment was rested in 2001 to allow vegetation to recover (PF-WAT-1). High severity fire in the Andrews allotment occurred mostly in the forested areas and the primary range did not burn to a large amount and grazing was allowed to continue (PF-WAT-2). Review of Waugh allotment conditions in the fall of 2001 found that although there were small pockets where vegetation was less vigorous, vegetative conditions on the primary range had improved since the fires (USFS, 2001) and use on the allotment was resumed in 2002.

Table 3.3- 1 - 2000 Fire Activity within Analysis Area

Allotment Name	High Severity Fire	Moderate Severity Fire	Low Severity Fire and No fire	Allotment with No Fire
Waugh Gulch	21%	2%	20%	57%
Andrews	45%	17%	38%	0

Watershed improvements in the form of road closures occurred in 1996 and again in 1998 in Camp Creek as part of the Camp Reimel Vegetation Management Project and Camp Creek Watershed Improvement Projects. This included the decompaction and seeding of several miles of roads. Monitoring of revegetation efforts shows that there is no soil movement on decompacted surfaces and vegetation density is at least similar to road surfaces where no decompaction took place and in some instances is better (USDA, 1998).

A stream crossing on the tributary to Camp Creek that flows through the campground was removed in 2006. This crossing was partially plugged, rusted, leaking and the stream backed up behind the crossing during peak flows. After removal the road fill was pulled away from the crossing and revegetated. Monitoring in 2007 found that vegetation was recovering, planted shrubs were surviving. Some adjustment of the channel during the first runoff after the culvert was removed that resulted in sediment deposition

downstream. Although less adjustment was desired, the result was considerably less sediment deposition than if the culvert had plugged, overtopped and washed out 6-8 feet of road fill.

Another project resulting from the Camp Reimel EA was the construction of two fences around sections of Waugh Creek. This eliminates livestock access along a 1400 foot reach of the stream. Monitoring of this fence indicates that it is effective in limiting livestock access to the stream. A broken section of fence in 2002, allowed a small amount of use. This was repaired as soon as the break was discovered. Review since 2002 has found that the fence has been effective in keeping livestock from Waugh Creek. Another 700 feet of fence was constructed in 2004 to prevent livestock from accessing a burned section of Waugh Creek,

Throughout the 1960's and up through the early 2000's logging activities occurred in the allotment areas with most of it occurring in the 1960's and 1970's. In Waugh Creek and the tributary above Indian Trees Campground, regeneration harvest occurred during the 1960's and 1970's. Intermediate harvest occurred in the West Fork of Camp Creek in the 1960's and 1970's. About ½ of two unnamed tributaries to West Fork Camp received some form of harvest in the 1970's with most of it being regeneration harvest. In the 1990's some regeneration harvest occurred in the Maynard Creek watershed. (PF-WAT-4) It is likely that water yields increased as a result of these actions and was further influenced by the 2000 fires. Harvested units were planted and the many of them now support pine 20-30 feet tall. Water yields in this watershed are on a decreasing trend as trees planted in the harvested units continue to grow and recovery from the fires continues.

Road construction coincided with harvest activities. The majority of harvest occurred in the late sixties, the road construction occurred during this time period as well. Man-caused sediment yields were likely greatest during the sixties, both because of erosion associated with new roads and the erosion from ground disturbance within the units. Erosion associated with harvest has likely recovered as ground cover regrowth occurred and sedimentation from roads has recovered from the high immediately following construction to a relatively constant sediment source (USFS, 1981, Luce and Black, 1999, Elliot and Robichaud, 2001)

Livestock use has occurred throughout the allotment area since the 1930's. Various levels of use have occurred since that time and a description of this can be found in the Range section of this report. Higher levels of use common in the past likely resulted in greater amounts of streambank use and poorer channel conditions than exist today.

Discussion of Stream Conditions

Streams are the product of upstream influences, including those described above. They have evolved to their current conditions as a result of upstream geology, precipitation regimes, natural process and human management. The stream surveys conducted evaluate the effect of these influences on the specific stream reach.

The majority of streams within the analysis area are steep A3 and A4 type streams. These types of streams are characterized by narrow floodplains, fairly straight streams and have high gradients (greater than 4% water surface slopes). In the analysis area, the majority of these streams have coniferous vegetation with little appeal to livestock or wildlife. Streams with finer bank materials (A4, B4, and C4) are more vulnerable to bank trampling than those with predominately cobbles such as A3 streamtypes and are usually found at lower elevations. Vegetation presence and vigor is vital to maintenance of bank stability in these types of streams. In Waugh Gulch and Andrews allotment most riparian areas are well vegetated with coniferous or deciduous vegetation. An exception is West Fork Camp near the crossing of road 729.

Access in this area affects channel stability as well as wetland conditions for approximately 1/2 mile. Function of riparian areas is the result of mostly accessibility and fire.

Most stream corridors or wetlands within the allotments were not burned at high or moderate severity and so vegetation still provide shade and the stabilizing effect of root systems. Eight years after the fires, where riparian area did burn shrubs are recovered and 5-8 feet tall. Fire did occur in the headwater reaches of three tributaries to West Fork Camp, Waugh Creek, headwaters to Maynard Creek and in Andrews Creek. Livestock access to areas of stream channel that burned is limited. PF-WAT-15 and 16 display burned stream reaches.

Site visits to streams within the allotments indicates that the majority are well forested and access by livestock is difficult along most reaches of streams. There are approximately 31 miles of perennial or intermittent streams mapped on USGS quads within the two allotments, of this about 4 1/2 miles are accessible to livestock either because of topography, road access or vegetation, this represents 15% of the total stream miles. Within the accessible areas, there are several known access points where roads lead to streams or wetland areas and livestock congregate. Included in this group is Waugh Gulch above and below the existing fence, where a broad wet valley bottom and vegetation conditions allow livestock use throughout much of the lower mile of the stream.

About five miles of the total stream miles burned at high or moderate severity, of this about 0.8 miles is accessible to livestock, the remainder of the burned riparian areas are too steep or access is blocked by existing vegetation. This burned and accessible area represents about 3% of the stream miles within Andrews and Waugh allotments.

Table 3.3- 2 - Summary of Stream Accessibility, Refer also to PF-WAT-14

Total Stream Miles	Miles of Stream Accessible Pre-Fire	Miles of Stream Burned at Moderate /High Severity	Miles Accessible Because of Fire
31	4.5 Locations: Unfenced reach of Lower Waugh, Lower reach and upper reach of unnamed trib to Waugh, Lower trib below Boot Hill, Indian Trees CG Trib, EF Camp above/below Rd 729 xing, Scattered road xings	5 Locations: Upper Maynard above 728 xing, upper headwater area of Waugh, Trib below Boot Hill, headwater portion of trib to EF Camp,	0.8 Location: Upper Maynard in the vicinity of Rd. 13369.

A site located in the fenced reach of Waugh Gulch was surveyed in 2002 and prior to fencing in 1991. Measurements in 1991 indicated that livestock used this area heavily and that trampling occurred along 67% of the reach. This section was fenced in 1998 and livestock use was essentially eliminated. The percentage of the substrate composed of fine sediments within this reach is slightly lower in 2002 than in 1991 and is similar to that of reference reaches. Only a short portion of the Waugh Creek stream corridor was affected by fires in 2000, most burned areas were at higher elevations and affected a minimal amount of stream channel.

A survey site is located on West Fork Camp Creek ¼ mile above the campground. This site is located in a spruce bottom where some blow down of spruce trees has occurred in the past and this influences bank stability and the availability of erodible banks. In this area, it is difficult for livestock to access the streamside area because of the density of the forest and scattered down trees. Survey notes indicate than there was trampling on only 1% of the measured stream reach. Compared to reference, substrate composition is of a smaller size than reference but other parameters were similar. In this area of West Fork Camp (between the confluence of East Fork Camp and 3,000 feet upstream) there are only isolated locations where livestock can reach the stream because of the dense forest and down trees. Most livestock access on this stream occurs within a several hundred feet of the stream crossing of FDR 729. Above that, livestock use becomes less frequent to almost non-existent where Road 8112 switchbacks out of the stream bottom. This area was not burned by the 2000 fires.

A survey site was located on the tributary to the West Fork that flows through Indian Trees Campground. This is one of the sites were livestock can easily access a couple thousand feet of stream because of gentle gradient. This location is sensitive because the streambanks do consist of gravels and sand sized particles that can be easily displaced by trampling or by changes in sediment or water yields. Survey results indicated that there are fewer pools and substrate composition is more fine than reference. About 50% of the streambank within this stream reach had evidence of trampling in 1995. Site visits to this area in 2002 and 2003 indicates that less livestock use occurred the in the vicinity of this reach since the fires (PF-WAT-18).

Another stream survey was located on a tributary to West Fork Camp (milepost 1.0) in 1995 above the FDR 8112 crossing. This site wasn't burned in 2000 and only a small section in the headwaters of this stream was affected by fire. Although livestock trailing occurs along the south side of this stream, thick vegetation limits access by livestock to a large degree along this reach and along most of the stream itself. The substrate in this reach is slightly more fine than that found in reference reaches.

A survey site on Andrews Creek above the forest boundary was measured in 1990. This was a steep stream reach having well-vegetated and stable banks. No mention of livestock trampling was made on the data forms. This area wasn't burned in 2000 and receives little to no livestock use.

In the Maynard Creek watershed a survey site is located near the confluence with the East Fork of the Bitterroot River and livestock do not have access to this area. This site has several years of data beginning in the early 1990's as well as following the fires. Substrate composition and fines in this reach have been similar between all years and within the range of reference streams. Two other limited survey sites are located on a tributary adjacent to FDR 73365 in upper Maynard Creek that were used to measure effects from road construction. No livestock use was documented on the field forms in this area of Maynard Creek. Use is limited because of steep slopes and dense vegetation is this area. A field review of the Maynard Creek area in respect to livestock access was made in 2003. This review found that the severely burned areas of this watershed were not accessible to livestock because of topography. In a reach of stream that appeared to be accessible from the road, actual review found that no evidence of past livestock use existed (PF-WAT-18). The majority of livestock use in the Maynard watershed appears to be trailing along FDR 728 and the low gradient riparian areas such as is found a long FDR 13369. Evidence of livestock trails and pies were present in these locations but the channel of the unnamed tributary had two isolated crossings, stream banks were stable.

All of the streams within the allotment areas are tributaries to the East Fork of the Bitterroot River. Fisheries and watershed crews have measured substrate composition on the East Fork of the Bitterroot immediately following the fires and annually through 2005. Surveys up through 2007 show that sediment numbers fluctuate from year to year but have not changed despite debris flows, fire effects, and highway construction. The East Fork is a large stream and most of the reaches are very stable B4 streamtypes that

are able to transport sediment through the stream rather than depositing it in low velocity areas (there are few low gradient reaches in this section of the East Fork). The stable stream banks (well vegetated, cobbly and bouldery and riprapped) are able to withstand higher flows associated with the fires and higher sediment loads without a change in stream channel or stream bank conditions.

Summary

The majority of streams within the allotment are not accessible to livestock and likely at or near their potential. The reaches that have been burned but aren't accessible will continue to recover as vegetation and soil conditions recover with no additional impacts. Some reaches are accessible and have been burned but this represents about 8% of the total stream miles. These reaches are at the most at risk to livestock use because they are easily accessed and are sensitive because duff and vegetation removed by the fire. There is also rapid vegetation regrowth in these areas that may be extremely palatable to livestock. These reaches are located in the headwaters of Maynard Creek, an unnamed tributary to Camp Creek located in Section 8 and 9, and an unnamed tributary that on the map flows into Waugh Creek near the Forest boundary but in reality has only subsurface flow to that stream. At most burned riparian sites where post-fire monitoring has occurred, woody vegetation is resprouting and is 2-3 feet tall in 2002.

It is likely that streams have made channel adjustments since the 2000 fires due to changes in water and sediment yields (Gresswell, 1999). In 2002, several tributaries to the East Fork, including Waugh Gulch and Maynard Creek experienced large amounts of bedload movement during peak flows that resulted in channel migration. This includes Maynard Creek especially at mid to upper elevations where a large percentage of the upstream watershed burned, and the unnamed tributary in Section 8 and 9.

The burned and accessible stream reaches are at most risk to livestock use because of lack of protective ground cover, young palatable growing vegetation and the fact that they are accessible. Since the fires, use in these areas has not noticeably increased in these burned reaches.

3.3.6 ENVIRONMENTAL CONSEQUENCES

A. Effects Common to All Action Alternatives

In all action alternatives there would be no change in access to the areas that burned and are accessible to livestock. This amounts to a total of approximately 0.8 miles in several reaches of stream located throughout the allotments.

B. Direct and Indirect Effects

Alternative 1 - No Action

Use would continue as in the recent past. There would be no change in existing conditions because use throughout the allotment would remain the same. Stream and wetland conditions as described in the existing condition section of this report would continue on the same trend as is present today.

The fence around the aspen clone in Waugh would not be removed until the young aspen reached a size that was not palatable to wildlife. This fence was installed as part of the Camp Reimel Environmental Assessment to restrict use to both livestock and wildlife and would remain in place until aspen potential is attained.

Improvements designed to facilitate livestock movements in the allotments would remain, and be maintained as necessary.

There would be no changes in current conditions from the implementation of this alternative.

Alternative 2 - Proposed Action

This alternative would result in improvements to riparian and wetland conditions to a greater degree than Alternative 1 but less than the no grazing alternative. This is because not only would livestock patterns of use change because of the change in pasture use proposed, but the amount of time livestock could possibly use any single riparian area within each pasture would be reduced. To illustrate, instead of livestock grazing in Waugh Gulch for most of the summer, they would be limited to less than one month. This type of change would be an improvement because it would limit access to stream banks and provide time for recovery each year. This alternative would result in less bank trampling, less production of sediment because of less unstable streambanks and the potential for improvement in riparian vegetation.

The addition of more water developments would reduce pressure on wetland areas adjacent to the development site. This would allow for improved wetland conditions near spring sites.

The fence around the aspen clone in Waugh would not be removed until the young aspen reached a size that was not palatable to wildlife. This fence was installed as part of the Camp Reimel Environmental Assessment to restrict use to both livestock and wildlife and would remain in place until aspen potential is attained.

Alternative 3 - No Grazing

This alternative would eliminate all grazing in the Waugh and Andrews allotments. Livestock impacts (stream bank trampling, woody vegetation utilization) would be eliminated. Improvements in bank stability would begin in reaches where livestock have had effects on channel stability such as along the West Fork of Camp Creek in the vicinity of the road crossing of FDR 729. The wetlands throughout the allotments would no longer have livestock use, lack of livestock would allow woody vegetation in riparian and wetland areas that are accessible to cattle to recover to potential. Review of conditions within the fenced portions of Waugh Creek, indicates that following livestock elimination recovery would begin immediately and noticeable improvements would be seen within three years.

The fence around the aspen clone in Waugh would not be removed until the young aspen reach a size that was not palatable to wildlife. This fence was installed as part of the Camp Reimel Environmental Assessment to restrict use to both livestock and wildlife and would remain in place until aspen potential is attained. All posts and wire would then be removed from the site.

Other range improvements in the allotment would be removed. This would include the fence around Waugh Creek, as well as troughs and fences protecting spring developments.

Riparian, stream channel and wetland areas within the allotment would begin an improving trend because of the lack of livestock use throughout the area.

C. Cumulative Effects

The cumulative effects analysis area is the Camp Creek watershed, (HUC) 0502 and consists of State and National Forest lands with some private land inclusions. The East Fork of the Bitterroot is also included

because sediment produced because of allotment activities has the potential to affect sediment levels in the East Fork of the Bitterroot.

Past, Ongoing and Reasonably Foreseeable Activities

Follows is a list of activities where there is very low risk to contributing to cumulative effects when combined with the Waugh and Andrews Allotments. This is because their potential for sediment production, steam bank effects, or water yield increase is low due to 1) the location where activities might take place in relation to the analysis area or streams, 2) the size of the activity and the magnitude of its effects, or 3) the mitigation that would be applied during implementation.

- Personal Use Firewood and Christmas Tree Cutting
- Hunting, Fishing, Dispersed Recreation
- Mushroom and Special Products Harvest
- Waugh Gulch Burned Interface Demonstration Project
- Fish stocking by MFWP
- Fish stocking
- Forest Service facilities construction or reconstruction
- Forest Trail Construction and Maintenance
- Facilities Maintenance
- Outfitter and Guide Activities
- Use of Developed Recreation Sites

Activities that *may* contribute to cumulative effects, even if to a small degree

Timber Sales: Timber harvest has occurred on most of the lands within the allotment and cumulative effects area. Vegetation management activities older than three years are likely contributing no sediment (USFS, 1981) but removal of vegetation from some riparian areas has allowed livestock access to otherwise unaccessible areas.

BAR related harvest activities have occurred throughout Camp Creek and tributaries to the East Fork of the Bitterroot River and includes Bitter Camp, Maynard, Guide, Reimel, Mama Waugh and Papa Waugh. Sediment actually produced by these activities is actually much lower than that estimated during BAR analysis. Monitoring indicates that BAR related harvest has resulted in only a small amount of ground disturbance (PF-WAT-6, WAT-7, and WAT-8). Monitoring of BMP application and effectiveness very little ground disturbance occurred and no off-site erosion or sediment contribution to streams has occurred as a result of the yarding activities. Hauling in this area didn't result in sediment contributions to streams primarily because of road locations but also from timber sale management.

Waugh Gulch Burned Interface Project: This project is located near Waugh Gulch and is within the allotment. Harvest occurred here in the spring of 2001 to demonstrate the ground effects from winter ground based yarding. Very little ground disturbance occurred and no sediment moved offsite (USDA, 2001).

Guide Timber Sale is located the Guide as well as Jennings Camp Watershed. Unit Logs (PF-WAT-7) indicate that little ground disturbance has occurred. Effects are not likely to be measurable in downstream locations.

Harvest has and will likely continue on private and State land. Depending upon yarding system and the amount of trees removed sediment and water yields can be changed. On State lands the application of

BMP's is required; on private land they are optional. The location of the harvest in relation to streams, the application of BMP's, the slope of the land and yarding system influence ground disturbance, erosion and sediment potential. On State land, monitoring of fire related harvest required the use of a streamside buffer that was effective in maintaining shade, woody debris recruitment potential and filtering sediment (DNRC, 2000). On private land, it is estimated that up to 300 acres could be harvested following the fires in Camp Creek. Some of this has occurred, most of it within a year of the fire, we have no data available to describe the effect of this activity on the watershed or the amount of sediment produced.

It is likely that Douglas fir outbreaks will continue on forested lands in this analysis area leading to more areas with increased water yields (Potts, 1984). It is also likely that harvest of at least some of these areas would occur, on all land ownerships. This would not affect water yields to a measurable degree because the trees would already be dead and evapotranspiration ceased but the method of harvest could result in some ground disturbance and changes in sediment yields. The magnitude of this affect would depend upon the location of the areas in respect to streams, the type of yarding system used and the mitigation required. Use of mitigation and the application of BMP's can limit the ground disturbance of this future harvest and the potential for erosion. Complete analysis would occur wherever this harvest was proposed.

In the Burned Area Recovery Project (BAR), the decision was made to gravel stream crossings, and upgrade the roads to improve the drainage system and reduce watershed impacts (USDA, 2001a, pages 2-20 and 2-11) and to replace several culverts in the area (Waugh Gulch, West Fork Camp and culverts on several tributaries to West Fork Camp). Culverts have been replaced with larger pipes that allow fish passage and 100 year flows on West Fork Camp on the FDR 729 road crossing and on two unnamed tributaries to West Fork Camp on FDR 8112. This was completed in 2003. Other culvert replacements have not yet occurred because of funding but it is still planned and would be implemented when funding is available. When the BAR improvements are complete, long-term sediment inputs would be reduced by about 14% in Camp Creek (Land and Water, 2001).

Artificial Reforestation: Planting trees in clearcuts decreases the amount of time it takes for a cleared area to become hydrologically recovered by several years. Hydrologically recovered is defined as vegetative recovery to a level that approximates a mature stand in use of soil moisture, and snow distribution, typically this takes about 30 years in this area.

Road Construction, Maintenance: Most roads were constructed during the same time period as the harvest, with road being built in the 1960's. Sediment levels within the allotments likely peaked at this time and have recovered somewhat since then. Currently, roads have stabilized to the extent possible and are probably providing a chronic source of sediment to streams at road crossings. Maintenance on roads would be ongoing and include blading, culvert inlet and ditch cleaning. This activity does disturb the road surface and can increase erosion from the road for a short time period. However the benefit of restoring drainage and reducing future erosion (benefit of maintenance) offsets the short-term increase. Some roads would receive little or no maintenance. This can reduce the effectiveness of designed road drainage and increase runoff and sedimentation from roads.

Road on State and Private Lands: Effects of roads on State and Private land is basically the same as that on National Forest lands. New construction of roads on State lands requires mitigation and road standards similar to those on National Forest lands and so the risk of sediment production is lower than on private land where roadwork is not regulated.

Noxious Weeds Treatment: Herbicide treatment of noxious weeds has occurred along FDR 8112 to Porcupine Trailhead and along FDR 729 in Camp Creek. These avoid application on wetland sites and adjacent to stream channels. Applied correctly, the risk of herbicides having a lingering effect on water quality is low (PF-WAT-11), as dosages are very small. This project wouldn't change the frequency or

intensity of future roadside treatments. In the Bitterroot National Forest 2003 Noxious Weeds Record of Decision, treatment is proposed on burned areas and grasslands. Reduction in noxious weeds would likely lead to long term reductions in sediment by promoting native vegetation and restoring surface protection to reduce erosion potential. Monitoring effects of spray projects on Mormon Ridge and Sawmill RNA suggest that risk to water resources is minimal when applied properly (USDA, 2003). The implementation of any of the alternatives for the allotments would not affect the areas proposed to be treated with the Noxious Weeds EIS nor its effects.

