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GRASSHOPPER AND MORMON CRICKET SUPPRESSION ON LANDS ADMINISTERED BY THE BUREAU OF LAND MANAGEMENT IN WYOMING

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Bureau of Land Management

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Acronyms

ACEC	Area of Critical Environmental Concern
APHIS	Animal and Plant Health Inspection Service
ATV	All Terrain Vehicle
AUM	Animal Unit Month
BLM	Bureau of Land Management
CARMA	Case-based Rangeland Grasshopper Management Advisor
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ET	Economic Threshold
FLPMA	Federal Land Policy and Management Act
ID Team	Interdisciplinary Team
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register Historic Places
OHV	Off-Highway Vehicle
PM_{10}	Suspended particulate matter less than 10 microns in diameter
RAATs	Reduced Agent and Area Treatments
RFD	Reasonably Foreseeable Development
RMP	Resource Management Plan
ROD	Record of Decision
SHPO	State Historic Preservation Officer
SOP	Standard Operating Procedure
TCP	Traditional Cultural Property
USC	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFWS	U.S. Fish and Wildlife Service
VRM	Visual Resource Management
WGFD	Wyoming Game and Fish Department
WSA	Wilderness Study Area

1 PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

The Bureau of Land Management (BLM) is preparing this Environmental Assessment (EA) for emergency grasshopper and Mormon cricket suppression activities on BLM-administered lands in Wyoming. This EA discloses the direct, indirect, and cumulative environmental effects that would result from suppression activities as required by the National Environmental Policy Act of 1969 (NEPA, 42 United States Code [USC] 4321-4347), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500-1508), and the BLM NEPA Handbook (H-1790-1; USDI BLM 2008a). The EA will provide evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI) that presents the reasons why implementation of the Proposed Action would not result in "significant" environmental effects(40 CFR 1508.27). The EA is organized following guidance in the BLM NEPA Handbook with additional documentation on file at the State Office and individual field offices, as applicable. Throughout this document the term "grasshopper" is used to collectively refer to both grasshoppers and Mormon crickets (which are not actually grasshoppers or crickets but belong to the shield-backed katydid or long-horned grasshopper family), unless it is necessary to draw a distinction.

1.2 Location of Proposed Action

The proposed action would take place on BLM-administered lands in Wyoming (Figure 1). The BLM administers approximately 18 million acres of land in Wyoming (Table 1). Based on grasshopper infestation locations in 2009, it is likely that the most severe outbreaks, and thus suppression activities, will largely occur in the northeast and north-central part of the state in the counties within the Buffalo, Casper, and Newcastle Field Offices, and in the Big Horn Basin in the Worland and Cody Field Offices (Figure 2).

Table 1. BLM-administered lands in Wyoming by county and by field office.

County	Acres	County	Acres
Albany	295,129	Natrona	1,419,988
Big Horn	1,159,280	Niobrara	123,735
Campbell	223,899	Park	625,233
Carbon	2,046,323	Platte	82,462
Converse	128,673	Sheridan	51,168
Crooke	93,661	Sublette	1,264,691
Freemont	2,102,109	Sweetwater	4,389,358
Goshen	25,174	Teton	2,494
Hot Springs	487,478	Uinta	479,108
Johnson	504,260	Washakie	917,667
Laramie	9,089	Weston	74,878
Lincoln	984,185		

Field Office	Acres
Buffalo	779,438
Casper	1,359,243
Cody	1,089,502
Kemmerer	1,421,577
Lander	2,388,889
Newcastle[1]	292,344
Pinedale	924,636
Rawlins	3,531,172
Rock Springs	3,605,503
Worland	2,098,990

[1] The Newcastle Field Office includes approximately 6,600 acres that are located in Nebraska. Because those acres are under the management of the Wyoming BLM there is the potential that they may be treated and thus are included in the analysis.

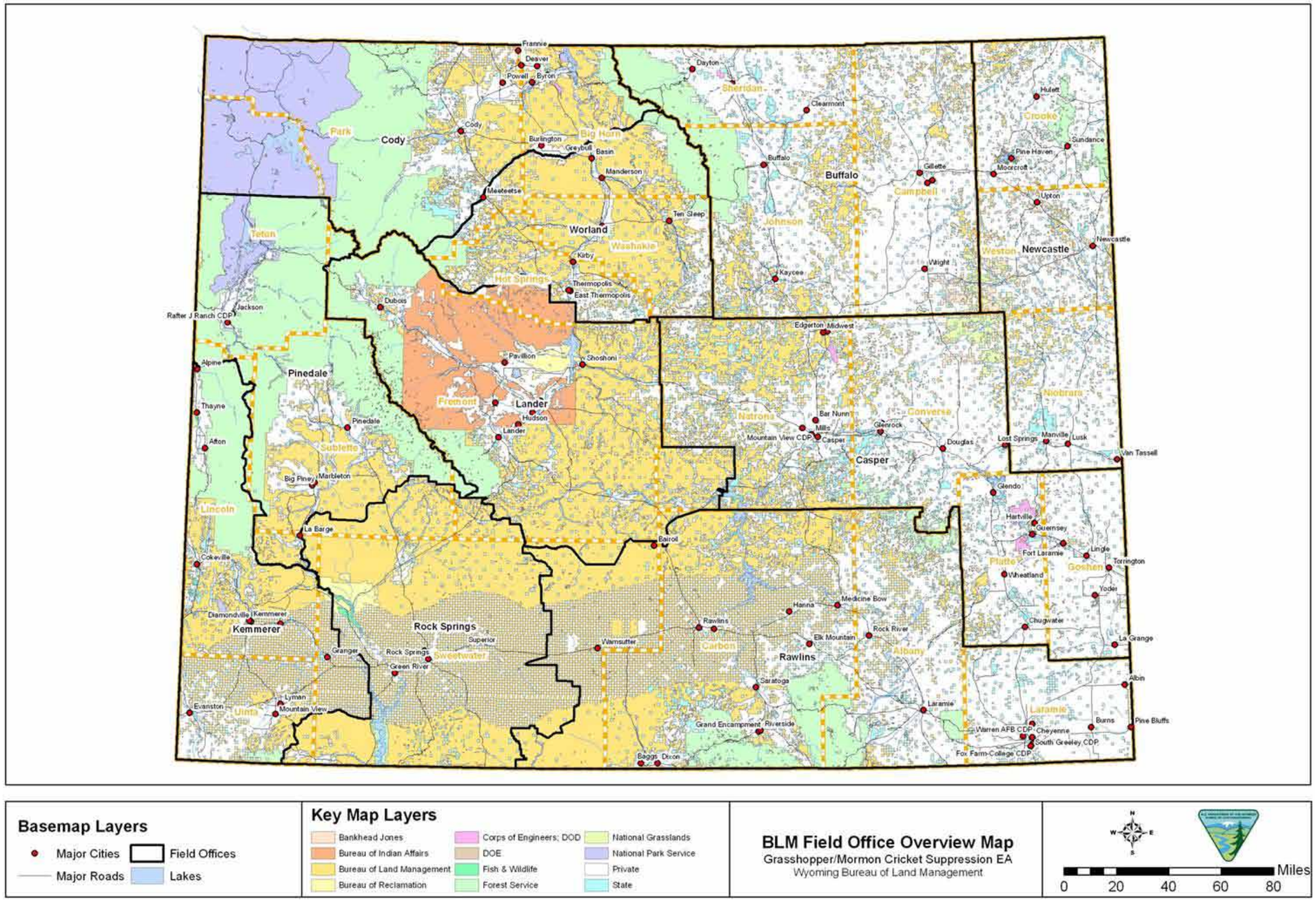

Figure 1. Land ownership in Wyoming.

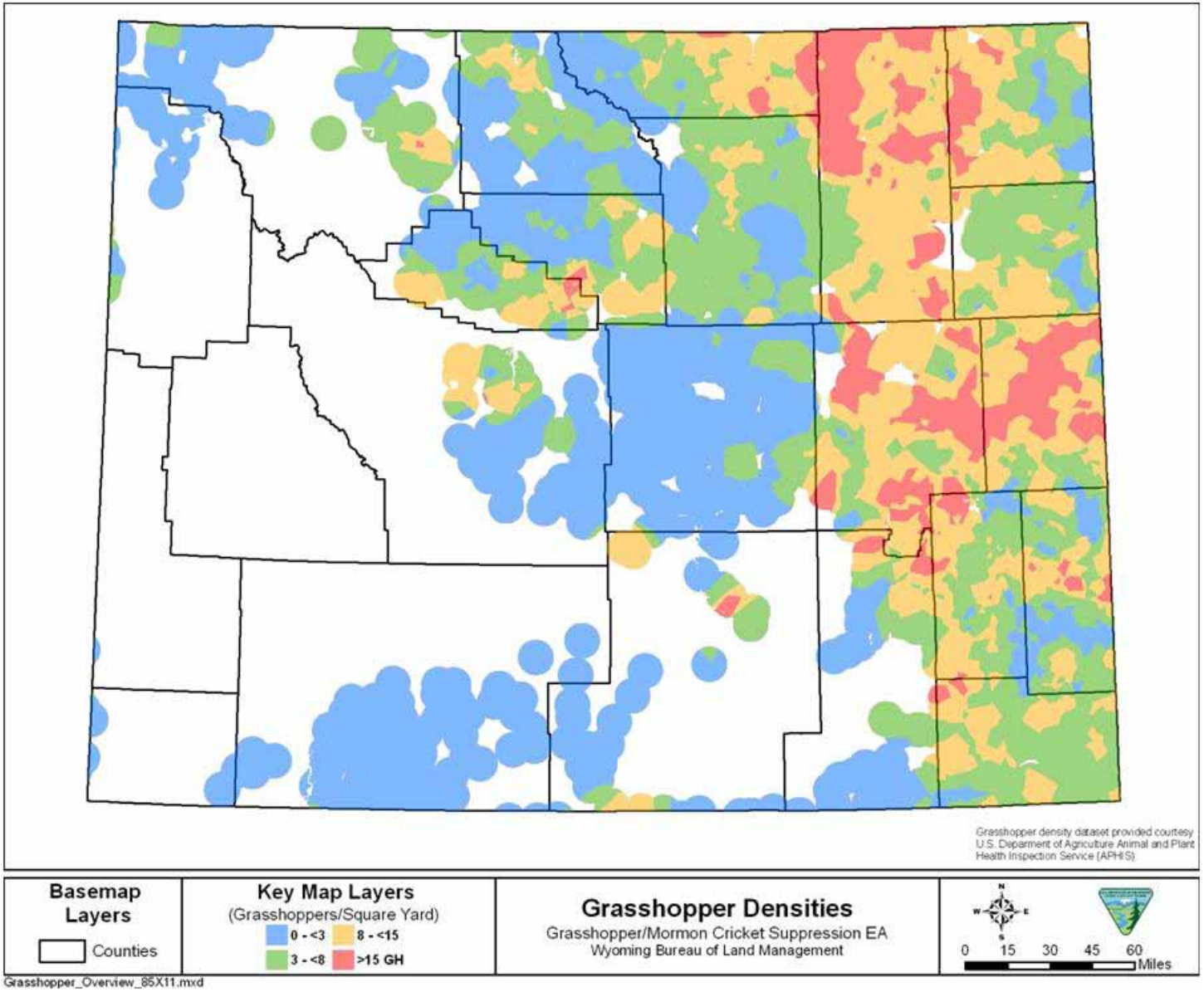

Figure 2. Predicted grasshopper densities in Wyoming in 2010.

1.3 Background

Nearly 400 species of grasshoppers are known to inhabit the 17 western states. Only about two dozen, however, are considered pest species capable of producing economic damage when their densities become high. Grasshopper densities are naturally variable each year depending on many environmental factors, such as temperature, moisture, and forage availability. In normal years, densities of 3 to 8 grasshoppers per square yard are common (Lockwood and Lockwood 2008). In some years, grasshopper populations can build to abnormally high levels and densities may reach 60+ grasshoppers per square yard (Norelius and Lockwood 1999). During these periods of increase, populations may spread from a few acres of rangeland to more than 2,000 square miles (Pfadt 1994) necessitating treatment of large areas to prevent widespread ecological damage and economic losses.

Economic considerations are a major part of grasshopper management (Skold and Davis 2000, Davis and Skold 2000). Rangeland grasshopper control programs, as well as other pest management strategies, use the concepts of economic threshold (ET) and economic injury level when deciding whether to treat a grasshopper outbreak. Historically, grasshopper control guidelines defined the intervention level density as 8 grasshoppers per square yard (Skold and Davis 2000). More recent research has shown that the ET is a dynamic number that can vary from place to place, year to year, or even within a season, and is based on many factors including economic use of available forage or crops; grasshopper species, age, and density present; rangeland productivity and composition; accessibility and cost of alternative forage; and weather patterns (USDA APHIS 2002). In general, managers regard the ET as the density at which the cost of the damage (usually measured in terms of the cost of replacing grasshopper-reduced rangeland forage production) is greater than the cost of implementing a grasshopper treatment program in a particular locale.

Grasshoppers are voracious feeders, consuming approximately one-half of their body weight in green forage per day. Field cage tests conducted in Montana and Wyoming demonstrated that over the duration of a growing season one bigheaded grasshopper per square yard could reduce grass forage equal to 20 pounds dry weight per acre (WAES 1994). Similarly, feeding tests for Mormon crickets indicate that at a density of one per square yard a Mormon cricket consumes over the growing season an amount of rangeland forage equal to 38 pounds dry weight per acre (WAES 1994). Thus, in an area of annual average forage production of 600 pounds dry weight per acre, 30 grasshoppers per square yard could consume all of the green forage available. Indeed, defoliation of 70 to 80 percent of grasses on the open range has been reported for historic severe outbreaks (Pfadt 1994). At higher grasshopper densities shrubs, woody material, and even paint or other household items may be consumed.

In high densities, grasshoppers can severely reduce the forage value and ecological conditions of rangeland. Grasshopper feeding causes direct damage to plants' growth and seed production, thus reducing valuable forage feed for wildlife and livestock. Other indirect effects of severe grasshopper infestations include soil erosion and degradation, disruption of nutrient cycles, increased risk of weedy plant invasion or proliferation, interference with water infiltration, and potential changes in the flora and fauna of the rangeland ecosystem (USDA APHIS 2002). In addition, populations that develop on rangelands can invade adjacent cropland where the economic value of crop plants is much higher than rangeland grasses. When such infestations

occur, a rapid and effective response consisting of direct, integrated intervention may be needed to suppress grasshopper populations and reduce defoliation of rangeland vegetation.

Typically, in these instances, a federal land management agency, state agriculture department, or private landowner may request assistance from the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS), which has the authority to conduct treatments under the Plant Protection Act (7 USC 7701 et seq.). APHIS conducts surveys for grasshopper populations on rangeland in the western United States and provides technical assistance on grasshopper management to land owners/managers. APHIS also cooperatively suppresses grasshoppers when direct intervention is requested by a federal land management agency or a state agriculture department (on behalf of a state or local government, or a private group or individual) and deemed necessary. Section 417 of the Plant Protection Act gives APHIS the authority to work in conjunction with federal land management agencies when they request treatment of areas that are infested with grasshoppers at a level of economic infestation or damage.

BLM land managers use information obtained from surveys conducted by APHIS to assess whether emergency treatments may be warranted on BLM-administered lands. From surveys of the grasshopper outbreak in 2009 (see Figure 2), an estimated 6.7 percent (1.2 million acres) of the approximately 18 million acres of BLM-administered lands in Wyoming are currently threatened at an ET level by a predicted infestation of grasshoppers. Based on the potential for large grasshopper populations the BLM initiated early coordination for APHIS assistance with treatments on BLM-administered lands. There are currently agreements in place between the BLM and the counties within the state whereby pest control conducted within a field office is coordinated with each county's weed and pest control district.

Generally when an outbreak occurs, the emergency application of a pesticide within all or part of the outbreak area is the most effective response available to rapidly suppress populations and effectively protect rangeland resources over large areas. Early suppression programs – with implementation in May and June when the earliest grasshoppers hatch – are most advantageous because they allow for use of insect growth regulator pesticides on nymph grasshoppers, which are ecologically safer and economically more advantageous than pesticides used for control of adult grasshoppers (additional discussion of chemical treatments and properties is presented in Chapter 2). Treatments may protect not only treated rangeland but also reduce the likelihood that grasshoppers would move from rangelands onto bordering croplands and other private lands. Damage to vegetation resulting from an unsuppressed outbreak may be so severe that all vegetation is defoliated and plant growth may be retarded for several years resulting in reduced forage and possibly degraded habitat (Pfadt 1994, USDA APHIS 2002).

1.4 Purpose of and Need for Proposed Action

Based on the scope of the predicted grasshopper infestation that experts are forecasting, Wyoming and other western states would experience detrimental effects to natural resources that are important to both wildlife and agriculture. The purpose of the proposed action analyzed in this EA is to suppress grasshopper populations in order to protect rangeland ecosystems and adjacent croplands. Implementation of the proposed action is needed to enable land managers to treat pests on public lands in order to reduce population levels to below economic thresholds.

1.5 Conformance with Applicable Land Use Plans

The State of Wyoming is divided into three BLM District Management Areas – High Desert District, High Plains District, and Wind River/Bighorn Basin District. These three districts are further divided into ten field offices (Figure 1). BLM-administered lands within these districts are managed in accordance with approved resource management plans (RMPs) for each of the field offices (Table 2). The RMPs listed in the table represent the current management documents in place for each field office and/or district.

Table 2. Current Wyoming BLM field office planning documents.

Field Office	Resource Management Plan(RMP) and Record of Decision (ROD)
High Desert District	
Kemmerer Field Office	Proposed RMP and Final EIS for the Kemmerer Field Office Planning Area (August 2008; USDI BLM 2008b) Draft RMP and Environmental Impact Statement for the Kemmerer Field Office Planning Area (July 2007; USDI BLM 2007a) Record of Decision (ROD) for the Kemmerer RMP and Rangeland Program Summary Document (June 1986; USDI BLM 1986a)
Pinedale Field Office	ROD and Approved Pinedale RMP (November 2008; USDI BLM 2008c) Proposed RMP and Final EIS for the Pinedale Field Office (August 2008; USDI BLM 2008d) Draft Environmental Impact Statement for the Pinedale RMP (February 2007; USDI BLM 2007b)
	ROD Snake River RMP (April 2004; USDI BLM 2004a) Final EIS for the Snake River RMP (September 2003; USDI BLM 2003a) Draft EIS for the Snake River RMP (January 2003; USDI BLM 2003b)
Rawlins Field Office	ROD and Approved Rawlins RMP (December 2008; USDI BLM 2008f) Proposed RMP and Final EIS for the Rawlins Field Office (January 2008; USDI BLM 2008e) Draft RMP and Environmental Impact Statement for the Rawlins Field Office (December 2004; USDI BLM 2004b)
Rock Springs Field Office	ROD and Jack Morrow Hills Coordinated Activity Plan/Green River RMP Amendment (July 2006; USDI BLM 2006a) Jack Morrow Hills Coordinated Activity Plan & Proposed Green River RMP Amendment/Final EIS (July 2004; USDI BLM 2004c) Supplemental Draft Environmental Impact Statement for the Jack Morrow Hills Coordinated Activity Plan/Draft Green River RMP Amendment (January 2003; USDI BLM 2003c) ROD and Green River RMP (October 1997; USDI BLM 1997a)
High Plains District	
Buffalo Field Office	Approved RMP Update for Public Lands Administered by the BLM Buffalo Field Office (April 2001; USDI BLM 2001a) ROD for the RMP/Final EIS for Buffalo Resource Area (incorporating

Field Office	Resource Management Plan(RMP) and Record of Decision (ROD)
	Rangeland Program Summary) (October 1985; USDI BLM 1985)
Casper Field Office	ROD and Approved Casper RMP (December 2007; USDI BLM 2007c) Proposed RMP and Final EIS for the Casper Field Office Planning Area (June 2007; USDI BLM 2007d) Draft RMP and Environmental Impact Statement for the Casper Field Office Planning Area (July 2006; USDI BLM 2006b)
Newcastle Field Office	ROD and Approved RMP for Public Lands Administered by the Newcastle Field Office (September 2000; USDI BLM 2000) Nebraska ROD and Approved RMP, Newcastle Resource Area (May 1992; USDI BLM 1992)
Wind River/Bighorn Basin District	
Cody Field Office	ROD and Approved RMP for the Cody Resource Area (November 1990; USDI BLM 1990)
Lander Field Office	ROD for the Lander RMP (June 1987; USDI BLM 1987)
Worland Field Office	ROD and Approved RMP for the Grass Creek Planning Area, Worland District (September 1998; USDI BLM 1998)
	ROD and Approved RMP for the Washakie Resource Area, Worland District (September 1988; USDI BLM 1988)

The proposed action analyzed in this EA is in compliance with the planning documents listed in Table 2. The control of insect pests is not specifically addressed in many existing RMPs because these activities are carried out in coordination with APHIS and the county weed and pest districts. Where pest or insect control is not specifically mentioned the proposed action is in compliance with the following more general statements for management of vegetation and other resources:

- Annual review and environmental analysis of insect infestations will be conducted with APHIS and control measures will be performed as needed (USDI BLM 1998, p. 22).
- Manage for healthy native plant communities by reducing, preventing expansion of, or eliminating the occurrence of…predatory plant pests or disease… Coordinate with APHIS prior to activities on the planning area to avoid non-target species mortalities, to facilitate pest and predator control, and minimize disturbance to fish or wildlife (USDI BLM 2008b, p. 2-52).
- With the exception of the Spanish Point Karst Area of Critical Environmental Concern (ACEC), chemical control of pests will be allowed planning area wide. This will be subject to restriction to reduce the possibilities of water pollution identified in Records of Decision on the…Rangeland Grasshopper Cooperative Management Program and subsequent EISs and EAs (USDI BLM 1988, p. 26).
- BLM cooperates with APHIS to control grasshoppers and Mormon crickets on public lands in conjunction with the control efforts initiated on adjoining non-federal lands (USDI BLM 2001a, p. 38).

- Manage environmental risks including…insect outbreaks and associated impacts in a manner compatible with sustaining plant, fish, wildlife, and special status species populations. Manage pesticide application in a manner compatible with fish, wildlife, and special status species' health. Coordinate with other agencies to prevent or control diseases that threaten the health of humans, wildlife, livestock, and vegetation. Coordinate with other agencies to manage native and nonnative predatory animals that pose a threat to the health or productivity of natural ecosystems (USDI BLM 2007c, p. 2-20).
- The preferred method for treating grasshoppers and Mormon crickets is by Reduced Agent and Area Treatments (RAATs). RAATs is a grasshopper suppression method in which the rate of pesticide is reduced from conventional levels, and treated swaths are alternated with swaths that are not directly treated. The RAATs strategy relies on the effects of a pesticide to suppress grasshoppers within treated swaths while conserving grasshopper predators and parasites in swaths not directly treated (USDI BLM 2009a, p. 2-78).
- When authorizing proposals for use of herbicides or pesticides on BLM-administered public lands, those chemicals with minimum toxicity to wildlife and fish will be selected. "No chemical use" buffer zones, to be delineated on a case-by-case basis, will be required along streams, rivers, lakes and riparian areas, including riparian areas along ephemeral and intermittent streams (USDI BLM 2000, p. 17).
- Manage vegetation to support wildlife habitat and livestock grazing needs, control soil erosion and provide riparian stability, control noxious weeds, and protect special status species (USDI BLM 2008c, p. 1-5).
- Maintain, restore, and enhance vegetation communities to facilitate a healthy mix of successional stages; control the introduction and proliferation of noxious and invasive species; maintain, restore, and enhance the health and diversity of plant communities through the use of management prescriptions (such as chemical or other treatments) in coordination with local, state, and federal management plans and policies; maintain, restore, and enhance vegetation to meet the Wyoming Standards for Healthy Rangelands (USDI BLM 2008f, p. 2-46).
- Manage upland and riparian vegetation to achieve desired plant community objectives, which emphasize wildlife habitat, livestock grazing, watershed, and biological diversity values while maintaining or enhancing habitat for special status species (USDI BLM 2006a, pgs. 19 and 28).
- Reduce the spread of noxious weeds and maintain or improve the diversity of plant communities to support livestock and wild horse forage needs, wildlife habitat, and watershed protection. Maintain or enhance upland habitat for wildlife and fish and promote species diversity (USDI BLM 1998, pgs. 17 and 22).
- Manage vegetation communities to restore, maintain, or enhance vegetation community health, composition, and diversity and….maintain populations of native, desirable nonnative, and special status plant species consistent with appropriate local, state, and federal management plans (USDI BLM 2008b, p. 2-52).
- Stabilize soils, increase vegetative productivity and maintain water quality to meet soil and water management objectives (USDI BLM 1988, p. 26).

1.6 Relationship to Statutes, Regulations or Other Plans

The proposal is consistent with applicable federal laws, amendments, and regulations including: *Endangered Species Act* (ESA; 16 USC 1531); *Migratory Bird Treaty Act* (16 USC 703 et seq.); *Bald and Golden Eagle Protection Act* (16 USC 668-668c), *National Historic Preservation Act* (NHPA; 16 USC 470); *Clean Air Act* (42 USC 7401 et seq.); and *Clean Water Act* (33 USC 1251 et seq.). The proposal is also consistent with the following two acts that specifically provide for protection of public lands:

- The *Federal Land Policy and Management Act* (FLPMA; Public Law 94-579; 43 USC 1701 et seq.) that directs the BLM to manage vegetation resources toward the maintenance or restoration of the physical function and biological health of vegetative ecosystems and to "...take any action necessary to prevent unnecessary and or undue degradation of the public lands."
- The *Public Rangelands Improvement Act* (Public Law 95-514; 43 USC 1901 et seq.) that requires the BLM to manage, maintain, and improve the condition of public rangelands so that they become as productive as feasible.

This EA incorporates by reference information from two previous analyses conducted for grasshopper and Mormon cricket suppression as allowed by NEPA, which states “Agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. The incorporated material shall be cited in the statement and its content briefly described…” (40 CFR 1502.21). These documents contain a description of proposed control methods as well as their potential impacts:

- The *Rangeland Grasshopper and Mormon Cricket Suppression Program Final Environmental Impact Statement* (Final EIS; USDA APHIS 2002) was completed by APHIS in June 2002 to analyze the actions available for suppression of grasshopper populations in 17 western states (including Wyoming). The EIS includes an environmental risk assessment for rangeland grasshopper suppression programs including the use of pesticides and their environmental fate.
- The *Rangeland Grasshopper and Mormon Cricket Suppression Program Wyoming Environmental Assessment* (USDA APHIS 2010) was completed by APHIS in March 2010 to analyze suppression of grasshopper populations in Wyoming that would be conducted by APHIS between March 15, 2010 and August 30, 2010.

In February 2009, APHIS and the BLM signed a Memorandum of Understanding (MOU) that defined the relationship and responsibility between the two agencies to cooperatively suppress grasshoppers and Mormon crickets on BLM lands (Document #09-8100-0870-MU, February 13, 2009). Efforts to treat pests on public lands are commonly accomplished through this existing agreement with the APHIS. Assuming a large outbreak occurs, the Wyoming BLM will need to fund and approve treatments on public lands in addition to the treatments that could occur under the APHIS agreement. To accomplish this, the Wyoming BLM has prepared this separate environmental analysis to evaluate the implementation of pesticide control measures on BLM-administered lands in a manner that protects public land resources while also being responsive to the needs and desires of local partners, governments and private landowners.

1.7 Scoping and Identification of Issues

In accordance with NEPA and the CEQ regulations contained in 40 CFR 1501.7, an open process has been employed for the determination and scope of issues to be addressed in this EA. Internal scoping was conducted by an interdisciplinary team (ID Team) of resource specialists from the BLM State Office as well as the field offices, in conjunction with representatives from cooperating agencies, to discuss the purpose and need of the project; various alternatives; resources of concern; and potential environmental impacts; and to identify potential issues. From these initial discussions, the BLM developed a scoping notice for the project to solicit public input on the proposed project and any additional issues to be analyzed in the EA.

External scoping was initiated with the distribution of the scoping notice to inform the public of the proposal, and to generate input on the preparation of this EA. The scoping notice for this proposal was sent to federal, state, and local agencies, organizations, and the interested public on March 12, 2010, initiating a 14-day comment period. The BLM listed this project on the BLM Wyoming NEPA Register at www.wy.blm.gov/nepa and posted a press release at www.blm.gov/wy/st/en/info/NEPA/documents/ghopper.html to inform the public of the proposed project and provide the opportunity to comment.

To identify issues specific to the proposed Grasshopper and Mormon Cricket Suppression Project, the ID Team reviewed all public comments and information about historical and current conditions within the project area. They also reviewed RMPs and other planning documents relevant to the project to further develop a list of issues.

An issue is defined as a point of discussion, debate, or dispute concerning environmental effects of an action. Issues are identified through the scoping process with the public and by review from other agencies and BLM personnel. The scoping process is used not only to identify important environmental issues, but also to identify and eliminate issues that do not pertain to the action, thus narrowing the scope of the environmental documentation process accordingly. Issues are sorted into three categories:

1) Significant issues – these drive the alternative development process.
2) Additional issues and concerns – these are recognized as important, but do not drive alternative development.
3) Issues outside the scope of the analysis – these include issues that are already decided by law or regulations, or beyond the scope of the project (not related to the purpose and need). The CEQ NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

A total of 22 individuals or organizations responded with written comments on the proposed project as a result of public scoping. No significant issues were identified that would drive development of additional alternatives. Several important issues and concerns were identified by public scoping and were considered in the analysis. These are addressed as part of the action alternatives or are addressed in Chapter 4.

Issue 1: Effects on Sage-grouse

The majority of comments were related to concerns about effects of treatment on sage-grouse. In particular, those commenting were concerned about habitat loss or degradation, particularly in core areas, and effects to juvenile sage-grouse from the reduction in

grasshoppers and other non-target insects that are an important food source for the species. Comments recommended working with agencies to identify important sage grouse habitat and appropriate mitigations.

Issue 2: Effects on Non-target Species

A number of comments were related to concerns about impacts to non-target species such as bees and other insects, aquatic species, birds, and other wildlife including threatened and endangered species, species of concern, and migratory birds. In particular, questions were raised about how effects to non-target species would be reduced; mitigation measures were recommended including incorporation of protective measures.

Issue 3: Effects of Pesticide Drift to Unintended Areas

Concern was expressed regarding drift of aerially applied pesticide into unintended areas, particularly inhabited areas, adjacent farm and ranch land (especially organic farmers and ranchers), and private gardens/food. A number of comments encouraged actions to minimize drift and mitigation to allow organic farmers to protect their farms.

Issue 4: Effects on Other Resources such as Water Quality, Riparian Resources, Wetlands, Air Quality, Soils and Socio-economics

Multiple comments were received identifying concerns related to possible effects to other resources such as soils, air quality, water quality, wetland, and riparian areas. A number of comments supported mitigation actions to reduce effects and protect existing resources.

Issue 5: Effects on the Food Chain

A number of comments related concerns about effects on different aspects of the food chain. Among the concerns were consideration of the important role grasshoppers play in the diets of many other species and ensuring enough insects remain for a food source. Other concerns were related to effects of humans from eating animals that have ingested pesticides and to the animals themselves.

Issue 6: Effects on Humans

Several comments related concerns about effects to the human population. Comments encouraged actions to notify the public about when and where treatments would occur so that treatment areas could be avoided.

Using the comments from the public in conjunction with the resource information developed by the ID Team, a list of resources of concern to be considered in the analysis was developed. Resources of concern identified in the development of this proposal and discussed in Chapter 3 include: areas of critical environmental concern; cultural resources; economic and social values; invasive, non-native species; migratory birds; range resources; recreational use; soils; threatened, endangered, and sensitive animals; threatened, endangered, and sensitive plants; vegetation; and wildlife.

2 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the alternatives considered for the proposed grasshopper suppression program on BLM-administered lands within the State of Wyoming. The action alternatives are described in detail and alternatives considered but not carried through for full analyses are presented. A description of the No Action Alternative is also included as required by CEQ regulations (40 CFR §1502.14d).

2.1 Alternatives Considered But Dropped From Further Consideration

In addition to the alternatives described in the subsequent sections, two other alternatives were considered by the ID Team. These alternatives were dropped from further consideration for the reasons described below.

2.1.1 Integrated Pest Management Alternative

An integrated pest management program that utilizes a combination of manual, mechanical, biological, and pesticide treatment methods, including aerial application of pesticides, would be authorized under this alternative. Efforts to develop biological controls have been ongoing for many years. A naturally occurring soil fungus (*Metarhizium anisopliae*) and a microsporidian protozoan (*Nosema locustae*) have both shown promise as biological controls of grasshoppers and Mormon crickets. However, the efficacy of treating large scale infestations with biological controls is not feasible since grasshopper populations do not decline immediately upon treatment. The biological treatments are not highly virulent, and infected grasshopper hosts continue to live (and feed, although at a somewhat reduced rate) for several weeks. Similarly, manual and mechanical methods would have limited efficacy against large scale outbreaks of grasshoppers and Mormon crickets because of the labor intensive nature of these methods. Although integrated pest management treatment methods would continue to be considered by the BLM, this alternative would not address the need of rapidly treating large outbreaks of grasshopper and Mormon cricket infestations.

2.1.2 Pesticide Applications at Conventional Rates and Complete Area Coverage Alternative

This alternative would employ ground and aerial application of pesticides. Applications would cover all treatable sites within an infested area per label directions. The pesticide agents that would be considered under this alternative would be diflubenzuron, carbaryl, and malathion. Descriptions of these three pesticides are provided in detail in the suppression program final EIS (USDA APHIS 2002) and in brief in Section 2.4 below.

This alternative would result in total or blanket coverage of an infested area. Although this alternative would be effective at controlling large outbreaks of grasshopper infestations, the goal of the BLM is not to eradicate all grasshoppers but to control or suppress outbreaks to a normal level. Furthermore, by killing all the grasshoppers in an infested area, parasites and natural predators of grasshoppers would have their food source reduced or eliminated in those areas and the possibility of grasshoppers developing pesticide resistance would be increased. Finally, as described in Section 2.4 below, a reduced rate of pesticide use and a reduced area of coverage have been shown to be nearly as effective at controlling insect infestations as full rate, complete coverage pesticide applications. Therefore, this alternative was not carried forward for further consideration.

2.2 Alternative Development

The No Action Alternative and two action alternatives were developed by the ID Team based on issues identified during internal scoping and an understanding of the purpose and need for the project. Appropriate resource protective measures were considered as part of development of the alternatives. Strategies under consideration included chemical selection, buffer zones, timing restrictions, and application rates. The alternatives analyzed in detail include the No Action Alternative (no treatment), the Reduced Agent and Area Treatments (RAATs) Alternative, and the RAATs with Additional Buffers Alternative. Each of these is described in detail in the subsequent sections including a description of elements common to both action alternatives.

2.3 Alternative 1 – No Action

Under the No Action Alternative, BLM would not fund or participate in any program to suppress grasshopper infestations. APHIS, state agriculture departments, local governments, or private groups or individuals would likely conduct their own grasshopper treatments, but BLM would not be involved with any additional suppression activities. As a result, grasshopper outbreaks would likely occur and the potential for widespread defoliation of rangeland plants and adjacent croplands in infested areas could occur. The environmental consequences (described in Chapter 4) of not treating are related to the potential for resource impacts if a grasshopper outbreak were to occur.

2.4 Elements Common to Both Action Alternatives

The elements in this section describe the overall strategy for pesticide application that would be employed under either action alternative described below. The pesticides that would be utilized under both action alternatives are diflubenzuron, carbaryl, and malathion. Briefly, carbaryl and malathion are fast-acting cholinesterase inhibitors (affecting the nervous system) and thus act as general pesticides (potentially killing both target and non-target insects and other arthropods indiscriminately). Diflubenzuron is an insect growth regulator; it acts by inhibiting the synthesis of chitin which affects the ability of insects to molt properly. It affects primarily immature insects and is very effective at controlling grasshoppers during larval or early instar developmental stages, although other insects and arthropods may also be affected.

These pesticides are currently registered for use and labeled by the Environmental Protection Agency (EPA) for rangeland grasshopper treatments and have been demonstrated to be effective. They are also approved for use on BLM-administered land. Conventional (by the label) application rates for the three pesticides are 16 fluid ounces (0.50 pound active ingredient) of carbaryl spray per acre, 10 pounds (0.50 pound active ingredient) of 2 to 5 percent carbaryl bait per acre, 1.0 to 2.0 fluid ounces (0.016 to 0.032 pound active ingredient) of diflubenzuron per acre, and 8 fluid ounces (0.62 pound active ingredient) of malathion per acre.

Pesticides used for grasshopper suppression can be applied in either of two different forms: liquid ultra-low-volume sprays or solid-based baits. The most common form of bait used is wheat bran that has been impregnated with carbaryl. Both sprays and baits can be distributed by aerial or ground applications. Depending upon the area requiring treatment, both forms have advantages and disadvantages. Habitat diversity, topographical features, meteorological conditions, economic concerns, and environmental considerations all have important roles in choosing the best form of treatment (Foster and Onsager 2000). Some grasshopper outbreak locations are economically or logistically accessible only by aircraft, while other locations may

be best treated by ground applicators. Aerial applications are typical for treatments over large areas. Ground applications are more likely when treating localized grasshopper outbreaks or for treatments where more precise placement of the pesticide is desired. Bait is easier than liquid spray applications to direct toward the target area, is more specific to grasshoppers, and affects fewer nontarget organisms than sprays. Grasshopper species vary considerably in their inclination to feed on wheat bran and other bait formulations and in their susceptibility to carbaryl-treated bait (Onsager et al. 1996). Bait applications, in general, yield lower grasshopper mortality than liquid sprays and are usually more expensive per unit area than aerially applied treatments.

RAATs methodology would be employed under both action alternatives. RAATs methodology relies on the effects of a pesticide to suppress grasshoppers within treated swaths and the conservation of grasshopper predators and parasites in swaths not directly treated (untreated swaths). RAATs methodology has been shown to be effective in suppressing grasshopper outbreaks, with 0 to 26 percent difference in grasshopper mortality between areas using conventional and RAATs methodologies (Lockwood et al. 2000, Foster et al. 2000).

The concept of leaving intermittent swaths untreated is designed to both reduce costs and conserve non-target biological resources, including predators and parasites of grasshoppers that are present in the untreated areas. There is no standardized percentage of area that is left untreated, but typically both APHIS and county weed and pest control districts that employ this methodology use a 50 to 60 percent treatment application. The proportion of land treated in a RAATs approach is a complex function of the rate of grasshopper movement, which is related to developmental stage, population density, and weather (Narisu et al. 1999, 2000), as well as the properties of the pesticide (pesticides with longer residuals allow wider spacing between treated swaths). The level of control necessary to suppress the grasshopper population to a desired level on BLM-administered lands would be determined by the individual BLM Field Offices.

Figure 3 shows a schematic representation (not to scale) of an aerial RAATs application pattern with 50 percent treatment. The solid line indicates the flight path of the airplane, and the shaded zones show the idealized area receiving pesticide under absolutely windless conditions. Although only half of the area would be treated under this methodology (would receive pesticides), all of it would be considered protected.

Under RAATs methodology, not only is the aerial extent of pesticide application reduced, but the rate at which it is applied is also reduced. In general, the application rates that would be employed under both action alternatives for the three pesticides are 8 fluid ounces (0.25 pound active ingredient) of carbaryl spray per acre, 10 pounds (0.20 pound active ingredient) of 2 percent carbaryl bait per acre, 0.75 to 1.0 fluid ounces (0.012 to 0.016 pound active ingredient) of diflubenzuron per acre, and 4 fluid ounces (0.31 pound active ingredient) of malathion per acre.

Under both action alternatives, malathion application would be limited to a total of 2,000 acres or less. Carbaryl would be used on up to 15 percent of the treated BLM-administered lands, and diflubenzuron would be used on 85 percent or more of the treated BLM-administered lands. Diflubenzuron is the preferred pesticide to use because of its specificity to insects that molt (e.g., grasshoppers).

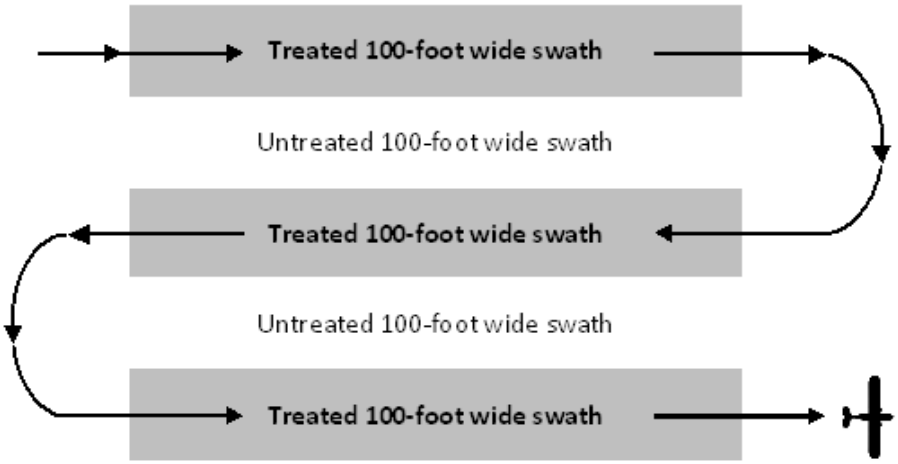

Figure 3. Fifty percent aerial application rate under RAATs methodology.

Diflubenzuron is typically applied in the early stages of grasshopper development, while carbaryl and malathion are applied at later stages of development. Carbaryl and malathion are active against a broad spectrum of insects in both the adult and immature stages whereas diflubenzuron causes mortality to immature insects. Because of the effectiveness of diflubenzuron at this early stage, it is used most effectively early in the treatment season. Therefore, treatment of the majority of the infested area would likely consist of an aerial application of diflubenzuron early in the season. Ground-based application of carbaryl can be used effectively both early and late in the season and would likely occur as a secondary treatment in areas that may have been missed by the initial treatment or where high infestation levels are discovered later in the season after treatment with diflubenzuron would no longer be effective. Malathion would be used only in limited circumstances; for instance, in situations where high adult grasshopper densities are observed next to agricultural land.

Treatments would adhere to federal environmental laws and statutes including the ESA, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, NHPA, Clean Air Act, Clean Water Act, and the Federal Insecticide, Fungicide, and Rodenticide Act. All label instructions and standard operating procedures (SOPs) for the proper handling, storage, application, accidental spill, and disposal of these pesticides would be followed. Information from the *Environmental Risk Assessment for Rangeland Grasshopper Suppression Programs – Insecticides* and *Environmental Fate and Transport Modeling for Grasshopper Insecticides* (USDA APHIS 2002, Appendices B and C, respectively) is incorporated into the action alternatives.

Aquatic invertebrates are especially sensitive to pesticide applications. Pesticide labels have protective measures designed to buffer riparian areas and other aquatic ecosystems to reduce potential exposure of aquatic organisms to pesticides from treatment applications. These are intended to minimize the potential for pesticides from entering water bodies under routine applications. Under the action alternatives, the following protective measures would be employed to minimize the potential for pesticides from entering water bodies:

- Pesticides would not be directly applied to water bodies (defined herein as reservoirs, lakes, ponds, pools left by seasonal streams, springs, wetlands, and perennial streams and

rivers). To the extent possible, efforts would also be made to avoid other ephemeral or small water bodies such as intermittent streams, vernal pools, cattle tanks, and puddles.

- Buffers would be provided around all water bodies as follows: 500-foot buffer with aerial liquid pesticides, 200-foot buffer with aerial bait, 50-foot buffer with ground bait. In addition, at least 25 feet of the buffer around the water body would need to be comprised of vegetation. These buffers exceed label requirements for protection of water bodies.
- Pesticides would not be applied near water bodies under high wind conditions to minimize the potential for drift.

As described in the National Bald Eagle Management Guidelines (USFWS 2007), the following mitigation measures would be followed when practical to ensure protection of bald and golden eagles, pursuant to the Bald and Golden Eagle Protection Act of 1940 (16 USC 668-668c):

> "Category G. Helicopters and fixed-wing aircraft. Except for authorized biologists trained in survey techniques, avoid operating aircraft within 1,000 feet of the nest during the breeding season, except where eagles have demonstrated tolerance for such activity. In addition, Category A (Agriculture) and Category D (Off Road Vehicle Use) both provide the same guidance for use of ATVs or trucks: No buffer is necessary around nest sites outside the breeding season. During the breeding season, do not operate off-road vehicles within 330 feet of the nest. In open areas, where there is increased visibility and exposure to noise, this distance should be extended to 660 feet."

Aerial flights are routinely conducted by Federal and State agencies and private contractors to search for raptor nests. Flight heights range between 100 and 200 feet and transects approximately ¼ mile apart. When a nest is located the nest may be circled to determine the status of the nest and species. Nevertheless, the U.S. Fish and Wildlife Service (USFWS) in Wyoming recommends implementing 0.5-mile buffers around known active eagle nests for disturbing activities. Under this alternative, 0.5-mile buffers would be employed for ground-based treatments to minimize potential disturbance of active eagle nests.

Several BLM instruction memoranda (e.g., WY-2010-12, 2010-071, and 2010-084), the *BLM National Sage-grouse Habitat Conservation Strategy* (USDI BLM 2004d), and other agency guidelines (e.g., State of Wyoming Executive Order 2008-2; Wyoming 2008) provide direction for the protection of greater sage-grouse (*Centrocercus urophasianus*) and their habitat. The following mitigation measures would be implemented for ground-based treatments to ensure protection of greater sage-grouse.

- Sage-grouse leks inside Core Areas: Disruptive activity would be restricted on or within six tenths (0.6) mile radius of the perimeter of occupied or undetermined sage-grouse leks from 6 pm to 8 am from March 15 to May 15.
- Sage-grouse leks outside Core Areas: Disruptive activity would be restricted on or within one quarter (0.25) mile radius of the perimeter of occupied or undetermined sage-grouse leks from 6 pm to 8 am from March 15 to May 15.
- Disruptive activity would be restricted between March 15 and June 30 in suitable sage-grouse nesting and early brood-rearing habitat within designated core areas, together with suitable sage-grouse nesting and early brood-rearing habitat outside core areas within

mapped habitat important for connectivity, or within 2 miles of any occupied or undetermined lek.