Farming, Ranching and Subdivision on Private Land: Some land in the Camp Creek and other areas nearby that was historically 'farmed' is now used for pasture or homesite/resort development. Except for an increased number of roads associated with homes and resorts, the effects of farming or ranching on sediment or channel conditions is likely similar to homesite/resort development. The private land in the analysis area is currently held by a few landowners who are maintaining the ranch-like atmosphere; however additional subdivision could occur at the landowner's discretion.

Fire Suppression: Fire suppression resulted in more dense stands throughout the area. This has helped lead to a greater amount of ground fuels and probably contributed to the size and severity of the 2000 fires. It is likely that fire suppression will continue, especially along wildland urban interface areas located throughout Camp Creek and the East Fork. This may reduce the spread of small fires given the right weather conditions and may lead to increased fuels in these areas if they aren't reduced by some other method.

Prescribed Fire: Very little prescribed fire has been applied in this analysis area in comparison the size of the land area. The effect on sediment yield increases is minimal because most often prescribed fire isn't hot enough to kill ground vegetation (DeBano, 1995 p. 176-77 and 183). It is likely that in areas where fuel levels are high, especially along interface areas that environmental analysis would occur and fuels reduced if appropriate. Low intensity prescribed fire typically burns ground fuels but doesn't result in hydrophobic soils or large numbers of tree mortality (Elliot et.al, 2000). Vegetation usually resprouts soon after the burn is completed. Little off-site erosion occurs. These types of treatments are likely to continue in the future.

2000 Fire Effects: The Fires of 2000 fire burned a large portion of the Camp Creek and East Fork of the Bitterroot watersheds. The summer of 2003 will be the third growing season following the fires and research has shown that after three years, sediment produced by fires is approaching pre-fire levels (USDA, 1981, DeBano, 1999, Elliot et.al, 2000). The water yield effects of the fires will continue until vegetation recovers and usually takes 20-30 years. It is expected that higher stream flows will cause channels to adapt and enlarge to carry these larger flows. For about ten years following the fires, there are likely to be channel changes as streams adapt to increases in fire associated water yields (Gresswell, 1999).

2000 Fires-Suppression and Rehabilitation Effects: Hand and dozer fireline was constructed in the analysis area; no dozer-line was constructed within streamside management zones. All of dozer and handline was rehabbed following active fire suppression. Monitoring conducted in 2002 on firelines on the Sula District by the Zone Fisheries Biologist (USDA, 2001) indicates that firelines were rehabilitated and are well stocked with grass. Erosion off these sites is isolated and not contributing to decreased channel conditions.

2000 Fires- Completed BAER Projects: Log erosion barriers, culverts and mulching occurred throughout Camp Creek following the fires. It is very likely that sedimentation occurred during and immediately following the replacement of culverts. Based upon monitoring as described in the fisheries section, local short-term deposition occurred below culverts did affect channel conditions to a small degree. It is likely that this sediment was transported downstream the first high runoff period following installation and was deposited in other low gradient reaches downstream. A research study is ongoing near Waugh Gulch where scientists are studying the effectiveness of log erosion barriers and the effect of hydrophobic soils on

sediment production. This area doesn't affect channel conditions but livestock can alter the site conditions by ranging though the study plots.

Wildfire Effects: Wildfires have occurred and will continue to occur within the analysis area. The Saddle Mountain Fire was the largest wildfire to occur in Camp Creek until 2000. This area is currently supporting stands of pole sized and larger trees. Other small, less impactive wildfires have burned in isolated locations in the analysis area. 2000 fires burned about 34% of Camp Creek watershed and it has been estimated that this will increase water yields about 8% above pre-fire levels (Farnes, 2000).Water yield increases from wildfire can last for many years because tree mortality eliminates evapotranspiration allowing more moisture to be available for runoff. Wildfire has the potential to increase sediment yield (reduction of ground cover and overland flow events) as well. The effects of sediment from wildfire locally are relatively short-lived because vegetative recovery reduces the amount of erosion that takes place within a few years (DeBano, 1998). Stream channels adjust and adapt to changes in both sediment and water yield through the immediate post-fire and recovery cycles (Griswell, 1999).

Ditches, Diversions, and Irrigation Dewatering, Ditch Bills: Irrigation withdrawals occur in the analysis area at the lower elevations and on private land. This activity reduces flows in streams below diversions and can affect stream temperature, lead to decreased channel size and affect the streams ability to transport sediment. Activity related to water withdrawals is expected to continue indefinitely.

Highway 93 Construction, Reconstruction and Maintenance: Highway 93 is a major influence in river conditions on the East Fork and Camp Creek. Initial construction in the 1930's resulted in meander cutoff and location of the river and Camp Creek adjacent to the highway. This has resulted in higher inputs of sediment (from construction activities as well as from maintenance and sanding) and restricting floodplain access. The reconstruction has mostly eliminated this sediment source by moving the highway further away from the river. Other maintenance activities are short-term minor sources of sediment depending upon the size of the activity. Reconstruction of Highway 93 between Sula and Warm Springs resulted in pulses of sediment during construction activities but now the highway is set further back from the river and sediment input from winter sanding operations is much lower than prior to reconstruction. Effects from highways will continue although at a lower level because of the improvements made to Highway 93 in 2002. Future Highway 93 construction is in the planning phases for the section between Warm Springs and Conner. Construction on this segment will likely contribute sediment to the East Fork. The management of Waugh and Andrews Allotments would not affect the implementation of effects of the highway reconstruction to any measurable degree.

Grazing: This activity is common throughout the East Fork and includes the Camp Reimel and Warm Springs Allotments, as well as grazing on private and State land. Livestock tend to favor riparian areas that are easily accessible and herding or other management tools are necessary to limit use along streams and wetlands. Overuse can (and at times does) result in streambank trampling, compaction of soils, and changes in channel conditions and stability where herding efforts are not effective. In Warm Springs Allotment, revision in 1995 eliminated all but incidental use in the vicinity of Warm Springs Creek, focusing livestock use on the upland grasslands and developing water sources for these areas. In the Camp Reimel Allotment, fencing of Reimel Creek occurred in 2001 that eliminated nearly all livestock use in the riparian valley bottom. Use of the Andrews and Waugh allotments would not change management on private lands which will continue indefinitely.

Off Highway Vehicle EIS and Trails: OHV trails tend to be found on old, often abandoned roads and along ridgetops. There are no known problem areas causing impacts to streams resulting from OHV's within the analysis area. The OHV EIS analysis resulted in the restriction of off road vehicles to existing roads and trails and is an improvement over past conditions because is limits the development of new user made trails and the formation of new erosion sources. Hiking and horse trail construction and maintenance

cause only minor ground disturbance and there are no known problem trails impacting stream conditions in the analysis area.

Watershed Improvement Projects: Camp Reimel Vegetation Management Project (USDA, 1997) and Camp Creek Watershed Improvement Project are two restoration projects ongoing in the Camp Creek watershed. Both have been mostly implemented as of March, 2007. Plan components completed to date include the aspen exclosure fence in Waugh Gulch, the stream exclosure fence around Waugh Creek and the decommissioning and storage of roads throughout the Camp Creek. The fencing projects implemented to date have resulted in improved conditions by excluding livestock and some species of wildlife from sensitive areas. The Camp Creek Watershed Restoration Project (USDA, 1995) was implemented in 1996 and included 8.5 miles of road obliterated and removed from the system and 6.6 miles of year long closures. In the Camp Reimel project, 2.1 miles were closed year long and 5.1 miles of road obliterated. (PF-WAT-3). Monitoring of these areas has shown than vegetation on closed roads has recovered (USDA, 1998). Additional road work associated with these projects is on line for completion depending upon funding and would include storage of roads in Waugh and Andrews Creek. The effect of decommissioning and storing roads is most often seen in the removal of culverts where estimates indicate that about one ton of sediment is produced for each culvert removal or replacement. Though there may be erosion on roads that are decompacted, sediment is not often transported off site to streams except at crossings where culverts were removed.

Private Pond Construction: Construction of ponds on private land has the potential to produce and contribute sediment to streams depending upon their location in relation to the stream channels. During and immediately following construction, turbid, sedimented water can flow from the newly disturbed areas to the streams. The more closely the pond is connected to live streams the greater the potential for sediment to be contributed. Maintenance of ponds or failure of them during high flows can further result in sediment contributed to streams. Sedimentation from ponds is usually a short-term impact.

Lost Trail Ski Area Construction and Expansion: Construction at the ski area began in the 1960's and has continued off and on since that time. Most of the activity is in the headwaters of the East Fork of Camp Creek where open water is some distance from development areas. The exception to this is Chair 3 where clearcutting along the stream occurred to install the lift. This has the potential to influence sediment but less than one acre of actual ground disturbance occurred during this activity because of mitigation and the cautious efforts of the permittee. Additional ground disturbing activities are planned to occur during the next phase of expansion but the mitigation required will limit the risk of sedimentation in streams.

Lost Trail Hot Springs Resort Operation and Use, Sula Store and Campground Use, Forest Service Facilities Construction, Reconstruction and Maintenance Indian Trees Campground Reconstruction, Sula Ranger District Water System Upgrades: Development of these facilities has resulted in many different occurrences of ground disturbance and potential sediment input to streams. Input has likely been limited because in each of these developments it is conducive to restore vegetative cover as soon as possible following disturbance each project area is located on relatively flat ground where sediment transport from the work site is limited and unlikely. Operations like these are required to maintain functioning sewage treatment and potable water facilities that are regulated and monitored by the state or county. It is not likely that these operations contributed to measurable changes in the stream channel or water quality.

Camp Creek Channel Relocation: Camp Creek has been relocated in two known locations on private land in the recent past. Both of these restoration projects were designed to move the stream out of the "ditches" constructed during the construction of Highway 93 and improve stream conditions. The first project was completed several years ago and was not particularly effective in reducing sediment loads or the amount of unstable banks but did reduce stream gradient and improve fish habitat potential above that

present where the stream was previously located. The second was completed in 2002 and has been "successful" in reducing stream gradient, improving fish habitat potential, improving, increasing the amount of wetlands and reducing sediment sources (sanding on Highway 93).

Alternative 1 - No Action

Alternative 1 would result in the maintenance of sediment sources and bank stability compared to pre-fire conditions. Sediment sources from activities in the above list would continue with the exception of fire and Highway 93 related sediment. These two sources would decrease and be on improving trends as soils stabilized. The continued level of sediment inputs to Camp Creek and the East Fork of the Bitterroot River from this alternative would result in conditions being maintained at the current level.

Alternative 2 - Proposed Action

Alternative 2 would result in sediment source reduction between Alternatives 1 and 3. Combined with the sediment produced by activities in the above list, the improvements in downstream reaches would be greater than Alternative 1 but not as great as Alternative 3. Combined with projects described in the above list, there would be localized improvements in channel conditions.

Alternative 3 - No Grazing

This alternative would result in the most noticeable improvements within the West Fork of Camp Creek in bank stability and sediment yields. The lower inputs within the allotment would lead to lower inputs of sediment to Camp Creek and the East Fork of the Bitterroot from the project area. In the larger stream systems these minor reductions would not likely be measurable but would still contribute to improvements to a small degree

The no grazing alternative would result in an overall decrease in sediment sources in the streams affected by the allotments and in total sediment budget in Camp Creek and the East Fork. Combined with projects described in the above list, there would be localized improvements in channel conditions; mostly related to livestock exclusion.

3.3.7 CONSISTENCY WITH THE BITTERROOT FOREST PLAN AND OTHER REGULATORY DIRECTION

Forest Plan Standards

The Forest Plan directs management to maintain water quality and quantity (Forest Plan p. II-3). Alternative 1, 2 and 3 do this by either maintaining conditions (Alternative 1), improving conditions (Alternatives 2 or 3). The improvements are the result of fencing of Waugh Creek, and the change in livestock use patterns within the allotment.

The Forest Plan directs reduction of sediment from existing roads. None of the action alternatives would address this direction specifically but there are projects in the cumulative effects list that does follow that direction (Camp Waugh/Warm Springs Watershed Improvement) where implementation is ongoing (portions of Camp Creek and Camp Reimel Watershed Improvements), are planned for immediate implementation (BAR culvert replacement in West Fork Camp) or are planned for implementation as budget allows (BAR watershed improvements). This project doesn't define additional road work because

implementation of either action alternative would not change the level of use currently occurring on the roads within the allotments.

Best Management Practices

The application of Best Management Practices or BMP's (ARM 16.20.603) is the foundation of water quality standards for Montana. The application of BMP's would meet the State of Montana requirement for the maintenance of beneficial uses. The Forest Service together with other Montana land management agencies developed Best Management Practices for Grazing and has agreed in a Memorandum of Understanding with the State of Montana to follow these BMP's. BMP's are applied directly as mitigation and project design. Implementation and effectiveness monitoring for BMP's would be routinely conducted by range managers and during other implementation and annual monitoring events.

Clean Water Act

Section 303(d) directs states to list water quality impaired streams (WQLS) and develop total maximum daily loads (TMDL) to control non-point source pollution. The analysis area is within the East Fork of the Bitterroot drainage that is listed and the Bitterroot Headwaters area that is currently being evaluated by the State for TMDL development. The East Fork of the Bitterroot is listed for flow alteration, other habitat alterations and siltation. With the implementation of Alternative 2, sediment sources would remain at current levels and there should not be further degradation in the East Fork from the combination of Alternative 2 and activities on the cumulative effects list. With Alternative 3, sediment sources would be reduced within the allotment and in the long-term would lead to minor improvements in the East Fork. Alternative 1, the no grazing alternative would result in the most improvement of channel conditions and water quality of the three alternatives. The Montana Department of Environmental Quality has been included in scoping and will be sent a copy of this EA and their input requested.

3.4 RECREATION

3.4.1 INTRODUCTION

The Andrews and Waugh Gulch area is a low to moderate use area on the Sula Ranger District. Highway 93 is the major north/south travel route. Both developed and dispersed recreation opportunities exist. Lost Trail/Chief Joseph Passes are popular winter recreation areas. The Lewis and Clark Trail route crosses the Lost Trail and the Sula Peak area. Trail use (e.g., horseback riding, hiking, mountain bike riding, and cross-country skiing), hunting, fishing, camping, and wildlife viewing, are popular activities in analysis area.

3.4.2 REGULATORY FRAMEWORK

National Environmental Policy Act

NEPA requires integrated use of the natural and social sciences in all planning and decision-making that affect the human environment. The human environment includes the natural and physical environment and the relationship of people to the environment (40 CFR 1508.14)

Forest Plan Direction

Provide for the current mix of dispersed recreation by maintaining about 50% of the Forest in wilderness, about 20% in semi-primitive motorized, and about 30% in roaded areas (II-4). Along with the following Forest-wide recreation standards, each Management Area (MA) denoted by the Forest Plan includes additional recreation standards. Refer to the map in the Project File for MA allocations in burned over areas for all the Geographical Areas. Forest-wide management goals and standards and the recreational management goals and standards for theses MAs which are applicable to this project are described below:

MA-1 Recreation Standards

- Manage for recreation activities associated with roads and motorized equipment. The recreation opportunity spectrum setting is roaded natural.

MA-2 Recreation Standards

- Manage for recreation activities associated with roads and motorized equipment. The recreation opportunity spectrum setting is roaded natural. Off-road vehicle use will be controlled during critical periods on susceptible ranges such as high-use winter range, spring range, and densely roaded fall range.

MA-3a Recreation Standards

- Manage to provide recreation opportunities associated with the main access roads and fishing streams. The ROS setting is roaded natural.

MA-5 Recreation Standards

- The ROS setting is semi-primitive motorized and non-motorized

- Manage for recreation activities associated with roadless areas, including hiking, hunting, fishing, camping, motorbiking, and snowmobiling.

MA-8a Recreation Standards

- Manage for ROS setting and recreation activities associated with adjacent management areas.
- Maintain trails and roads that pass through these units for recreation use unless closure is required to meet other resource standards.
- Pending resolution by Congress, that portion of the management area within the boundary of Montana Wilderness Study Act areas will be administered according to the goals and standards established for management area 6.

Recreation Opportunity Spectrum (ROS)

Recreation opportunity spectrum is a land classification system that categorizes land into 6 categories, each being defined by its setting and by the probable recreation experiences and activities it affords. The six management classes are: urban, rural, roaded natural, semi-primitive motorized, semi-primitive non-motorized and primitive. The Bitterroot Forest Plan allocates the following ROS classifications in the Forest: rural, roaded natural, semi-primitive motorized, semi-primitive non-motorized, and primitive.

Off-Highway Vehicle (OHV) Use

In January of 2001, the Forest Service and Bureau of Land Management issued a decision to limit or restrict motorized wheeled cross-country travel on land administered by the two agencies in Montana. The decision restricts, yearlong, wheeled motorized cross-country travel, where it was not already restricted. OHV vehicles that are wider than the existing trail is considered to be cross-country travel and are prohibited. Exceptions to the rule are:

1. Motorized wheeled cross-country travel would be allowed for any military, fire, search and rescue, or law enforcement vehicles used for emergency purposes.
2. Motorized wheeled cross-country travel for the Forest Service would be limited to official administrative business as outlined by internal memo.
3. Motorized wheeled cross-country travel for other government entities on official business would require authorization from the local field or district ranger in their respective areas. The authorization would be through normal permitting processes and/or memorandum of understanding.
4. Motorized wheeled cross-country travel for lessees and permittees would be limited to the administration of a federal lease permit.
5. Motorized wheeled cross-country travel to a campsite would be permissible within 300 feet of road or trail.

3.4.3 AREA OF ANALYSIS

The area of analysis is the Andrew and Waugh Gulch Grazing Allotment.

3.4.4 EXISTING CONDITION

Developed Recreation

- Campgrounds: Indian Trees Campground
- Ski Area: Lost Trail Ski Area
- Trailheads: Porcupine Saddle Trail #196, Trail #178, Trail #177.

The Indian Trees Campground is fenced to exclude cattle around its perimeter. Cattleguards prevent livestock from accessing the campground along the road system. The Lost Trail Ski Area lies well outside the boundary of the allotment.

Trails

The majority of trails in the analysis area experience low to moderate use, primarily by hikers, hunters and mountain bikers. There is some off-highway vehicle use in the analysis area because of the steepness of the topography, primarily motorcycle use.

Table 3.4- 1 - Trails within the Analysis Area

Trail Name and No.	Trail Miles	Travel Management Status	Primary Management Objective
Porcupine Saddle #196	0.7	Open to motorized use	Pack and Saddle
Warm Springs Ridge #177.2	11.5	Closed to vehicles over 40" 10-15 to 12-1	Pack and Saddle
Andrews Creek #178	3.4	Open to motorized use	Pack and Saddle

Lewis and Clark Trail

The exact route of the Lewis and Clark Expedition is unknown but the route probably went near the north runs of the ski area expansion area where the burn severity was low. Their trail may have gone through the area north of Saddle Mountain. The Expedition also traveled near Indian Trees Campground. At Ross' Hole, the fire passed through the meadow in the area of the Sept. 4-5, 1805 and July 5, 1806 campsites. The Expedition followed a trail through the Low Saddle/Sula Peak area.

Dispersed Recreation

Dispersed recreation in the analysis area includes fishing along streams; camping; day and overnight hunting; and wildlife viewing.

Outfitters and Guides

There is an overnight hunting and summer operation that is permitted in the Warm Springs drainage and Andrews Creek during the summer for overnight horseback trips, and from September 1 through December 1 for overnight hunting trips. Day-use hunting occurs in the analysis are outside of the Allen Mountain Inventoried Roadless Area. There are two outfitters that provide guided hike/van interpretive touring trips focused on the Lewis and Clark Expedition in the vicinity of Road 729 to Indian Trees campground.

3.4.5 ENVIRONMENTAL CONSEQUENCES

A. Direct and Indirect Effects

Alternative 1 - No Action

Livestock grazing will continue as a visible activity in the project area at a level similar to that experienced over the last decade. Recreationists engaged in camping, fishing and bow hunting in the area will encounter cattle in upland and riparian sites continually during the summer and early fall months.

Alternative 2 - Proposed Action

A reduced level of livestock grazing will incrementally reduce the number of encounters with cattle experienced by recreationists during the summer and early fall seasons. The rotational grazing will reduce livestock – recreationist encounters in a staggered pattern. A more rapid improvement in riparian condition may result in a moderate to high level of satisfaction experienced by a many recreationists.

Alternative 3 - No Grazing

The removal of livestock grazing will eliminate encounters between cattle and recreationists completely. No accidental drift of cattle into the Indian Trees Campground would occur with this alternative. This alternative will carry a high level of satisfaction for those recreationists who have a negative attitude towards commercial livestock use on public lands. Other recreationists who enjoy seeing livestock in the project area may experience a lower level of satisfaction.

B. Cumulative Effects

There are no cumulative effects on recreation activity associated with any of the alternatives.

3.5 VEGETATION

3.5.1 AFFECTED ENVIRONMENT

A. Common Vegetation Species and Habitat Types

Introduction

The Bitterroot National Forest is part of the Middle Rocky Mountain Steppe, Coniferous Forest, and Alpine Meadow Ecoregions (Bailey and McNab 1994). The project area contains steppe (grassland) and coniferous forest vegetation. Dominant habitat series in the project area are Douglas-fir, Engelmann spruce, subalpine fir, and Idaho fescue (Pfister et al. 1977, Mueggler and Stewart 1980). Existing vegetation is determined by the complex interaction of factors such as topography, climate, geology, soils, disturbance history, and human management activities.

Regulatory Framework

Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 as amended by the National Forest Management Act (NFMA) of 1976, section 6 codified at 16 U.S.C. §§1600 (g) WHICH PROVIDES THAT THE Secretary shall "promulgate regulations … (3) specifying guidelines for land management plans … which … (B) provides for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives, and within the multiple-use objectives of a land management plan…"

Existing Condition

The project area contains a mosaic of forest, open woodland, grassland, and recent logging units. Shrub fields and rock/talus occur in the southern Waugh Allotment. Large expanses of forest burned in the fires of 2000. Riparian habitats are scattered throughout the project area. In 2002, existing vegetation was mapped using aerial photographs and field verification, and then analyzed using GIS (Geographic Information System) software. Percentages of each vegetation type follow:

Waugh Allotment

62% forest
25% burned forest (stand-replacing fire)
2% grassland & open woodland
4% recent logging unit
5% shrub field
2% rock/talus
2% riparian (overlaps other vegetation types)

Andrews Allotment

19% forest
61% burned forest (stand-replacing fire)
10% grassland & open woodland
10% recent logging unit
2% riparian (overlaps other vegetation types)

Below 6500 feet, dominant forest plants are Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), snowberry (*Symphoricarpos albus*), pinegrass (*Calamagrostis rubescens*), heartleaf arnica (*Arnica cordifolia*), lupine (*Lupinus* sp.), elk sedge (*Carex geyeri*), fireweed (*Epilobium angustifolium*), woodland strawberry (*Fragaria vesca*), and Oregon grape (*Mahonia repens*). Ninebark (*Physocarpus malvaceus*) is often common on wetter north to east slopes. Above 6500 feet, dominant plants are subalpine fir (*Abies lasiocarpa*), lodgepole pine (*Pinus contorta*), beargrass (*Xerophyllum tenax*), lupine (*Lupinus* sp.), huckleberry (*Vaccinium globulare*), and whortleberry (*Vaccinium scoparium*). Plants associated with upland forest sites are of limited forage value to livestock. Cattle use of this vegetation has generally been light.

The above plant species also dominate recent logging units and burned forest in the project area. However, because of recent stand-replacing disturbance, these sites have less than 20% tree canopy cover and relatively thick understory vegetation. Shrub fields in the southern Waugh Allotment established after the Saddle Mountain Fire (1960) and subsequent salvage logging. Regenerating conifers are slowly displacing the shrubs. Livestock use in logging units and burned areas has generally been light, except for patches of moderate use near roads.

Grasslands below 6500 feet in the project area are largely dominated by non-native weeds. Grasslands above 6500 feet are more pristine, although patches of spotted knapweed occur in most of them. (See Noxious Weeds existing condition for further discussion.) Dominant native grassland plants include bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), balsamroot (*Balsamorhiza sagittata*), yarrow (*Achillea millefolium*), Indian paintbrush (*Castilleja hispida*), longleaf phlox (*Phlox longifolia*), and biscuitroot (*Lomatium triternatum*). Scattered Douglas-fir and ponderosa pine commonly occur in the grasslands. Open woodlands with a mix of forest and grassland species typically occur along the forest/grassland boundary. Outside of riparian areas, grasslands and open woodlands in the project area have received the heaviest livestock use, although use varies widely depending on accessibility and proximity to water.

Riparian areas include streamside forests, seeps and springs, and wet meadows. Riparian habitats contain the project area's greatest plant diversity. Dominant plants are subalpine fir, spruce (*Picea engelmannii*), thinleaf alder (*Alnus incana*), red-osier dogwood (*Cornus stolonifera*), bluejoint reedgrass (*Calamagrostis canadensis*), twinflower (*Linnaea borealis*), willow-herb (*Epilobium watsonii*), several sedges (*Carex* sp.), northern black currant (*Ribes hudsonianum*), brook saxifrage (*Saxifraga arguta*), arrowleaf groundsel (*Senecio triangularis*), and mosses. Riparian areas have historically experienced the heaviest grazing pressure in the allotments due to their abundance of water, shade, and forage. The most extensive impacts have been in the lowlands of West Fork Camp Creek and Waugh Gulch. Smaller, more isolated riparian areas elsewhere in the allotments have occasionally been impacted by grazing and trampling from cattle and wildlife. Topography and/or thick vegetation limits livestock access to many riparian areas.

B. Noxious Weeds

Introduction

Several species of noxious weeds are widespread on the Bitterroot National Forest. Noxious weeds produce wide-ranging impacts on native ecosystems. They can impact soil properties such as erosion rate, soil chemistry, organic matter content, and water infiltration. Noxious weed invasions can also alter native plant communities and nutrient cycles, reduce wildlife and livestock forage, and modify fire regimes, alter the effects of flood events, and influence other disturbance processes (Olson 1999a).

Regulatory Framework

The Forest Plan (p. II-29) states "the primary means of preventing, containing or controlling noxious weeds will be through vegetation management practices and by the use of biological control agents. Herbicides may be utilized to provide short-term protection on specific sites, after appropriate environmental analysis." Region 1 of the Forest Service directs an Integrated Weed Management approach for management of noxious weeds on National Forest System lands in the region. Requirements for range projects include consideration of weed prevention and control in grazing management plans, an analysis of weed risks associated with the project, minimizing soil disturbance and creation of bare soil, and minimizing transport of weed seed into and within allotments (FSM 2000, Zero Code 2080 – Noxious Weed Management, Supplement # R1 2000-2001-1).

The 2003 Bitterroot Forest Noxious Weed Treatment Project (ROD / EIS) allows for a combination of biological control releases and both ground-based and aerial herbicide application on off-road and burned sites in the project area. The 1997 Bitterroot Forest Noxious Weed Environmental Assessment qualified the system roads in the project area for ground-based herbicide treatment. To date, only ground-based herbicide treatments and biological control releases have occurred in the project area.

Area of Analysis

The area analyzed for noxious weed species is the Waugh and Andrews Allotments and adjacent portions of the Warm Springs Allotment, with emphasis on habitats at greatest risk of cattle disturbance, noxious weed invasion, or both (lowland riparian and dry, open habitats).

Existing Condition

The project area was surveyed for noxious weeds as part of the Warm Springs and Camp Reimel Integrated Resource Areas (IRAs) analysis in 1994-96. Based on known and suspected weed infestations, targeted follow-up surveys were done in 2002. Spotted knapweed (*Centaurea biebersteinii {C. maculosa}*) is common on dry, open sites below 6500 feet in the Waugh Allotment. Heavy infestations occur in grasslands, open woodlands, and some logged areas in dry forest habitats. Although often present on forested sites, knapweed is patchy and less aggressive where shaded. In the Andrews Allotment, knapweed is abundant in grasslands along the lower Andrews Creek Road. Grasslands above 6500 feet in the Andrews Allotment remain relatively pristine with only occasional patches of knapweed. Many road corridors in the project area are heavily infested with knapweed. Oxeye daisy (*Leucanthemum vulgare {Chrysanthemum leucanthemum}*) and tall buttercup (*Ranunculus acris*) occur along roads at low elevations in the Waugh Allotment. In places they have spread into adjacent meadows and forest. Patches of oxeye daisy and tall buttercup occur elsewhere in the project area, usually in moist areas along roads. A patch of houndstongue (*Cynoglossum officinale*) occurs in lower Waugh Gulch; other patches are likely in the project area. In 2002, sulfur cinquefoil (*Potentilla recta*) was documented on "Boot Hill" in the Waugh Allotment. Common tansy (*Tanacetum vulgare*) and St. Johnswort (*Hypericum perforatum*) occur in the Sula area, but they have not been found in the allotments. An invasive annual grass, cheatgrass (*Bromus tectorum*), is abundant along roads and in grasslands and open woodlands below 6500 feet in the project area.

The fires of 2000 reduced tree canopy and disturbed the soil in much of the project area, potentially exposing new areas to noxious weed invasion (BAR FEIS 2001, Sutherland 2003). Rapid regrowth of rhizomatous native plants such as pinegrass, beargrass, fireweed, snowberry, and heartleaf arnica has stabilized and shaded the soil surface on most burned forest sites.

C. Threatened, Endangered, and Sensitive (TES) Plants

Introduction

Thirty-three plant species are listed as sensitive on the Bitterroot National Forest, including two non-vascular plant species. Although sensitive plants occur in a wide variety of habitats on the forest, three habitats contain the majority of the species: 1) grassland/dry woodland; 2) riparian; and 3) alpine. Grassland/dry woodland and riparian habitats occur in the project area.

Regulatory Framework

The U.S. Fish and Wildlife Service designate threatened and endangered plant species. Sensitive plant species, identified by the Regional Forester, are species "for which population viability is a concern, as evidenced by significant current or predicted downward trends in 1) population numbers or density and/or 2) habitat capability that would reduce a species' existing distribution" (FSM 2670.5). Forest Service management practices should "avoid or minimize impacts" on sensitive species to ensure they "do not become threatened or endangered species because of Forest Service actions" and to "maintain viable populations of all native species throughout their geographic range on National Forest System lands" (FSM 2670.22 and 2670.32). Project effects on TES species will be disclosed in a Biological Evaluation (FSM 2670.32).

Area of Analysis

The analysis area includes the Waugh and Andrews Allotments and the area within a five-mile radius of the allotment boundaries.

Existing Condition

Three federally listed threatened plant species occur in Montana: water howellia (*Howellia aquatilis*), Spalding's catchfly (*Silene spaldingii*), and Ute ladies' tresses (*Spiranthes diluvialis*). Only water howellia has been found on Forest Service land, and none of them have been found on the Bitterroot National Forest.

The Montana Natural Heritage Program database and Bitterroot National Forest records were reviewed to identify known sensitive plant populations in the project area vicinity. The project area was surveyed for sensitive plants in 1994-96 (Warm Springs and Camp Reimel IRAs). Aerial photographs were used to determine possible habitat for sensitive plant species in the project area. The following species have possible habitat in the project area and/or occur in the project area vicinity:

western boneset	*Ageratina occidentale*
tapertip onion	Allium acuminatum
dwarf onion	*Allium parvum*
Rocky Mountain paintbrush	*Castilleja covilleana*
yellow lady's slipper	*Cypripedium parviflorum*
English sundew	*Drosera anglica*
crested shield fern	*Dryopteris cristata*
giant helleborine	*Epipactus gigantea*
puzzling rockcress	*Halimolobos perplexa*
dwarf purple monkeyflower	*Mimulus nanus*
primrose monkeyflower	*Mimulus primuloides*

turkey-peas	Orogenia fusiformis
Lemhi penstemon	Penstemon lemhiensis
Payette penstemon	Penstemon payettensis
woollyhead clover	Trifolium eriocephalum
hollyleaf clover	*Trifolium gymnocarpon*
California false hellebore	*Veratrum californicum*

Western boneset is known from cliffs, rock outcrops, and talus and occurs in widely scattered populations on the Bitterroot National Forest, including a site near Lost Trail Pass. Rocky areas in the project area are possible habitat for this species.

Yellow lady's slipper, giant helleborine, and California false hellebore are associated with riparian habitats such as stream banks, wet meadows, seeps and springs, boggy areas, lake margins, and damp forest understories. Giant helleborine was recently discovered on the West Fork Ranger District. California false hellebore is reported from the southern Sapphire Mountains. Yellow lady's slipper has not been found on the Bitterroot National Forest, but it is known from adjacent national forests and it is expected to occur here. Riparian areas in the project area contain possible habitat for giant helleborine, California false hellebore, and yellow lady's slipper.

A species of potential concern, northern golden-carpet (*Chrysosplenium tetrandrum*), occurs in riparian areas in the project area. Northern golden-carpet was managed as a sensitive species until surveys revealed it was relatively common and widespread on the Darby and Sula Ranger Districts. The state Natural Heritage Program considers it a species of potential concern because of restricted range in Montana and habitat impacts from grazing and noxious weeds. In the project area, northern golden-carpet populations occur along Maynard and Waugh Creeks, at Indian Trees Campground, and along unnamed small tributaries within a mile north and south of the campground.

English sundew, crested shield fern, and primrose monkeyflower are riparian species usually restricted to fens. English sundew and primrose monkeyflower occur in a fen near Lost Trail Pass; crested shield fern has been found in fens elsewhere on the Bitterroot National Forest. No fens are known to occur in the project area.

Dwarf onion, Lemhi penstemon, Payette penstemon, dwarf purple monkeyflower and puzzling rockcress are known from the southern Bitterroot National Forest, where they occur in grasslands and open ponderosa pine/Douglas-fir woodlands. Dwarf onion has been found in the project area, in grasslands along the Maynard/Warm Springs divide and on "Boot Hill" near Indian Trees Campground. Possible habitat for dwarf onion, Lemhi penstemon, Payette penstemon, dwarf purple monkeyflower, and puzzling rockcress is scattered throughout the project area.

Rocky Mountain paintbrush, hollyleaf clover, and tapertip onion occur in the southern Bitterroot usually in dry, open woodlands dominated by ponderosa pine and/or Douglas-fir. In wetter Douglas-fir/lodgepole pine forests, they are usually restricted to open microsites. Possible habitat for Rocky Mountain paintbrush, hollyleaf clover, and tapertip onion is widespread in the project area.

Woollyhead clover and turkey-peas occur on the Bitterroot National Forest in Douglas-fir/lodgepole pine forests and moist meadows, and occasionally in open ponderosa pine/Douglas-fir woodlands. Possible habitat for them is common in the project area.

3.5.2 ENVIRONMENTAL CONSEQUENCES

Sensitive Plants

A. Effects Common to All Grazing Alternatives

Dwarf onion is the only sensitive plant species known to occur in the project area. A population of dwarf onion, consisting of two subpopulations, was found in 1995 in the Boot Hill grassland. Both subpopulations were resurveyed in 2003. The lower subpopulation contains about 25 dwarf onion plants. Spotted knapweed and cheatgrass are abundant in the lower subpopulation. Sulfur cinquefoil has invaded the lower site since 1995. The upper subpopulation contains about 120 dwarf onion plants. In 1995, vegetation on the upper site was a native bunchgrass community; by 2003, spotted knapweed dominated the site.

Cattle have historically grazed Boot Hill. Their impacts on dwarf onion are unknown. Cattle rarely graze dwarf onion because the plants are widely scattered, only 1-2 inches tall, and they usually shrivel by the time cattle use begins. Cattle have probably trampled individual dwarf onion plants. Dwarf onion is likely adapted to occasional trampling disturbance, because it occurs on sites frequented by deer and elk. It is often found on steep slopes with unstable, relatively bare soil. Dwarf onion plants are sometimes found in patches of disturbed soil associated with pocket gopher burrowing. Dwarf onion may benefit from light soil disturbance that aerates the soil and removes competing plants.

Most cattle impacts on dwarf onion are likely indirect, through the spread of noxious weeds. Noxious weeds may be the greatest threat to dwarf onion in the project area. Cattle use contributes to the establishment and spread of noxious weeds, causing loss of habitat for native plants such as dwarf onion (see Noxious Weeds section). Many native plant species are not well adapted to compete with noxious weeds. The persistence of dwarf onion on Boot Hill in spite of heavy spotted knapweed infestation suggests it may compete better than many native species, at least in the short term. The long-term viability of dwarf onion populations on weedy sites is unknown. Noxious weeds have only recently invaded dwarf onion sites on the Bitterroot National Forest, and several decades may be required before the long-term persistence of dwarf onion can be assessed.

Elk use may be more significant than cattle use in the Boot Hill dwarf onion population. In May 2003, the site had far more elk droppings than those of cattle. Based on the distribution of droppings, cattle use concentrates near the base of the slope and along the ridge, not on the steeper slopes where dwarf onion occurs. Elk and deer are also more likely to graze dwarf onion because they use the site in the spring when dwarf onion is active. In May 2003, elk had grazed several dwarf onion plants on Boot Hill. Cattle generally use the site after dwarf onion has flowered and shriveled.

Grasslands and dry, open forests in the project area are also possible habitat for Lemhi penstemon, Payette penstemon, dwarf purple monkeyflower, and puzzling rockcress. Habitat for these species would be affected by the proposed action in the same ways as dwarf onion habitat.

Rocky areas in the project area are possible habitat for western boneset. These sites are too rugged for cattle use, so western boneset habitat should not be affected by cattle grazing.

Riparian areas in the project area contain possible habitat for several sensitive species: yellow lady's slipper, giant helleborine, California false hellebore, English sundew, crested shield fern, and primrose monkeyflower. In portions of the project area, cattle have significantly affected riparian vegetation. Cattle impact riparian vegetation through grazing, trampling, soil disturbance and compaction, and spreading

noxious weeds. No sensitive plants are known to occur in the project's riparian areas; however, possible habitat for the above species has likely been degraded on sites where cattle concentrate. Soil compaction creates unfavorable rooting conditions for many native plants (Clary 1995), favoring invasion of noxious weeds. Two noxious weed species, tall buttercup and oxeye daisy, occur along the lower reaches of West Fork Camp Creek and Waugh Creek, areas that have historically received heavy cattle use. Selective grazing of more palatable species, frequent disturbance, and soil compaction favor tall buttercup and oxeye daisy over many native species.

Populations of northern golden-carpet, a plant species of special concern in Montana, occur along Maynard Creek and in the lower elevations of the Waugh Allotment. Grazing and trampling are possible threats to northern golden-carpet. The Maynard Creek population is not readily accessible and cattle use has been minimal. Populations in the Waugh Allotment have received considerable livestock disturbance. Cattle have likely trampled individual northern golden-carpet plants and altered their riparian habitat. The persistence of northern golden-carpet in areas with livestock trampling and the species' occurrence on stream banks subject to seasonal flood disturbance suggests it can withstand periodic disturbance. However, ongoing heavy cattle use is likely to be detrimental, especially if it promotes noxious weeds. Northern golden-carpet populations at Indian Trees Campground and along lower Waugh Creek have been partially fenced, reducing livestock impacts on northern golden-carpet plants and their habitat.

Camas, a plant species of special cultural concern to the Salish and Kootenai Tribes, occurs at Indian Trees Campground. All known plants in this population are inside the fenced exclosure, and therefore are not normally subject to cattle grazing.

Forests and open woodlands in the project area contain possible habitat for Rocky Mountain paintbrush, hollyleaf clover, tapertip onion, woollyhead clover, and turkey-peas. Cattle use of most forest habitats in the project area is light. Isolated areas of heavier use occur near water sources and around grassland margins. Typical grazing levels in forest habitats should not significantly impact habitat for these species. All of these species have been found elsewhere on the Bitterroot National Forest on sites characterized by historic fire disturbance, so they appear adapted to periodic light disturbance. Forest in much of the project area burned in the fires of 2000. Areas of greater cattle use could occur in burned forest where palatable forage increased after the fires. Due to the scattered nature of palatable forage in forest habitats, cattle use should continue to be dispersed and relatively light.

B. Direct and Indirect Effects

Alternative 1 (No Action)

Under Alternative One, grazing would continue under the existing allotment management plans. Areas of heavy cattle use would occur in riparian habitats, especially in the lowlands of the Waugh Allotment. Habitat for northern golden-carpet, camas, yellow lady's slipper, giant helleborine, crested shield fern, English sundew, California false hellebore, and primrose monkeyflower would experience soil disturbance and risk noxious weed spread associated with cattle use. The risk of cattle causing riparian habitat degradation would be greatest under this alternative.

Uplands in the project area would receive occasional cattle disturbance, with use concentrated near water sources and grasslands. Cattle would continue to contribute to noxious weed spread in dry, open habitats and possibly introduce new noxious weed species to the project area. Areas of habitat for dwarf onion, Lemhi penstemon, Payette penstemon, dwaf purple monkeyflower, puzzling rockcress, Rocky Mountain paintbrush, hollyleaf clover, tapertip onion, woollyhead clover, and turkey-peas would be affected by cattle disturbance. The risk of noxious weed spread and habitat degradation would be greater under Alternative

One. The dwarf onion population on Boot Hill would remain weedy, and cattle use could contribute to further decline in native plant species including dwarf onion.

Alternative 2 (Proposed Action)

Under this alternative, the Andrews and Waugh allotments would be combined into one allotment. Livestock AUMs in the project area would be reduced, and the grazing season would be shortened on many sites. Compared to the existing condition, riparian habitats in the project area should become healthier. Soil compaction and noxious weed spread should be reduced. Cattle impacts on habitat for northern golden-carpet, camas, yellow lady'slipper, giant helleborine, crested shield fern, English sundew, California false hellebore, and primrose monkeyflower would continue to occur, but they would be less than under Alternative One.

Certain uplands in the project area could receive more cattle use. If grasslands receive increased cattle use, the risk of noxious weed spread would increase (see Noxious Weeds section). An increase in noxious weeds could adversely impact the population of dwarf onion on Boot Hill, and also affect habitat for dwarf onion, Lemhi penstemon, Payette penstemon, dwarf purple monkeyflower, and puzzling halimolobos in the project area. Increased cattle use of upland forest habitats is less likely to increase noxious weed spread because these habitats are less susceptible to weed spread (see Noxious Weed section). Habitat for Rocky Mountain paintbrush, hollyleaf clover, tapertip onion, and woollyhead clover should not be adversely affected by increased cattle use, as all of these species are found elsewhere on the Bitterroot National Forest on sites that have receive periodic disturbance.

Alternative 3 (No Grazing)

Under this alternative, cattle would no longer trample or graze dwarf onion plants in the project area. Soil disturbance and noxious weed spread associated with cattle use would not occur; therefore the risk of noxious weed spread would be less than under the grazing alternatives. Although the dwarf onion population on Boot Hill is already weed-infested, the risk of new weed species invading the site would be reduced. Habitat for dwarf onion, Lemhi penstemon, and puzzling rockcress would be more likely to be maintained in the project area.