Disruptive activities are defined in the Wyoming BLM Information Bulletin No. WY-2007-029 *Guidance for Use of Standardized Surface Use Definitions*. Disruptive activity requires people and/or the activity to be in nesting habitats for a duration of 1 hour or more during a 24 hour period during the nesting season in a site-specific area. Ground-based treatments lasting more than 1 hour in a location would be considered disruptive; aerial treatments would not be restricted unless limited by other BLM guidance documents (e.g., Instruction Memorandum 2010-084).

Protection measures that result from the Section 7 consultation process would be implemented and strictly followed. The following measures would be incorporated into the suppression activities to ensure compliance with ESA, protect endangered or threatened species, and their habitats and pollinators:

- A 0.25 mile buffer for aerial spray would be maintained on each side of the Little Laramie River and no treatments would be applied within a 0.25 mile buffer of Mortenson National Wildlife Refuge in Albany County to protect populations of the endangered Wyoming toad (*Anaxyrus baxteri*).
- A 0.25 mile buffer would be maintained around the Kendall warm springs site in Sublette County for carbaryl, diflubenzuron, and ground applications of malathion to protect the endangered Kendall warm springs dace (*Rhinichthys osculus thermalis*).
- To protect the endangered blowout penstemon (*Penstemon haydenii*) habitat in Carbon County, no aerial application of malathion or carbaryl would occur within 3 miles of the ACEC as defined by BLM; only carbaryl bran bait or diflubenzuron combined with RAATs methodology would be used within the 3 mile buffer; and no application of carbaryl bran bait would be applied within a 0.25 mile buffer of the plant.
- To protect the threatened Colorado butterfly plant (*Gaura neomexicana* var. *coloradensis*) and its designated critical habitat (primarily found in the southeast counties of Platte, Goshen, and Laramie), no aerial application of malathion or carbaryl would occur within 3 miles of the critical habitat or known occupied habitat of the plant; only carbaryl bran bait or diflubenzuron combined with RAATs methodology would be used within the 3 mile buffer; and no application of carbaryl bran bait would be applied within a 0.25 mile buffer of critical habitat or known occupied habitat of the plant.
- To protect the threatened Ute ladies'-tresses (*Spiranthes diluvialis*) populations, no aerial application of malathion or carbaryl would occur within 3 miles of occupied habitat; only carbaryl bran bait or diflubenzuron combined with RAATs methodology would be used within the 3 mile buffer; and no application of carbaryl bran bait would be applied within a 0.25 mile buffer of occupied habitat of the plant.
- To protect the threatened desert yellowhead (*Yermo xanthocephalus*) plant and its designated critical habitat in Fremont County, no aerial application of malathion or carbaryl would occur within 3 miles of critical habitat; only carbaryl bran bait or diflubenzuron combined with RAATs methodology would be used within the 3 mile buffer; and no application of carbaryl bran bait would be applied within a 0.25 mile buffer of critical habitat of the plant.

To ensure that there would be no impact on domestic bee production or on alfalfa leafcutter bee pollination activity, the following measures would be followed:

- State-registered beekeepers would be given notice of any proposed pesticide treatments in areas that contain domestic or leafcutter bees. Observation aircraft may be used to check for bee yards in the proposed treatment area.
- When using malathion or carbaryl spray, a 2 mile buffer for domestic bees and a 4 mile buffer for leaf cutter bees would be enforced either by the movement of bees or with buffer zones.

Cultural resources and petroglyphs are not anticipated to be impacted by the proposed pesticide treatments. To ensure that the BLM meets its responsibilities under the NHPA, the BLM cultural resource specialist at the field office level would determine if specific areas or activities should be excluded from treatment. Identified traditional Native American plant gathering areas would be avoided to the extent possible. Tribes will be encouraged to contact the local BLM cultural resource specialist prior to any plant gathering activities to ensure that gathering areas have not recently been treated.

To limit potential adverse effects from drift, wind speed restrictions on the chemical labels would be followed. Pesticides are only applied when the potential for drift to sensitive areas is minimal. Applicators take into account droplet size, wind pattern and speed, temperature, humidity, and topography, among other factors, to minimize impacts to recreation areas, residential areas, bodies of water, or other identified sensitive areas. To minimize unintended consequences to the public, a minimum 500-foot buffer would be used for aerial treatments for areas such as residences, organic farms, and adjacent private lands that are identified by the public for avoidance. These buffers would be determined at the Field Office level. In addition, spray would be turned off if individuals were noticed on the ground during aerial applications.

2.4.1 Alternative 2 – Reduced Area and Agent Treatments (RAATs)

Grasshopper suppression activities in Wyoming in 2010 are anticipated to occur on approximately 4 million acres of federal, state, and private land. There is considerable uncertainty in determining specific locations where suppression activities may be needed until grasshoppers have actually hatched. Based on outbreak locations in 2009 it is most likely that suppression activities would largely occur in the northeast and north-central counties on BLM-administered land in the Buffalo, Casper, and Newcastle Field Offices (see Figure 2). Under Alternative 2 – RAATs, APHIS may apply pesticides to approximately 317,000 acres of BLM-administered land. In addition, approximately 240,000 other acres of BLM-administered land may be treated by the counties through local weed and pest control districts. Therefore, up to 557,000 acres of BLM-administered land may be treated in 2010 under Alternative 2, which using RAATs methodology would equate to approximately 1 million acres protected. Reoccurring outbreaks may require treatments in subsequent years.

2.4.2 Alternative 3 – RAATs with Additional Buffers

Under Alternative 3 – RAATs with Additional Buffers, grasshopper suppression activities may occur on up to 557,000 acres of BLM-administered land in 2010 as described in Alternative 2[2], but additional seasonal or spatial buffers would be employed to protect specific resources, as described below:

- To protect raptors during the breeding season, no aerial or ground treatments would occur within 0.5 mile of known active nests. This would extend the 1,000-foot buffer described above for bald and golden eagles to 0.5 mile and would extend this protection to all raptors. The primary concern for bird species is related to disturbance (from aircraft or vehicles used in the application of the pesticides) and the effects of decreases in insect populations from pesticide applications on insectivorous species rather than to the direct toxicity to birds.
- To protect the greater sage-grouse, an ESA candidate species, no aerial or ground treatments would occur within 3 miles of known leks or brood rearing areas until after June 30. The primary concern for sage-grouse is the effect the grasshopper suppression program would have on the forage base of young sage-grouse, which rely most heavily on insects during the first three weeks of life. Although RAATs methodology would leave a significant food base under both action alternatives, this measure would ensure that no additional disturbance occurs around leks and early brood rearing areas.
- No aerial or ground treatments would occur within 1 mile of known mountain plover nesting areas until after July 31. The mountain plover (*Charadrius montanus*) is an ESA candidate species that nests and feeds in shortgrass prairie habitat, especially in heavily grazed areas and within prairie dog colonies. The primary concern for the mountain plover is the effect the grasshopper suppression program would have on their insect food base and the potential for ground-based treatments to destroy their nondescript nests.
- No aerial or ground treatments would occur within 1 mile of known big game parturition areas until after the calving season is complete, typically by July 15. The primary concern for big game animals would be the disturbance caused by aircraft or vehicles used in the application of the pesticides.
- No ground treatments would occur within 1,000 feet of known pygmy rabbits burrows. Pygmy rabbit (*Brachylagus idahoensis*) populations have been declining throughout the west and they have been petitioned for ESA listing. Pygmy rabbits are typically found in areas of tall, dense sagebrush upon which they depend for both food and shelter. The primary concern for the pygmy rabbit is the potential for ground-based treatments to destroy their burrows.

[2] Although additional buffers are employed under Alternative 3, many of these are seasonal buffers. Thus, the total number of acres across the State of Wyoming that may be treated under Alternative 3 could still add up to the same number of acres that are treated under Alternative 2. In a particular location, seasonal buffers may delay grasshopper suppression treatments, or other buffers may reduce the number of acres that are treated at that particular location, but treatments in other locations could make up the difference in the total number of acres that are treated under Alternative 3. For illustrative purposes, of the approximately 18 million acres of BLM-administered land in Wyoming, approximately 13 million of them would have seasonal or spatial buffers under Alternative 3.

2.5 Alternative Comparison

The exact location of the proposed grasshopper suppression activities is unknown. To illustrate the difference in potential treatment between alternatives, the impact of the grasshopper suppression program being carried out in Natrona County in the Casper Field Office is briefly described.

The total acreage of Natrona County is 3,436,160 acres of which 1,419,988 acres are administered by the BLM. Under Alternative 1, no grasshopper suppression treatments would occur on BLM-administered land. Private and state lands may still be treated under this alternative, but 0 acres of BLM-administered land would be treated, even if a severe outbreak were to occur on them.

Under Alternative 2, with a 50 percent RAATs methodology and standard protective buffers, up to 443,825 acres of BLM-administered land could be treated in Natrona County if grasshopper infestation levels were determined by the field office in cooperation with APHIS to be at an ET level that warranted suppression treatments. In practice, the actual number of acres treated in Natrona County would be a fraction of this since the total number of BLM-administered acres that may be treated under this proposal across the entire State of Wyoming in 2010 is only 557,000 acres.

Under Alternative 3, with a 50 percent RAATs methodology and additional protective buffers, up to 266,169 acres of BLM-administered land could be treated in Natrona County without any timing restrictions. As stated above, treatment on this many acres would only occur if all of the BLM-administered lands in Natrona County were found to be infested at an ET level that warranted suppression treatments and, in all likelihood, only a fraction of this would actually be treated.

The additional buffers that would be employed under Alternative 3 are graphically depicted for Natrona County in Figure 4. Similar results may be expected in other counties, although the extent of BLM-administered lands in these counties may be more or less than in Natrona County, and the presence of resources requiring protective buffers may also be more or less than in Natrona County. A comparison of the three alternatives is shown in Table 3.

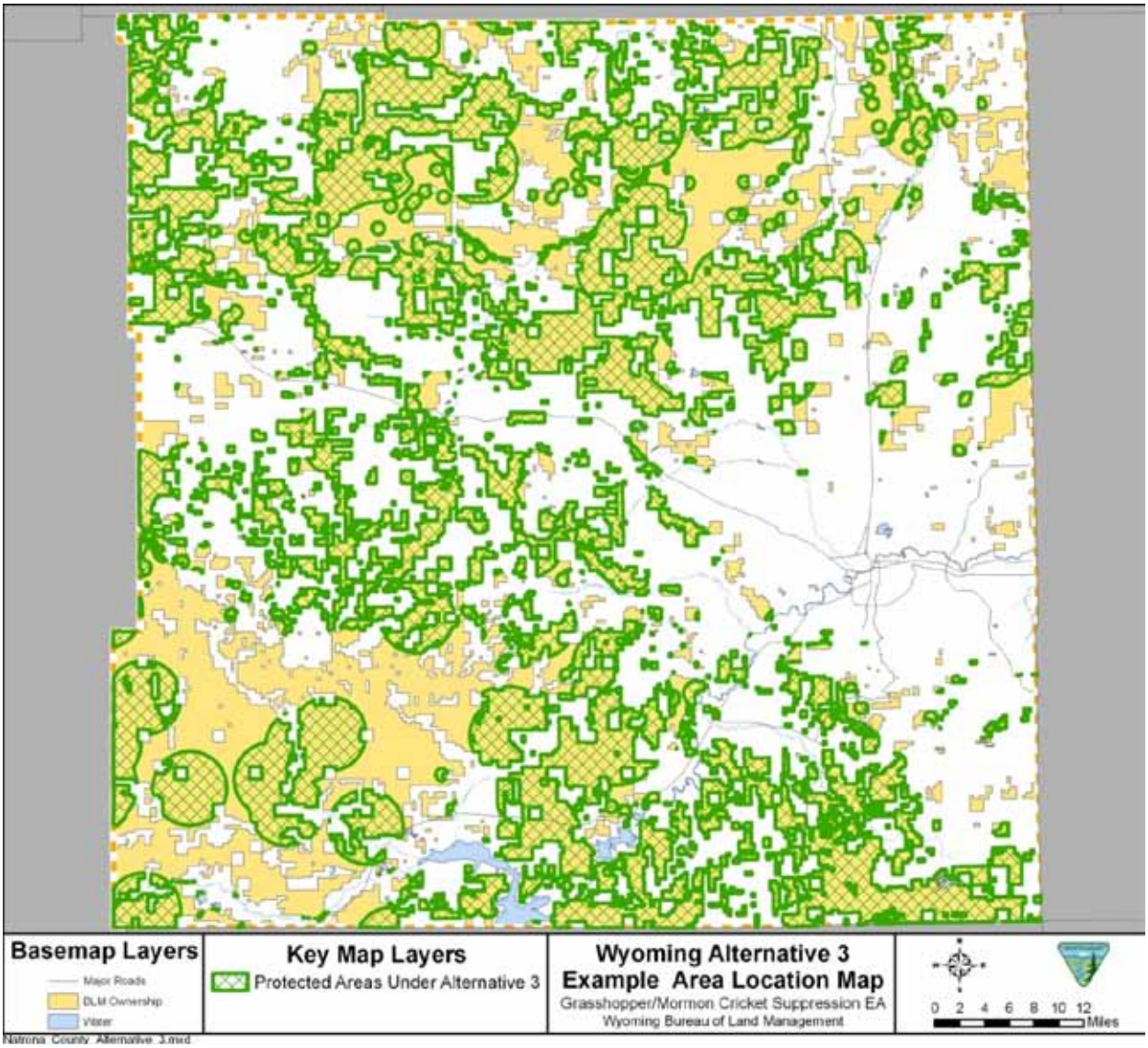

Figure 4. Depiction of additional protective buffers under Alternative 3.

Table 3. Comparison of alternatives.

	Alternative 1 No Action	**Alternative 2 RAATs**	**Alternative 3 RAATs with Additional Buffers**
Spatial Buffers for Water Bodies	n/a	500 feet aerial spray 200 feet aerial bait 50 feet ground bait	500 feet aerial spray 200 feet aerial bait 50 feet ground bait
Spatial Buffers for Bees (carbaryl and malathion only) Domestic bees Leaf cutter bees	n/a	2 miles aerial spray 4 miles aerial spray	2 miles aerial spray 4 miles aerial spray
Spatial Buffers for Threatened and Endangered Plants (carbaryl and malathion only)	n/a	3 miles aerial 0.25 mile ground bait	3 miles aerial 0.25 mile ground bait
Seasonal Buffers for Raptors Known active eagle nests Other known active raptor nests	n/a	1,000 feet aerial 0.5 mile ground 0 0	0.5 mile aerial 0.5 mile ground 0.5 mile aerial 0.5 mile ground
Seasonal Buffers for Sage-grouse Restrictions for disruptive activities in …leks in core areas …leks outside core areas …nesting or brood-rearing habitat	n/a	0.6 mile 0.25 mile 2 miles	3 miles 3 miles 3 miles
Seasonal or Spatial Buffers for Other Wildlife Mountain plover nests Big game parturition areas Pygmy rabbit burrows	n/a	0 0 0	1 mile 1 mile 1,000 feet

3 AFFECTED ENVIRONMENT

Chapter 3 sets the framework for understanding the baseline environment – the existing physical, biological, and socioeconomic characteristics of the area that would be affected by the alternatives described in Chapter 2 – and assists the reader in understanding the analysis developed in Chapter 4. The list of resource issues addressed in this chapter was developed by the ID Team based on project review and scoping (see Chapter 1). Emphasis is placed on those resources that have the highest potential to be impacted; environmental components that would not be affected or that are not important to the resolution of issues are not covered in detail. The description of the resources has been summarized from RMPs, reports, and other existing material.

3.1 General Setting

As stated in Chapter 1, this EA covers the potential for grasshopper suppression treatments to take place on all BLM-administered land in the State of Wyoming. Most BLM-administered surface land in the state exists as large tracts of relatively contiguous land with the exception of lands in the Buffalo, Casper, and Newcastle Field Offices which are comprised primarily of scattered tracts intermingled with state and private lands. The state is sparsely populated; in 2000 the state's three largest towns – Cheyenne, Casper, and Laramie – had populations of 53,011, 49,644, and 27,204, respectively (http://factfinder.census.gov/). The total estimated population of the state in 2009 was approximately 544,000.

Because of the large area covered, there is a high degree of variability in conditions present. Elevations range from less than 4,000 feet to over 13,000 feet. Dominant vegetation transitions from sagebrush and grasslands in the lower elevations to mountain shrublands and ultimately to coniferous forests in the higher elevations. Although topography is highly variable, the treatments would typically be focused at the lower elevations in sagebrush steppe and grassland communities where grasshopper outbreaks are most likely.

Climate can be classified as desert and temperate semi-arid characterized by large seasonal variations in temperature with long cold winters and short summers and a wide variation in daily and annual temperatures. In general these climates have precipitation levels that are low but still sufficient for the growth of short, sparse grass. Precipitation ranges from more than 30 inches annually in the mountains to less than 10 inches in some grasslands. Soils and vegetation in the planning area generally provide suitable rangeland and habitat for a variety of wildlife.

3.2 Critical and Other Important Elements of the Human Environment

Consideration of critical elements is required as specified in statute, regulation, executive order, or policy and must be considered in all EAs. In addition, other important elements typically screened for impacts by BLM (e.g., recreation, soils) are generally considered in EAs. Critical elements and other important elements identified by an "X" in the "Present Not Affected" column of Table 4 (as determined by the ID Team) will not be discussed in detail in this EA. Rationale for their dismissal is presented in Section 3.3 below. Elements identified by an "X" in the "Present Affected" column of Table 4 are likely to be affected by implementation of the action alternatives and thus are discussed further in this chapter.

Table 4. Critical and other important elements of the human environment.

Element	Present Not Affected	Present Affected
Access	X	
Air Quality	X	
Areas of Critical Environmental Concern		X
Cultural Resources		X
Economic & Social Values		X
Environmental Justice	X	
Existing and Potential Land Uses	X	
Fisheries	X	
Floodplains	X	
Forest Resources	X	
Invasive, Non-native Species		X
Migratory Birds		X
Mineral Resources	X	
Native American Religious Concerns	X	
Paleontological Resources	X	
Prime and Unique Farmlands	X	
Range Resources (Livestock Management)		X
Recreational Use		X
Soil Resources		X
Threatened, Endangered, and Sensitive Animals		X
Threatened, Endangered, and Sensitive Fish	X	
Threatened, Endangered, and Sensitive Plants		X
Vegetation		X
Visual Resources	X	
Wastes, Hazardous and Solid	X	
Water Quality (Surface and Ground)	X	
Wetland and Riparian Zones	X	
Wild & Scenic Rivers	X	
Wild Horse and Burro Designated Herd Management Areas	X	
Wilderness	X	
Wildlife Resources		X

3.3 Resources Not Carried Forward for Analysis

3.3.1 Access

Treatments for the suppression of grasshoppers would not limit access within the planning area.

3.3.2 Air Quality

Currently Sheridan County is designated by the EPA as nonattainment for PM_{10} (particulate matter with an aerodynamic diameter of 10 micrometers or less) and Sublette County has been recommended for designation as nonattainment for ozone, primarily associated with energy

development. A number of Class I areas exist within the state, primarily in the northwest portion of the state (Yellowstone National Park, Grand Targhee National Park, Bridger Wilderness, South Absaroka Wilderness, North Absaroka Wilderness, and the National Elk Refuge). Aerial application of pesticides can contribute to air pollution but any effects would be temporary and minor. Pesticides that are applied aerially can volatilize and may be blown by winds into nearby areas. They can also adhere to dust and other wind-blown particles. Levels would diminish over time through dispersion and dissipation. Ground spraying would produce less potential for pesticide drift than aerial spraying. Criteria pollutants (pollutants for which maximum allowable emission levels and concentrations are enforced by state agencies) would be produced by internal combustion engine fuel consumption during pesticide application activities. Effects would be localized and similar to other vehicular activities in treatment areas. The grasshopper suppression treatments are not anticipated to have a direct or indirect impact to air quality standards within the field office areas or the Class I areas within the state.

3.3.3 Environmental Justice

Executive Order 12898, issued on 11 February 1994, mandates federal agencies to assess whether their actions would have disproportionate environmental and human health impacts on minority and low-income populations. The intent of this order is to ensure that all communities, including minority, low-income, or federally recognized tribes, live in a safe and healthful environment. Treatments would only occur on BLM-administered lands and SOPs and label instructions for pesticide application near communities would be followed to ensure that risks to human health would be minimized.

3.3.4 Existing and Potential Land Uses

There would be no changes to existing and potential land uses as a result of implementation of the proposed grasshopper suppression treatments.

3.3.5 Fisheries

Pesticide labels have protective measures designed to buffer riparian areas and other aquatic ecosystems to minimize exposure of fish species to pesticides from treatment applications (see Chapter 2). These buffers are intended to limit the potential for pesticides to enter water bodies under routine applications. Under all alternatives, label directions would be followed to prevent pesticides from entering water bodies and buffers would be provided around all water bodies. Buffers employed by APHIS around water bodies exceed those required by label. Because treatments near aquatic systems would be avoided, no effects to fisheries are expected.

3.3.6 Floodplains

A floodplain is a low plain adjacent to a river that is formed chiefly of river sediment and is periodically covered with floodwater from that river during intervals of overbank flow. Pesticide labels have protective measures designed to buffer riparian areas to minimize exposure of water resources to pesticides from treatment applications. These buffers are intended to limit the potential for pesticides to enter water bodies under routine applications. As described in Chapter 2, buffers would be provided around all water bodies. Because treatments near aquatic systems would be avoided, no effects to floodplains are expected.

3.3.7 Forest Resources

Forest resources would not be impacted since they are not included in the focus areas for treatment.

3.3.8 Mineral Resources

The grasshopper suppression treatments would occur on the ground surface and would not impact mineral resources.

3.3.9 Native American Religious Concerns

In accordance with the American Indian Religious Freedom Act (1979), the Native American Graves Protection and Repatriation Act, the NHPA, BLM Manual 8160-1 Handbook, and other statutes, Native American tribes were consulted as part of the government-to-government consultation process that is required of federal agencies. During the preparation of this EA, letters were sent to the tribes requesting their comments concerning any religious or cultural areas within the potential treatment areas. A summary of the activities conducted as part of the Native American consultation process is provided in Chapter 5. No concerns have been identified and the field offices would continue to consult with the tribes during treatment implementation activities.

3.3.10 Paleontological Resources

Paleontological resources, usually thought of as fossils, include the bones, teeth, body remains, traces, or imprints of plants and animals preserved in the earth through geologic time. Paleontological resources also include related geological information, such as rock types and ages. Most fossils occur in sedimentary rock formations. The BLM is legally mandated to manage and protect scientifically noteworthy fossils for the benefit of the public. Preservation concerns are addressed by mitigation efforts aimed at reducing or preventing loss of paleontological resources and related information. These losses can be caused by surface disturbing activities and accelerated erosion resulting from natural or manmade actions among other things. The only surface disturbing activity associated with the action alternatives is the use of ATVs for ground-based applications. Because of the low potential for surface disturbance, effects to this resource would be negligible.

3.3.11 Prime and Unique Farmlands

Prime and unique farmlands are defined in 7 CFR 657. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (e.g., cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. Unique farmland is land other than prime farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality and/or high yields of a specific crop when treated and managed according to acceptable farming methods. The Natural Resources Conservation Service conducts soil surveys to identify soil types within Wyoming that meet the criteria for designation as prime farmlands. Successful suppression of grasshopper infestations and maintenance of healthy native vegetation or crops would be beneficial to soil

quality in these areas. No adverse effects to prime or unique farmlands are anticipated from the action alternatives.

3.3.12 Threatened, Endangered, and Sensitive Fish

Pesticide labels have protective measures designed to buffer riparian areas and other aquatic ecosystems to minimize the potential of exposure of threatened, endangered, and sensitive fish species to pesticides from treatment applications. These buffers are intended to limit the potential for pesticides to enter water bodies under routine applications. As described in Chapter 2, buffers would be provided around all water bodies. Under all alternatives, label directions would be followed to prevent pesticides from entering water bodies and buffers would be provided around all water bodies. Buffers employed by APHIS around water bodies exceed those required by label. Because treatments near aquatic systems would be avoided, no effects to threatened, endangered, and sensitive fish are expected. Consultation with USFWS would be conducted as necessary.

3.3.13 Visual Resources

Public lands have a variety of visual (scenic) values that warrant different levels of management. The BLM uses a system called visual resource management (VRM; Manual 8400; USDI BLM 1986b) to identify and evaluate these values to determine the appropriate level of scenery management. Areas designated as VRM Class I, II, III, and IV occur in portions of the state. These management classes regulate the amount of disturbance that is allowed to occur within a given area – Class IV allows for the most visual change to the existing landscape while Class I allows the least. Suppression activities for grasshopper infestations would not affect VRM objectives.

3.3.14 Wastes, Hazardous and Solid

Hazardous materials management involves the prevention of illegal hazardous materials actions on public lands; the proper authorization, permitting, and regulation of the uses of hazardous materials; and the timely, efficient, and safe responses to hazardous materials incidences. Pesticides – which by their very nature are hazardous materials – would be stored, transported, and used during grasshopper suppression activities under the action alternatives. All label instructions and SOPs for the proper handling, storage, application, accidental spill, and disposal of the authorized pesticides would be followed. Following these practices would minimize the risks these materials might pose to human health and the environment, and should ensure that no additional hazardous waste management actions are necessary due to grasshopper suppression activities.

3.3.15 Water Quality (Surface and Ground)

Pesticide labels have protective measures designed to buffer riparian areas and other aquatic ecosystems to reduce exposure of water resources to pesticides from treatment applications. These buffers are intended to minimize the risk of pesticides entering water bodies under routine applications. Under the action alternatives, label directions would be followed to prevent pesticides from entering water bodies. As described in Chapter 2, buffers would be provided around all water bodies. Because treatments near aquatic systems would be avoided, no effects to water quality are expected.

3.3.16 Wetland and Riparian Zones

Pesticide labels have protective measures designed to buffer riparian areas and other aquatic ecosystems to reduce exposure of wetlands and riparian zones to pesticides from treatment applications. These buffers are intended to minimize the risk of pesticides entering water bodies under routine applications. Under the action alternatives, label directions would be followed to prevent pesticides from entering wetland and riparian zones. As described in Chapter 2, buffers would be provided around all water bodies including wetlands. Because treatments near aquatic systems would be avoided, no effects to wetland and riparian zones are expected.

3.3.17 Wild & Scenic Rivers

There would be no impact to Wild & Scenic Rivers as a result of implementation of the proposed grasshopper suppression treatments.

3.3.18 Wild Horse and Burro Designated Herd Management Areas

The Wild Horse and Burro Act of 1971 states that wild horses "are considered in the area where presently found as an integral part of the natural system of the public lands" and should be "protected and managed as components of the public lands." There are a number of herd management areas in Wyoming, primarily in the southwest portion of the state. At the low application rates proposed, there is little possibility of toxicity-caused mortality or other effects to mammals (McEwen et al. 2000). No adverse effects to wild horses and burros are expected.

3.3.19 Wilderness

The BLM may conduct grasshopper suppression activities, aerially or otherwise, in a wilderness area if BLM deems it an emergency pest situation as per 43 CFR Section 6304.22 (2001), "BLM may prescribe measures to control fire, noxious weeds, non-native invasive plants, insects, and diseases." Likewise, BLM may treat for grasshoppers on Wilderness Study Area (WSA) land as advised under the BLM Interim Management Policy for Lands under Wilderness Review (IMP 1995, section D; USDI BLM 1995). Rangeland Management No. 4 (e) states: "Insect and disease control by chemical or biological means may be permitted if applied to individual trees or areas up to 5 acres, or to larger areas under emergency conditions when there is no effective alternative. Insect control by chemical or biological means may be applied to larger areas under nonemergency conditions when there are insects present in an unusually high population in a peak year of its population cycle and the infestation, if uncontrolled, will cause serious damage to crops or property on adjacent non-federal lands." An emergency situation may arise if the characteristics of a WSA or designated wilderness area were believed to be at risk of irreparable harm due to a grasshopper outbreak. Suppression treatments would not affect wilderness resources or WSA characteristics other than potential impacts to vegetation, as described for that resource below.

3.4 Vegetation Resources

General Vegetation

Vegetation communities across Wyoming include riparian (montane, plains/basin, wetland, aquatic, and meadow), grassland (shortgrass prairie, mixed-grass prairie, alpine tundra), forest (low to high elevation conifer, aspen), and shrubland (juniper woodland, shrub steppe, mountain-foothills shrub). Riparian communities are precluded from grasshopper suppression treatment and grasshoppers do not occur at problematic levels within forest or alpine tundra; therefore, these vegetation types will not be discussed. Other habitat groups in Wyoming which do not occur on BLM-administered land and will not be discussed include agricultural croplands, pasture, and irrigated native meadows.

In Wyoming, grasshoppers primarily inhabit grassland and shrub steppe vegetation communities, hereafter referred to collectively as rangeland. Grasshopper suppression activities would primarily occur in rangeland vegetation communities, although other habitat types may be protected if they are adjacent to treated areas. A healthy rangeland plant community consists of a composition of native plant species in a mix of successional stages that is capable of regeneration. Rangeland plants such as perennial grasses and shrubs are key components in soil and moisture retention in Wyoming's windswept plains. Healthy rangelands create valuable forage and habitat for livestock and wildlife.

Shortgrass prairie in Wyoming is mostly found in the southeast corner of the state. They are dominated by buffalograss (*Buchloe dactyloides*) and blue grama (*Bouteloua gracilis*), both low-growing, warm-season perennial grasses. Mixed-grass prairie is found across most of the eastern part of the state, and typically receives more precipitation and has greater diversity than shortgrass prairie. Common grasses include needle-and-thread (*Hesperostipa comata*), western wheatgrass (*Pascopyrum smithii*), blue grama, Sandberg bluegrass (*Poa sandbergii*), prairie junegrass (*Koeleria macrantha*), and Indian ricegrass (*Achnatherum hymenoides*). Both types of grassland are found on rolling hills and plains at elevations of 3,100 to 7,200 feet (Knight 1996).

Shrub steppe is dominated by sagebrush (*Artemisia tridentata*), greasewood (*Sarcobatus vermiculatus)*, saltbush (*Atriplex confertifolia*), and rabbitbrush (*Chrysothamnus viscidiflorus* and *Ericameria nauseosa*) with an understory of perennial grasses such as blue grama, needle-and-thread, Idaho fescue (*Festuca idahoensis*), and Sandberg's bluegrass. Shrub steppe habitat is found throughout much of central Wyoming on rolling hills, plains, and rocky slopes. Shrub stands may vary in composition from a single species to a mosaic and stand density can be sparse, patchy, or dense. Other species present can include antelope bitterbrush (*Purshia tridentata*), Mormon tea (*Ephedra viridis*), winterfat (*Krascheninnikovia lanata*), and spiny hopsage (*Grayia spinosa*).

Juniper woodland in Wyoming includes both Utah (*Juniperus osteosperma*) and Rocky Mountain juniper (*Juniperus scopulorum*), typically found from 4,000 to 6,000 feet in ravines and escarpments with very dry, sandy, or rocky soils. The two species infrequently form mixed stands and more commonly occur as patchy habitat made up of a single species. Juniper woodland is usually associated with mountain-foothills shrub and shrub-steppe habitat. Understory shrubs include big sagebrush, mountain mahogany (*Cercocarpus* spp.), rabbitbrush, and antelope bitterbrush.

Mountain-foothills shrub is composed of pure or mixed shrub stands that can include but are not limited to mountain mahogany, serviceberry (*Amelanchier sp.)*, Gambel oak (*Quercus gambelii),*

antelope bitterbrush, skunkbush sumac (*Rhus trilobata)*, snowberry (*Symphoricarpos spp.),* hawthorn (*Crataegus sp.),* wild plum (*Prunus americana*), chokecherry (*Prunus virginiana*), and boxelder (*Acer negundo)*. Mountain-foothills shrub typically occurs as patchy habitat and is frequently found in a mosaic of sagebrush and perennial grasses.

Threatened and Endangered Plants

Table 5 displays federal special status plant species present in Wyoming. Information presented in the table regarding habitat requirements was obtained from NatureServe (2010). Based on habitat requirements detailed below, blowout penstemon and desert yellowhead are the only species which may occur within treatment areas. Colorado butterfly plant and Ute ladies' tresses will not be discussed further due to riparian or wetland habitat requirements, which are precluded from treatment.

Table 5. Federally-listed plant species present in Wyoming.

Common Name ***Scientific Name***	**Federal Status***	**Habitat**	**County Occurrence (Field Office)**
Colorado Butterfly Plant *Gaura neomexicana* var. *coloradensis*	T	Subirrigated, alluvial soils on level or slightly sloping floodplains and drainage bottoms, in low depressions or along bends in wide, meandering stream channels; 5,000-6,400 feet	Laramie, Platte (Rawlins)
Blowout Penstemon *Penstemon haydenii*	E	Sparsely vegetated sandy blowouts in the early stages of plant community development on 60-120 feet high sand dunes and sandy aprons at the base of mountains and ridges; 5,800-7,500 feet	Carbon (Rawlins)
Ute Ladies' Tresses *Spiranthes diluvialis*	T	Moist valley bottoms with groundwater-fed small perennial streams with well-drained soils which remain moist through most of the growing season; 1,800-7,000 feet	Converse, Goshen, Laramie, Niobrara (Casper, Newcastle, Rawlins)
Desert Yellowhead *Yermo xanthocephalus*	T	Aridic sandstone and limestone soils with high concentrations of volcanic ash in wind-carved deflation hollows and on barren low slopes or erosional fans below sandstone mesas; 6,700 feet	Fremont (Lander)

*T = Threatened, E = Endangered

Blowout Penstemon

Three populations of blowout penstemon occur in the northeastern corner of the Great Divide Basin in Carbon County on BLM and state land in the western Seminoe Mountains, eastern Ferris Mountains, and on the Pedro Mountains foothills (Heidel 2005). This species is regionally endemic to the Nebraska Sandhills. Blowout penstemon is one of the first plants to populate rims and lee slopes of sand dune blowout depressions and is restricted to sparsely vegetated habitats with less than 5 percent cover (Fertig 2000) in the early stages of plant community development. Associated species are blowout grass *(Redfieldia flexuosa)*, lemon scurf-pea *(Psoralidium lanceolatum)*, thickspike wheatgrass *(Elymus lanceolatus*) and Indian ricegrass. In Wyoming blowout penstemon blooms in June and is pollinated by twenty-six species of solitary bees and one bee-like wasp. The absence of blowout penstemon from other active blowouts and undulating sand dune fields found in central and eastern Wyoming is likely due to a lack of soil moisture during the growing season and the stage in development of local plant communities.

Desert Yellowhead

Desert yellowhead has a single population in the Beaver Rim area of Fremont County surrounded by 360 acres of designated critical habitat. Populations occur mostly in sparsely vegetated cushion plant communities in wind-carved deflation hollows and on barren low slopes or erosional fans below sandstone mesas. Associated species include Indian ricegrass, Hookers sandwort (*Arenaria hookeri*), spiny milkvetch (*Astragalus kentrophyta*), tufted cryptantha (*Cryptantha caespitosa*), rayless tansyaster (*Haplopappus nuttallii*), Gordon's ivesia (*Ivesia gordonii*), musk phlox (*Phlox muscoides*), Beaver Rim phlox (*P. pungens*), and wooly groundsel (*Packera canus*). Desert yellowhead is typically absent from surrounding areas dominated by Wyoming big sagebrush (*Artemisia tridentata* var. *wyomingensis*), bluebunch wheatgrass, and needle-and-thread (Heidel 2002). Desert yellowhead starts to flower in late June and continues until the end of the growing season. Specific pollinator species are unknown.

BLM Sensitive Plants

Plant species listed on the 2009 BLM Wyoming sensitive species list and their associated habitat types and locations are presented in Table 6. Habitat information was obtained from NatureServe (2010) and from state species abstracts archived by the Wyoming Natural Diversity Database. Forty species are listed but all have little potential to occur within grasshopper suppression treatment areas due to specific habitat requirements and/or remote locations. Several species occur in riparian/wetland habitats or forested areas, which are precluded from treatment; others are found at elevations of 7,500 feet or higher where grasshopper treatments would likely not occur. The remaining species are found in sparsely vegetated habitats and/or have very limited population sizes in remote locations.

Table 6. BLM sensitive plant species present in Wyoming.

Common Name ***Scientific Name***	**Habitat**	**County Occurrence (Field Office)**
Meadow Pussytoes *Antennaria arcuata*	Moist, hummocky meadows, seeps or springs surrounded by sagebrush/grasslands dominated by tufted hairgrass (*Deschampsia cespitosa*), baltic rush *(Juncus balticus)*, Kentucky bluegrass (*Poa pratensis*), Sandberg bluegrass, prairie junegrass, and clustered field sedge (*Carex praegracilis*), and/or silver sagebrush (*Artemisia cana*) and shrubby cinquefoil (*Dasiphora fruticosa*); 4,950-7,900 feet	Fremont, Sublette (Lander, Rock Springs)
Laramie Columbine *Aquilegia laramiensis*	Shady crevices and ledges in large granite boulders or cliffs with thin soils, within forests of subalpine fir/ponderosa pine (*Abies lasiocarpa/Pinus ponderosa)* or ponderosa pine/quaking aspen (*Populus tremuloides*); 5,400-10,100 feet	Albany, Converse (Casper, Rawlins)
Porter's Sagebrush *Artemisia porteri*	Very sparsely vegetated badlands of pale, ashy or tufaceous (volcanic) mudstones and clay slopes; 5,300-6,500 feet	Fremont, Johnson, Natrona (Buffalo, Casper, Lander)
Meadow Milkvetch *Astragalus diversifolius*	Moist, often alkaline meadows, ditch banks, and swales in the sagebrush zone; 4,400-6,300 feet	Sweetwater (Rock Springs)
Dubois Milkvetch *Astragalus gilviflorus* var. *purpureus*	Sparsely vegetated cushion plant/bunchgrass communities on sandy-clay soils with abundant surface gravel; 6,900-8,800 feet	Fremont (Lander)
Hyattville Milkvetch *Astragalus jejunus* var. *articulatus*	Sparsely vegetated stony ridges and barren red clay slopes; 4,900-5,900 feet	Big Horn (Worland)
Precocious Milkvetch *Astragalus proimanthus*	Sparsely vegetated rims and gullied upper slopes of benches, bluffs, and mesa-like ridges in cushion plant/bunchgrass communities dominated by hood phlox (*Phlox hoodii*), rayless tansyaster, silky cryptantha (*Cryptantha sericea)*, and bluebunch wheatgrass in openings within big sagebrush or Utah juniper grasslands, with rocky, clay soils mixed with shale; 6,800-7,200 feet	Sweetwater (Rock Springs)
Trelease's Milkvetch *Astragalus racemosus* var. *treleasei*	Sparsely vegetated outwash flats and fluted badlands slopes derived from shale. Associated species include thickspike wheatgrass, rubber rabbitbrush, green rabbitbrush, and shadscale saltbush; 6,500-7,500 feet	Sublette, Uinta (Kemmerer, Pinedale)
Small Rock Cress *Boechera pusilla*	Cracks/crevices in sparsely vegetated, coarse granite soil in granite-pegmatite outcrops surrounded by sagebrush grassland; 8,000-8,100 feet	Fremont (Rock Springs)

Common Name ***Scientific Name***	**Habitat**	**County Occurrence (Field Office)**
Slender Moonwort *Botrychium lineare*	Montane forests or meadow habitats; 4,900-9,800 feet	Crook, Weston (Newcastle)
Cedar Rim Thistle *Cirsium aridum*	Sparsely vegetated openings within Wyoming big sagebrush grasslands on barren, chalky hills, gravelly slopes, and fine textured, sandy-shaley draws; 5,800-7,500 feet	Carbon, Fremont, Sublette, Sweetwater (Lander, Rawlins, Rock Springs)
Ownbey's Thistle *Cirsium ownbeyi*	Sparsely vegetated openings within a matrix of big sagebrush, shadscale saltbush, green rabbitbrush, antelope bitterbrush, Utah juniper, mountain mahogany, or serviceberry on semi-barren rims or steep slopes of broken gray slate below shaley cliffs; 6,440-8,400 feet	Sweetwater (Rock Springs)
Many-stemmed Spider-flower *Cleome multicaulis*	Margins of moist, slightly saline depressions, such as alkali sinks, alkaline meadows, and old lake beds; 5,900 feet	Natrona (Casper)
Owl Creek Miner's Candle *Cryptantha subcapitata*	Sandy-gravelly slopes and desert ridges on sandstones in sparsely vegetated cushion plant communities, often dominated by rock tansy (*Sphaeromeria capitata*) or black sagebrush (*Artemisia nova*); 4,700-6,000 feet	Fremont (Lander)
Evert's Wafer-Parsnip *Cymopterus evertii*	Montane forests on dry, rocky, often disturbed ridges, in meadows, or along sandstone ridges with scattered limber pine (*Pinus flexilis*) and Utah juniper; 5,900-10,900 feet	Hot Springs, Park (Cody)
Williams' Wafer-Parsnip *Cymopterus williamsii*	Open ridgetops and upper slopes with exposed limestone outcrops or talus. Associated plants include prostrate milkvetch (*Astragalus miser* var. *decumbens*), tufted milkvetch (*Astragalus spatulatus*), alpine bladderpod (*Lesquerella alpine*), spreading nailwort (*Paronychia depressa*), and stemless four-nerve daisy (*Tetraneuris acaulis*). Usually absent or very sparse where grass cover is high; 6,000-8,300 feet	Big Horn, Johnson, Natrona, Washakie (Buffalo, Casper, Worland)
Wyoming Tansymustard *Descurainia torulosa*	Sparsely vegetated sandy slopes at base of cliffs of volcanic breccia or sandstone; 7,700-10,000 feet	Fremont, Park, Sweetwater, Teton (Rock Springs)
Dune Wildrye *Elymus simplex* var. *luxurians*	Drifting sand dunes; 7,130 feet	(Rock Springs)
Winward's narrow leaf goldenweed *Ericameria winwardii*	Barren clay shale slopes and silty clay out-wash from outcrops at 6,790-7,000 feet	(Kemmerer)

Common Name ***Scientific Name***	**Habitat**	**County Occurrence (Field Office)**
Entire-leaved Peppergrass *Lepidium integrifolium* var. *integrifolium*	Sparsely vegetated and seasonally saturated clay flats, greasewood communities on clay hummocks, and moist alkaline meadows; 6,200-6,770 feet	Lincoln, Uinta (Kemmerer)
Sidesaddle Bladderpod *Lesquerella arenosa* var. *agrillosa*	Dry, open rock outcrops of gravel, shale, or limestone and barren, often seleniferous, roadsides and in dry open areas within grasslands or badlands; 4,200-4,300 feet	Niobrara (Newcastle)
Fremont Bladderpod *Lesquerella fremontii*	Meadows, slopes, ridges, and benches in cushion plant communities on rocky, mesic, limestone derived soils. Associated plants include threetip sagebrush (*Artemisia tripartita*), hoary balsamroot (*Balsamorhiza incana*), cous biscuitroot (*Lomatium cous*), hood phlox, flowery phlox (*Phlox multiflora*), and sword Townsend daisy (*Townsendia spathulata*); 7,000-9,000 feet	Fremont (Lander)
Large-fruited Bladderpod *Lesquerella macrocarpa*	Sparsely vegetated Gardner's saltbush-squirreltail (*Atriplex gardneri-Elymus elymoides*) communities on low hills, knolls, and colluvial fans with barren, fine-textured clays and shales, often with gypsum or bentonite. It is usually absent from areas dominated by sagebrush or high grass cover; 6,800-7,700 feet	Fremont, Lincoln, Sweetwater, Sublette (Kemmerer, Pinedale, Rock Springs)
Prostrate Bladderpod *Lesquerella prostrata*	Cushion plant or sparse sage grassland communities on slopes and rims of whitish to reddish or gray limey clays and soft sandstones with a surface layer of fine gravel. Associated plants include shortstem buckwheat (*Eriogonum brevicaule* var. *laxifolium*), Douglas's dusty maiden (*Chaenactis douglasii*), tufted cryptantha, tufted twinpod (*Physaria condensata*), Sandberg bluegrass, bluebunch wheatgrass, Indian ricegrass, Wyoming big sagebrush, and green rabbitbrush; 7,200-7,700 feet	Lincoln, Uinta (Kemmerer)
Absaroka Beardtongue *Penstemon absarokensis*	Sparsely vegetated slopes, rocky ridges, and creek bottoms on loose volcanic rubble or outcrops of dry andesitic volcanic rock; 5,920-10,000 feet	Fremont, Park (Cody)

Common Name ***Scientific Name***	**Habitat**	**County Occurrence (Field Office)**
Stemless Beardtongue *Penstemon acaulis* var. *acaulis*	Sparsely vegetated cushion plant/bunchgrass communities in openings within black sagebrush grasslands on low slopes, outwash fans, ridgetops, and flats. Often dominated by Torrey's four-nerve daisy (*Hymenoxys torreyana*), tufted milkvetch, hood phlox, Sandberg bluegrass, needle-and-thread, and bluebunch wheatgrass (Fertig and Welp 2001); 5,900-8,200 feet	Sweetwater (Rock Springs)
Gibbens' Beardtongue *Penstemon gibbensii*	Sparsely vegetated grasslands of bluebunch wheatgrass, Indian ricegrass and needle-and-thread with scattered shrubs on shale or sandstone slopes; 5,500-7,700 feet	Carbon, Sweetwater (Rock Springs)
Beaver Rim Phlox *Phlox pungens*	Sparsely vegetated cushion plant communities on slopes on sandstone, siltstone, red-bed clays or limestone substrates; 6,000-7,400 feet	Fremont, Lincoln, Sublette (Kemmerer, Lander, Pinedale, Rock Springs)
Tufted Twinpod *Physaria condensata*	Sparsely vegetated cushion plant communities in openings within sagebrush grassland on dry, rocky calcareous knolls and ridges, clay banks, and shaley hills; 6,500-7,000 feet	Lincoln, Sublette, Uinta (Kemmerer, Pinedale, Rock Springs)
Dorn's Twinpod *Physaria dornii*	Openings within sparsely vegetated communities of mountain mahogany, Indian ricegrass, and Sandberg bluegrass on dry, calcareous-shaley soils on slopes and ridges; 6,500-7,200 feet	Lincoln, Uinta (Kemmerer)
Rocky Mountain Twinpod *Physaria saximontana* var. *saximontana*	Sparsely vegetated rocky slopes on sandy, gravelly soils, or talus of limestone, red sandstone, or clay; 5,600-8,300 feet	Carbon, Fremont, Hot Springs, Park (Lander, Worland)
Whitebark Pine *Pinus albicaulis*	Montane forests and on thin, rocky, cold soils at or near timberline; 4,200-12,000 feet	Fremont, Hot Springs, Lincoln, Park, Sublette, Teton (Cody, Kemmerer, Lander, Pinedale, Worland)
Limber Pine *Pinus flexilis*	Dry rocky sites, throughout forested regions on more mesic sites, especially in low density, open areas; 4,900-12,000 feet	15 Counties (8 Field Offices)
Persistent Sepal Yellowcress *Rorippa calycina*	Moist sandy to muddy banks of streams, stock ponds, and man-made reservoirs near the high-water line; 3,660-6,800 feet	Albany, Bighorn, Carbon, Fremont, Park, Sweetwater, Washakie (Cody, Lander, Rawlins, Worland)
Shoshonea *Shoshonea pulvinata*	Sparsely vegetated sites on shallow, stony calcareous soils of exposed limestone outcrops, ridgetops, and talus slopes; 5,900-9,200 feet	Fremont, Hot Springs, Park (Cody, Worland)

Common Name ***Scientific Name***	**Habitat**	**County Occurrence (Field Office)**
Laramie False Sagebrush *Sphaeromeria simplex*	Cushion plant communities on rocky limestone ridges and gentle slopes; 7,500-8,600 feet	Albany, Carbon, Converse, Natrona (Casper, Rawlins)
Green River Greenthread *Thelesperma caespitosum*	Sparsely vegetated cushion plant communities on white shale slopes and ridges of Green River Formation; 6,300 feet	Sweetwater (Rock Springs)
Uinta Greenthread *Thelesperma pubescens*	Sparsely vegetated cushion plant communities and sagebrush grassland benches and ridges on coarse, cobbly soils of Bishop Conglomerate; 8,200-8,900 feet	Sweetwater, Uinta (Rock Springs)
Cedar Mountain Easter Daisy *Townsendia microcephala*	Exposed, west-facing rocky upper slopes and ridges; 8,200-8,500 feet	Sweetwater, Uinta (Rock Springs)
Barneby's Clover *Trifolium barnebyi*	Ledges, crevices, and seams on reddish-cream Nugget Sandstone outcrops; 5,600-6,700 feet	Fremont (Lander)

Non-native, Invasive Plants

Portions of native rangeland in Wyoming have been affected by the introduction of non-native, invasive plants. Invasive plants include both noxious weeds and other introduced, non-native plants and usually have no natural enemies to limit their reproduction and spread. Legally, a noxious weed is any terrestrial or aquatic plant designated by a federal, state or county government as injurious to public health, agriculture, recreation, wildlife or property (Sheley et al. 1999). In Wyoming there are 25 state-listed noxious weeds (USDA Plants 2010) and 23 additional invasive plant species (Global Invasive Species Database 2010).