Compared to the grazing alternatives, possible habitat for yellow lady's slipper, giant helleborine, English sundew, California false hellebore, crested shield fern, primrose monkeyflower, Rocky Mountain paintbrush, hollyleaf clover, tapertip onion, woollyhead clover, and turkey-peas would be more likely to be maintained because the risk of noxious weed spread in the project area would be less. Riparian sensitive plant species would benefit the most under this alternative because cattle use tends to concentrate in their habitat.

C. Cumulative Effects Common to All Grazing Alternatives

Dwarf onion is the only sensitive plant species known to occur in the project area. The cumulative effects of historic human activities on dwarf onion are unknown. Road and trail construction, logging, grazing, and recreational uses have likely affected dwarf onion habitat and contributed to the spread of noxious weeds (see Noxious Weeds – Cumulative Effects). For example, the Gibbons Pass Road bisects a dwarf onion population and has allowed spotted knapweed to invade the site. No known dwarf onion populations on the Bitterroot National Forest have been lost due to human activities, although habitat degradation is widespread. Grasslands are probably the most degraded habitat on the Bitterroot National Forest due largely to the invasion of noxious weed species. Spotted knapweed alone infests 264,000 acres of grasslands, open woodlands, and roadsides on the Forest (USDA Forest Service 2003). Noxious weed

invasion of dwarf onion habitat likely poses a risk to the long-term viability of some dwarf onion populations, including the population in the project area. The cumulative impacts of noxious weeds on the overall viability of dwarf onion on the Bitterroot National Forest are not known.

Several grasslands in the project area are scheduled for herbicide spraying under the Noxious Weed Treatment Project, including the dwarf onion population on Boot Hill (USDA Forest Service 2003). The project includes mitigation measures to protect sensitive plants, such as flagging and avoiding sensitive plant populations, spraying when affected sensitive species are dormant, and manual control of noxious weeds around sensitive plants. If successful, the project should restore areas of dwarf onion habitat and help maintain the species' viability on the Bitterroot National Forest. A dwarf onion population in the Sula area will be monitored for the Noxious Weed Treatment Project to better determine the long-term effects of noxious weeds on dwarf onion population viability.

Alternative 1

Under Alternative One, grazing would continue under the existing allotment management plans. Cattle use of riparian areas would be greatest under this alternative; therefore cumulative effects on habitat for camas, yellow lady'slipper, giant helleborine, crested shield fern, English sundew, California false hellebore, and primrose monkeyflower would also be greatest under this alternative. Compared to the other alternatives, noxious weed spread in riparian areas would be more likely to degrade habitat for these species. Cattle grazing would contribute to noxious weed spread in habitat for dwarf onion, puzzling rockcress, Payette penstemon, dwarf purple monkeyflower and Lemhi penstemon. Cumulative effects from cattle grazing on habitat for Rocky Mountain paintbrush, hollyleaf clover, tapertip onion, woollyhead clover, and turkey-peas are likely to be negligible, as cattle rarely use their habitat.

Alternative 2

Overall stocking levels in the project area would decrease, with emphasis on reducing cattle impacts to riparian areas in the Waugh allotment. Compared to Alternative One, the cumulative effects on habitat for camas, yellow lady's slipper, giant helleborine, crested shield fern, English sundew, California false-hellebore, and primrose monkeyflower should be less because cattle use of riparian areas would decrease. Cumulative effects on habitat for dwarf onion, puzzling rockcress, Payette penstemon, dwarf purple monkeyflower, and Lemhi penstemon could be greatest under this alternative if cattle use of grasslands increased. Cumulative effects on habitat for Rocky Mountain paintbrush, hollyleaf clover, tapertip onion, woollyhead clover, and turkey-peas should be insignificant and similar to Alternative Three.

Alternative 3

Under this alternative, cattle grazing would not occur in the project area and the project would not contribute to the cumulative effects discussed above. Compared to the grazing alternatives, cumulative effects on sensitive plant species and their habitat would be reduced. Noxious weed spread should be reduced, helping to maintain sensitive plant habitat in the project area.

Table 3.5- 1 - Bitterroot National Forest Sensitive Plant Species Biological Evaluation

Table Summary of Conclusion of Effects

SPECIES	Alternative 3	Alternatives 1 and 2
western boneset Ageratina occidentale	NI	NI
tapertip onion Allium acuminatum	NI	MIIH
dwarf onion Allium parvum	NI	MIIH
candystick Allotropa virgata	NI	MIIH
Rocky Mountain paintbrush Castilleja covilleana	NI	MIIH
yellow lady's slipper Cypripedium parviflorum	NI	MIIH
English sundew Drosera anglica	NI	MIIH
crested shield fern Dryopteris cristata	NI	MIIH
giant helleborine Epipactus gigantea	NI	MIIH
puzzling rockcress Halimolobos perplexa	NI	MIIH
dwarf purple monkeyflower Mimulus nanus	NI	MIIH
primrose monkeyflower Mimulus primuloides	NI	MIIH
turkey-peas Orogenia fusiformis	NI	MIIH
Lemhi penstemon Penstemon lemhiensis	NI	MIIH
woollyhead clover Trifolium eriocephalum	NI	MIIH
hollyleaf clover Trifolium gymnocarpon	NI	MIIH
California false hellebore Veratrum californicum	NI	MIIH

NI = No Impact **MIIH** = May Impact Individuals or Habitat, but Will Not Likely Result in a Trend Toward Federal Listing or Reduced Viability for the Population or Species **LIFV*** = Likely To Impact Individuals or Habitat with a Consequence that the Action may Contribute Towards Federal Listing or Result in Reduced Viability for the Population or Species **BI** = Beneficial Impact

Noxious Weeds

A. Effects Common to All Grazing Alternatives

As recently as the 1970s, noxious weeds were uncommon in the project area. Range condition monitoring transects on Boot Hill and along the Warm Springs divide indicated native plants dominated grasslands. Today, spotted knapweed is abundant on most open slopes below 6500 feet in the project area. Cheatgrass is also common on dry slopes, and sulfur cinquefoil has invaded much of Boot Hill. Oxeye daisy is widespread in riparian areas of the Waugh Allotment, along with patches of tall buttercup and houndstongue.

Cattle use creates conditions that can favor noxious weed establishment and spread. Weed seeds lodged in cattle hair and in soil on their hooves can be transported to uninfested sites, establishing new weed populations (Clerck-Floate 1997, Olson 1999b). Weed seeds can also survive several days in a cow's digestive tract and be deposited with the droppings in new sites (Olson 1999b). Cattle trample vegetation and disturb and sometimes compact soils, reducing plant vigor (Clary 1995). Many native plant species are more palatable than noxious weeds and are preferentially grazed by cattle. Most native plants can withstand some grazing without significant impact on their vigor. However, heavy or repeated grazing often reduces plant vigor, and the tendency of cattle to graze native grasses instead of forbs -- including invasive forbs -- favors noxious weed spread (Olson & Wallander 1997, Jacobs and Sheley 1999). As native plants lose vigor they are increasingly vulnerable to displacement by noxious weeds. Over time, aggressive competition from noxious weeds, ongoing soil disturbance, and selective grazing shifts community dominance from native plants to noxious weeds (Olson 1999b).

Factors other than grazing also influence noxious weed establishment and spread. Stohlgren et al. (1999) found little correlation between grazing history and plant species composition. They suggested that variables in the physical environment, such as soil texture, elevation, and climatic extremes, might have greater influence on exotic plant distribution. On the Bitterroot National Forest, spotted knapweed is abundant on many dry sites where cattle do not graze. Other factors contributing to noxious weed spread include proximity to weed-infested roads, logging, wildlife grazing and migration, fires, and off-road vehicles and other recreational uses. All of these factors have affected the project area (see Cumulative Effects).

Most plants native to the northern Rocky Mountains are adapted to infrequent and/or low intensity natural disturbances. In contrast, many noxious weeds evolved in Eurasian environments where disturbance is frequent and intensive (Sheley et al. 1999). In these environments they became adaptable and very competitive. Noxious weeds often become even more aggressive outside of their native habitats because they are removed from their natural enemies (Mitchell and Power 2003).

Once established, noxious weeds often alter natural processes in ways that favor their persistence, making it difficult to restore native plant communities. For example, spotted knapweed appears to better compete for limited soil phosphorus than native plants (LeJeune and Seastedt 2001), and its roots exude allelopathic chemicals that suppress competitors and help maintain its dominance (Callaway et al. 1999).
Livestock grazing in the project area has likely promoted the spread of noxious weeds. Forage utilization monitoring on Boot Hill and along Waugh and West Fork Camp creeks indicates heavy grazing has occurred in recent decades. Although heavy grazing has not been continuous, it has occurred often enough to create areas of bare soil, reduce native plant vigor, and contribute to noxious weed spread.

B. Direct and Indirect Effects

Alternative 1: No Action

Under Alternative 1, grazing would continue under the stocking rate and season/ duration of use. In the Waugh Allotment, riparian areas along West Fork Camp Creek and Waugh Gulch would likely experience concentrated cattle use and periods of heavy grazing. Soil disturbance and compaction, transport of noxious weed seeds, and preferential grazing of native graminoids would favor the spread of established populations of oxeye daisy, tall buttercup, and houndstongue in riparian areas and increase the risk of new weed species being introduced.

Dry, open uplands would continue to be at risk of noxious weed spread associated with cattle use. Noxious weeds would likely increase in the relatively pristine grasslands above 6500 feet. Grasslands below 6500 feet, where noxious weeds are already abundant, would remain weedy. Although cattle use of these grasslands is generally light, even occasional grazing of the few remaining native plants could further reduce their vigor and convert these sites to noxious weed monocultures. Cattle could transport new noxious weed species into upland areas.

Alternative 2: Proposed Action

Under Alternative 2, the existing Andrews and Waugh Gulch Allotments would be combined into one allotment. Overall stocking rates in the Andrews and Waugh allotments would be reduced by about 30%, with emphasis on reducing cattle use of riparian areas in the Waugh Allotment. Soil compaction, selective grazing of many native plants, and spread of noxious weed seed in riparian areas would diminish. The health of native plants, particularly graminoids, would likely improve. Riparian habitats would become more resistant to noxious weed establishment and spread (Sheley and Fay 1995).

The proposed action could increase cattle use of uplands through improved riding and herding. Utilization and other impacts would stay within prescribed Forest Plan standards. If cattle use of grassland habitats increases, the risk of noxious weed spread in the project area would increase (Table 3.5-2). On the other hand, cattle use of upland forest habitats should not significantly increase the risk of noxious weed spread. Upland forest habitats potentially suitable for grazing include the extensive shrub field east of West Fork Camp Creek as well as forest burned in the fires of 2000. The dispersed nature of forage in these uplands would reduce concentrated cattle disturbance and minimize the risk of noxious weed establishment. Rhizomatous plants that can effectively compete with noxious weeds are common on these sites. Eventual forest recovery will shade the soil and help suppress noxious weed patches if they do become established.

Careful grazing management can reduce the risk of noxious weed spread (Duncan and Sheley 2001, Olson 1999b). Grazing a given site at different times each year and altering stocking rates, through a rest-rotation system, helps achieve moderate grass utilization, allows desirable vegetation to recover between grazing periods, and promotes litter accumulation. Monitoring cattle use and promptly correcting violations of management plan standards should reduce noxious weed spread.

Alternative 3: No Grazing

Under Alternative 3, no cattle grazing would occur. As a result, this alternative would have the lowest risk of noxious weed spread in the project area (Table 3.5-2). Cattle would no longer create soil disturbance, disperse weed seeds, and selectively graze native grasses. Riparian plant species, especially grasses and sedges (graminoids), would likely become more vigorous and better able to compete with existing noxious weeds. Riparian vegetation cover should increase, reducing the risk of noxious weed spread (Sheley et al.

1995). Grassland responses in the project area would likely vary. Grasslands still dominated by native plants should become more resistant to noxious weed spread. Grasslands where noxious weeds are abundant would likely remain weedy. Without human intervention, native plant communities are often unable to recover from a noxious weed invasion (Jacobs et al. 1999).

Removal of cattle from the project area would not prevent noxious weed spread. Areas of heavy wildlife use would continue to create conditions favorable to noxious weed spread. For example, a cursory survey of Boot Hill in May 2003 revealed that elk had grazed the new shoots of most native plant species while largely ignoring spotted knapweed rosettes. Wildlife migration and human activities would also continue to spread noxious weeds in the project area (see Cumulative Effects).

Table 3.5- 2 - Relative Risk of Livestock Vectored Noxious Weed Spread by Habitat, Comparison of Alternatives

	Habitat		
Alternative	**Riparian**	**Grassland**	**Upland Forest**
One	Moderate to High Risk	Moderate to High Risk	Low Risk
Two	Moderate Risk	Moderate Risk	Low Risk
Three	Low Risk	Low Risk	Low Risk

C. Cumulative Effects Common to All Grazing Alternatives

Historic human activities contributed to the establishment and spread of noxious weeds. Forest road construction and subsequent vehicle use may have introduced some noxious weed species to the project area. Extensive logging in the 1960s through 1980s created soil disturbance favorable to weed establishment and likely spread noxious weed seeds throughout much of the project area. Most logged sites are in relatively moist habitats where recovery of rhizomatous native plants minimized noxious weed establishment except on heavily disturbed skid trails and landings. Reforestation should suppress noxious weeds on many logged sites by shading the understory. Portions of the project area were salvage logged as part as the Burned Area Recovery project (USDA Forest Service 2001). Noxious weed mitigation measures were implemented for this project to minimize the establishment and spread of noxious weeds in the area. Ongoing road and trail maintenance has likely spread noxious weed seeds and maintained disturbed sites that are vulnerable to weed invasion (Gelbard and Belnap 2003).

Recreational use has spread noxious weed seeds and perhaps established new weed populations. Spotted knapweed is common along trails in the project area. Noxious weed seed can be carried along recreation trails by horses, hikers, hunters, wildlife, and motorcycles. Illegal off-road vehicle use has likely dispersed noxious weed seeds elsewhere in the project area. The Indian Trees Campground, primary forest roads, and some burned sites in the project area are treated with herbicides on a rotational schedule since 2003. Noticeable reductions in the density and distribution of noxious weeds are evident (Personal Communication 2007).

Human activities on adjacent state and private land have also contributed to weed establishment and spread in the project area vicinity. For example, extensive salvage logging occurred on state and private land after the fires of 2000. Some log skidding occurred during the summer, causing significant soil disturbance and an opportunity for noxious weeds to spread. Areas of heavy grazing, dispersed recreation, and road building have also occurred on non-federal land in the project area.

Wildlife use has many of the same effects as cattle use, and contributes to noxious weed spread. For example, in May 2003 elk had grazed new shoots of most native plants on Boot Hill, but not spotted knapweed rosettes. Selective grazing of native plants favors noxious weed spread. Daily and seasonal migrations of elk and deer also likely disperse noxious weed seeds throughout much of the project area.

The fires of 2000 burned the Andrews Allotment and much of the Waugh Allotment, causing soil disturbance and a reduction in forest canopy that increased the potential for noxious weed spread (USDA Forest Service 2001). Fire suppression and rehabilitation activities also temporarily increased the risk of noxious weed spread. Existing noxious weed infestations may have become more vigorous after the fires (Sutherland 2003). Rapid recovery of native rhizomatous plants such as snowberry, pinegrass, fireweed, heartleaf arnica, and beargrass on burned forest sites should minimize the spread of existing weed infestations and the risk of new noxious weed populations becoming established. Dense growth of these species stabilizes and shades the soil surface and effectively competes with noxious weeds. Trees will eventually recover on most forest sites in the project area, further shading the soil and creating an environment unfavorable for the persistence of most noxious weed species.

Several sites in the project area are proposed for herbicide treatment, including Boot Hill and several smaller grassland sites where spotted knapweed is abundant (USDA Forest Service 2003). Many native plant species will be affected by herbicide treatment, but overall native plant cover is expected to increase as native bunchgrasses recover. Where native plants do not adequately recover on their own, revegetation with native bunchgrasses and forbs is being considered to prevent reestablishment of noxious weeds. If successful, this project could significantly reduce noxious weeds in treated areas and lessen the risk of weed seeds spreading to uninfested areas.

Alternative 1

Historic wildlife use and human activities have dispersed noxious weeds throughout much of the project area (see Cumulative Effects Common to All Grazing Alternatives). Alternative 1 would contribute to further noxious weed spread. The cumulative risk of noxious weed spread is moderate to high in both riparian areas and uplands.

Alternative 2

Historic wildlife use and human activities have dispersed noxious weeds throughout much of the project area (see Cumulative Effects Common to All Action Alternatives). Alternative 2 would contribute to further noxious weed spread due to the active grazing and movement of cattle in the project area. The cumulative risk of noxious weed spread is moderate in both uplands and riparian zones because of a shorter grazing duration and reduced stocking rates.

Alternative 3

This alternative would discontinue cattle grazing; therefore there would be no future cumulative effects from cattle grazing in the project area. Noxious weeds would continue to be dispersed by wildlife and human activities such as logging and recreational use. Compared to the action alternatives, the cumulative risk of noxious weed spread in the project area would be less because disturbance and weed spread associated with cattle use would no longer occur.

3.6 WILDLIFE

3.6.1 REGULATORY FRAMEWORK

The two principle laws relevant to wildlife management are the National Forest Management Act of 1976 (NFMA) and the Endangered Species Act of 1973 (ESA). Regulations promulgated subsequent to passing NFMA require the Forest Service to manage fish and wildlife habitat to maintain viable populations of all native and desirable non-native wildlife species and conservation of listed Threatened or Endangered species populations (36CFR219.19). Additional guidance is found in Forest Service Manual Direction which states; identify and prescribe measures to prevent adverse modifications or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and proposed species (FSM2670.31 (6)). ESA requires Forests to manage for the recovery of threatened and endangered species and the ecosystems upon which they depend. Forests are required to consult with the Fish and Wildlife Service if a proposed activity may affect the population or habitat of a listed species.

The Forest Service Manual also directs the Regional Forester to identify sensitive species for each National Forest where species viability may be a concern. Forests are then required to monitor sensitive species populations and prevent declines that might require listing under ESA (FSM 2670.32 (4)).

The principle policy document relevant to wildlife management is the Bitterroot Forest Plan of 1987. This document provides standards and guidelines for management of wildlife species and habitats on the Forest. The Record of Decision (1987) for this plan requires retention of 25 percent of the big game winter range in thermal cover. Other Forest Plan standards related to maintenance of wildlife populations include standards for amount and distribution of old growth habitat by management area, retention of snags, maintenance of elk populations and habitat, and management of elk habitat effectiveness through the Travel Planning process (USDA, Forest Service, 1987).

3.6.2 AREA OF ANALYSIS

The area of analysis for wildlife includes all land within the allotment boundary. The total allotment area is approximately 7,700 acres for Waugh Gulch and 2,850 acres for Andrews, which includes portions of the Waugh Creek, West Fork of Camp Creek and Maynard Creek drainages. This area is bordered by private or state land on much of the east side. The Lost Trail Ski area is located to the south of the allotments. The analysis area was not expanded for wildlife species whose range is larger than the allotment due to the limited nature of impacts from grazing within the allotment.

3.6.3 DESCRIPTION, HISTORY AND EXISTING CONDITION

Habitat Conditions

Historical vegetation within the allotment is most likely similar to that existing today. The Waugh Gulch Allotment is about 87% forest with 25% of that recently burned. The remainder is early seral vegetation in the form of recently harvested units, grassland and/or shrub fields and some rock talus slopes. The Andrews allotment is about 80 % forest with about 61% of that recently burned. The reminder of the allotment acreage is early seral comprised of recently harvested units and/or grasslands and open woodlands.

Tree species include some Ponderosa Pine in the lower elevations (below 6500 feet) and grading into Douglas-fir and finally into lodgepole pine and subalpine fir at the highest elevations. Wildlife species

associated with this type of stand structure such as pileated woodpeckers and flammulated owls were probably relatively common throughout the area. Since this area was probably always heavily forested it is probable that big game species were present but never truly abundant due to the likely paucity of forage in forested systems.

Areas of the allotment above 6500 feet support denser stands of mixed Douglas-fir, lodgepole pine and sub-alpine fir with fewer grassy openings. Stand structures at these elevations were typically seedling, sapling or pole sized timber, with some islands of older trees in areas missed by fire. Snags were common in recently burned areas. This stand structure was maintained by less frequent fires of low to high intensity. Wildlife species associated with this type of stand structure such as marten, lynx, and several woodpecker species were probably relatively common throughout the area.

Selective harvest of large ponderosa pine occurred in some areas, especially on flatter ground. Previously logged lower elevation areas (that haven't recently burned) now support stands of mixed immature ponderosa pine and Douglas-fir. Understory vegetation in forested areas is dominated by dry site grasses, forbs and shrubs, while natural openings are still dominated by grasses. Noxious weeds such as spotted knapweed have taken over some areas near roads and noxious weeds dominate grassy openings below 6500 feet in the Waugh allotment. Spotted knapweed is relatively abundant along the Lower Andrews Creek road.

Higher elevations of the allotment have been visited by fire and some clearcut harvest has occurred. These openings support young regrowth. A large stand-replacing fire (Saddle Mountain) occurred within portions of the Waugh Gulch allotment in 1960. Most burned areas remain relatively open but have young conifers throughout the burned areas. The more recent wildfires of 2000 have removed additional vegetation. Much of the allotment is accessed by a road system, some of which is open to motorized vehicles year-round. Public recreational use of the area is heavy during big game hunting season, but is light to moderate at other times.

Riparian vegetation is present along most of the major drainages.