Invasive species are generally adept at colonizing disturbed sites, often out-competing native vegetation by faster growth, more prolific seed set and more successful seed germination. Disturbed areas with decreased native vegetative cover – such as could result in grasshopper outbreak areas – can quickly play host to invasive weeds. These species can quickly form a monoculture which reduces plant and animal diversity and wildlife habitat value. Most weedy annuals do not have extensive root systems and contribute to soil erosion. The majority of invasive plants prove unpalatable to cattle and wildlife. If not eradicated or controlled, noxious weeds and other invasives persist and multiply and often cause permanent damage. The restoration of native species and habitat conditions in ecosystems that have been invaded is often slow, difficult and expensive.

3.5 Wildlife Resources

General Wildlife

Wildlife in Wyoming is primarily managed by Wyoming Game and Fish Department (WGFD) and USFWS. Many wildlife species are found on BLM-administered lands and BLM management goals emphasize the protection of important wildlife habitats. Wildlife classifications include: big game (e.g., elk, mule deer, white-tailed deer, moose, pronghorn, black

bear, mountain lion, and big horn sheep), small mammals (e.g., mice, voles, rabbits, skunk, badger, gopher, squirrels, etc.), game birds, non-game birds, reptiles, amphibians, and fish.

Threatened, Endangered, and Candidate Animals

Under Section 7 of the ESA, federal agencies are required to consult with the USFWS regarding the degree of impact to federally proposed and listed species and critical habitat from program actions, together with necessary protective measures to avoid or minimize adverse effects. Eight wildlife species currently present in Wyoming are afforded protection under the ESA or are candidates for protection. These include four mammals, two birds, one amphibian, and one fish (Table 7). The order and level of detail in which the following ESA-listed species are discussed is based on the potential for and significance of impacts from actions proposed in this EA.

Table 7. Federally-listed animal species present in Wyoming.

Common Name ***Scientific Name***	**Federal Status***	**Habitat**	**County Occurrence (Field Office)**
Greater Sage-Grouse *Centrocercus urophasianus***	C	Sagebrush steppe and grasslands	Albany, Carbon, Crook, Fremont, Hot Springs, Lincoln, Natrona, Niobrara, Park, Sublette, Sweetwater, Uinta, Weston (Buffalo, Casper, Cody, Kemmerer, Lander, Newcastle, Pinedale, Rawlins, Rock Springs, Worland)
Black-footed Ferret *Mustela nigripes*	EXP	Prairie dog towns, located in open grassland and shrubland habitat	Albany, Carbon, Fremont, Hot Springs, Lincoln, Natrona, Park, Sublette, Sweetwater, Uinta (Casper, Kemmerer, Lander, Newcastle, Rawlins, Rock Springs,)
Yellow-billed Cuckoo *Coccyzus americanus***	C	Open woodlands, streamside willow and alder groves	Carbon, Fremont, Lincoln, Sublette, Sweetwater, Teton, Uinta (Buffalo, Casper, Cody, Kemmerer, Lander, Newcastle, Pinedale, Rawlins, Rock Springs, Worland)
Gray Wolf *Canis lupus*	EXP	Greater Yellowstone ecosystem forests, basin-prairie shrub	Fremont, Hot Springs, Lincoln, Park, Sublette, Teton (Cody, Casper, Kemmerer, Lander, Pinedale, Worland)
Grizzly Bear *Ursus arctos horribilis*	T	Montane forests, Conifer and deciduous forests	Fremont, Hot Springs, Lincoln, Park, Sublette, Teton (Cody, Kemmerer, Lander, Pinedale, Worland)
Canada Lynx *Lynx canadensis*	T	Montane forests, Conifer forests, woodland-chaparral	Albany, Carbon, Fremont, Hot Springs, Johnson, Lincoln, Park, Sweetwater, Sublette, Teton (Cody, Kemmerer, Lander, Pinedale)
Wyoming Toad *Bufo baxteri =hemiophrys*	E	Permanent and temporary waters	Albany (Rawlins)
Kendall Warm Springs Dace *Rhinichthys osculus thermalis*	E	Aquatic habitat	Sublette (Pinedale, Rock Springs)

*T = Threatened, E = Endangered, C = Candidate, EXP = Experimental, non-essential
**Also classified as a BLM Sensitive species until permanently listed for protection under ESA.

Greater Sage-Grouse

On March 5, 2010, the USFWS announced that listing of the greater sage-grouse as an endangered species under the ESA is warranted, but listing is precluded by the need to complete other listing actions of higher priority. As a result, the greater sage-grouse (hereafter referred to as sage-grouse) has been placed on the candidate list for future action, meaning the species will not receive statutory protection under the ESA and that individual states continue to be responsible for their management.

Sage-grouse is designated as a BLM sensitive species, in accordance with BLM special status species policy (BLM Manual 6840; USDI BLM 2001b). Wyoming BLM policy is to manage sage-grouse seasonal habitats and maintain habitat connectivity to support population objectives defined by the WGFD. This is consistent with guidelines provided in the Governor's Sage-Grouse Implementation Team's Core Population Area strategy and the Governor's Executive Order 2008-2 (Wyoming 2008). This policy is also consistent with the BLM National Sage-grouse Habitat Conservation Strategy (USDI BLM 2004d) and BLM Instruction Memoranda WY-2010-012 and 2010-071. Sage-grouse core areas were delineated to capture a minimum of two-thirds of the habitats and populations of sage-grouse in Wyoming, and continue to be refined based on recent mapping of suitable and occupied habitat. Suitable habitat outside currently delineated core areas may also be highly important to sage-grouse in order to maintain connectivity between core areas.

Wyoming historically supports larger populations of sage-grouse than any other state (Patterson 1952, USFWS 2010a) due to the high percentage (approximately 50 percent) of land area that is composed of sagebrush habitats. Currently delineated sage-grouse core areas cover approximately 14.9 million acres, of which more than 52 percent are found on BLM-administered lands (Figure 5).

Sage-grouse are the largest North American grouse species, with a historical range covering much of the sagebrush-dominated ecosystems of North America. It has been extirpated from five states and one Canadian province, and now occupies only 56 percent of its likely distribution prior to European settlement (Schroeder et al. 2004). Populations over the remainder of its range have declined an average of 2 percent per year from 1965-2003 (Connelly et al. 2004). Conservative estimates indicate that 50 percent of its original range is no longer capable of supporting sage-grouse on an annual basis (Braun et al. 1976, Braun 1995). Changes in land use and land development are the primary causes of habitat loss, while habitat degradation is a complicated interaction among many factors including drought, livestock grazing, changes in natural fire regimes, and the spread of invasive, non-native species (Connelly et al. 2004).

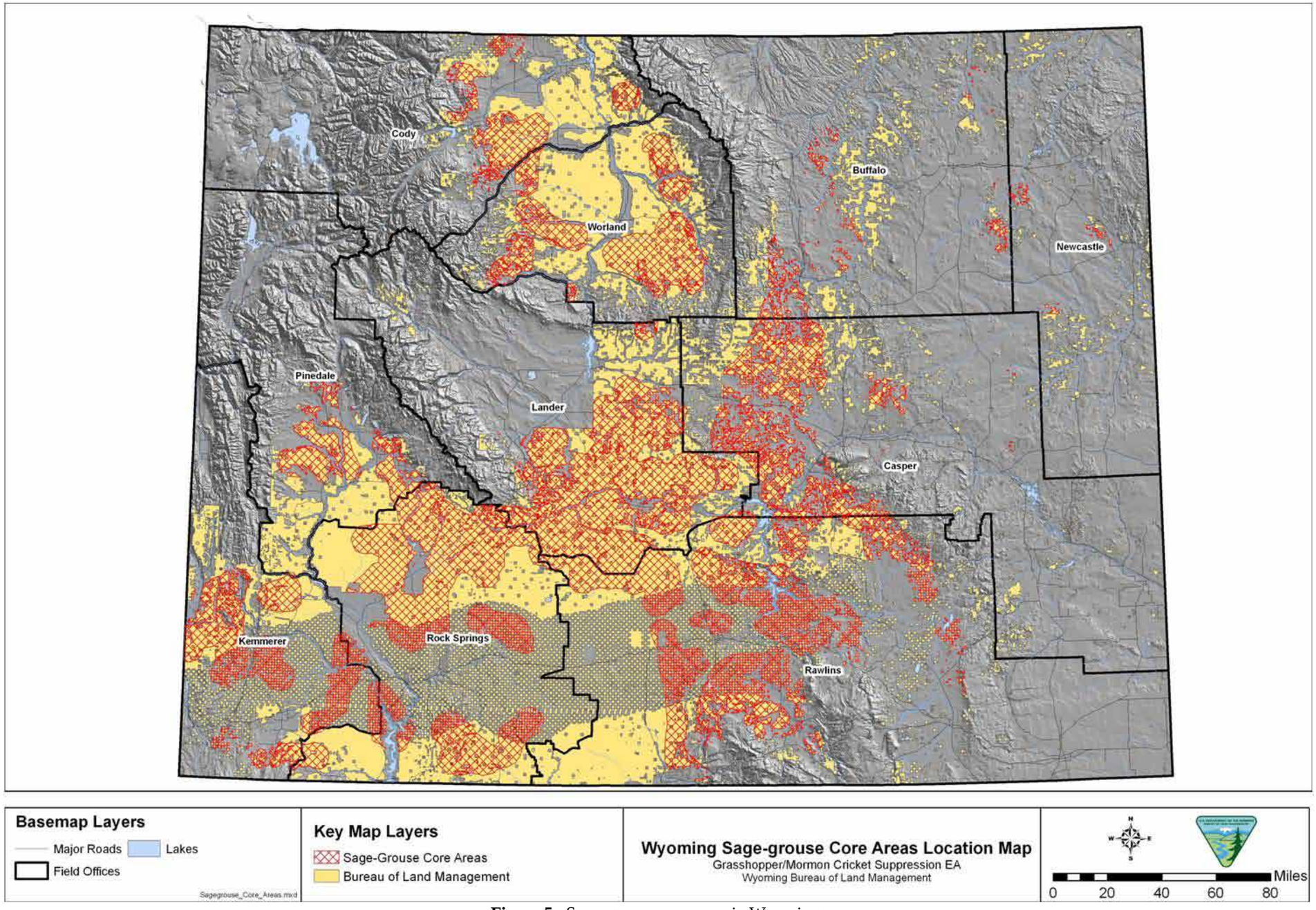

Figure 5. Sage-grouse core areas in Wyoming.

Sage-grouse are considered to be a sagebrush obligate species, requiring large interconnected expanses of sagebrush with healthy, native understories (Connelly et al. 2004). Habitat requirements vary throughout its life cycle. Sage-grouse display strong site fidelity (loyalty to a particular area even when that area is no longer suitable) to seasonal habitats, including breeding, nesting, brood rearing, and wintering areas (Connelly et al. 2004). Adult sage-grouse rarely switch between these habitats once they have been selected, limiting their adaptability to habitat changes. Site fidelity is displayed by both migratory and non-migratory sage-grouse populations. Migratory populations make long distance movements (greater than 6 miles one way) between seasonal ranges. These long distance movements may take place in stages between 2 or 3 distinct seasonal ranges. Non-migratory populations do not make such long distance movements between seasonal ranges (Connelly et al. 2000). The following descriptions of sage-grouse diet and seasonal use areas are derived from the Wyoming Sage-grouse Conservation Plan (WGFD 2003), where they are discussed in greater detail.

Leks

Breeding occurs on strutting grounds (leks) during late March and April. A lek is typically an open area surrounded by potential nesting habitat. The common feature of leks is that they have less shrub and herbaceous cover than surrounding areas. During breeding, sage-grouse use the sagebrush habitat surrounding a lek for foraging, loafing, and protection from weather and predators. Plant composition in early spring habitat contributes to nesting success. At green-up, forbs are more nutritious than sagebrush. Sage-grouse hens need protein, calcium, and phosphorus rich foods to support nest initiation, increase clutch size, and improve hatch success as well as early chick survival. Low growing leafy forbs, especially milky-stemmed composites (e.g., dandelion), represent potential food forbs. Common forb species that serve as important food sources include common dandelion (*Taraxacum officinale*), curlycup gumweed (*Grindelia squarrosa*), western salsify (*Tragopogon dubius*), western yarrow (*Achillea lanulosa*), prickly lettuce (*Lactuca serriola*), cudweed (*Gnaphalium palustre*), fleabane (*Erigeron* spp.), sweetclover (*Melilotus officinalis*), milkvetch (*Astragalus bisulcatus*), and alfalfa (*Medicago sativa*).

Nesting Habitat - Late Spring

Approximately two-thirds of sage-grouse hens nest within 3 miles of the lek where they were bred. The remaining one-third usually nest within 15 miles of the lek. Nesting habitat for sage-grouse in Wyoming generally consists of sagebrush stands with canopy cover of 15 to 30 percent and shrub heights of 11 to 32 inches. Dense residual grasses at least as tall as the bottom of the canopy on mid-height sagebrush appear to positively influence hatching success. Hatching success also appears to improve with increased forb cover and diversity.

Early Brood-Rearing Habitat - June to Mid-July

Early brood-rearing habitats are used during the first month of life. Sage-grouse hens move their brood immediately upon hatching from the nest site to brood-rearing areas. Sites used during the first 10 to14 days after hatching are typically within 1.5 miles of the nest. After the first 10 days, broods may have dispersed 5 or more miles from the nest. Early brood-rearing habitat generally has 10 to 25 percent sagebrush canopy cover and has slightly higher canopy cover of grasses and forbs than nesting habitat.

Brood survival is tied to an abundance of insects and green vegetation, primarily forbs, in close proximity to sagebrush cover that provides adequate protection from weather and predators. Important forb species for chick survival are very similar to those listed for pre-laying hens.

Insects as a food source are crucial during the first 10 days to three weeks post-hatch, supplying up to 75 percent of chick diets. Grasshoppers, ants, and beetles are the most commonly utilized insects (Patterson 1952). Insects remain an important source of protein throughout the summer.

Late Brood-Rearing Habitat - Mid-July through Mid-September
As summer progresses and food plants mature and dry, sage-grouse move to areas still supporting succulent herbaceous vegetation. They continue to rely on adjacent sagebrush for protection from weather and predators, and for roosting and loafing. From mid to late summer, wet meadows, springs and streams are the primary sites that produce the forbs and insects necessary for juvenile birds. The drier the summer, the more sage-grouse are attracted to the remaining green areas.

Winter Habitat
During winter, sage-grouse feed almost exclusively on sagebrush leaves and buds. Suitable winter habitat requires sagebrush above snow and sage-grouse tend to select wintering sites where sagebrush is exposed 10 to14 inches. Exposed sagebrush canopy cover ranges from 10 to 30 percent.

Black-Footed Ferret

The black-footed ferret was designated as endangered in March 1967 under a precursor to the ESA (32 FR 4001). Black-footed ferrets are small, nocturnal, specialized carnivores closely associated with prairie dog towns. Ferrets rely almost entirely on these rodents as prey, and also use prairie dog burrows for denning and shelter. Their precipitous decline is primarily due to factors impacting prairie dog complexes, including habitat conversion for farming, prairie dog eradication efforts, sylvatic plague, oil and gas development, and recreational shooting (USDI BLM 2005a). An additional threat is canine distemper, which is invariably fatal to ferrets (NGPC 2010).

Black-footed ferrets were considered extinct until a small population was discovered near Meeteetse, Wyoming, in 1981. Following outbreaks of distemper, surviving ferrets were brought into captivity and a breeding program was initiated, which led to their reintroduction to suitable habitat in the Shirley Basin, Wyoming in 1991. The Shirley Basin is a mixed ownership area and includes approximately 487,000 acres of BLM-administered land. Shirley Basin ferrets are successfully reproducing in the wild and are listed as an experimental, non-essential population, allowing for more flexible management guidelines. No other populations are known to occur in Wyoming; any that are found would be classified as endangered (USDI BLM 2005). Black-footed ferrets have also been reintroduced to Colorado, Utah, South Dakota, Arizona, and Montana.

Western Yellow-billed Cuckoo

The Distinct Population Segment of the yellow-billed cuckoo west of the Continental Divide is a candidate for listing under the ESA (66 FR 143). Yellow-billed cuckoos are riparian obligates, requiring extensive areas of woody, riparian vegetation that combine a dense shrubby understory for nesting and a cottonwood overstory for foraging. Major threats to this species stem from the destruction, degradation, and fragmentation of wooded, riparian habitats. Yellow-billed cuckoos are primarily insectivorous; preferred food items include large caterpillars and grasshoppers. The loss of prey due to pesticide use, coupled with direct impacts from pesticide toxicity, may also be contributing to their decline (Wiggins 2005).

Gray Wolf

The gray wolf was designated as endangered in 1967 (32 FR 4001). Wolves in Wyoming are classified as an experimental, non-essential population. Prey availability, especially large ungulates, is critical to habitat selection. In 2009, a minimum of 320 wolves in at least 44 packs (27 breeding pairs) inhabited Wyoming, including Yellowstone National Park. The Wyoming wolf population increased approximately 6 percent from 2008, with approximately 70 percent of the population outside park boundaries (USFWS 2010b). Wolves are found primarily in the western portions of the state with the densest population located in the northwest portion of the state surrounding and including Yellowstone National Park (Jimenez et al. 2010).

Grizzly Bear

The grizzly bear was listed as endangered in 1967 and subsequently reclassified as threatened in 1975 (40 FR 31734-31736). The Yellowstone Distinct Population Segment was delisted in 2007. On September 21, 2009, the Federal District Court in Missoula, Montana vacated the delisting; in compliance with this order, the Yellowstone population is once again classified as threatened. In Wyoming, the Yellowstone population inhabits the Greater Yellowstone Area, including Grand Teton National Park and portions of adjacent national forest and private lands, extending south in the Wind River Range to Green River Lakes. Potential habitat for grizzly bears also exists in forested regions of the Wyoming Range. Grizzly bears can be found in alpine tundra, coniferous forests, mountain-foothills shrublands, riparian shrub, and mountain-foothills grassland. Major threats to this species include habitat alienation, alteration, and loss; increased access to wilderness; and hunting (both legal and illegal) (NatureServe 2010).

Canada Lynx

The Canada lynx was designated as threatened in 2000 (65 FR 16051 16086). Typically, this large, snow-adapted cat is associated with high-elevation forested areas that support ample populations of snowshoe hares and other preferred prey species. Forested landscapes containing a variety of seral stages provide foraging, denning, and travel or dispersal habitats for Canada lynx. Lynx use woody debris, such as downed logs and windfalls, to provide denning sites with security and thermal cover for kittens. The size of their home range varies by gender, abundance of prey, season, and population density. The complexities of lynx life-history and lack of current data for the contiguous United States make it difficult to ascertain present population status. Extensive potential habitat occurs in the Wind River Mountains and the Wyoming Range.

Wyoming Toad

The Wyoming toad, designated as endangered in 1984 (49 FR 1992-1994), is considered to be extinct in the wild. This species is endemic to Wyoming and historically was associated with floodplain ponds in the Laramie Basin. The sole known population at Mortenson Lake National Wildlife Refuge is maintained by the release of captive-reared young. Adult toads are insectivorous, eating ants, beetles, and other invertebrates. Their activity level varies seasonally. In early summer, Wyoming toads are active during daylight hours but may become nocturnal in later summer as it becomes hotter and drier (USDI BLM 2005b). The Wyoming toad's historic range is fully contained within the Rawlins Field Office boundaries; there are no known historic or currently active breeding sites on BLM-administered lands. The great majority (88 percent) of primary and secondary Wyoming toad habitat is found on privately owned lands; a relatively small portion of primary (5 percent, 2,393 acres) and secondary (less than 0.1 percent, 29 acres) habitat is located on BLM-administered lands (USDI BLM 2005).

Kendall Warm Springs Dace

The Kendall Warm Springs dace was designated as endangered in 1970 (35 FR 16047 16048). It is known from only one location, a series of seeps and thermal springs in Sublette County. The springs extend for approximately 1,000 feet, feeding into the Green River; upstream passage into Kendall Warm Springs from the river is blocked by a waterfall. Threats to the dace include lowering of the water table, contamination in the area surrounding the springs, and destruction of riparian vegetation or in-stream habitat. Kendall Warm Springs are located on the Bridger-Teton National Forest and would not be affected by actions occurring on BLM-administered lands; therefore, this species will not be discussed further in this EA.

BLM Sensitive Animals

Wyoming BLM has designated 40 wildlife species as sensitive, including 11 mammals, 15 birds, 9 fish, 1 reptile, and 4 amphibians (Table 8). Grasshopper treatments would not be conducted within coniferous/deciduous forest habitats; therefore, species occurring solely within these habitats would not be affected and will not be analyzed in greater detail. Similarly, as described in Chapter 2, buffer zones would be used around all aquatic and riparian habitats for both aerial and ground-based application methods. This would ensure that in general, riparian/wetland, and aquatic dwelling species would not be directly affected by treatment. Species will be discussed if during part of their life-cycle they range into adjacent upland habitats or if impacts may result from lack of treatments. Additionally, certain bird species (e.g., bald eagles and other raptors) may experience short-term temporary disturbance impacts associated with both aerial and ground-based pesticide applications and will be discussed in more detail in Chapter 4.

Table 8. BLM sensitive animal species present in Wyoming.

Common Name ***Scientific Name***	**Habitat**	**County Occurrence (Field Office)**
Pygmy Rabbit *Brachylagus idahoensis*	Basin-prairie and riparian shrub	Carbon, Fremont, Lincoln, Natrona, Sublette, Sweetwater, Uinta (Kemmerer, Pinedale, Rock Springs)
Townsend's Big-eared Bat *Corynorhinus townsendii*	Forests, basin-prairie shrub, caves and mines	Albany, Big Horn, Campbell, Carbon, Converse, Crook, Fremont, Goshen, Hot Springs, Johnson, Laramie, Lincoln, Natrona, Niobrara, Park, Platte, Teton, Sheridan, Sweetwater, Sublette, Washakie, Weston, Uinta (Buffalo, Casper, Cody, Lander, Newcastle, Rawlins, Rock Springs, Worland)
White-tailed Prairie Dog *Cynomys leucurus*	Basin-prairie shrub, grasslands	Park, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Natrona, Carbon, Albany (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Kemmerer, Pinedale)
Black-tailed Prairie Dog *Cynomys ludovicianus*	Short-grass prairie	Sheridan, Johnson, Natrona, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Cody, Rawlins, Lander, Casper, Buffalo, Newcastle)
Spotted Bat *Euderma maculatum*	Cliffs over perennial water, basin-prairie shrub	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Niobrara, Carbon,

Common Name ***Scientific Name***	**Habitat**	**County Occurrence** **(Field Office)**
		Albany, Converse, Campbell, Crook, Weston, Platte, Goshen, Laramie (Worland, Cody, Rock Springs, Lander, Casper, Buffalo, Newcastle)
Long-eared Myotis *Myotis evotis*	Conifer and deciduous forests, caves and mines	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Fringed Myotis *Myotis thysanodes*	Conifer forests, woodland-chaparral, caves and mine	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Rawlins, Rock Springs, Casper, Buffalo, Newcastle)
Wyoming Pocket Gopher *Thomomys clusius*	Meadows with loose soil	Carbon, Sweetwater (Rawlins, Rock Springs)
Idaho Pocket Gopher *Thomomys idahoensis*	Shallow stony soils	Lincoln, Sublette, Sweetwater, Uinta (Kemmerer, Pinedale, Rock Springs)
Swift Fox *Vulpes velox*	Grasslands	Sheridan, Washakie, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle)
Preble's Meadow Jumping Mouse *Zapus hudsonius preblei*	Heavily vegetated, shrub-dominated riparian (streamside) zones	Albany, Converse, Goshen, Laramie, Platte (Casper, Rawlins)
Northern Goshawk *Accipter gentilis*	Conifer and deciduous forests	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Niobrara, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Baird's Sparrow *Ammodramus bairdii*	Grasslands, weedy fields	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Lander, Casper, Buffalo, Newcastle)
Sage Sparrow *Amphispiza belli*	Basin-prairie shrub, mountain-foothill shrub	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie,

Common Name ***Scientific Name***	**Habitat**	**County Occurrence (Field Office)**
		Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Burrowing Owl *Athene cunicularia*	Grasslands, basin-prairie shrub	Park, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Ferruginous Hawk *Buteo regalis*	Basin-prairie shrub, grassland, rock outcrops	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Mountain Plover *Charadris montanus*	Short-grass and mixed-grass prairie, openings in shrub ecosystems, prairie dog towns	Park, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Trumpeter Swan *Cygnus buccinator*	Lakes, ponds, rivers	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Natrona, Converse, Crook (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Peregrine Falcon *Falco peregrinus*	Tall cliffs	Park, Teton, Lincoln, Sweetwater, Sublette, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Carbon, Albany, Converse, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Kemmerer, Pinedale)
Bald Eagle *Haliaeetus leucocephalus*	Primarily along rivers, streams, lakes and waterways	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Loggerhead Shrike *Lanius ludovicianus*	Basin-prairie shrub, mountain-foothill shrub	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara,

Common Name ***Scientific Name***	**Habitat**	**County Occurrence (Field Office)**
		Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Long-billed Curlew *Numenius americanus*	Grasslands, plains, foothills, wet meadows	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Sage Thrasher *Oreoscoptes montanus*	Basin-prairie shrub, mountain-foothill shrub	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
White-faced Ibis *Plegadis chihi*	Marshes, wet meadows	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Goshen (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Brewer's Sparrow *Spizella breweri*	Basin-prairie shrub	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Columbian Sharp-tailed Grouse *Tympanuchus phasianellus columbianus*	Grasslands and shrublands	Carbon (Rawlins)
Bluehead Sucker *Catostomus discobolus*	Bear, Snake and Green River drainages, all waters	Teton, Sublette, Lincoln, Uinta, Sweetwater, Carbon (Rawlins, Rock Springs, Kemmerer, Pinedale)
Flannelmouth Sucker *Catostomus latipinnis*	Colorado River drainage, large rivers, streams and lakes	Lincoln, Uinta Sweetwater, Sublette, Carbon (Rawlins, Rock Springs, Kemmerer, Pinedale)
Roundtail Chub *Gila robusta*	Colorado River drainage, mostly large rivers, also streams and lakes	Lincoln, Uinta Sweetwater, Sublette, Carbon (Rawlins, Rock Springs, Kemmerer, Pinedale)
Northern Leatherside Chub *Lepidomeda copei*	Bear, Snake and Green River drainages, clear, cool streams and pools	Teton, Lincoln, Uinta (Rock Springs, Kemmerer, Pinedale)

Common Name ***Scientific Name***	**Habitat**	**County Occurrence (Field Office)**
Hornyhead Chub *Nocomis biguttatus*	Lower Laramie and North Laramie River Watersheds in small to medium sized, moderate to low gradient, clear gravelly streams.	Albany, Platte, Goshen (Rawlins, Rock Springs, Kemmerer, Pinedale)
Yellowstone Cutthroat Trout *Oncorhynchus clarki bouvieri*	Yellowstone drainage, small mountain streams and large rivers	Park, Teton, Fremont, Hot Springs, Washakie, Big Horn, Sheridan (Worland, Cody, Lander, Buffalo, Kemmerer, Pinedale)
Colorado River Cutthroat Trout *Oncorhynchus clarki pleuriticus*	Colorado River drainage, clear mountain streams	Sublette, Lincoln, Uinta, Sweetwater, Carbon (Rawlins, Rock Springs, Kemmerer, Pinedale)
Fine-spotted Snake River Cutthroat Trout *Oncorhynchus clarki spp*	Snake River drainage, clear, fast water	Teton, Lincoln, Sublette, Fremont (Kemmerer, Pinedale)
Bonneville Cutthroat Trout *Oncorhynchus clarki utah*	Bear River drainage, clear mountain streams	Lincoln, Uinta (Kemmerer)
Midget Faded Rattlesnake *Crotalus viridis concolor*	Mountain foothills shrub, rock outcrop	Sweetwater, Lincoln (Rock Springs)
Boreal Toad (Northern Rocky Mountain population) *Bufo boreas boreas*	Pond margins, wet meadows, riparian areas	Park, Teton, Lincoln, Sublette, Uinta, Fremont, Sweetwater, Carbon, Albany, Converse, Platte (Cody, Rawlins, Rock Springs, Lander, Kemmerer, Pinedale)
Northern Leopard Frog *Rana pipiens*	Beaver ponds, permanent water in plains and foothills	Park, Teton, Sublette, Lincoln, Uinta, Sweetwater, Fremont, Hot Springs, Big Horn, Washakie, Sheridan, Johnson, Natrona, Carbon, Albany, Converse, Campbell, Crook, Weston, Niobrara, Platte, Goshen, Laramie (Worland, Cody, Rawlins, Rock Springs, Lander, Casper, Buffalo, Newcastle, Kemmerer, Pinedale)
Spotted Frog *Ranus pretiosa (lutieventris)*	Ponds, sloughs, small streams	Park, Teton, Lincoln, Sublette, Big Horn, Washakie, Sheridan, Johnson (Cody, Rock Springs, Lander, Buffalo, Kemmerer, Pinedale)
Great Basin Spadefoot *Spea intermontana*	Spring seeps, permanent and temporary waters	Sublette, Lincoln, Uinta, Sweetwater, Fremont, Natrona, Carbon (Rawlins, Rock Springs, Lander, Kemmerer)

Grasshopper treatments would most likely be conducted in shrubland and open prairie/grassland habitats. The pygmy rabbit, white-tailed prairie dog, black-tailed prairie dog, swift fox, Wyoming pocket gopher, and Idaho pocket gopher all inhabit burrows in open prairie or shrublands. The swift fox is carnivorous (including insect prey); the remaining five species feed predominantly on shrubs, grasses, forbs, and roots. An additional four mammals occur in basin-

prairie shrub habitats: Townsend's big-eared bat, fringed myotis, long-eared myotis, and spotted bat, all primarily insectivorous nocturnal feeders. Prairie and shrubland bird species include the ferruginous hawk, which subsists primarily on small mammals. Other birds are: Baird's sparrow, sage sparrow, burrowing owl, mountain plover, loggerhead shrike, long-billed curlew, sage thrasher, and Columbian sharp-tailed grouse, all dependent on insects to varying degrees. The loggerhead shrike, sage thrasher, and mountain plover in particular are known to consume large amounts of grasshoppers (USDA APHIS 2010). Midget faded rattlesnakes occupy mountain foothills shrub and rock outcrop habitats. Their primary diet consists of small mammals and the few lizards that share their habitat (Travsky and Beauvais 2004).

Riparian and aquatic species include one mammal, Preble's meadow jumping mouse. This mouse inhabits riparian areas within prairie grasslands, but also ranges into adjacent uplands to feed and hibernate (USFWS 2010c). Diet includes a variety of invertebrates, seeds, leaves, roots, and fungi. Trumpeter swans and white-faced ibis frequent ponds, lakes, marshes, and rivers. Adult swans feed mostly on aquatic vegetation, while young also eat aquatic insects and crustaceans (NatureServe 2010). Ibis diet includes amphibians, fish, crustaceans, and insects. Habitat and dietary requirements for BLM sensitive fish vary: cutthroat trout need cold clear water, complex habitat structure, and insect food sources; chub generally require cool to warm clear water, and suckers are bottom feeders adapted to a range of water conditions from cool and clear to warm and turbid (NatureServe 2010). Amphibians, including the boreal toad, northern leopard and spotted frogs, and Great Basin spadefoot, vary in their tendency to stay within purely riparian habitats or range into adjacent upland areas. These species also migrate varying distances between aquatic breeding habitats and terrestrial non-breeding habitats. Even the most aquatic species may travel several hundred meters through adjacent upland habitats. Insects and other invertebrates constitute a major part of adult diets (NatureServe 2010).

Bald and golden eagles are protected by the Eagle Act (16 U.S.C. 668-668c), enacted in 1940 and since amended several times. This prohibits "taking" bald eagles, including their parts, nests, or eggs, without a permit from the Secretary of the Interior. Under the Eagle Act, "take" includes "disturb," as further defined by the act. Disturbances are actions that agitate or bother an eagle to a degree that cause, or are likely to cause, injury; a decrease in productivity by interfering with normal breeding, feeding, or sheltering behavior; or nest abandonment.

Mountain Plover

Among the BLM sensitive animals, the mountain plover warrants additional discussion as breeding habitat for this species is associated with short-grass prairie dominated by blue grama (*Bouteloua gracilis*). The mountain plover was proposed for listing in 1999 (*Federal Register* 64:7587-7601), but was removed from the list by the USFWS in 2003. The listing status for mountain plover is currently under review by USFWS. Mountain plovers nest in sparsely vegetated habitats including short-grass prairies, fallow and recently plowed ground, prairie-dog colonies, and other areas of surface disturbance. Current population estimates put this species at less than 10,000, and it has declined by 50 percent since 1966, according to 30 years of Breeding Bird Survey data, which is the highest rate of decline of any other grassland bird. The decline of this species is due to a combination of factors including loss of native grasslands to agriculture and urban development, certain grazing practices, and reduction of prairie dogs and other burrowing rodents.

Migratory Birds

The Migratory Bird Treaty Act of 1918, as amended, protects more than 800 species of birds that regularly visit or reside in North America. Species documented in Wyoming include 84 year-round residents, 163 summer residents (typically breeders), 13 winter residents, and 65 migrants (Cerovski et al. 2004). Migratory species traveling south of the U.S.-Mexico border are termed neotropical migrants, and are of particular concern as many are experiencing significant population declines. Migratory birds are found in many different habitat types, but riparian areas typically support the greatest diversity of species, including neotropical migrants (Knopf et al. 1988). Migratory bird species consume a wide variety of food including but not limited to seeds, fruit, plants, insects, small mammals, lizards, and snakes.

3.6 Economic and Social Values

Wyoming is a predominantly rural state with a population of approximately 544,000 (Wyoming DAI EAD 2010). The federal government is responsible for managing approximately 47 percent of the land base (29.5 million acres), of which 28 percent (approximately 18 million acres) is BLM-administered.

Although ranching and other agricultural industries do not make up a large portion of Wyoming's gross domestic product, they contribute considerably to the culture and lifestyle of Wyoming residents. Ranching provides direct and indirect employment, contributes to the maintenance and preservation of wildlife habitats, scenic vistas, open space and additionally provides active stewardship of remote lands, and the continuation of a way of life that helps draw tourists to the state. Due to the high percentage of federally administered lands in Wyoming the ranching industry is dependent on public rangelands for forage; BLM issues 2,822 permits and leases for grazing on public lands (USDI BLM 2009b).

In 2009 there were approximately 11,000 farms and ranches in Wyoming (USDA ERS 2009). In 2008 (the most recent year for which statistics are available) the livestock industry provided 76.8 percent of the total agricultural income for the state. Cattle were responsible for 61.5 percent, or $598 million, and sheep accounted for an additional 3.3 percent, or $32 million. The remaining agricultural income came from crops, including hay, grains, sugar beets, and dry beans. Honey was the thirteenth most valuable agricultural commodity; 39,000 bee colonies produced more than $3 million worth of honey (USDA ERS 2009). Honey production in Wyoming was 25 percent lower in 2009 than 2008 (USDA NASS 2009). Beekeepers across the U.S. experienced large-scale, unexplained losses of colonies during the winter of 2006-2007. Investigators termed the phenomenon colony collapse disorder. Although the cause is still unknown, it appears to be a syndrome caused by many different factors working in combination. These include pesticides, parasites, and pathogens (USDA ARS 2009).

Farm incomes vary considerably from year to year depending on many factors including drought and other weather events, fuel and feed costs and market conditions. For example in 2007, a difficult year for Wyoming agricultural producers, more than half of Wyoming's counties reported negative earnings and net farm income was less than a third of earnings in 2008 (USDA ERS 2009).

Economic analysis is a critical part of grasshopper management programs. Rangeland grasshopper control programs use the concepts of ET and level of economic infestation to determine if intervention is appropriate or cost effective (Skold and Davis 2000, USDA APHIS 2002). The level of economic infestation is a measurement of the economic losses caused by a

particular density of grasshoppers. This is balanced against the cost of treating to determine an ET where the cost of treatment equals the anticipated losses and there would be no overall economic benefit from treatment above that level.

Historically, grasshopper control guidelines defined the intervention level density as eight grasshoppers per square yard (Skold and Davis 2000). More recent research shows that the ET varies considerably and thus the intervention point also varies. It is based on many factors including economic use of available forage or crops; grasshopper species, age, and density present; rangeland productivity and composition; accessibility and cost of alternative forage; and weather patterns (USDA APHIS 2002).

Specialized analysis programs have been developed to improve the accuracy of ET determination. An example is Case-based Rangeland Grasshopper Management Advisor (CARMA). CARMA was developed at the Universities of Wyoming and Nebraska and has been successfully used since 1996. It enables the manipulation of treatment parameters to explore which combination of insecticidal agent, rate, carrier and coverage produces the greatest return on investment, generally together with the lowest environmental impact (Hastings et al. 2009).

The most recent version of CARMA, from August 2009, enumerates current average costs and effectiveness of various treatment options. Costs per protected acre range from $1.05 using aerial RAATs methodology for application of diflubenzuron in a canola oil carrier, to $4.24 using ground-based application of carbaryl bait. In general, costs per protected acre using RAATs methodology are reduced up to 60 percent compared to conventional coverage while also maintaining effective levels of suppression and reducing environmental impacts (Hastings et al. 2009).

Public lands also provide a wide spectrum of recreational opportunities including hunting, fishing, camping, hiking, wildlife viewing, horseback riding, scenic driving, and recreational OHV use. These opportunities provide tourist income to local communities and are also an important component of rurally based lifestyles that enhance the perceived quality of life of many Wyoming residents.

Analysis to determine the ET does not quantify intangible or nonmarket benefits to treatment such as maintenance of wildlife habitats and scenic or recreational values. However, methods are evolving to quantify and assign economic weight to these values (Bishop and Welsh 1992), thereby increasing the ability to analyze potential treatment benefits versus costs. Studies attempting to quantify impacts to wildlife-associated recreation values (beyond the loss of tourist dollars) rely on the concept of “willingness to pay” (USDI NPS 1995) which leads to a quantified “consumer surplus.” This is the perceived value of a recreational activity beyond what must be paid to enjoy it. Consumer surplus is calculated per activity day. The median consumer surplus values calculated from studies conducted within the U.S. Forest Service Intermountain Region range from approximately $24 for camping to $32 for wildlife viewing and $36 dollars for big-game hunting (Rosenberger and Loomis 2001). These values have likely increased since the study was conducted due to increased fuel costs and inflation over the past nine years.

3.7 Soils

Soil health is largely a product of land management practices. The BLM is tasked with protecting and enhancing soil resources on public lands. This is accomplished through site-

specific mitigation of individual surface-disturbing actions. Many of the soils throughout the state are in good condition and capable of producing forage for wildlife and livestock, maintaining watershed integrity, and recovering from impacts associated with surface-disturbing activities. Other localized areas have, however, been impacted by historic livestock overgrazing, drought events, extensive soil erosion, mineral development activities, right-of-ways, off-highway vehicle (OHV) use, timber harvesting, and rangeland improvements.

Soils in Wyoming are diverse, vary substantially, and have formed from a wide array of geologic material, ranging from in situ geologic parent material rock (residuum) to material transported by wind (aeolian deposits), water (alluvium), gravity (colluvium), and ice (glacial till). These parent materials, along with variable climate, topography, vegetation, and management, produce soils with diverse characteristics. Together, these variables contribute to a soil's susceptibility to wind and water erosion (USDI BLM 2007c). Throughout the state there are soils that have been identified as being highly erodible. Highly erodible soils are characterized by the loss of valuable topsoil resulting from action by either wind or water. Erosion increases when the vegetative community is disturbed by intense grazing, fire, road construction, or any other use or action that reduces the amount of vegetative cover.

Because rangeland areas with saline and/or sandy soils have decreased infiltration rates and reduced nutrient and water availability for plants, these areas typically have lower vegetative cover than other areas. Consequently, these soil types are highly susceptible to wind erosion. Saline soils have calcium, magnesium, or other nonsodium salts dominating their ionic composition, although they might also contain some sodium salts. Infiltration of precipitation into these soils is reduced by the dispersion of soil particles caused by the higher levels of sodium. Reduced infiltration rates result in greater surface runoff rates and increased soil erosion and sediment yields.

Sand dune areas and sandy soils occur throughout the state, both on private and BLM-administered lands. The Sand Hills area within the Rawlins Field Office represents one such dune system and the band of frequently active sand dunes north of Seminoe Reservoir that stretches across the northern portion of the Rawlins planning area is another (USDI BLM 2008e). These scattered areas of sand dunes and sandy soils are easily eroded by wind when vegetation is removed. BLM management objectives for these areas include protection of the vegetation and minimization of soil erosion.

In areas where erosive and fragile soils occur, BLM often requires mitigation measures or specific protections associated with surface disturbing activities to protect these soils. For example, work windows have been established for areas within the Buffalo Field Office that contain erosive or fragile soils wherein surface disturbing activities are prohibited from March 1 through June 15 to lessen the potential of severe erosion hazards (USDI BLM 2001a). Equipment restrictions are also often employed, preventing certain types of vehicles from being operated within areas containing these soil types.

3.8 Cultural Resources

The BLM is required by law, regulations, and Executive Orders to manage cultural resources in order to preserve and protect them from destruction and that the appropriate uses will be made of these resources. Law, regulations, and Executive Orders further require that such management be coordinated with the appropriate Native American tribes and individuals. Compliance with the NHPA (36 CFR 800), the Native American Graves Protection and Repatriation Act, the

American Indian Religious Freedom Act, and Executive Order 13007 Indian Sacred Sites is required.

Section 106 of the NHPA requires that agencies identify historic properties that will be impacted by a federal undertaking, and seek to protect those properties that are eligible to the National Register of Historic Places (NRHP). When these properties cannot be protected from adverse affects, mitigation actions must occur. These requirements also apply when working on non-federal lands or when the work will be implemented by a non-federal partner.

A consultative process to determine site eligibility, assess impacts, and identify impact avoidance or mitigation actions is defined in Section 106. Consultation parties are typically the State Historic Preservation Office (SHPO) and interested tribes. It may also include the Advisory Council on Historic Preservation. If projects involve working on privately owned lands, the land owner becomes a consulting party. All commitments identified during consultation are documented in a memorandum of agreement or programmatic agreement signed by the consulting parties.

Cultural resources are any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for traditional, religious, scientific, or other purposes. Cultural resources include archeological resources, historic architectural and engineering resources, and traditional resources.

Archeological resources are areas of material remains of prehistoric or historic human life or activity. This would include rock art, projectiles and weapons, tools, and human internments. Architectural and engineering resources consist of standing buildings and structures, bridges and dams, and other edifice of historic or aesthetic significance. Traditional resources can include archeological resources, structures, topographic features, habitats, plants, wildlife, and minerals that Native Americans or other groups consider essential for the preservation of their traditional culture. Traditional cultural properties (TCPs) have special heritage value to contemporary communities including Native American cultures. These are properties associated with the cultural practices or beliefs that maintain the cultural identity traditions of that community. TCPs must meet the criteria for eligibility to the Register in order to warrant protection.