Management Direction

Portions of the allotment are classified as Management Area (MA) 1, 2, 3a, 3b, and 5 in the Bitterroot National Forest (BNF) Forest Plan (FP). Management standards limit livestock use to *50%* of forage production in MA 1, 35% in MAs 2 and 3a, and 35% in big game winter range and *50%* in big game summer range in MAs 3a, 3b, and 5.

Grazing Effects

Past livestock impacts to vegetation in the allotment appear to be quite limited. Much of the allotment is too steep or too heavily forested to attract cattle use. Water sources are limited to the stream systems and several small spring sites in the allotment.

There have been several areas identified during annual monitoring where cattle congregate and have exceeded utilization standards or have impacted streamside riparian areas. The hydrology section of this EA documents the measured effects of cattle use on stream banks in the allotment. Cattle do not appear to be consuming enough forage to limit the size of wintering big game herds at this time, especially since big game often use slopes that cattle avoid.

Wildlife Populations -Non-TES species

Mule deer and elk utilize extensive portions of the allotments year-round. Montana Fish. Wildlife and Parks (MFWP) spring elk trend counts show that the trend count area which includes the allotment and adjacent private state and Federal lands supports an upward trend in big game numbers.

The allotment is also used by numerous other wildlife species associated with forested environments including black bears, western tanagers, red squirrels, and snowshoe hares.

Wildlife Populations -TES species

The Forest Plan provides the following direction regarding Threatened, Endangered and Sensitive (TES) species:

- The habitat needs of sensitive species, as listed by the Regional Forester, will be considered in all project planning (Forest Plan 11-21).

Participate in the identification and protection of threatened and endangered species and vascular plants identified as rare, pending study and proposal as threatened and endangered (Forest Plan 11-21).

Maintain viable populations of sensitive species throughout its existing range within the planning area (this means the Bitterroot National Forest) (FSM 2670.5 19, 28). Special management emphasis is provided to ensure sensitive species viability and preclude trends toward endangerment that would result in the need for Federal listing as Threatened or Endangered under the Endangered Species Act of 1973. A Biological Evaluation (BE) must be conducted to determine the effects of proposed actions on sensitive species.

This section describes the known existing conditions for TES wildlife species populations and their habitats within the Allotment and adjacent areas. It serves as the Environmental Baseline and documents information collected during Pre-field and/or field reviews.

Pre-Field Review and Results

A pre-field review of the project analysis area was conducted to identify potential habitat of all TES wildlife species on the current Regional Forester's Sensitive Species list. This comparative analysis provides information about potential occurrence of a wildlife species when current surveys are lacking or to determine if additional fieldwork is required. Other information sources reviewed during the prefield analysis included the most recent list of Threatened and Endangered wildlife species which may occur on the BNF included the Montana Natural Heritage Program's Element occurrence Database, Montana Department of Fish, Wildlife and Parks trapping records and Bitterroot National Forest wildlife sighting records.

The pre-field review indicated that suitable habitat exists within the analysis area for one former species listed by the US Fish and Wildlife Service *(USFWS)* as threatened or endangered *(USFWS,* 1993) and one existing listed specie: Gray wolf (Canis lupus) (formerly Endangered now delisted) and Lynx (Lynx *canadensis)* (Threatened, Resident).

Wolves are known to frequent the project area, but no den sites have been located on the National Forest. Lynx likely occur as transients in the area. Both species may increase use in or near the project area in the future based on current recovery plans and known use patterns of dispersing wolf packs and/or future presence of prey within the analysis area.

In addition, the pre-field review indicated that six Sensitive species could potentially occur in proposed units in the project analysis area based on their habitat requirements: Flammulated owl *(Otus flwwneolus)* (Migrant) Black-backed woodpecker *(Picoides* arctus) (Resident, transient) Fisher (Martes *pennanti)* (Resident), Wolverine *(Gulo gulo)* (Resident, transient), and Boreal Toad (*Bufo borealis*), Resident.

Table 3.6- 1- Federal Listing Status for Species of Concern

Species	ST[1]	Historical Presence[2]		Current Presence[2]		Habitat Comments/Issues Related to Project Area
		BNF	Allot	BNF	Allot	
Bald Eagle	De-listed	Y	Y	Y	Unl	No known historical nests; fall/winter presence on the Bitterroot River system around open water.
Grizzly Bear	T	Y	N	Y	Unl	No known grizzly bear in analysis area.
Gray Wolf	De-Listed	Y	Y	Y	P	Wolves have and continue to use the Bitterroot NF.
Canada Lynx	T	Y	P	Y	P	Historically present no recent sightings or records in the project area.
Peregrine Falcon	RD	Y	N	N	Unl	No known nesting sites, current or historical, have been documented.
Flammulated Owl	S	Y	P	Y	Unk	The project area contains limited habitat attributes that may provide suitable habitat.
Harlequin Duck	S	Unk	N	Unk	Unl	Perennial mountain streams with < 3% gradient and shrub cover.
Townsend's Big-eared Bat	S	P	P	Unl	Unl	No known caves that can function as hibernacula or maternity roosts known in the project area.
Black-backed Woodpecker.	S	Y	Y	P	P	Expected beetle outbreaks and recent fires will provide a good forage base to support a woodpecker population increase.
Wolverine	S	Y	Unk	Y	Unk	No known habitat favored for denning is present in the analysis area.
Fisher	S	Y	Unk	Unk	Unk	Mature and old growth forests adjacent to streams are preferred habitat conditions.
Northern Goshawk	S	Y	Y	Unk	Unk	Mature and old growth forests, especially in riparian areas are preferred habitat conditions.
Northern Leopard Frog	S	Y	Unk	N	N	This species is believed extirpated in the Bitterroot Valley. No habitat is present on public lands in this allotment.
Boreal Toad	S	Y	Unk	Y	P	Breeding habitat occurs in lakes, ponds and slow streams. Habitat is present.
Pine marten	MIS	Y	P	Y	P	Year round use most likely occurs.
Pileated WP	MIS	Y	P	Y	P	Year round use most likely occurs.
Elk	MIS	Y	Y	Y	Y	Winter, early spring and late fall seasonal habitats exist.
Coeur d'Alene Salamander	S	Unk	Unk	Y	Unl	Springs and seeps, waterfall spray zones, damp streambanks in talus or fractured rock sites up to 5,900 feet.

[1]**ST = Status**; **T**=Federally Threatened; **E**=Federally Endangered; **RD**=Recently delisted, likely to be listed as Sensitive; **S**=Forest Service Region 1 listed as Sensitive; **MIS**= Bitterroot National Forest Management Indicator Species. **Presence; Y**=Yes; **N**=No; **P**=Probable (based on known habitat requirements); **Unl**=Unlikely (based on known habitat requirements; **Unk**=Unknown; **S**= Seasonal.

Field Clearances and Surveys, and Results

This section contains short habitat descriptions and known existing condition information for the TES species known or suspected to occur within the Waugh Gulch and Andrews Allotments. The expected effects to these species from implementation of the alternatives are influenced by this existing condition information. Effects are documented in Chapter IV of this document.

Flammulated owls have been documented near the allotment and it is probable that this species may reside and even nest within or near the allotments. No surveys for other TES wildlife species have been conducted in this area.

Montana Department of Fish Wildlife and Parks trapping records indicate that no fisher, lynx or wolverine have been taken from Hunting District (HD) 250 in recent years. No observations of any of these species have been reported recently within the allotment, but this analysis assumes that all three species use the allotment to some extent.

Threatened and Endangered Species

Gray Wolf *(Canis lupus)* – Recently Delisted from Endangered Status

Gray wolves are habitat generalists that utilize a wide variety of habitats while searching for adequate food supplies. The availability of ungulate prey and isolation from human activities are the most important factors that determine suitability of habitat for wolves (Reel, et al. 1989).

Wolves were hunted and trapped to the point of extirpation in Montana by 1930, but began to re-colonize the state from Canada in the 1980s. In 1986 a pack was discovered on the west side of Glacier National Park and other packs subsequently became established within and adjacent to the Park. Wolves dispersing from these Glacier Park packs established several other packs in the state starting in the late 1980s, and by 1993 there were five known packs with a total population of approximately 50 individuals in the state (Bangs and Fritts, 1993).

We have no evidence that gray wolves occurred in the area in recent decades prior to the U.S. Fish and Wildlife Service's reintroduction efforts near the Salmon River (see below) in January 1995. No tracks, scats, howls or wolf sightings had been reported from the analysis area. While radio-collared, transplanted wolves have been tracked on the Forest, the activity seems to be transient, and there is still no evidence that denning exists within the analysis area.

The Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho Final Environmental Impact Statement (USDI, 1994) shows the entire Bitterroot Forest within the boundaries of the Central Idaho Non-essential Experimental Population Area. A non-essential experimental population is defined as an introduced population not essential to survival of the gray wolf in the wild. Wolves were moved from Canada to the Central Idaho area at three locations; the mouth of Corn Creek on the Salmon River and at Indian Creek and Thomas Creek airstrips on the Middle Fork of the Salmon River in January and December, 1995. The Fish and Wildlife Service, through the Nez Perce Tribe, continues to monitor their movements and will alert the Forest if den sites are discovered.

Under the conditions for management of the non-essential experimental population published in the Federal Register November 22, 1994, the only land management restriction in the recovery area would "control" intrusive human disturbances around active wolf den sites. Such temporary restrictions on human access, when five or fewer breeding pairs are established in an experimental area, may be required between April 1

and June 30, within one mile of active wolf dens or rendezvous sites and would only apply to public lands..."(USDI, 1994). "When six or more breeding pairs are established in an experimental population area, no land-use restrictions may be employed outside of national parks or national wildlife refuges..." (USDI, 1994)

As of December 2002 the U.S. Fish and Wildlife Service met their recovery goals of thirty breeding pairs within the tri-state area. Late December estimates of wolf numbers indicate between 650-700 wolves in about 41 breeding pairs equitably distributed throughout Montana (about 120 wolves in 13 breeding pairs), Idaho (about 285 wolves in 10 breeding pairs), and Greater Yellowstone (270 wolves in 18 breeding pairs). 2002 was the third consecutive year that the wolf population in the Northern Rocky Mountains had 30 or more breeding pairs, meaning the wolf population had achieved the numerical and distributional recovery goals. Wolves can be delisted once adequate state wolf management plans and state laws are in place in MT, ID, and WY (http://www.forwolves.org, 2003).

The Selway-Bitterroot Wilderness portion of the BNF was included in the original Central Idaho Wolf Recovery Zone designated by the USFWS in the Draft EIS for the Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho (USFWS, 1993). With the publication of the Final EIS for The Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho (USFWS. 1994), the USFWS renamed and enlarged this wolf recovery zone. It is now called the Central Idaho Nonessential Experimental Population Area (ClNEPA), and includes all of Idaho south of Interstate 90, and all of western Montana south of Interstate 90 and west of Interstate 15. The allotments are within this larger area. Wolves may eventually utilize the allotments to some extent, although it is likely that most wolf use will be centered in Idaho. The existing populations of deer and elk within the area especially during the winter indicate that portions of the allotment contain suitable foraging habitat for gray wolves. Overall, populations of elk and white-tailed deer in the Bitterroot Valley are higher than in the past and can provide foraging potential for wolves.

Grizzly Bear *(Ursus* arctos) -Threatened

Grizzly bears are habitat generalists that will utilize a wide variety of habitats while searching for adequate food supplies. Food distribution and availability, as well as isolation from human disturbance dictates habitat use. Although they move widely over a large home range, grizzlies are non-migratory. Given an adequate forage base, freedom from human disturbance is probably the most critical habitat need for grizzlies. (Reel, et al. 1989)

Grizzlies may move seasonally along an elevational gradient. They move down to low elevation riparian areas, snow chutes and meadows in the spring and late fall. In the summer, early fall and winter they move up to high elevation areas such as subalpine forests and alpine cirque basins. Grizzlies use mixed shrubfields, seeps, grasslands, timbered sidehill parks, and old burns for feeding and resting. They spend the winter hibernating in dens they excavate, generally located above *6500 feet.* Grizzlies are omnivores, and a majority of their diet is composed of vegetation including forbs, sedges and grasses, roots, berries and pine nuts. They also consume fish, small mammals, insects, ungulates and carrion when available (Reel, et al. 1989).

Grizzly bears were relatively common in the Selway/Bitterroot area until at least the 1920's and were undoubtedly present in the Sapphire Range as well. Sightings of grizzlies or grizzly tracks have been reported occasionally from several areas of the BNF including one seen at Buck Horn Saddle (unconfirmed) which was likely a black bear. The most recent was a grizzly sighting east of Stevensville, Mt (2002).

USFWS studied the Bitterroot Grizzly Bear Evaluation Area to determine its habitat capability for grizzly bear. This evaluation area was determined to be suitable for grizzly bear and was designated as the Bitterroot Grizzly Bear Recovery Zone, which is one of six ecosystems in the continental U.S. out- side of Alaska that are managed for grizzly bear. The Recovery Zone lies primarily within the wilderness boundary (USF\VS, 1993). No critical habitat for grizzly bears exists outside the Recovery Zone so there is none within the allotment.

Some individuals may eventually use the allotment to a limited extent. Possible dispersal routes for future populations of grizzlies in the Selway/Bitterroot Wilderness might include portions of this area that tie into the Continental Divide at Lost Trail Pass, and could potentially connect future Selway/Bitterroot Wilderness populations with other populations in the Northern Continental Divide ecosystem.

Canada Lynx (*Lynx canadensis*) – Threatened

Lynx occupy dense coniferous forests in the subalpine zone just below timberline. They are uncommon and occur in low densities in even the best habitat. Lynx are dependent on snowshoe hare as their primary prey and providing good hare habitat will benefit lynx (Quinn and Parker, 1987). Lynx prefer to move through continuous forest and frequently use forested saddles, ridges, and riparian areas (Ruediger et al, 2000) during travels. They prefer to forage in areas that support their primary prey, the snowshoe hare. Vegetation characteristics that do so include a dense, multi-layered understory that maximizes cover and browse at both the ground level and at varying snow depths throughout the winter (crown cover within the lower 15 feet in order to provide cover and food for hares to 6 feet high at maximum snow depths). This habitat includes shrubs and saplings, which provide food as well as cover from predators. Lynx prefer mature forest with deadfall for denning (Koehler and Brittell, 1990).

In the Bitterroot Mountains lynx habitat has been identified through an interdisciplinary process with the United States Fish and Wildlife Service at an elevation of 6200 feet and higher. This effectively eliminates the dry Douglas-fir that occurs in the Bitterroot Mountains as lynx habitat. The Waugh Gulch allotment contains roughly 2300 acres of lynx habitats and the Andrews allotment contains approximately 1645 acres. About 90% of the lynx habitats burned in 2001 in Andrews and about 50% of the existing lynx habitats burned completely in Waugh in 2001. The burned lynx habitats were severely affected and are considered temporarily non-habitat for lynx. As shrubs and trees repopulate the area (10-30 years) lynx foraging and den habitat quality will improve.

Past livestock use of lynx habitats is light due to topographic features and heavy forest cover that reduces the production of grass and forb forage preferred by cattle.

Formal lynx surveys were conducted on forest from August, 1999 through October, 1999 using the National Lynx Survey Protocol. Field surveyors reported no lynx tracks or other evidence of lynx during the 1999 survey. Lab results from hair samples collected during this survey also showed no evidence of lynx. However, a reported sighting was confirmed in January, 2001 on the top of the ridge separating the South Fork of Lost Horse Creek from Upper Lick Creek drainage on the Darby Ranger District (Lockman, 2001). Since 1980 eight lynx sightings have been recorded in Ravalli County with none of those within the allotments.

Bald Eagle (*Haliaeetus leucocephalus*) - Recently Delisted from Threatened Status

Bald eagle nesting or roosting habitat typically includes mature to over mature mixed conifer, ponderosa pine and cottonwood stands near large rivers or lakes. Although bald eagles pass through the area occasionally during migration, no suitable nesting habitat for bald eagles exists within the analysis area.

Sensitive Species

Boreal Toad (*Bufo boreas*)

Boreal toads are found in a variety of habitats from valley bottoms to high elevations. They breed in lakes, ponds, and slow streams with a preference for shallow areas with mud bottoms. Tadpoles are seen in ponds during the day. During the breeding season, adults can also be found in water; however, displacement to nearby upland habitats is quite common (Hendricks and Reichel, 1996). During a survey of the Bitterroot NF in 1995, 16 sites were found to have Boreal toads (Hendricks and Reichel, 1996), none in the analysis area. Although the area has suitable habitat and the toads probably occur there, habitat is limited since most streams are fast moving systems without mud bottoms and lakes and ponds are not present within the allotment. There are no known breeding sites within the allotment.

Peregrine Falcon (*Falco peregrinus*)

Peregrine falcons have exhibited remarkable recovery from no known active eyries in Montana in the 1960's to at least 37 by 2001 (Sumner and Rogers, 2001). Peregrines were reintroduced to the Bitterroot Forest at three sites since 1989: Painted Rocks, Canyon Creek and Little Rock Creek. We confirmed the first wild eyrie in the West Fork of the Bitterroot in 1991 near Painted Rocks reservoir. The peregrines that occupy the Painted Rocks eyrie also use an alternate eyrie just east of the dam. One or the other of the Painted Rocks eyries has been occupied since 1991. The closest known eyrie to the analysis area is over 14 miles away. The allotments do not contain nesting cliffs suitable for peregrine falcons.

Western Big-Eared Bat (*Plecotus townsendii*)

The Bitterroot NF is within the range of the western big-eared bat. Hoffman et al. (1969) reported specimens collected northeast of Florence, at the Curlew Mine, in Hamilton, and at Lake Como. The bats use a wide variety of vegetation types, from juniper/pine to high elevation mixed conifer forests (Barbour and Davis, 1969). Roosting, nesting and hibernating colonies are often found in caves, abandoned mine tunnels, and occasionally abandoned buildings. Females generally tend the young alone so are most often found associated with the nesting colonies. Males are more solitary and may venture further out into the forest to forage and occasionally roost in cavities or behind loose bark. Caves or mine tunnels are essential to western big-eared bat nursery colonies. There are no known caves within the assessment area and no tunnels that would be suitable for a colony.

Coeur d'Alene Salamander (*Plethodon idahoensis*)

The Bitterroot NF lies at the southern extreme of the range of the Coeur d'Alene salamander. There are three known occurrences on the Forest, all found north of the West Fork of the Bitterroot River (per com, Bryce Maxell 2003). They inhabit small streams, usually near waterfalls and in the spray zone of cascading streams. They are dependent on fractures or fissures in rocks for cover during the day, and hibernation in winter. Neither the distribution nor geology indicates any likelihood of these salamanders presence in the analysis area.

Flammulated Owl (*Otus flammeolus*)

Based on current literature, Flammulated Owls are dependent on mature to old growth ponderosa pine/Douglas-fir forests at low elevations in the Rocky Mountains. These habitats correspond very closely to a vegetative type that is found on the Bitterroot Forest. They are found in mature open park-like stands with some understory shrubs and small trees (McCallum, 1994).

Composition of forests within favored areas where Flammulated Owls foraged repeatedly suggests the importance of old ponderosa pine/Douglas-fir in the foraging behavior of the owl. Old yellow-pine forests (whether pure or mixed with other species) typically form open stands with well-developed grass or shrub understories. These understories support arthropods (insects for food) in a forest layer that is used extensively by fledged owlets and molting adults in late summer (Reynolds and Linkhart, 1987b). Linkhart et al. found that males sang from hidden positions next to tree trunks or in dense clumps of foliage and that ponderosa pine and Douglas-fir were the only species used as song trees, the trees had a mean age of 289 years (Reynolds and Linkhart, 1987b).

The associated prey for Flammulated Owls in the early spring are primarily noctuid (night flying) moths and in the summer crickets, grasshoppers, moths, beetles, and bugs (McCallum, 1994). The openness of these stands also provides space for hawking flying insects between crowns and for hover-gleaning them from outer needle bunches (Reynolds and Linkhart, 1987b).

Research in Colorado found male owls gleaned arthropods from pine needles and the bark of limbs and trunks of large conifers. Occasionally the owls hawked flying insects between tree crowns, or dropped from the lower crown branches to arthropods on the ground (Reynolds and Linkhart, 1987b).

Flammulated Owls spend winters in Mexico and Central America, returning to breed in western Montana around the first of May when nights are warm enough to support nocturnal flying insects they are dependent on for food (Reynolds and Linkhart, 1987).

They depend on woodpeckers to create nesting cavities, usually in large dead trees. Reynolds and Linkhart (1992) state that in reports where forests surrounding nests were described or photographed, all nests were in, or adjacent to, mature or old growth stands (Hanna, 1941; Bull and Anderson, 1978; Canning et al., 1978; Hasenyager et al., 1979; Cannings, 1982;, Bloom, 1983; Reynolds and Linkhart, 1984 and1987b; Fix, 1986; Goggans, 1985; Haward, 1986; Howie and Ritcey, 1987; and McCallum and Ghelback, 1988). However, Hassenyager et al. (1979) and Bloom (1983) reported nests in forests that had been partially cut but contained large, residual trees, and Winter (1994) found the owl in second-growth forests, although they did not report nesting in this age-class (Reynolds and Linkhart, 1987b).

Potential habitat for Flammulated Owls exists across the lower elevations within the analysis area. Wright (1996) conducted a two-year study of Flammulated Owls on the Bitterroot NF. Using a “callback survey”, she recorded approximately 100 Flammulated Owl observations. Ninety percent of these observations were clustered (>3 owls per transect). Wright suggested the clustering is probably a consequence of owls occupying appropriate microhabitat only when the larger area is also suitable (Wright, 1996). Scientists have suggested that it is possible habitat will only be suitable when it is abundant enough to accommodate a cluster of territories (Montana Bird Conservation Plan, 2000).

About 80 of Wright’s 100 observations of Flammulated Owls were on the Sula and Darby Ranger Districts. No Flammulated Owls have been documented in the analysis area, although some of the lower elevation ponderosa pine forests appear to have some suitable habitat.

Fisher (Martes pennanti)

Characteristics of pine marten and fisher habitat are remarkably similar (Quinn and Parker, 1987; Douglas and Strickland, 1987; and Jones, 1991). Fishers are very uncommon or rare on the Bitterroot NF, but between three and five have been trapped each year for the past eight years in the Bitterroot Valley according to Montana Department of Fish, Wildlife and Parks trapping records. All records are from the west side canyons, except three from the Rye Creek drainage. Fishers are closely associated with forested riparian areas that are used extensively for foraging, resting, and as travel corridors (Claar et al., 1999).

Most studies have reported that fishers prefer forests with continuous cover, though some use of shrubby clearings can occur during certain seasons (Claar et al., 1999). Suitable fisher habitat probably occurs in the analysis area with no indication it is occupied habitat.

Wolverine (*Gulo gulo*)

Wolverines are solitary animals, which range widely over a wide variety of habitats. Isolation from human impacts and a diverse prey base seem to be the most important habitat components. Within large roadless areas, wolverine use appears to be concentrated in medium to scattered mature timber and in ecotonal areas around natural openings such as cliffs, slides, basins and meadows. There seems to be little use in stands of dense young timber or in openings such as clear-cuts or wet meadows (Reel et al., 1989; Butts, 1992). Wolverine home ranges are very large, averaging about 150 square miles in Montana. Wolverines feed primarily on rodents and carrion, although they are opportunists and will also consume berries, insects, fish, birds, and eggs when available. Ungulate carrion seems to be particularly important in the winter, and wolverine movement to lower elevations during winter may be to take advantage of ungulate mortalities on winter ranges (Reel et al., 1989; Butts, 1992). Wolverines in Montana seem to display a distinct seasonal elevational movement pattern. In the summer, they move to higher elevations and inhabit forests dominated by subalpine fir. In the winter, low elevation riparian areas may be important (Reel et al., 1989; Butts, 1992).

In the past several years we have recorded wolverines on the Forest, although none have been reported in the Waugh Gulch or Andrews allotments and no tracks have been noted along pine marten survey routes. According to Montana Fish, Wildlife and Parks trapping records, only five have been trapped in the Bitterroot Valley since 1980, the last one in January 2003 in the Lost Horse drainage. If wolverines were to occur in the analysis area, it would probably be only as transient individuals.

Wolverines could potentially utilize the lower elk winter range area. It is possible that wolverine use the allotments to some extent, although the entire analysis area would constitute only a fraction of the home range of one wolverine and visits to the allotment could be expected to be sporadic as the animal traveled its' territory.

Black-backed Woodpecker (*Picoides arcticus*)

Black-backed Woodpeckers are opportunistic feeders typically associated with mid- to higher elevation coniferous forests in the northern Rocky Mountains. This species is highly mobile and tends to concentrate in areas of bark beetle outbreaks, usually associated with stand-replacement fires. They are rarely seen except in recent burns. Beetle outbreaks typically decrease within three years (at least where fire was the cause of tree mortality), and concentrations of these birds then move on to other foraging opportunities. Black-backed Woodpeckers seem to be more strongly associated with beetle outbreaks in fire-killed trees, whereas the closely related Three-toed Woodpecker (*Picoides tridactylus*) tends to be more closely tied to non-fire related beetle outbreaks. There is considerable overlap between the two species.

Hutto has found that Black-backed Woodpeckers prefer fire-killed Douglas-fir (*Pseudotsuga menziesii*), western larch (*Larix occidentalis*) and ponderosa pine (*Pinus ponderosa*), whereas lodgepole pine (*Pinus contorta*) is a secondary species. Weydemeyer and Weydemeyer (1928) also list Douglas-fir as the birds' preferred species. Black-backed Woodpeckers usually forage on larger diameter trees, probably because larger sizes are more prone to beetle attack. They are stronger drillers than many other woodpeckers, so are capable of excavating in harder wood and through thicker bark than other species.

Snag concentrations seem to be more critical for winter foraging than for summer foraging. Small flocks of Black-backed Woodpeckers often seen in snag concentrations in the winter seem to disperse during the summer, probably due to territoriality associated with nesting.

Black-backed Woodpeckers excavate nest cavities in live or dead trees in close proximity to foraging areas. They nest relatively close to the ground (3-16 feet) in trees larger than 12 inches DBH. Clusters of snags provide both nesting and foraging habitat.

It is highly likely that this woodpecker species uses and will continue to use burned areas of the allotment since most of the Andrews forested areas burned and about 20 % of the Waugh Gulch allotments forested stands burned and 75% of the forested stands in the Andrews allotment burned in 2000.

Northern Bog Lemming (*Synaptomys borealis*)

Northern Bog lemmings are found in highest abundance in sphagnum bogs. Bogs are another rare and ecologically fragile habitat. Bogs develop on undrained or poorly drained sites where chemical conditions hinder decomposition of organic matter. These wetlands are characterized by standing water interspersed with vegetated ridges or floating mats of vegetation on organic soils (Hansen et al., 1995). Some bog lemmings occur in wet areas along streams. Bog lemmings are found where the stream gradient is relatively gentle and wetlands extend laterally from the stream. Potential habitat exists only along streams, and then only if gradients are gentle and wetlands approximating bogs are present. It is very unlikely any occur in the analysis area.

Northern Leopard Frog (*Rana pipiens*)

Northern Leopard frogs are found in or near non-forest habitats. Typically, the vegetation is a dense sedge wet-meadow or cattail marsh. Northern leopard frogs are not known to occur on forest habitats and are known to occur primarily on low elevation marshes and wetlands on the Bitterroot Valley bottoms. Breeding takes place in lakes and ponds (temporary and permanent), springs, and occasionally backwaters to beaver ponds in streams. Historically the Northern leopard frog was widespread in Montana, but it now appears to have been extirpated throughout much of the western part of the state. Bullfrogs are a primary predator of Northern leopard frogs, and as introductions of bullfrogs were made, Northern leopard frog populations began to decrease. Re-surveys of 14 known historical sites west of the Continental Divide, three years prior to 1996, failed to reveal a single individual (Hendricks and Reichel, 1996). The species probably does not occur in the analysis area because there is no suitable habitat.

Management Indicator Species

Elk

In general, the elk is a migratory animal, spending the summer months at high elevations (summer range), the spring and fall at intermediate elevations (transition range), and the winter at low elevations (winter range) (Dalke *et al.*, 1965: 337; Knight, 1970: 13-24; Murie, 1951: 59-67). Inclement weather at high elevations in the fall tends to move elk downward for the duration of the storm or the season. Deep snow restricts elk movement and forces many animals to winter in narrow yards along river and canyon bottoms (Craighead *et al.*, 1972, 1973; Dalke *et al.*, 1965). The pace of the spring movement toward summer range is dictated by the development of grasses, sedges, and forbs (any herb not grasslike), referred to colloquially as "spring greenup" (Dalke *et al.*, 1965: 336; Goodwin, 1975: 27). Barriers to elk movement include hunters, interstate highways, and fenced farmland (Craighead *et al.*, 1972: 11; Goodwin, 1975: 52; Mace, 1971: 9; Ward *et al.*, 1973: 337).

The optimum habitat for elk is generally accepted to consist of 60 percent openings and 40 percent cover (Thomas *et al.*, 1976). Home range is defined as that area traversed by the individual elk in its normal activities of food gathering, mating, and caring for young (Burt, 1943). The breeding season for elk begins in late August, when the sexually mature males begin to disperse and establish territories (Dalke, *et al.*, 1965: 337; Knight, 1970: 32-34; Peek and Lovaas, 1968: 553). Normally, September is regarded as the month when the most intensive breeding occurs and October or November as the time when breeding terminates, after which the cows comprising the harem disperse for the winter (Altman, 1960; Knight, 1970; Moran, 1973; Murie, 1951; Struhsaker, 1967). Following a gestation period of about 239 days, parturition occurs sometime between mid-May and late June on areas used as transition range (Martinka, 1969: 472; Moran, 1973: 79; Peek and Lovaas, 1968: 553). Calving areas consist of a gentle, sloping bench (15 percent) with a southern exposure, containing water, grasses, and forbs, surrounded by an immediately adjacent stand of trees and shrubs (Davis, 1970; Roberts, 1974; Rust, 1946; Young and Robinette, 1939). The cows use the trees for both escape and thermal cover and the grass-like plants for nourishment to support lactation. The newborn calves use shrubs, dead trees, and downed logs for hiding cover.

Winter range is usually regarded as the measure of an elk herd (Murie, 1951: 292). Severe weather conditions on poor winter ranges result in the loss of mature bulls, pregnant cows, and yearlings due to starvation and malnutrition. Forage conditions during and shortly before ovulation determine ovulation rate in the female (Longhurst, 1951). Likewise, the nutrition plane prior to and during pregnancy affects both the growth, weight, and survival, of the calf after birth (Thorne *et al.*, 1976: 333). Hence, the total range situation influences the productivity of an elk population.

There are approximately 3000 acres of winter range within the Waugh Gulch allotment and 1200 acres in the Andrews allotment. Of these acres approximately 50% burned in Waugh and 50% burned in Andrews. Nearly all of elk summer range burned and security habitat characteristics have been altered on about 30% of the acres across both allotments.

Forage production will in the short term (next 10 years) be much greater than pre-2000 wildfires due to the removal of conifer canopy cover. In addition it can be expected that shrubs and other woody browse species will increase substantially over the next several years due to the removal of competing conifers, and the release and availability of water and nutrients.

Elk populations within the hunting unit are increasing and habitat components do not appear to be deficient.

Pine Marten

The marten is an opportunistic feeder that eats primarily small mammals including squirrels and rodents. Occasionally birds, fruit, nuts, insects, and carrion will be eaten as well. They often have fast-paced chases in trees with one of their favorite prey items, the red squirrel (Tamiasciurus hudsonicus).

According to Buskirk and Powell (In: Ruggiero et al 1994) and Tomson (1998) American martens are closely associated with late successional, mesic forests, with an abundance of snags, coarse, woody debris or low shrubs and small understory trees. In summer martens may also use young forests where coarse, woody debris is abundant, although they may be more vulnerable to predation in young forests (Baker, In: Ruggiero et al 1994, Tomson 1998). In the Beaverhead National Forest, Fager (1991) and Coffin (1994) found no preference between mature and old forests. In the Gallatin National Forest, however, Kujala (1994) found a strong preference for old stands. Martens appear closely associated with interior forest conditions, and tend to avoid edges or openings (Koehler and Hornocker, 1977). Tomson (1998) suggested martens are at increased risk from avian predators and coyotes in openings.

Although the allotments contain some habitat for marten the fires of 2000 and other wildfires (Saddle Mountain) has reduced the overall quantity of marten habitat within both allotments. There have been no surveys for this species within either of the allotments but it is highly probable that marten occupy adequate habitat within each of the allotments.

Table 2. Wildlife species/habitats that were not carried forward into the effects analysis of the NEPA process for the Waugh Gulch-Andrews Allotment EA.

Table 3.6- 2- Species not Included in Effects Analysis

Species	Rationale For Not Including in Effects Analysis
Bald Eagle	Habitat along rivers would be unaffected.
Peregrine Falcon	No potential nesting habitat is present in either allotment
Townsend's Big-Eared Bat	No maternal roosting or other habitat for the species in the project area.
Black-backed Woodpecker.	Known potential habitat would be unaffected by grazing or associated activities.
Wolverine	No known habitat in project area. Grazing will not affect den habitat or prey species availability.
Fisher	Potential foraging/den habitat would be unaffected. Cattle tend to avoid closed canopy environments.
Pine marten	Potential foraging/den habitat would be unaffected. Cattle tend to avoid closed canopy environments.
Grizzly Bear	Bears not present and habitat would remain unaffected.
Northern Leopard Frog	Species is not present within the Bitterroot Valley. There are no slow moving or standing water bodies present.
Northern Bog Lemming	There are no bogs which provide suitable habitat for the northern bog lemming
Pileated Woodpecker	Forested habitat will not be appreciably affected by grazing.

No suitable habitat exists within the allotment for other wildlife species on the Regional Forester's Sensitive Species List or is known or suspected to occur on the BNF. There are no caves or mine shafts that could provide habitat for hibernaculum or nursery colonies for western big-eared bats *(Plecotus townsendit1*. There are no bogs that provide suitable habitat for the northern bog lemming (Synaptomys borealis). There are no medium-sized mountain streams that could provide habitat for Harlequin Ducks *(Histrionicus histrionicus).* Although the Coeur d'Alene salamander has been found at two locations in the valley, there are no known records of this species within either of the allotments and preferred habitats would not be used by cattle.

Further analysis for these species is not necessary because none of the alternatives would have any effect on individuals of these species or their suitable habitats.

3.6.4 ENVIRONMENTAL CONSEQUENCES

Consistency with the Forest Plan

Management Indicator Species

The designated Management Indicator Species (MIS) for wildlife habitat changes in the Bitterroot Forest Plan are elk, pine marten and pileated woodpecker. None of the alternatives will adversely affect pine marten or the pileated woodpecker. There will be no further discussion of these species.

Threatened, Endangered and Sensitive Species (TES)

Threatened, endangered, and sensitive (TES) wildlife species could also occur within the allotment area. Effects of the alternatives to these wildlife species are analyzed in this document. The Forest Plan provides direction regarding Threatened. Endangered and Sensitive species:

The habitat needs of sensitive species as listed by the Regional Forester will be considered in all project planning (Forest Plan 11-21).

Effects to Threatened, Endangered and Sensitive Wildlife Species

No effects are expected to the Peregrine Falcon, Townsend's big-eared bat, Coeur d'Alene salamander or northern bog lemming because suitable habitat for these species does not occur in the allotment or will remain unaffected by livestock grazing as noted in the Affected Environment Section. As regards the recent delisting of the gray wolf (March, 2008), the project area is located within the former Central Idaho Nonessential Experimental Population Area (CINEPA). This was the recovery area for gray wolves that was identified in the Final EIS for the Reintroduction of Gray Wolves to Yellowstone National Park and Central Idaho (USFWS. 1994). No critical habitat was identified within this recovery area, so none exists in or near the allotments.

None of the alternatives would adversely affect corridors linking existing and potential subpopulations of wolves. Since livestock grazing does not appear to be limiting the number of elk within the allotments the proposed action alternatives will have no effect on this primary prey species of the gray wolf and therefore will have no effect on the wolf or wolf population. There would be no direct, indirect, or cumulative effects to wolves or their habitat as a result of implementation of any of the alternatives.

Other Tes Species Are Described Below

Lynx: Snowshoe hare (a lynx prey species) habitats often utilize shrub and/or riparian habitats. Livestock will eat aspen and other shrubby species when utilization on grasses and forbs exceed 45 to 50 percent utilization levels or when herbaceous forage matures and dries out. Therefore any of the action alternatives have some potential to affect aspen or shrub recruitment in localized areas of the allotment. However, the proposed level of livestock use and past records of utilization indicate that effects on aspen or shrubs would be (localized) negligible across the allotments and those effects on aspen and shrubs at elevations within lynx habitats will be near zero because livestock use is concentrated at elevations below mapped lynx habitats. All of the alternatives would result in No Effect to lynx because none of them would result in direct, indirect or cumulative impacts to this species. None of the alternatives would affect the lynx population capacity of the area or the viability of lynx on any scale.

Flammulated owl: Flammulated owls have not been found on the allotments and livestock will not affect this species. Indirectly livestock have the potential to impact the invertebrate prey species of this owl by removing grasses and forbs that constitute habitat of insects and other arthropods. Although at first glance this bird species that utilizes tree cavities would be unaffected by livestock grazing this removal may be detrimental to owls especially since flammulated owls are more likely to be present in those lower elevation open stands where livestock would tend to congregate. It is not known to what extent the consumption of grass and forbs by livestock will affect insect and other arthropod populations although it

can be expected that these populations will be reduced to some extent. It is, however, reasonable to predict that the averaged limited amount of grazing does not constrain the ability of the project area to provide habitat characteristics favored by flammulated owls. Although all action alternatives could cause some reductions in invertebrate prey species and may under certain environmental conditions affect individual owls, the action alternatives are not expected to reduce the flammulated owl population capacity of the area or the viability of flammulated owls on the Bitterroot National Forest.

Wolverine: Wolverine travel over very large home ranges containing a wide diversity of habitats but prefer areas remote from human development and activities. None of the alternatives would have any direct effects to wolverine populations because the potential for livestock to interact with wolverine is very low. Cattle in this allotment tend to frequent areas relatively close to roads, areas which wolverine tend to avoid.

Cumulative Effects

Livestock grazing has contributed little to cumulative effects to wolverine in this allotment in the past. None of the alternatives are likely to add additional cumulative effects to wolverine.

3.6.5 COMPARISON OF ALTERNATIVES

Alternative 1 (No Action)

Under the existing permitted livestock stocking rate and season of use, uplands and riparian sites currently experiencing localized trampling and over-utilization would continue but overall conditions for most wildlife species would remain the same. Most effects to wildlife occur late in the season as livestock begin to migrate to moister more succulent vegetation in riparian areas or congregate around diminishing water sources. Grazing during these “hot periods” generally can show heavier use on woody plant species as range plants become less palatable. Overall, most vegetation shows an upward trend that could be expected to continue. Over-utilized upland areas and riparian stream reaches would be maintained in an early seral condition and some localized impacts could be expected to continue but it is predicted that overall wildlife populations would remain viable across the allotments.

Since winter forage is not currently a limiting factor for big game, wintering big game populations would not be affected by forage utilization under this alternative.

Effects to riparian vegetation and wildlife associated with riparian vegetation such as birds, small mammals and fisher would be similar to those described in Alternative 2, since recovery of riparian vegetation would be gradual.

Alternative 2 (Proposed Action)

Reducing the livestock use by about 30% and introducing periodic rest for each pasture would improve wildlife forage and shrub / herbaceous vegetation cover availability. Alternative 2 provides a marked improvement over the permitted stocking rate and season of use and will help reduce localized livestock impacts to riparian and upland vegetation sites. Consistent adherence to utilization standards and timely removal of cattle from pastures that reach standards will further reduce most of the persistent livestock impacts. Individuals of some wildlife species may be impacted but this alternative is not expected to affect the viability of any wildlife species on the Bitterroot National Forest.

Alternative 3 (No Grazing)

Removing livestock grazing from both allotments would reduce competition for forage between big game and elk and allow a rapid recovery of those riparian areas and uplands that have received overuse by livestock. Localized trampling impacts caused by livestock would not occur and possibly any potential trampling effects to small birds, mammals, or amphibian species would be eliminated.

This would increase the amount of winter range forage available to wintering big game, but it is unlikely that this would result in an increase in the big game carrying capacity of this area because winter forage is not currently limiting the size of the big game herds.

Cumulative Effects -Wildlife

Cumulative impacts of grazing are most relevant to th ose species that utilize either riparian areas or upland grassland sites since livestock do not currently use heavily forested areas to any extent. Riparian site vegetation is not being affected by any other human induced management action therefore grazing will not add impacts. Likewise upland grassland sites are not being nor have they been affected by any human induced management actions and therefore grazing will not add another impact. There is some level of disturbance at some trailheads by both cattle and human use that might at times displace some wildlife species but the level of use is considered light and sporadic enough such that random visits by livestock and people most likely does not cause a long-term or permanent abandonment of these areas. None of the alternatives would add cumulative impacts that would affect habitat for any of the Forest's designated MIS or TES wildlife species. None of the alternatives would affect population viability of MIS and TES wildlife species at any scale.

3.7 LIVESTOCK MANAGEMENT

3.7.1 INTRODUCTION

Prior to this analysis, the Waugh Gulch and Andrews Allotments were managed as separate units. Natural barriers consisting of topography, timber and downfall result in a minimal need for expensive pasture division fences to control cattle drift between grazing areas. The Fires of 2000 created additional transitory forage opportunities.

3.7.2 REGULATORY FRAMEWORK

Forest-wide rangeland management standards and guidelines that apply to this project are contained in the following documents:

- The Bitterroot Forest Plan (USDA, Forest Service, 1987)
- Forest Service Manual Guidelines (FSM 2210, 2240)
- Forest Service Handbook Guidelines (FSM 2209)

Specific items in the Bitterroot Forest Plan that address livestock management are:

- Management Area direction that establishes forage utilization levels by domestic livestock at 35% on big game winter ranges and 50% on non-winter range and big game summer range sites (Ch III, pp 3-79)

- Direction that "allotments may be closed if the permittee stops his or her cattle operation, if transitory forage is eliminated by tree regeneration, it is not cost effective, or if environmental quality can't be protected." Resource Standards Section, Ch II, p. 29.

Forest Service Manual Direction 2240

Allows rangeland improvements where the activity "is designed to improve production of forage; change vegetation composition; control patterns of use; provide water……including but not limited to: structures, treatment projects and use of mechanical means to accomplish desired results (Public Rangelands Improvement Act of 1978, 43 USC.1902)"

3.7.3 PAST, PRESENT AND REASONABLY FORESEEABLE FUTURE ACTIVITIES

Historical and Current Activity and Uses

Waugh Gulch Allotment

The Waugh Gulch Allotment was used as a sheep allotment up until the 1930's. Since that time the allotment has been grazed exclusively by cattle in a cow/calf operation. The season of use was 5/16 to 10/31 until 1954 when it was shortened to 6/1 to 9/30. Cattle numbers were between 50 and 55 head until 1957 when numbers were reduces to 38 head due to the elimination of 1,040 acres of state land from the allotment.