Native American resources found on BLM-administered lands throughout the State of Wyoming include TCPs and traditional resources that are eligible for the NRHP. These resources consist of campsites with various types of fire and baking pits, lithic scatters, and animal bone fragments. There are also petroglyphs and pictographs; burial sites; plant and animal resource collection areas; and spiritual locations within the management areas. Some traditional use locations may have spiritual or other cultural meaning to Native Americans yet are not eligible for the NRHP. If Native American groups have identified them as significant to their culture this may offer the sites protection under the American Indian Religious Freedom Act.

Historic properties known to occur on BLM-administered lands in Wyoming consist of congressionally designated historic trails and historic sites, Tri-Territory markers, and NRHP-eligible historic livestock management sites. Historic roads and trails eligible for the NRHP include emigrant trails, such as the Oregon/Mormon Pioneer Trails (USDI BLM 1986c) and freight wagon and stagecoach trails. Military camp and fort sites, irrigation systems, coal mines, early oil fields, railroads such as the Union Pacific Transcontinental Railroad and the Union Pacific Oregon Short Line Railroad are part of the Euro-American history of the area.

3.9 Recreation

Public lands in Wyoming provide a wide variety of outdoor recreational opportunities. Recreation activities which commonly occur on public lands include hunting, fishing, camping, backpacking, hiking, horsepacking and riding, OHV use, mountain biking, boating and river rafting, rock, antler, fossil, and petrified wood collecting, scenic driving and sightseeing, wildlife viewing, bird watching, and photography. Activities generating the most visitor use were scenic and wildlife viewing, water-based recreation, hiking, and hunting (USDI BLM 2009c). In 2009 almost two million visitor days were spent on BLM-administered land, enhancing residents' quality of life and contributing to state-wide tourist income (USDI BLM 2009c). The economic aspects of recreation-related tourism are discussed in greater detail in the socio-economics section.

Recreation opportunities are categorized as developed (sites such as campgrounds, trailheads, and interpretive centers) or dispersed – occurring anywhere on public lands where legal access exists. A Special Recreation Management Area designation intensifies management of areas where outdoor recreation is a high priority. It helps direct recreation program priorities toward areas with high resource values, elevated public concern, or significant amounts of recreational activity. Areas with a Special Recreation Management Area designation can be expected to see investments in recreation facilities and visitor services aimed at reducing resource damage and mitigating user conflicts. An Extensive Recreation Management Area is an area that emphasizes the traditional dispersed recreation use of public lands. Extensive Recreation Management Areas have an undeveloped character that allows visitors to escape crowds, rely on their own skills and equipment for recreation pursuits, and freedom from stricter regulations. All lands that are not within a designated Special Recreation Management Area revert to the Extensive Recreation Management Area category. Dispersed recreation activities account for the majority of visitor use on BLM-administered lands in Wyoming.

3.10 Areas of Critical Environmental Concern

Pursuant to the FLPMA of 1976, Section 103(a), an ACEC is defined as an area "within public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards." The BLM regulations for implementing the ACEC provisions of FLPMA state that management of areas having potential for ACEC designation and protection shall be identified and considered throughout the resource management planning process (43 CFR 1610.7-2(b)). The ACECs designated by the BLM within the State of Wyoming are listed in Table 9 along with the resources for which they were designated.

While an ACEC may emphasize one or more unique resources, other existing multiple-use management can continue within an ACEC so long as the uses do not impair the values for which the ACEC was established. Management of ACECs includes certain restrictions on use of the areas in order to protect the resources for which the area was designated. For example OHV travel is limited to designated roads and trails in several of the ACECs and travel is prohibited on some designated routes during certain time periods in order to protect wildlife habitat such as big game winter range.

Some management guidance is more restrictive, for example the Rock Creek ACEC is closed to OHV use and the Whoopup Canyon ACEC is closed to both motorized and nonmotorized

vehicle use, except for authorized administrative purposes. In the Pine Springs, New Fork Potholes, and Trappers Point ACECs, surface disturbing activities are prohibited except those that benefit wildlife, vegetation, watershed, or cultural values; and no surface disturbing activities are allowed in riparian habitats within the Raymond Mountain and Beaver Creek ACECs. The Rock Springs Field Office SSP Species ACEC is closed to direct surface disturbing activities or any disrupting activities (e.g., off-site dust, air pollutants, etc.) that could adversely affect the special status plant species and their habitat. Known locations of special status plant species communities are closed to off-road vehicle travel and off-road vehicle travel in the remainder of the ACEC is limited to designated roads and trails.

Table 9. ACECs present in Wyoming.

ACEC Name	Resource Value(s)
Casper Field Office	
Alcova Fossil	Paleontological resources including the Alcova Pterodactyl Trackway locality and exposed outcrops of the Morrison and Sundance formations with fossilized remains of marine and terrestrial species from the Triassic and Jurassic periods
Jackson Canyon	Bald eagle habitats and winter roost sites
Cody Field Office	
Brown/Howe Dinosaur	World class paleontological resources including dinosaur specimens
Carter Mountain	Unique alpine tundra and fragile soils; scenic values; crucial winter range for elk and mule deer
Five Springs Falls	Existing populations of four near-endemic rare and sensitive plant species
Little Mountain	Cave, cultural, and paleontological resources; scenic values
Sheep Mountain Anticline	Important natural area with unique geological features including internationally significant caves
Kemmerer Field Office	
Raymond Mountain	Sensitive Bonneville cutthroat trout habitat; riparian resources; wildlife habitats and winter ranges; scenic values
SSP Species	Known special status plant species populations and habitats
Lander Field Office	
Beaver Rim	Significant sites and segments along the Oregon/Mormon Pioneer Trail (e.g., ruts, swales, graves, campsites, pristine settings, etc.)
Dubois Badlands	Bighorn sheep habitat; scenic quality and erosive nature of badlands
East Fork	Crucial elk winter range
Green Mountain	Crucial elk winter range; historical Sparhawk Cabin
Lander Slope	Important wildlife habitat; scenic values
Red Canyon	Highly visible steep slopes; important wildlife habitat
Significant sites along OMPCPE NHT	Significant sites and segments along the Oregon/Mormon Pioneer Trail (e.g., ruts swales, graves, campsites, pristine settings, etc.)
South Pass	Significant cultural values including proposed Historic Mining District
Whiskey Mountain	Bighorn sheep winter range
Newcastle Field Office	
Whoopup Canyon	Nationally significant cultural resources; steep-walled scenic canyon

Pinedale Field Office	
Beaver Creek	Wildlife habitat including elk calving habitat; aquatic habitat for Colorado River cutthroat trout
New Fork Potholes	Unique pothole wildlife habitat for trumpeter swans and other migratory waterfowl; elk and deer parturition areas; geologically unique areas
Rock Creek	Wildlife habitat including crucial winter range for a portion of the Piney elk herd; aquatic habitat for Colorado River cutthroat trout; scenic values
Trapper's Point	Big game migration bottleneck; cultural and historic resources; livestock trailing use
Rawlins Field Office	
Blowout Penstemon	Potential and occupied habitat for the endangered blowout penstemon
Cave Creek	Cave ecosystem for wildlife species, especially bat hibernaculum and maternity roost habitat
Sand Hills/JO Ranch	Unique vegetation complex; wildlife habitat values including crucial winter range for mule deer and elk, and nesting and foraging habitat for raptors, greater sage-grouse, and Columbian sharp-tailed grouse populations; historic JO Ranch and the Rawlins-to-Baggs Freight Road
Rock Springs Field Office	
Cedar Canyon	Cultural values; scenic values; watershed values; wildlife habitat including raptor habitat and big game winter range
Greater Sand Dunes	Geologic features; prehistoric and historic values; wildlife habitat including the Steamboat elk herd; recreation values
Natural Corrals	Cultural values; historical resources, recreation values; geological values; wildlife habitat including crucial big game winter range and raptor nesting
Oregon Buttes	Scenic integrity as a historic landmark; wildlife values including deer fawning and elk calving and raptor habitat
Pine Springs	Cultural, historic, and prehistoric resource values
Greater Red Creek	Watershed values; Colorado River cutthroat trout habitat; wildlife habitat; scenic values
SSP Species	Special status plant species communities and habitat
South Pass Historic Landscape	Visual and historic integrity of the historic trails and their surrounding viewscape
Steamboat Mountain	Cultural values; wildlife values including unique habitat features for the Steamboat desert elk herd and crucial winter range for many species (especially elk and deer)
White Mountain Petroglyphs	Nationally significant cultural values
Worland Field Office	
Big Cedar Ridge	Paleontological resources, in particular fossilized plants of the late Cretaceous Period
Red Gulch Dinosaur Tracksite	Paleontological resources dating back to the Middle Jurassic period including the largest tracksite in Wyoming
Spanish Point Karst	Cave and karst systems; sinking stream segments; groundwater resources; scenic values
Upper Owl Creek Area	Big game habitat and migration corridors; fisheries habitat; shallow soils; alpine vegetation and rare plants; cultural resources; Native American traditional values; scenic values

3.11 Rangeland Resources

The BLM administers public land grazing in accordance with the Taylor Grazing Act of 1934, as amended, Section 4 of the Oregon and California Railroad Land Act of 1937, Public Rangeland Improvement Act of 1978, FLPMA, Executive Orders that implement the Bankhead-Jones Farm Tenant Act of 1937, and other public land orders, Executive Orders, and agreements. Permits and leases are offered by the BLM to ranchers who graze their livestock on allotments under BLM administration and management. Allotments are managed to meet objectives outlined in RMPs, Allotment Management Plans, and/or other regulations (e.g., 43 CFR 4180).

Currently there are 4,173 grazing allotments permitted for use on BLM-administered land within the State of Wyoming (USDI BLM 2010). The majority of land within the allotments are owned and managed by the BLM although portions of state and/or privately owned property can occur within allotment boundaries. The livestock grazing on BLM-administered public lands are primarily cattle, but also include sheep, and to a lesser extent horses and bison. The number of grazing livestock varies over time in response to their economic value as a commodity (cattle, sheep, and bison) and their use in ranching operations (horses).

The amount of grazing that takes place each year on BLM-administered allotments may be affected by environmental and economic factors. Grazing management must be in accordance with the Standards for Healthy Rangelands & Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming (BLM 2008g). Allotments are periodically assessed by a BLM ID Team to determine if those standards are being met and to set the number of animal unit months (AUM) that are available for that allotment. An AUM is the amount of forage needed to sustain one cow and calf, one horse, or five sheep or goats for one month).

4 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This chapter provides an analysis of the effects that would result from implementation of the alternatives, as described in Chapter 2. An environmental effect or impact is defined as a modification or change in the existing environment brought about by the action taken. Under NEPA, actions that could significantly affect the quality of the human environment must be disclosed and analyzed in terms of direct and indirect impacts, whether beneficial or adverse, as well as short and long term, and cumulative effects.

Direct impacts are those that are caused by an action and occur at the same time and place as the action. Indirect impacts are caused by an action but occur later or farther away from the resource although they are still reasonably foreseeable. Beneficial impacts are those that involve a positive change in the condition or appearance of a resource or a change that moves the resource toward a desired condition. In contrast, adverse impacts involve a change that moves the resource away from a desired condition or detracts from its appearance or condition. For this analysis, short-term effects are defined as occurring during the treatment. Long-term effects are those that would remain for a longer duration after actual treatment activities have ceased. Cumulative impacts are the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts are discussed at the end of the chapter.

The analysis of the alternatives is focused on identifying the types of impacts anticipated to occur and estimating their potential intensity. The impact analysis for the No Action Alternative (no treatment on BLM lands) was prepared first and serves as a baseline against which to evaluate the environmental consequences of the action alternatives (various levels of treatment on BLM lands). For each alternative, the environmental effects are analyzed for the resource topics presented in Chapter 3 that were carried forward for analysis. The organization of this chapter parallels that of Chapter 3, in that the resources are presented in the same order. Because resources and resource uses are often interrelated, one section may refer to another. Impacts that are common to both action alternatives are addressed for Alternative 2 but are not repeated for Alternative 3 to reduce redundancy in the analysis.

4.2 Vegetation Resources

4.2.1 Alternative 1 – No Action

General Vegetation

Under Alternative 1, no application of pesticide would occur on BLM-administered land and there would be no direct effects to general vegetation. In the absence of treatment, grasshopper outbreaks on BLM-administered land could impact rangeland vegetation in 2010 and subsequent years. Grasshoppers feed predominantly on rangeland grasses and forbs, although outbreak levels of grasshoppers have resulted in defoliation and death of native shrubs as well (Pfadt 1994). Their feeding causes direct damage to plant growth as well as seed production.

In addition to loss of rangeland vegetation, indirect effects of not treating grasshoppers could include soil erosion, establishment and spread of invasive plants, and potential changes in the

rangeland ecosystem. These effects could lead to a rangeland plant community that is less healthy, for instance, by converting to an annual grassland, and less capable of regeneration. An unsuppressed grasshopper outbreak would impact rangeland resiliency and could kill or weaken plants, adversely affecting seed-producing capabilities. The reduction in rangeland plants would adversely affect the ability of the range to retain soil and moisture and decrease forage and habitat value for livestock and wildlife. It is likely it would take many years for rangeland to recover from an unsuppressed outbreak of grasshoppers. Even when grasshopper densities return to normal levels, native vegetation could be reduced for several years after an outbreak (USDA APHIS 2002).

Threatened, Endangered, and Sensitive Plants

Because effects for threatened and endangered plant species would be largely the same as those for BLM sensitive plants, these two topics were grouped for analysis purposes. Under the No Action Alternative no pesticide would be applied on BLM-administered land, although state and private land could still be treated. Grasshopper outbreaks at predicted levels would pose a threat to rangeland health both this year and in successive years and pose a threat to sensitive, threatened, or endangered plants and their habitats. Grasshopper consumption of highly specialized plants that often have restricted habitat requirements, low population numbers, and limited rates of reproduction can kill or weaken a population.

In Wyoming, two ESA-listed species and the majority of sensitive plant species are located in dry, sparsely vegetated habitats. Grasshopper consumption of these plants could jeopardize ecosystem health, adversely impact seed-producing capabilities, and create favorable conditions for invasive plants. Restoration of native species and habitat conditions is often slow, difficult and expensive. It is likely it would take many years for a rare plant population to recover from an infestation of grasshoppers, with the chance of recovery decreasing in each year of successive outbreaks.

Non-native, Invasive Plants

Under the No Action Alternative, there would be no direct adverse effects from ground-based treatments. In the absence of treatment, grasshopper outbreaks at predicted levels would pose a threat to rangeland health both this year and in successive years. Rangeland vulnerability to invasive, non-native species would be indirectly increased, upsetting the natural balance of the plant community and potentially increasing fire frequency.

Increased grasshopper consumption of rangeland plants would enable pioneering, fast growing, and spreading invasive plants to gain a foothold in previously healthy rangeland, or create favorable conditions for increased density and spread of invasive weeds already present. New or increased weed infestations would reduce forage for grazing by cattle and wildlife and would decrease native plant populations. If left untreated, weed impacts would persist and multiply. In the event of invasive plant colonization, the restoration of native species and habitat conditions is often slow, difficult and expensive. Without grasshopper suppression, reduced populations of native plants and seed banks would remain to naturally revegetate disturbed rangeland prior to weed invasion.

4.2.2 Alternative 2 – RAATs

General Vegetation

No direct effects to rangeland vegetation are likely to occur under Alternative 2. The pesticides (diflubenzuron, carbaryl, and malathion) intended for grasshopper suppression on BLM-administered lands have been shown to be non-toxic to plants at field application rates (USDA APHIS 2002). Direct impacts are also unlikely as the majority of treatment is by aerial application. Limited ground-based application (usually by ATV) would be used when warranted by the situation or time of year. Ground treatment poses the risk of trampling/running over vegetation, soil compaction, ground disturbance, and the introduction of invasive plant species in limited areas.

Alternative 2 would have beneficial indirect effects on rangeland vegetation if treatment successfully reduces outbreak levels of grasshoppers to those typically found on rangeland. RAATs methodology normally results in 80 to 95 percent control of grasshoppers, thereby preserving a significant portion of rangeland vegetation and reducing rangeland degradation. The retention of native plants is essential to repopulating adjacent habitat damaged by grasshopper activity.

While the pesticides intended for grasshopper suppression on BLM-administered lands are not-directly toxic to plants at field application rates (USDA APHIS 2002), carbaryl and malathion, particularly in liquid sprays, have the potential to indirectly affect vegetation through effects to non-target, plant pollinating insects such as bees. Pollinator reduction would decrease seed production and regeneration of rangeland plants. The majority of outbreak areas would be treated by aerial application of diflubenzuron, which has the least effect on non-target insect species and does not affect bee pollinators (USDA APHIS 2002). Pollinators present in areas treated with limited aerial application of carbaryl sprays may be adversely affected. Studies with carbaryl bran bait have found no sublethal effects on adult bees or larvae (Peach et al. 1994).

Adverse effects of grasshopper outbreaks would affect rangeland vegetation even with treatments using RAATs methodology. However, rangeland restoration to pre-outbreak conditions is likely to be realized sooner than if no suppression occurred.

Threatened, Endangered, and Sensitive Plants

Grasshopper suppression under this alternative would help protect threatened, endangered, and sensitive plant populations from unusually dense populations of grasshoppers. While those plant populations are not likely to be treated directly, they would still benefit from grasshopper suppression due to decreased numbers. A grasshopper outbreak could lead to increased numbers of grasshoppers migrating into critical or other important habitat. Grasshopper consumption of highly specialized plants with limited distribution and low population numbers can kill or weaken a population. It is likely it would take many years for a rare plant population to recover from an infestation of grasshoppers, and chance of recovery decreases with each year of successive outbreaks.

Grasshopper suppression using RAATs methodology would protect native vegetation from complete consumption by grasshoppers. The retention of these plants would be important in repopulating adjacent areas disturbed by grasshopper activity. Grasshopper treatment would allow increased seed bank retention and production by sensitive, threatened and endangered plants which would be elemental in restoring grasshopper-disturbed rangeland habitat. Ground-

based treatment poses more of a risk to sensitive plant populations than aerial application due to the potential for trampling/running over individuals, soil compaction, ground disturbance, and the introduction of invasive plant species.

Blowout penstemon is unlikely to be affected by grasshopper suppression activities in Wyoming. The sparsely vegetated habitat consisting of less than 5 percent cover combined with its remote location is not likely to make it a high priority in grasshopper treatment. Blowout penstemon pollinators may be adversely affected in the event of carbaryl or malathion treatments. Implementation of the impact minimization measures described in Chapter 2 for this species would protect pollinators if a proposed malathion or carbaryl treatment overlaps the location of this species (no buffer is required for diflubenzuron as it has no effect on adult insect pollinators).

Similarly, desert yellowhead is unlikely to be affected by grasshopper suppression activities in Wyoming but pollinators for this species may be adversely affected in the event of carbaryl or malathion treatments. As described above, impact minimization measures for the protection of pollinators would be implemented if a proposed malathion or carbaryl treatment overlaps the critical habitat of this species (no buffer is required for diflubenzuron as it has no effect on adult insect pollinators). Implementation of the impact minimization measures described in Chapter 2 for this species would protect pollinators if a proposed malathion or carbaryl treatment overlaps the location of this species (no buffer is required for diflubenzuron as it has no effect on adult insect pollinators).

Effects to non-target, plant pollinating insects such as bees would be the same as those discussed above for general vegetation. Buffers around threatened and endangered plants for aerial treatments would help reduce any adverse impacts to pollinators. Ground application of carbaryl bran bait within the aerial treatment buffer would not affect bee pollinators. Grasshopper suppression activities are not likely to adversely affect threatened and endangered plants or their designated critical habitat because the protective treatment buffers from described in section 2.4 would be implemented.

Non-native, Invasive Plants

Grasshopper suppression using RAATs methodology would protect native vegetation from complete consumption by grasshoppers. The retention of these plants would be important in repopulating adjacent areas affected by grasshopper activity. Successful treatment would also reduce the likelihood of grasshoppers impacting rangeland resiliency and potentially increasing its vulnerability to invasive, non-native species. Although still vulnerable to weed establishment, pockets of disturbance are less likely to quickly become dominated by invasive plants than large areas. Grasshopper treatment would allow increased seed bank retention and production which would be elemental in restoring grasshopper-disturbed rangeland habitat.

Biological control (biocontrol) agents used to treat invasive plants are a non-target species of concern. Many biocontrol agents are insects, such as the flea beetle (*Aphthona* spp.), which is used on the noxious weed leafy spurge (*Euphorbia esula*). If biocontrol agents have been released in grasshopper treatment areas they could be exposed to pesticides. More studies are needed to understand the effects of pesticides on biocontrol agents; in laboratory bioassays, diflubenzuron did not produce significant flea beetle mortality, while malathion and carbaryl produced moderate and high mortality, respectively (Foster et al. 2001).

The BLM intends to use aerial application of pesticides whenever possible. In buffer zones and other smaller areas, ground application may occur. Ground disturbance during grasshopper suppression activities could lead to an increase in existing invasive species and/or introduction of new species to the area. Disturbances that increase bare ground cover increase both erosion potential and the likelihood of invasion by non-native plants, such as noxious weeds and cheatgrass (*Bromus tectorum*). The presence of cheatgrass increases fire frequency, which in turn promotes cheatgrass expansion, a cycle that leads to conversion of rangeland to annual grasslands (Young and Evans 1978).

4.2.3 Alternative 3 – RAATs with Additional Buffers

General Vegetation

Alternative 3 would have direct and indirect impacts on rangeland vegetation similar to Alternative 2. However, increased buffers may result in some grasshopper infested areas not being treated, potentially increasing the impact of grasshoppers on vegetation. Indirect beneficial effects discussed in Alternative 2 would potentially be lessened due to the reduction in amount of rangeland habitat available for grasshopper suppression treatment in a particular locale. Larger buffer zones would make natural revegetation in untreated areas difficult if severe defoliation occurs due to the increased distance to treated areas where native plants exist. Impacts due to severe grasshopper infestations within the buffer zones would be similar to those discussed under the No Action Alternative. Rangeland restoration to pre-outbreak conditions would take longer than Alternative 2 if severe grasshopper damage occurs in large untreated buffer areas.

Threatened, Endangered, and Sensitive Plants

Alternative 3 would potentially decrease the amount of rangeland habitat available to receive grasshopper suppression treatment in a particular locale. This would increase the rangeland habitat susceptible to grasshopper outbreaks and could increase the potential for grasshoppers to migrate into rare plant populations. Critical habitat and individual plants could be at greater risk of grasshopper damage due to the decreased treatment area. Natural revegetation could also be more difficult if native plant retention areas and seed banks are a greater distance away. Additional buffer zones under this alternative would necessitate more ground treatment with pesticides. Ground application poses the additional risk of trampling/running over individuals, soil compaction, ground disturbance, and the introduction of invasive plant species. Grasshopper suppression activities are not likely to adversely affect threatened and endangered plants or their designated critical habitats because the protective buffers and impact minimization measures described in section 2.4 would be implemented.