In 1965, the permittee fenced out the remaining state land, which caused another reduction of 11 head. A temporary permit was issued in 1968 for an additional 25 head bringing the total to 52. This was due to the increase in available forage provided by the Saddle Mountain Burn.

Up until the Saddle Mountain Burn in 1960 there were no major timber sales in the Waugh Gulch area. Most of the burn (a major portion of the south unit) was logged during the early 1960's. Throughout the 1960's and early 1970's major logging activity occurred in the Indian Trees and Waugh Gulch areas. In 1980 a major timber sale opened more area on the east portion of the allotment. These cut-over areas provide transitory range for livestock use.

In 1980, a grazing permit was issued for 52 pairs of cattle, for the period of 6/1 to 9/30. Between 1980 and 1991, temporary increases were granted on an annual basis. The 1982 Waugh Gulch Management Plan and Environmental Assessment Report was revised in 1990 and 1991, and a supplemental decision was issued. This decision called for adherence to Forest Plan Standards and Guidelines and the issuance of a term grazing permit for 83 cow/calf pairs. Monitoring showed that the current plan did not bring the allotment into compliance with the Bitterroot National Forest Plan. In 2000 the area burned again but this time mostly in the north unit in the Waugh Creek drainage. The allotment was rested in 2001. The permit changed hands and was grazed for a short duration in 2002. The new permittee used the allotment as an additional pasture to his existing allotments in Warm Springs and Andrews. 110 cow/calf pairs were grazed in the north pasture of Waugh Creek from approximately June 1 to June 15 (72 AUMs) and in the south pasture of West Fork Camp Creek from June 16 through June 30 (72 AUMs). Forage utilization levels were within standards when cattle were herded from the allotment in early July. However several pairs returned to Waugh Creek throughout the summer resulting in a level of utilization in excess of the allowable standard on that riparian site. Waugh Gulch was rested in 2003, grazed for two weeks in 2004, and received light use in 2005. Starting in 2006, drift only was allowed in Waugh Gulch. West Fork Camp Creek was grazed for two weeks only starting in 2003. The entire allotment was rested in 2007.

Andrews Allotment

The Andrews Creek Allotment was used as a combined horse and cattle allotment until the 1970’s. Since that time the allotment has been grazed exclusively by cattle under a cow/calf operation.

The Allotment was grazed under a special class of grazing permit that allowed the adjacent State Land to be managed with the National Forest under Forest standards and guidelines. During this period up to about 340 AUMs were permitted to graze between both jurisdictions over a season of four months (June 1 thru Sept 30).

Since 1992, the permittee has chosen not to graze the State land in combination with the Forest allotment. The Andrews Allotment Term Grazing Permit allows about 130 AUMS of use (or 64 cow/calf pairs for up to six weeks).

A decision memo dated May 30, 1991 called for re-issuance of the term grazing permit with the Forest Plan standards and guidelines incorporated in Part 3 of the permit.

3.7.4 AFFECTED ENVIRONMENT

This section describes the forage type, availability and quantity present on the allotments.

Grazing Capacity

Waugh Gulch Allotment

The Waugh Gulch grazing allotment encompasses approximately 7,700 acres, of which approximately 1,800 are classified as suitable range. Of the suitable range, 1,500 acres are considered primary range and of that primary range approximately 782 acres are considered to be transitory primary range. The area is characterized by a variety of upland Douglas-fir and Ponderosa pine habitats, with shrubby or grassland understories.

Past management activities, including timber harvest, road construction, and fire suppression altered community composition throughout the allotment. Past timber harvest units continue to produce an appreciable amount of transitory forage available to livestock. Spotted knapweed invasion has decreased forage quantity and quality over the past 25 year period.

Carrying capacity estimated for this allotment is based upon the Ecodata Sampling Method completed in 1997. At forage use levels consistent with the Forest Plan, there are about 250 AUMs available for use by domestic livestock annually.

Andrews Allotment

The Andrews Creek grazing allotment covers approximately 2850 acres of National Forest ground of which almost 1000 are classified as suitable range. The majority of the allotment is transitory range however; large areas of canopy were opened during the 2000 fires.

Carrying capacity estimated for this allotment is based upon the Ecodata Sampling Method completed in 1990. Applying current Forest Plan utilization standards, in the respective Management Areas, carrying capacity is estimated at about 100 AUM's.

Range Readiness

Range readiness has been monitored for many years on the Waugh and Andrews allotments in order to determine the appropriate date for grazing in spring. Range readiness varies from year to year depending on the severity of the weather during the spring and winter. The AMP lists the current on-date as June 1st. The on-date is the average date on which herbaceous vegetation achieves a level of physiological development which will accommodate grazing without lowered plant vigor. Soil moisture is also a factor in determining the average on-date. This date may be adjusted forward or back, according to weather and moisture conditions in a given year. It appears that the current on-date is appropriate based on past readiness monitoring.

3.7.5 ENVIRONMENTAL CONSEQUENCES

This section analyzes the effects of the alternatives on the permitted livestock operations associated with the allotment. The analysis focuses primarily on social and economic effects.

A. Direct and Indirect Effects

Alternative 1: No Action

The allotments would graze the currently permitted number of 470 AUMs (or 356 Head Months). Cattle would continue to graze separately under the existing permit with 65 pair for the season of June 1- Sept 30 in the Waugh and West Fork Camp Creek Pastures and 64 pair for the season of June 1 – June 30 and September 1 – September 15 in the Andrews Pasture.

Under alternative 1, annual expenses by the Forest Service in administering the permit would cost about $5,000. Because Waugh and West Fork Camp Creek would receive season-long use, it would take more monitoring by the Forest Service to assure that cattle do not overutilize key riparian sites throughout the allotment. Time and labor demands on the permittee would remain high due to the need for frequent riding and herding to insure compliance with annual utilization standards.

Based on the 2008 grazing fee of $1.35 per head month, collections received by the Forest Service from the two allotments would be $481.

This option allows the permittee a higher potential stocking rate and economic benefit on paper through the Term Grazing Permit. However, there is an inherent high degree of uncertainty because the allotment, even with the additional transitory forage created by the 2000 Fires, may be unable to sustain this stocking rate after applying Forest Plan standards. Weather and forage production variations may result in more frequent adjustments to entry and exit dates in order to comply with annual utilization standards.

Alternative 2: Proposed Action

Combine Waugh and Andrews as one allotment containing three pastures or management units. This alternative establishes a lower stocking rate of 330 AUMs on the combined allotments. The grazing season would begin on June 1and end on Sept 30.

Under this alternative, Forest Service expenses in administering the permit would be about $3700. Less monitoring would be required because the cattle would not be allowed in the more sensitive Waugh Creek area for a full season. Based on the 2008 grazing fee of $1.35 per head month, income to the Forest Service from the two allotments would be $331. Compared to Alternative 1, this amounts to a $150 savings to the permittee each year (down from $481)and a negligible annual revenue loss to the Forest Service. This revenue loss is offset by a lower range administration cost in the reduced time needed to administer the allotment..

This alternative provides a more realistic stocking rate that will facilitate compliance with Forest Plan standards. It allows the permittee to make ranch operation plans with less uncertainty about the duration of the grazing season or allowable cattle numbers from year to year. Rotation of pastures would allow for easier compliance with Forest Plan standards and guidelines although riding and herding demands on the permittee would remain essential tactics for successful management of the allotment.

The reduction in stocking rate may result in some revenue loss to the County.

Alternative 3: No Grazing

This alternative eliminates all domestic livestock grazing on the Andrews and Waugh Allotments and removes all livestock management improvements.

Cost to the Forest Service of administering a grazing permit would drop to zero under Alternative 3. The Forest Service would receive no revenue from grazing fees. Removal of existing range improvements would result in a one-time expense to the government of approximately $10,000.

The permittee is dependent on the grazing allotments for summer pasture. In order to maintain a commercially viable operation, the permittee would need to secure additional summer pasture. There is limited private pasture currently available for lease or sale in the area. Loss of the two allotments would create economic hardship for the current permittee. Reduction of the permittee's herd size, in order to accommodate the loss of public land summer pasture, would result in some reduction in revenue to the County.

B. Cumulative Effects

Alternative 1: No Action

There are no cumulative effects on livestock management associated with this alternative

Alternative 2: Proposed Action

There are no cumulative effects on livestock management associated with this alternative

Alternative 3: No Grazing

Loss of grazing opportunity on the Andrews and Waugh Allotments would reduce the permittee's ability to continue ranching. Following the trend of other ranchers in the Bitterroot Valley, he may re-evaluate his options for generating income from his land and decide to subdivide his property. This could lead to an incremental loss of open space to the community and wildlife winter range. At the same time, however, subdivision would increase housing opportunities in the area.

Elk grazing on private land pastures adjacent to the allotments may decrease incrementally with the additional residual forage not consumed by domestic livestock.

APPENDIX

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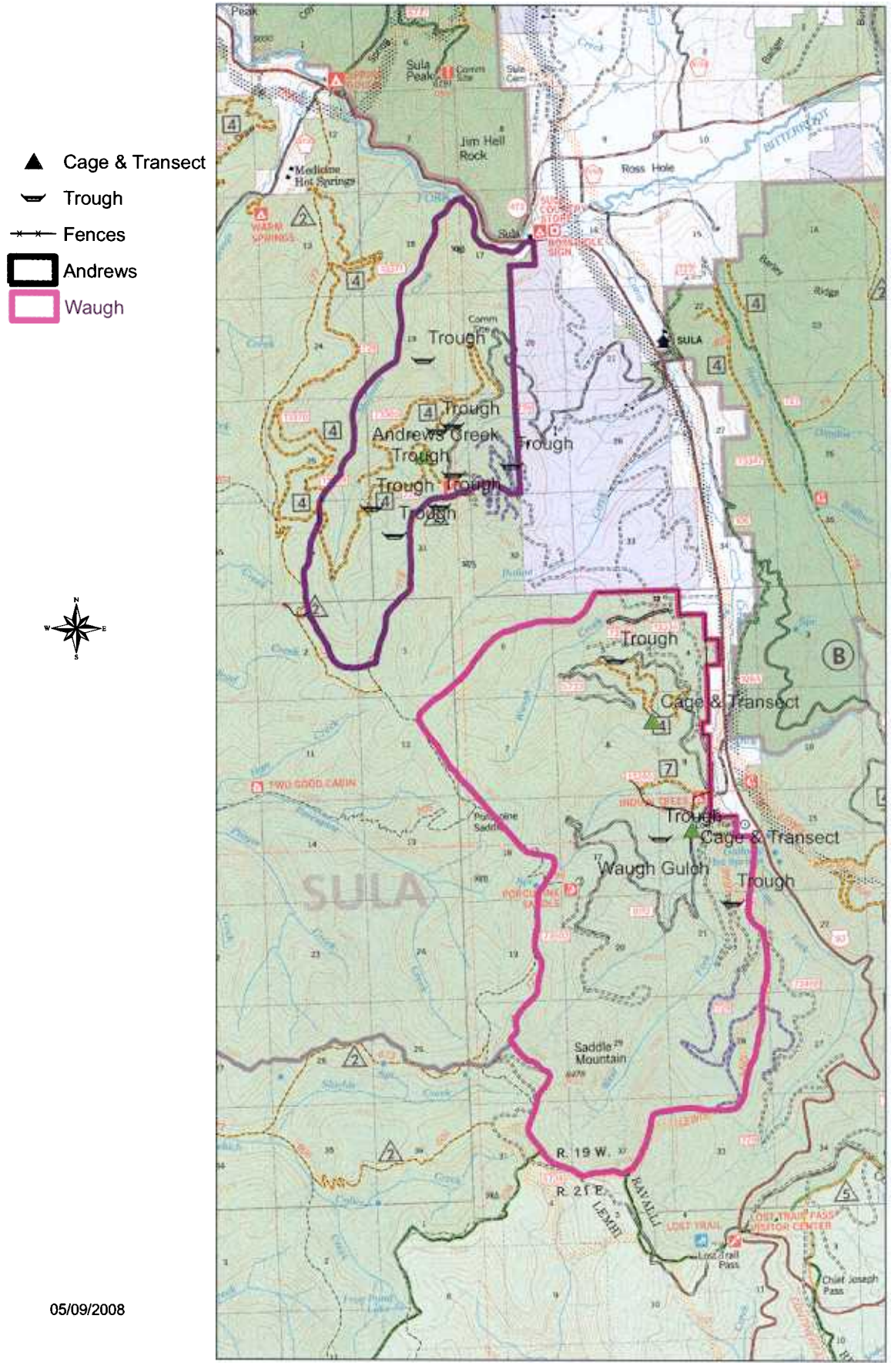
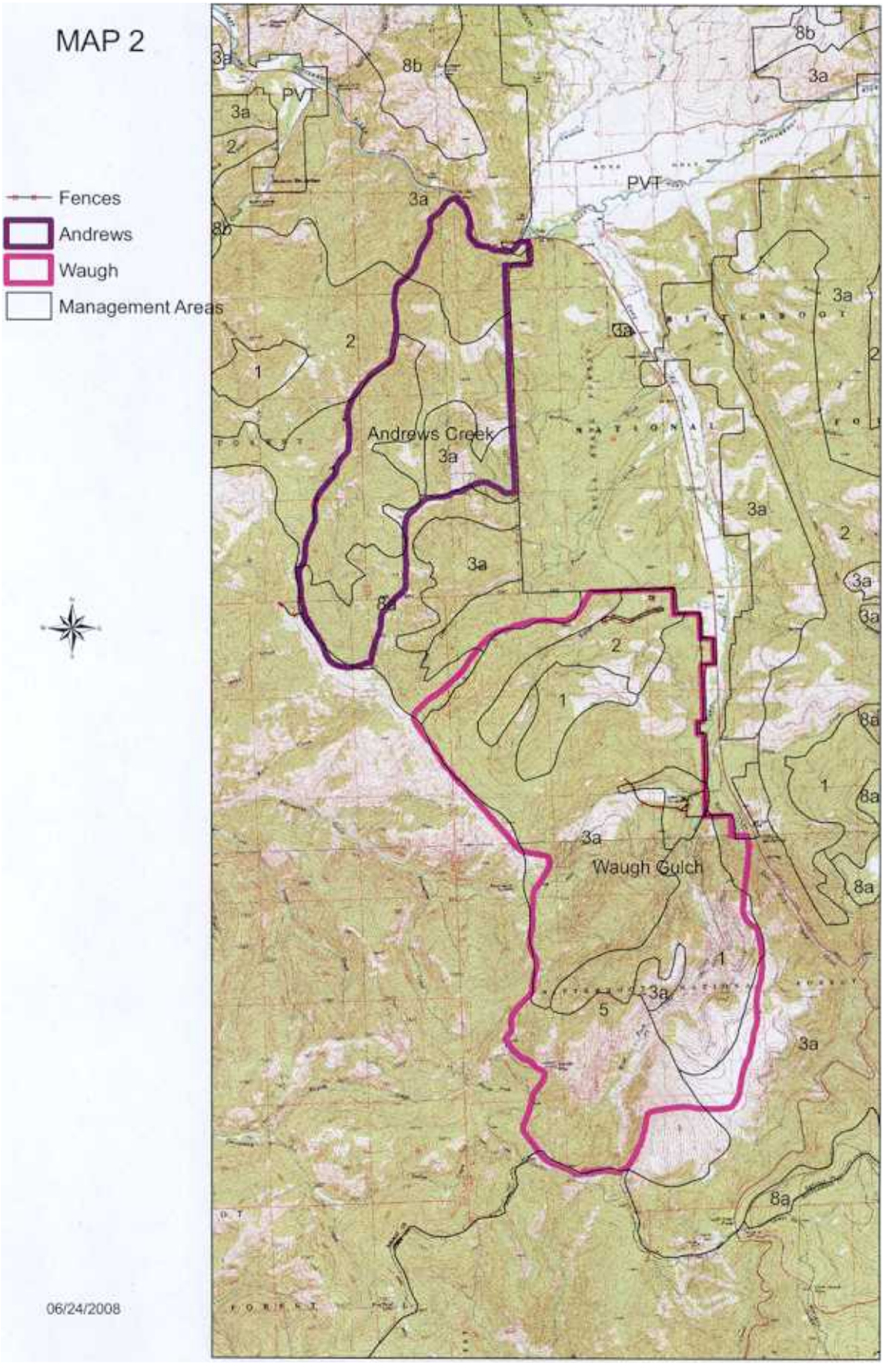
MAP 1

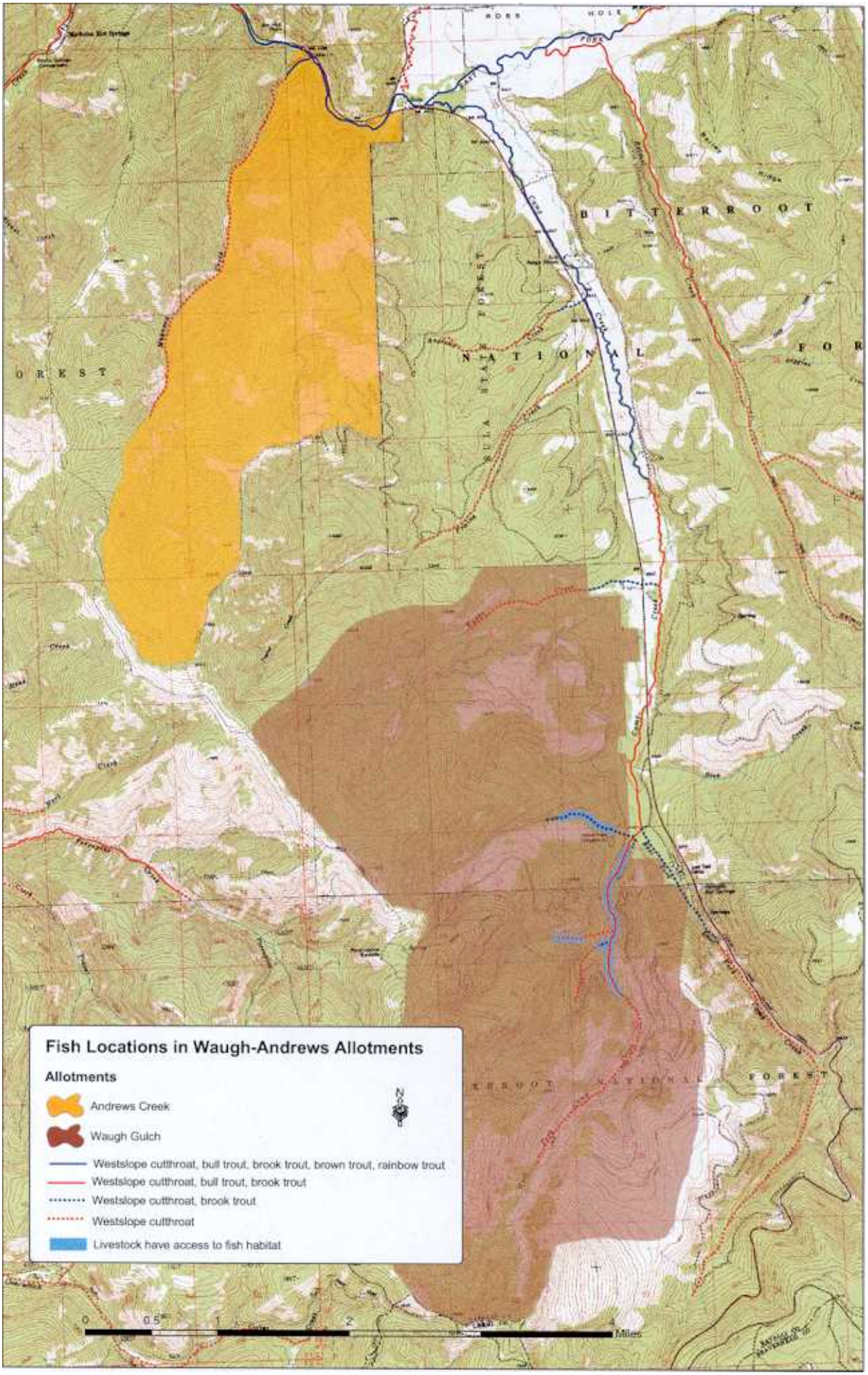
ANDREWS, WAUGH GRAZING ALLOTMENT ANALYSIS AREA



ANDREWS, WAUGH GRAZING ALLOTMENT MANAGEMENT AREAS



MAP 3


Fish Locations in Waugh-Andrews Allotments
Allotments
Andrews Creek
Waugh Gulch
Westslope cutthroat, bull trout, brook trout, brown trout, rainbow trout
Westslope cutthroat, bull trout, brook trout
Westslope cutthroat, brook trout
Westslope cutthroat
Livestock have access to fish habitat
N
0
0.5
1
2
4
Miles
BITTERROOT
NATIONAL
FOREST

USDA Forest Service - Northern Region
Bitterroot National Forest

Wildlife Biological Assessment (BA) and Biological Evaluation (BE)
for
"NO EFFECT" and "NO IMPACT" Projects or minor "MIIH" projects for FS Sensitive species and consistency findings related to Forest Plan MIS species.

A. Project Information

Name: **Andrews and Waugh Gulch Allotment**		Type: **Cattle**
District:**Sula**	Contact: Gil Gale	ID #:

Determination Applies to the Following Activities:

The area of analysis for wildlife includes all land within the allotment boundary. The total allotment area is approximately 7,700 acres for Waugh Gulch and 2,850 acres for Andrews, which includes portions of the Waugh Creek, West Fork of Camp Creek and Maynard Creek drainages. This area is bordered by private or state land on much of the east side. The Lost Trail Ski area is located to the south of the allotments. The analysis area was not expanded for wildlife species whose range is larger than the allotment due to the limited nature of impacts from grazing within the allotment. For detalied analysis refer to wildlife section of document.

B. Criteria For Reaching A Determination of "No Effect", “No Impact”, or minor “MIIH”

FEDERAL LISTED SPECIES			
Species	**Presence**	**Effects Determination**	**Comment**

FOREST SERVICE SENSITIVE SPECIES			
Species	**Presence**	**Determination**	**Comment**
Gray Wolf *(Canis lupus)*	Habitat:Y Specie: Y	NI	Delisting Effective March 28, 2008. http://www.fws.gov/montanafieldoffice/Endangered_Species/Listed_Species/Forests/Bitterroot_sp_list.pdf
Fisher *(Martes pennanti)*	Habitat:Y Specie: Possible	NI	
Wolverine *(Gulo gulo luscus)*	Habitat:Y Specie: Possible	NI	
Townsend's Big-eared Bat *(Corynorhinus townsendii)*	Habitat:N Specie: N	NI	
Northern Bog Lemming *(Synaptomys borealis)*	Habitat:N Specie: N	NI	
American Peregrine Falcon *(Falco peregrinus anatum)*	Habitat:N Specie: N	NI	

FOREST SERVICE SENSITIVE SPECIES			
Species	**Presence**	**Determination**	**Comment**
Bald Eagle *(Haliaeetus leucocephalus)*	Habitat:N Specie: Possible	NI	No key habitat affected. Migrant individual birds may occur.
Flammulated Owl *(Otis flammeolus)*	Habitat:Y Specie: Y	NI	
Black-backed Woodpecker *(Picoides arcticus)*	Habitat:Y Specie: Y	NI	
Coeur d' Alene Salamander *(Plethodon idahoensis)*	Habitat:N Specie: N	NI	
Northern Leopard Frog *(Rana pipiens)*	Habitat:N Specie: N	NI	
Western Boreal Toad *(Bufo boreas boreas)*	Habitat:Y Specie: Y	NI	

FOREST PLAN ITEMS			
Species	**Presence**	**Determination**	**Comment**
"Old Growth"	Y	NI	

FOREST PLAN ITEMS			
Species	**Presence**	**Determination**	**Comment**
Rocky Mountain Elk (Cervus canadensis)	Habitat:Y Specie: Y	MIIH	Individual ungulates in this case elk may avoid areas utilized by cattle this temporary avoidance is considered to be insignificant. With proper management techniques or BMP's for the allotment, grasses can be affected positively. This is known as seasoning, when cattle move and graze in the area they season the grasses so that as elk come out of the high country summer range the grasses have time to put on new growth, producing more favorable and nutritional grasses.
American Marten *(Martes americana)*	Habitat:Y Specie: Y	NI	
Pileated Woodpecker (Dryocopus pileatus)	Habitat:Y Specie: Y	NI	

C. Additional Comments/Rationale

D. Signature

Date: 05/12/08

/s/ Dave Romero South Zone Wildlife Biologist

Key to Effects Determinations	
Federally Listed Threatened or Endangered Species	**Forest Service Sensitive Species**
NE - No Effect	**NI** - No Impact

Key to Effects Determinations	
Federally Listed Threatened or Endangered Species	**Forest Service Sensitive Species**
NLAA - May Affect, Not Likely to Adversely Affect	**MIIH** - May Impact Individuals or their Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Loss of Population Viability
LAA - May Affect, Likely to Adversely Affect	**WIFV** - Will Impact Individuals or Their Habitat That May Contribute To A Trend Towards Federal Listing or Cause A Loss of Population Viability

UTILIZATION HISTORY FOR ANDREWS, WARM SPRINGS AND WAUGH GULCH ALLOTMENTS

SITE	LEGAL LOCATION	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1991	1990
Andrews Creek Rd, State	SW, SW, S 21, T1N, R19W	Rest					50%											65%
Andrews Creek Rd, FS	NE, SW, S 30, T1N, R19W	Rest		15%			10%											
Andrews, Lower Meadow,	NW, NE, S 31, T1N, R19W	Rest															48%	
Andrews, Upper Meadow,	SE, NW, S 31, T1N, R19W	Rest	8%														36%	
West Fork Camp Creek, Waugh	NE, NW, S 21, T1S, R19W	Rest	55%		55%		35%	Rest			40%				70%	40%		68%
S of Campground, Waugh	SE, NW, S 16, T1S, R19W	Rest						Rest							60%			
Upper Clearcuts, N Waugh	SE, NE, S 8, T1S, R19W	Rest						Rest								20%		
Upper Clearcuts, Waugh	SW, NW, S 17, T1S, R19W	Rest						Rest								30%		
Boot Hill, Waugh	NE, S 8, T1S, R19W	Rest						Rest										
Boot Hill, Waugh	SE, NE, S 9, T1S, R19W	Rest						Rest				75%				50%		
Waugh Gulch near exclosure, Waugh	NE, NW, S 4, T1S, R19W	19%*		20%	50%	Rest	60%	Rest			25%	70%					31%	45%
Ridge between E & W Camp Creek, Waugh	NE, NE, S 21, T1S, R19W	Rest						Rest										

trespass cattle from adjacent private land

UTILIZATION HISTORY FOR ANDREWS, WARM SPRINGS AND WAUGH GULCH ALLOTMENTS

SITE	LEGAL LOCATION	1988	1987	1985	1984	1981	1980	1979	1978	1977	1973	1969	1967	1966	1961	1960	1959
Andrews Creek Rd, State	SW, SW, S 21, T1N, R19W																
Andrews Creek Rd, FS	NE, SW, S 30, T1N, R19W																
Andrews, Lower Meadow,	NW, NE, S 31, T1N, R19W																
Andrews, Upper Meadow,	SE, NW, S 31, T1N, R19W																
West Fork Camp Creek, Waugh	NE, NW, S 21, T1S, R19W		79%														
S of Campground, Waugh	SE, NW, S 16, T1S, R19W							57%	20%	51%							
Upper Clearcuts, N Waugh	SE, NE, S 8, T1S, R19W							6%	31%								
Upper Clearcuts, Waugh	SW, NW, S 17, T1S, R19W							66%	28%	38%							
Boot Hill, Waugh	NE, S 8, T1S, R19W							18%	47%	14%							
Boot Hill, Waugh	SE, NE, S 9, T1S, R19W				70%			75%		47%							
Waugh Gulch near exclosure, Waugh	NE, NW, S 4, T1S, R19W								30%								
Ridge between E & W Camp Creek, Waugh	NE, NE, S 21, T1S, R19W							14%		4%							
trespass cattle from adjacent private land																	

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Literature Cited

Adams, Paul. 1984. Compaction of Forest Soils. PNW 217, a Pacific Northwest Extension Publication.

Bailey, R. and W. McNab (eds.). 1994. Ecoregions and subregions of the United States (map, scale 1:7,500,000) and supplementary table of map unit descriptions. USDA Forest Service, Washington, DC.

Bohn, C.C. and J.C. Buckhouse. 1985. Some Responses of Riparian Soils to Grazing Management in Northeastern Oregon. Journal of Range Management 38(4), July 1985.

Brady, Nyle. 1990. Nature & Properties of Soils 10TH Edition. Macmillan. 1990.

Callaway, R., T. DeLuca, and W. Belleveau. 1999. Biological-Control Herbivores May Increase Competitive Ability of the Noxious Weed *Centaurea maculosa*. Ecology 80:1196-1201.

Clary, W. 1995. Vegetation and Soil Responses to Grazing Simulation on Riparian Meadows. J. Range Management 48:18-25.

Clayton, James L. 1981. Soil Disturbance Caused by clearcutting and Helicopter Yarding in the Idaho Batholith. USDA Forest Service, Intermountain Forest and Range Experiment Station, Research Note INT-305.

Clerk-Floate, R. 1997. Cattle as Dispersers of Hound's-tongue on Rangeland in Southeastern British Columbia. J. Range Management 50:239-243.

Cowardin, Lewis M., Virginia Carter, Francis C. Golet and Edward T. LaRoe, 1979. Classification of Wlands and Deepwater Habitats of the United States, US Department of Interior, Fis hand Wildlife Service, Washington D.C.

Debano, Leonard, F. 1990. The Effects of Fire on Soil Properties. Paper presented at the symposium on management and productivity of western-montane forest soils; Boise, ID, April 10-12, 1990.

DeBano, Leonard F., Daniel G. Neary, Peter F. Ffolliott. 1998. Fire Effects on Ecosystems. John Wiley and Sons, Inc. New York.

Decker, Gary, 1991. Bitterroot Sensitive Watershed Analysis. USDA Forest Service, Bitterroot National Forest.

Decker, Gary, 1993. Bitterroot Watershed Evaluation Process. USDA Forest Service, Bitterroot National Forest.

Duncan, C., J. Story, and R. Sheley. 2001. Montana Knapweeds: Identification, Biology, and Management. Circular 311. Montana State University Extension Service, Bozeman, MT.

Elliot, William J. and Peter R. Robichaud, 2001. Comparing Erosion Risks from Forest Operations to Wildfire. Paper presented to The International Mountain Logging and 11th Pacific Northwest Skyline Symposium, 2001.

Farnes, Phillip, 2000. Analysis of Snowmelt Runoff and Impact of the 2000 Fires, Bitterrroot River Drainage, Montana. Report prepared for the USFS BAER Rehabilitation Team. Snowcap Hydrology, Bozeman, Montana.

Factsheet: Soil Erosion – Causes and Effects. 1996. as found at http://www.gov.on.ca/OMAFRA/english/engineer/facts/87-040.htm.

Forestry Environmental Program News. 2002. Effects of logging and fire on forest productivity and plan biodiversity. Vol 14, No. 4.

Frequently asked questions about "What is Soil Quality or Soil Health" as found on http://res2.agr.ca/london/pmrc/english/faq/soilqual.html

Froehlich, H.A. et al. 1985. Soil Bulk Density Recovery on Compacted Skid Trails in Central Idaho. Soil Science Society of Amer. Journal 49:1015-1017.

FSH 2509.18 – Soil Management Handbook

Gelbard, J. and J. Belnap. 2003. Roads as Conduits for Exotic Plant Invasions in a Semiarid Landscape. Conservation Biology 17:420-432.

Gresswell, Robert E., 1999. Fire and Aquatic Ecosystems in Forested Biomes of North America. Transactions of the American Fisheries Society, Vol. 128.

Halvorson, Jonathan J., L. W. Gatto, and Donald K. McCool. 2002. Overwinter Changes to Near-Surface Bulk Density, Penetration Resistance and Infiltration Rates in Compacted Soil. Tektran, USDA Agricultural Research Service as found at http://www.nal.usda.gov/ttic/tektran/data/000013/02/0000130287.html

Holdorf, H. and Donahue, J. 1990. Landforms for Soil Surveys in the Northern Rockies. Misc Pub. No 51, Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Missoula

Information Ventures, 1998. Picloram Pesticide Fact Sheet. Internet Publication.

Jacobs, J., M. Carpinelli, and R. Sheley. 1999. Revegetating Noxious Weed-Infested Rangeland, pp. 133-141 in: R. Sheley and J. Petroff (eds.), Biology and Management of Noxious Rangeland Weeds. Oregon State University Press, Corvallis, OR.

Jacobs, J and R. Sheley. 1999. Grass Defoliation Intensity, Frequency, and Season Effects on Spotted Knapweed Invasion. J. Range Management 52:626-632.

Jones, A.J., E.C. Dickey, D.D. Eisenhauer, R.A Weise. Identification of Soil Compaction and its Limitations to Root Growth. Nebguide published by the Cooperative Extension Institute of Agriculture and Natural Resources, University of Nebraska, as found at http://www.ianr.unl.edu/pubs/soil/g831.htm.

Land and Water Consulting, 2001. Burned Area Recovery Watershed Analysis. Report compiled for Bitterroot National Forest.

LeJeune, K. and T. Seastedt. 2001. *Centaurea* Species: The Forb that Won the West. Conservation Biology 15: 1568-1574.

Luce, Charles H. and Thomas A. Black, 1999. Sediment Production from Forest Roads in Western Oregon. Water Resources Research, Vol. 35, No. 8.

McBride, R.A., H. Martin and B. Kennedy. 1997. Soil compaction. Ministry of Agriculture and Food Factsheet as found at: http://www.omafra.gov.on.ca/english/crops/pub811/2compact.htm

Megahan, Walter, John G. King, and Kathleen A. Seyedbagheri. 1995. Hydrologic and Erosional Responses of a Granitic Watershed to Helicopter Logging and Broadcast Burning. Reprinted from Forest Science, Vol. 41, No. 4, November 1995.

Missoula County. 2000. Clark Fork Watershed: Soils. As found at http://www.co.missoula.mt.us/measurables/soils.htm.

Mitchell, C. and A. Power. 2003. Release of Invasive Plants from Fungal and Viral Pathogens. Nature 421: 625-627.

Montana Bull Trout Restoration Team. 2000. Restoration plan for bull trout in the Clark Fork River Basin and Kootenai River Basin, Montana. Montana Department of Fish, Wildlife, and Parks. pgs. 16.

Montana Bull Trout Scientific Group. 1995. Bitterroot River drainage bull trout status report. Prepared for the Montana Bull Trout Restoration Team. pgs. 31. Montana Bull Trout Rest. Team c/o Montana Fish, wildlife and Parks. 1420 East 6th Avenue, Helena, MT 59620.

Montana Dept. of Environmental Quality, 2005. Water Quality Restoration Plan and Total Maximum Daily Loads for the Bitterroot Headwaters Planning Area.

Montana Department of Fish, Wildlife and Parks (FWP). 1999. Memorandum of understanding and conservation agreement for westslope cutthroat trout (*Oncorhynchus clarki lewisi*) in Montana. Helena, MT.

Montana Department of Natural Resources and Conservation (DNRC). 1994. Montana Guide to Streamside Management Zone Law and Rules. Helena, MT.

Montana DNRC. 1999. Best Management Practices for Grazing. Conservation Districts Bureau, Department of Natural Resources and Conservation, Helena, MT.

Montana Watershed Coordinateion Council, 1999. Best Management Practices for Grazing. Department of Natural Resources, Helena, Montana.

Mueggler, W. and W. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service, Gen. Tech. Rep. INT-66, Ogden, UT.

Natural Resources Defense Council. The adverse ecological impacts of road and logging: a compilation of independently reviewed research as found at http://www.nrdc.org/land/forest/roads/chap5/asp

Ohlander, Corky, 1993. Water Resources Analyses, T-Walk Water Quality Monitoring Field Manual and Tables. USDA Forest Service, Region 2.

Olson, B. and R. Wallander. 1997. Biomass and Carbohydrates of Spotted Knapweed and Idaho Fescue after Repeated Grazing. J. Range Management 50:409-412.

Olson, B. 1999a. Impacts of Noxious Weeds on Ecologic and Economic Systems, pp 4-18 in: R. Sheley and J. Petroff (eds.), Biology and Management of Noxious Rangeland Weeds. Oregon State University Press, Corvallis, OR.

Olson, B. 1999b. Grazing and Weeds, pp. 85-96 in: R. Sheley and J. Petroff (eds.), Biology and Management of Noxious Rangeland Weeds. Oregon State University Press, Corvallis, OR.

Olson-Rutz, Kathrin, Clayton Marlow, Kathy Hansen, Leonard Gagnon, and Rick Rossi. 1990. Packstock grazing impacts on soil compaction, plant growth, and ground cover of a high altitude meadow. Montana State University, Bozeman.

Page-Dumrose, D.S., M.F Jurgensen, R.E Brown, and G.D. Mroz. 1999. Comparison Methods for Determining Bulk Densities of Rocky Forest Soils. Published in Soil Science Society of America Journal, Vol. 63, No. 2, March-April 1999.

Pfister, R., B. Kovalchick, S. Arno, and R. Presby.1977. Forest habitat types of Montana. USDA Forest Service, Gen. Tech. Rep. INT-34, Ogden, UT.

Potts Donald F. 1984. Hydrologic Impacts of a Large-Scale Mountain Pine Beetle (Dendroctonus Ponderosae Hopkins) Epedemic. Water Resources Bulletin, American Water Resources Association, Paper Number 83122.

Rieman, Bruce, Danny Lee, Jack McIntyre, Kerry Overton, and Russ Thurow. 1993. Consideration of Extinction Risks for Salmonids. Fish Habitat Relationships Technical Bulletin, Number 14.

Rosgen, David L. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, CO.

Sheley, R., B. Mullin, and P. Fay. 1995. Riparian Weed Management. Pub. EB 317. Montana State University Extension Service, Bozeman, MT.

Sheley, R., T. Svejcar, B. Maxwell, and J. Jacobs. 1999. Healthy Plant Communities: Ecologically-Based Rangeland Weed Management. Montguide MT 9909. Montana State University Extension Service, Bozeman, MT.

Stinson, Ken. 2001. Fire Effects Guide: Prefire and postfire grazing management as found at http://fire.fws.gov/ifcc/monitor/EFGuide/graizing.htm

Stohlgren, Thomas J., Schell, Lisa D. and Brian Vanden Heuvel. 1998. How Grazing and Soil Quality Affect Native and Exotic Plant Diversity in Rocky Mountain Grasslands. Ecological Applications, Vol. 9, No. 1, pp. 45-64.

Sutherland, S. 2003. Post-fire Weed Response on the Bitterroot National Forest. Preliminary results of an ongoing research project (copy on file at Bitterroot National Forest Supervisor's Office, Hamilton, MT).

Syracuse Environmental Research Associates, Inc. (SERA). 1999. Clopyrlid (Transline) Final Report prepared for the USDA Forest Service. Fayetteville, New York.

University of Idaho. 2003. The Twelve Soil Orders as found at http://soils.ag.uidaho.edu/soilorders.htm

USDA, Forest Service. 1981. Guide to Predicting Sediment Yields From Forested Watersheds. Northern and Intermountain Regions.

USDA, Forest Service. 1987. Forest Plan, Bitterroot National Forest. USDA Forest Service, Northern Region. Hamilton MT, September, 1987.

USDA, Forest Service. 1995. Camp Creek Watershed Restoration Decision Memo. Bitterroot National Forest.

USDA, Forest Service. 1995. Inland Native Fish Strategy (INFISH) Environmental Assessment, Decision Notice and Finding of No Significant Impact. Interim strategies for managing fish-producing watersheds in eastern Oregon and Washington, Idaho, western Montana and portions of Nevada. USDA, Forest Service, Intermountain, Northern, and Pacific Northwest Regions.

USDA, Forest Service, 1997. Camp Reimel Vegetation Management Project Environmental Analysis. Bitterroot National Forest.

USDA, Forest Service. 1998. 1998 Forest Plan Monitoring Report, Bitterroot National Forest.

USDA, Forest Service. 2000. Bitterroot Post Fire Assessment.

USDA, Forest Service. 2000. Bitterroot River Section 7 Watershed Baseline – Bull Trout. Bitterroot National Forest, Hamilton, MT.

USDA, Forest Service. 2001. Burned Area Recovery Final Environmental Impact Statement. Bitterroot National Forest, Hamilton, MT.

USDA, Forest Service, 2001. 2001 Forest Plan Monitoring Report, Bitterroot National Forest.

USDA, Forest Service. 2002. Forest Plan Monitoring and Evaluation Report. Bitterroot National Forest, Hamilton, MT.

USDA, Forest Service. 2002. Noxious Weed Treatment Project Draft EIS. Bitterroot National Forest.

USDA, Forest Service. 2003. Bitterroot National Forest, Noxious Weed Treatment Project FEIS. Hamilton, Montana.

USDA, Forest Service. 2003. Forest Plan Monitoring and Evaluation Report. Bitterroot National Forest, Hamilton, MT.

USDA, Forest Service. 2004. Forest Plan Monitoring and Evaluation Report. Bitterroot National Forest, Hamilton, MT.

USDA, Forest Service. 2005. Forest Plan Monitoring and Evaluation Report. Bitterroot National Forest, Hamilton, MT.

USDA, Forest Service. 2006. Forest Plan Monitoring and Evaluation Report. Bitterroot National Forest, Hamilton, MT.

USDA, NRCS. 1996. Soil Quality Resource Concerns: Compaction.

USDA, NRCS. 2001. Rangeland Soil Quality – compaction. Soil Quality Information Sheet prepared by the Soil Quality Institute, Grazing Lands Technology Institute, and National Survey Center, USDA NRCS, the Jornada Experimental Range, Agricultural Research Service (USDA); and the USDI BLM.

USDA, NRCS. 2006. Bitterroot National Forest Soil Survey. Ravalli County, Hamliton Montana.

USDI, BLM. 1997. Idaho Standards for Rangeland Health and Guidelines for Livestock Grazing Management.

USDI, Fish and Wildlife Service. 1998. Bull Trout Biological Opinion for Forest Service Region's 1, 4, and 6, and the Bureau of Land Management. pgs. 121.

USDI, Fish and Wildlife Service. 2001. Biological Opinion for Bull Trout, Bitterroot National Forest Burned Area Recovery Project. U.S. Fish and Wildlife Service, Montana Field Office, Helena, MT. November 19, 2001.

USDI, Fish and Wildlife Service. 2002. Draft Bull Trout Recovery Plan. http://ecos.fws.gov/docs/recovery_plans/2002/021129.pdf

Wilent, Steve. 2001. here's HOW to…Protect Forest Soil Productivity. from the May issue of the Forestry Source, as found at http://www.safnet.org/archive/protectsoil501.cfm.

Wolman, M.G. 1954. A method of sampling coarse river-bed material. Transactions Ameriacn Geophysical Union. Volume 35. Number 6. Pp. 951-956.