Non-native, Invasive Plants

The reduction in potential treatment acreage in a locale under Alternative 3 would increase the rangeland habitat susceptible to grasshopper outbreaks and would enable invasive plant establishment on a greater area of land. Larger buffer zones would make natural revegetation in untreated areas difficult if severe defoliation occurs due to the increased distance to treated areas where native plants exist. Impacts due to severe grasshopper infestations within the buffer zones would be similar to those discussed under the No Action Alternative. Rangeland restoration to pre-outbreak conditions would take longer than Alternative 2 if severe grasshopper damage occurs in large untreated buffer areas. Additionally, larger buffer zones may necessitate more ground treatment with pesticides. Ground application would create ground disturbance which

could lead to an increase in existing invasive species and/or introduction of new species to the area, as described under Alternative 2.

4.3 Wildlife Resources

4.3.1 Alternative 1 – No Action

General Wildlife

The No Action Alternative would not directly affect general wildlife species. Indirect impacts would vary depending on the extent and severity of grasshopper outbreaks, and on individual species' diet and habitat requirements, as discussed previously. Big game, small mammals, and birds could all be affected by loss of forage, while loss of protective cover would most likely affect small mammals, birds, and reptiles.

Indirect effects to all species could persist beyond 2010. If predicted outbreaks occur, grasshopper densities could remain at outbreak levels for many years to come (Debrey et al. 1993), continuing to spread into previously unaffected areas. As discussed in more detail under sage-grouse, long-term impacts to rangeland health may result from substantial native plant defoliation or mortality. Disturbances that increase bare ground cover increase the likelihood of invasion by non-native plants and in severe instances can lead to conversion of rangeland to annual grasslands (Young and Evans 1978). Annual grasslands are simplified, impoverished ecosystems that support lower levels of wildlife diversity than intact native rangelands (Roberts 1990).

Threatened, Endangered, and Candidate Animals

Greater Sage-Grouse

The No Action Alternative would not directly impact sage-grouse as there would be no pesticide treatments to suppress grasshopper populations on BLM-administered public lands. Indirect adverse impacts to sage-grouse habitat could result in untreated areas where grasshopper densities reach outbreak levels. When grasshopper management is not attempted in outbreak areas, all available forage can be consumed at levels as low as 30 grasshoppers per square yard. Each grasshopper can consume approximately one-half of its body weight in green forage per day. Outbreaks can last 3 to 6 years and have been known to last up to 20 years (Debrey et al. 1993). The grasshopper species of greatest concern for Wyoming in 2010 (USDA APHIS 2010) feed predominantly on grasses and forbs (Pfadt 1994), although sufficiently high grasshopper nymph densities have resulted in the additional defoliation and death of native shrubs as well. Grasshopper damage disrupts the natural biodiversity of the plant community and increases the likelihood of soil erosion and colonization by invasive, non-native plant species (USDA APHIS 2002).

Sage-grouse chicks are highly dependent on the protein provided by insects and nutritious forbs; the levels of these in their early diet directly influence survival and growth rates (Johnson and Boyce 1990, Drut 1993). Grasshoppers are a valuable nutritional resource providing high energy value consisting of 50-70 percent crude protein (Ueckert et al. 1972). At outbreak levels, grasshopper densities exceed the ability of predators (including juvenile sage-grouse) to control population size (McEwen et al. 2000) and the remaining grasshoppers represent a competitive threat to the food base of sage-grouse chicks (USDA APHIS 2002). If grasshopper levels are dense enough that shrubs (including sagebrush) are impacted, then reduction in canopy cover could lead to increased vulnerability to predators. Sagebrush defoliation could also reduce the

availability of winter forage, as the winter diet for both juvenile and adult sage-grouse consists primarily of sagebrush leaves (Patterson 1952).

Indirect adverse impacts to sage-grouse habitat from no pesticide treatments could persist beyond 2010. If predicted outbreaks occur, grasshopper densities could remain at outbreak levels for many years to come (Debrey et al. 1993) and continue to spread into previously unaffected areas, impacting greater areas of sage-grouse habitat. Even when grasshopper densities return to below ET levels, plant growth could be reduced for several years (USDA APHIS 2002), thereby reducing available forage of nutritious forbs for both pre-laying hens and chicks, reducing nesting success. An additional factor that appears to correlate with nesting success is residual grass height, i.e., what remains of the previous year's growth (Connolly et al. 2004). Grasshopper populations exceeding ET levels could result in little to no grass production in subsequent years, reducing protective cover and adversely impacting nesting success.

Longer-lasting adverse impacts to sage-grouse habitats could result if loss of litter cover leads to increased bare ground and erosion potential. Defoliation and death or reduction of vigor in native plant communities can lead to increased colonization by invasive, non-native plants. These invasive plants could out-compete more nutritious and palatable forage species (both native and introduced) and reduce the availability of high-quality forage. Cheatgrass is highly invasive in disturbed areas with reduced vegetative cover. Its establishment could lead to increased fire frequency, which would in turn promote continued cheatgrass expansion and habitat conversion from sagebrush to annual grasslands (Young and Evans 1978), with associated loss of cover and forage for sage-grouse. Sagebrush restoration is difficult and usually ineffective once annual grasses such as cheatgrass become established (Connelly et al. 2004). Habitat loss due to fire has been identified as a primary factor in sage-grouse population declines (Connolly et al. 2000).

Consequences of the potential indirect impacts described above are likely to be increased by the strong fidelity exhibited by sage-grouse (particularly hens) to their seasonal ranges, even when habitat suitability has declined (Fischer et al. 1993, Holloran 2005). Studies suggest that sage-grouse hens do not move to suitable habitat and resume a productive life cycle following a fire or other disturbance resulting in the loss or removal of extensive areas of sagebrush. Hens either do not attempt to nest or select marginal nesting habitat within these fire-modified habitats. This may lead to higher mortality rates and lower nest success than when hens use unmodified habitat (Fischer 1994).

Black-Footed Ferret

The No Action Alternative would not directly impact the black-footed ferret. Indirect adverse impacts could result in untreated areas where grasshopper densities reach outbreak levels. The sole known Wyoming population in Shirley Basin is associated with the reintroduction program, and designated nonessential experimental. Not all prairie dog communities in Wyoming have been surveyed for the presence of ferrets, and there remains the remote possibility that previously undiscovered individuals exist. Untreated grasshopper outbreaks could potentially impact individual black-footed ferrets, by decreasing the available prey base in affected areas.

Prairie dogs are ferrets' primary prey; loss of prairie dog forage due to high grasshopper densities may reduce local prairie dog populations. White tailed prairie dogs feed primarily on forbs, while black-tailed prairie dogs prefer grasses (NatureServe 2010). As discussed in greater detail in the previous section on sage-grouse, the grasshopper species of greatest concern for

Wyoming in 2010 (USDA APHIS 2010) feed predominantly on grasses and forbs, and would directly compete with prairie dogs for their forage base. As also discussed under sage-grouse, long-term impacts to rangeland health may result in untreated areas if widespread defoliation leads to increased erosion and susceptibility to invasive, non-native plant species. If grasshopper levels in Shirley Basin warrant treatment, and BLM-administered lands remain untreated, the nonessential experimental ferret population may be adversely impacted. Reduction in available forage near other prairie dog colonies may also lessen their suitability as potential ferret reintroduction sites. The continued existence of black-footed ferrets is not likely to be jeopardized, due to additional nonessential experimental populations in several other western states.

Western Yellow-billed Cuckoo

The No Action Alternative would not directly affect the yellow-billed cuckoo. Indirect impacts could result in untreated areas where grasshopper densities reach outbreak levels. When available, grasshoppers and crickets constitute a major portion of the cuckoo's diet, ranging from 30 to 73 percent (Wiggins 2005). High grasshopper densities in upland areas adjacent to riparian habitat could lead to increased foraging opportunities for this riparian obligate species. If grasshoppers consume all available rangeland vegetation and migrate into adjacent riparian areas, substantial defoliation of riparian vegetation could occur. Attributes influencing nesting site selection include density of understory vegetation (IDFG 2005); a reduction in understory density by defoliation would reduce the suitability of cuckoo nesting habitat.

Gray Wolf

The No Action Alternative would not directly affect the gray wolf. Indirect impacts to wolves may result from widespread uncontrolled grasshopper breakouts removing forage material for the large ungulate species (i.e., deer and elk) that constitute wolves' primary prey base. Substantial reductions in forage availability within a pack's territory may increase the likelihood that resident ungulates move beyond territory boundaries in search of better forage opportunities. The severity of impact would depend on the size of the area affected by grasshoppers, together with additional factors including the availability of alternate prey sources, and presence or lack of opportunity to expand territory size. The majority of wolves in Wyoming are found in the Greater Yellowstone Area, in higher elevation forested and montane grassland/shrubland habitats that are less likely to experience breakout densities of grasshoppers. The continued existence of wolves in Wyoming is not likely to be jeopardized by this alternative.

Grizzly Bear

The No Action Alternative would not directly affect the grizzly bear. Indirect impacts from lack of treatment are also unlikely, as grasshopper outbreaks do not generally occur within the montane forest habitats used by grizzly bears.

Canada Lynx

The No Action Alternative would not directly affect Canada lynx. Indirect impacts from lack of treatment are also unlikely, as grasshopper outbreaks do not generally occur within the boreal forest habitats used by Canada lynx.

Wyoming Toad

The No Action Alternative would not directly affect the Wyoming toad. Indirect effects from this alternative are also unlikely, as the sole known population occurs on Mortenson National Wildlife Refuge and is maintained by a captive breeding program. No historic or current

breeding sites are known to occur on BLM-administered land. Primary habitat for the Wyoming toad includes approximately 2,400 acres of BLM-administered land, and may be indirectly adversely impacted if untreated grasshopper infestations consume all available rangeland vegetation and migrate into adjacent riparian areas.

BLM Sensitive Animals

The No Action Alternative would not directly affect any BLM sensitive species. Ground-dwelling mammals may be indirectly affected by loss of forage and cover due to untreated grasshopper outbreaks, as discussed in more detail under sage-grouse. Primarily herbivorous species (pygmy rabbit, prairie dogs, pocket gophers) would be adversely affected by loss of vegetation to grasshopper competition. Reduction in protective cover could render these small mammals more susceptible to predation, for example by raptors (Groves and Steenhof 1988, Nydegger and Smith 1986). The swift fox would also be impacted if loss of vegetation led to a reduction in availability of mammalian prey species; this may be partly compensated for by the abundance of grasshoppers, a potential food source for foxes (NatureServe 2010).

BLM sensitive bats may be indirectly affected by the No Action Alternative. These nocturnal species subsist primarily on night-flying insects, but may also forage for non-flying insects in trees, shrubs, and from the ground (NatureServe 2010). If high levels of grasshoppers out-compete other insects for available vegetative food sources, then bats could potentially be adversely impacted through reductions in their preferred prey base. They may be able to compensate by increasing the levels of grasshoppers in their diet.

Impacts to BLM sensitive birds would vary depending on their diet and cover requirements. High grasshopper densities would increase the available food base for insectivorous birds, such as the loggerhead shrike and sage thrasher which are voracious consumers of grasshoppers (USDA APHIS 2010, NatureServe 2010). Adverse impacts would be greater for birds that have a lower insect component to their diet, and rely more on grasses, forbs, and the seeds they provide. Raptors may be impacted by a reduction in their prey base in areas that experience a substantial loss of vegetation; the loss of protective cover for small mammals may also increase raptor hunting success (Groves and Steenhof 1988, Nydegger and Smith 1986).

Species dependent on aquatic or riparian habitats could potentially be affected by lack of treatment of adjoining rangelands if grasshoppers consume all available rangeland vegetation and migrate into adjacent riparian areas. Substantial defoliation of riparian vegetation could adversely impact aquatic species through a rise in water temperature due to lack of shade. Additional adverse impacts to aquatic habitats are possible if grasshopper infestations lead to widespread loss of upland vegetation and litter, increasing bare ground cover and susceptibility to erosion, as discussed in more detail under sage-grouse. Increased erosion would increase sediment deposition into adjacent waterways; the consequent rise in turbidity would reduce habitat suitability for species such as cutthroat trout that require clear water. High grasshopper densities may increase food availability for both amphibians and certain fish species, including cutthroat trout.

Mountain Plover

High grasshopper densities would increase the available food base for the mountain plover. Beneficial impacts could also occur for mountain plovers which prefer disturbed or sparsely vegetated areas for nesting.

Migratory Bird Species

The No Action Alternative would not directly affect eagles by causing any disturbance as defined by the Eagle Act. The No Action Alternative would not directly affect migratory birds. Indirect impacts would vary depending on specific diet and habitat requirements, as discussed previously under BLM sensitive birds. Riparian habitats generally support a greater diversity of migratory birds, particularly neotropical migrants, than upland areas (Knopf et al. 1988). Untreated grasshopper outbreaks that lead to loss of riparian vegetation would impact migratory birds proportionately more than loss of upland vegetation.

4.3.2 Alternative 2 – RAATs

General Wildlife

This alternative is not likely to have direct adverse impacts from the use of proposed pesticides on wildlife species not previously discussed; effects would be similar to those analyzed under ESA-listed and BLM sensitive species, including mammals, birds, fish, reptiles, and amphibians. Treatments may impact wildlife, as discussed below under BLM sensitive species. The limited scale and later-season timing of proposed ground-based treatments would minimize the likelihood of impacts to ground-dwelling species, including small mammals, birds, and reptiles. The majority of treatments would be applied aerially, and low flying aircraft may cause temporary disturbance to big-game species using seasonal parturition (birthing) areas. Aerial treatments would likely occur during May and June, which coincides with use of parturition areas. Impacts would be short-term and not persist beyond the immediate duration of treatment. As with any low-flying aircraft, collisions with birds may occur.

Potential indirect adverse effects on wildlife through a reduction in prey base for insectivores and omnivores is discussed below under BLM sensitive species; RAATs methodology coupled with the use of diflubenzuron for the majority of treatment areas would minimize potential impacts.

Beneficial indirect effects to wildlife, including BLM sensitive species and migratory birds, could result from successful treatments that maintain rangeland forage productivity, resiliency, and resistance to invasion by non-native species by minimizing grasshopper defoliation of native vegetation, as discussed in more detail under sage-grouse. This alternative may also contribute to maintaining healthy riparian vegetation by controlling grasshopper outbreaks before they reach densities that induce them to migrate from depleted rangelands into adjoining riparian areas, thereby preserving suitable habitat for riparian and aquatic species.

Threatened, Endangered, and Candidate Animals

Greater Sage-grouse

This alternative is not likely to have direct adverse impacts on sage-grouse. APHIS conducted risk assessments analyzing sage-grouse as an indicator species (USDA APHIS 2002) and determined that diflubenzuron, carbaryl, and malathion at levels higher than those proposed with RAATs methodology would not directly affect this species. APHIS' risk assessment analyzed both the effects of direct pesticide exposure and indirect exposure via ingestion of moribund grasshoppers by juvenile sage-grouse, and concluded that there is little likelihood that the pesticides proposed for use in this EA would be toxic to sage-grouse (USDA APHIS 2002).

Diflubenzuron would be used for the great majority of treatment areas under this proposal and has the least potential to directly affect sage-grouse. Studies show that diflubenzuron is a selective pesticide that is highly effective against grasshoppers at early stages in their lifecycle

and has minimal effects on non-target insects and other arthropods (Catangui et al. 2000). Carbaryl is less selective; its potential for affecting non-target species can be minimized by application as bran-based bait, rather than a liquid. According to APHIS, the use of carbaryl in bait form generally has considerable environmental advantages over liquid applications; it is easier to direct toward the target area, more specific to grasshoppers, and affects fewer non-target organisms than sprays. Malathion would have the greatest potential to affect non-target insects within a treatment area. Large reductions in some insect populations would be expected after a malathion treatment (USDA APHIS 2002).

Direct impacts stemming from treatments are also unlikely, as the majority of protected areas would be treated by aerial application of diflubenzuron, with lesser areas potentially treated by aerial application of carbaryl bait. Aerial surveys are a common means of locating lek sites, and aerial telemetry is often used to relocate radio-collared sage-grouse, including nesting hens and chicks, so it is not likely that aerial applications would adversely impact sage-grouse. Ground-based application of carbaryl spray or bait would be limited and ground-based application of malathion is limited to 2,000 acres. The use of carbaryl and malathion would be limited and used only when warranted by the situation or time of year (e.g., diflubenzuron becomes a less effective control as grasshoppers mature). Ground-based application could potentially be disruptive to sage-grouse depending on the time of year and treatment location. Effects would be minimized by following mitigation measures required by BLM guidelines (Instruction Memorandum WY-2010-012), and detailed in Chapter 2.

The greatest potential for adverse impacts on sage-grouse from pesticide use stems from the indirect effects of loss of insect food sources, which are critical during the first three weeks of life (Johnson 1987, Johnson and Boyce 1990). For most of Wyoming this period coincides with the earliest likely timing of grasshopper suppression treatments with diflubenzuron. Effects could result from both successful treatment of grasshoppers and associated mortality of non-target insects or other arthropod species. The great majority of areas affected by outbreak levels of grasshoppers are anticipated to be treated using diflubenzuron, with certain areas (as appropriate) treated with carbaryl bait. These treatments, together with RAATs methodology, are designed to minimize potential effects to non-target insect species, ensuring an adequate insect food supply for sage-grouse chicks within protected areas.

RAATs methodology would reduce the potential for adverse negative effects due to loss of insect prey base (compared to complete area coverage treatments), since untreated swaths would be interspersed with treated swaths. Lower densities of surviving grasshoppers would maintain a prey base for grasshopper predators and parasites in the untreated swaths, promoting the reestablishment of natural regulation of grasshopper populations (Lockwood and Latchinsky 2000). If grasshopper densities are reduced to levels below normal, sage-grouse may experience higher than normal search times while foraging, resulting in decreased fitness. However, RAATs methodology are expected to leave a grasshopper density that is comparable to that found on rangeland in a typical year.

Malathion would not be used unless circumstances and time of year of treatment warrant its use as the only effective treatment. This highly limited use (a maximum of 2,000 acres throughout the entire state) employing RAATs methodology is most likely to occur on rangeland directly bordering at-risk croplands, at a time of year when a slower acting agent such as diflubenzuron would not provide the needed control in time to prevent substantial suppression. In general, based on predicted outbreak areas, pesticide treatments are most likely to be conducted within

the Casper, Buffalo, and Newcastle Field Offices and in the Big Horn Basin. The majority of sage-grouse core habitat is found outside these areas, and it is not expected that malathion treatments would occur in designated core areas or intersect more than a very small fraction of other occupied habitat. Even using the RAATs methodology, malathion would likely cause greater grasshopper and non-target insect mortality than diflubenzuron or carbaryl, potentially reducing available insect food sources for sage-grouse. However, any limited malathion use would occur after sage-grouse chicks surpass the critical early period when their need for insect protein is highest. Insects still constitute a desirable diet item for older chicks, but studies show that behavioral changes such as switching to other diet items (including less susceptible insect species) or increased foraging time, may help compensate for the reduction in grasshoppers and other affected insect species (Howe et al. 2000).

Alternative 2 would likely have beneficial indirect effects on sage-grouse if treatment successfully reduces outbreak levels of grasshoppers to levels typically found on rangeland. Successful treatment would help achieve WGFD sage-grouse habitat management goals (Bohne et al. 2007), including maintaining the forb, grass, and litter component needed to provide nutritious food sources and nesting cover. Successful treatment would also reduce the likelihood of grasshoppers impacting rangeland resiliency and potentially increasing its vulnerability to invasive, non-native species. These plants could out-compete more nutritious and palatable forage species (both native and introduced) and reduce the availability of high-quality forage. Cheatgrass is highly invasive in disturbed areas with reduced vegetative cover. Its establishment could lead to increased fire frequency, which would in turn promote continued cheatgrass expansion and habitat conversion from sagebrush to annual grasslands (Young and Evans 1978), with associated loss of cover and forage for sage-grouse. Sagebrush restoration is difficult and usually ineffective once annual grasses such as cheatgrass become established (Connelly et al. 2004). Habitat loss due to fire has been identified as a primary factor in sage-grouse population declines (Connolly et al. 2000).

Black-Footed Ferret

This alternative is not likely to have direct adverse impacts on the black-footed ferret. APHIS risk assessments concluded that the use of proposed pesticides, applied using RAATs methodology would not directly affect carnivores, including the black-footed ferret. Their use would also not directly affect prairie dogs, their herbivorous prey (USDA APHIS 2002). Diflubenzuron would be used for the great majority of treatment areas under this proposal and has the least potential to directly affect mammals. Ground-based treatments are unlikely to adversely impact black-footed ferrets; however use of ATVs within prairie dog colonies could damage some prairie dog burrows. Damage to prairie dog colonies would be minimized and potential impacts to the ferret would be insignificant due to the limited acreage anticipated to be treated by ground-based methods, particularly within occupied prairie dog colonies; at least 85 percent of acreage treated would be through aerial application of diflubenzuron. If ground-based treatments were proposed within the Shirley Basin black-footed ferret reintroduction area, site-specific consultation would be initiated with USFWS as warranted by the Rawlins BLM Field Office.

Alternative 2 would likely have beneficial indirect effects on black-footed ferrets if treatments successfully reduce outbreak densities of grasshoppers to levels typically found on rangeland. This would reduce competition for the grasses and forbs that constitute the bulk of prairie dogs' diet, ensuring sufficient forage for these species and contributing to the maintenance of an

adequate prey base for ferrets. Grasshopper suppression activities are not likely to adversely affect black-footed ferret due to beneficial and insignificant effects.

Western Yellow-billed Cuckoo

This alternative is not likely to have direct adverse impacts on yellow-billed cuckoo. As described in Chapter 2, buffer zones would be used around all aquatic and riparian habitats for both aerial and ground-based application methods. This would ensure that in general, riparian-dwelling species would not be directly affected by treatment. However, there remains the potential for exposure to pesticides if cuckoos forage in adjacent upland areas, a likely event if grasshoppers - a preferred food source, along with caterpillars and other slow-moving insects (Wiggins 2005) - are present in abundance. Exposure could result from direct contact with pesticides, or through ingestion of moribund grasshoppers.

APHIS risk assessments concluded that the use of diflubenzuron and carbaryl, applied using RAATs methodology, would not directly affect insectivorous birds, including the yellow-billed cuckoo. Diflubenzuron would be used for the great majority of treatment areas under this proposal and has the least potential to directly affect the yellow-billed cuckoo. Malathion has a greater potential for adverse effects (USDA APHIS 2002); susceptibility to sublethal toxic effects appears to vary considerably among different bird species (McEwen et al. 2000), and sufficient information is lacking to determine its potential effect on yellow-billed cuckoo at sublethal levels. Malathion would not be used unless circumstances and time of year of treatment warrant its use as the only effective treatment. This limited use (a maximum of 2,000 acres throughout the entire state) is most likely to occur on rangeland directly bordering at-risk croplands in the north central and northeastern portions of the state. Limited malathion use in these geographic areas would not impact the Distinct Population Segment west of the Continental Divide.

The greatest potential for adverse impacts on yellow-billed cuckoo from pesticide use stems from the indirect effects of loss of insect food sources. However, as detailed in Chapter 2, no treatments would occur in buffer zones around riparian areas, leaving an intact prey base for yellow-billed cuckoos within their riparian habitats. Impacts to upland foraging would also be minimized, as treatments using RAATs methodology would only reduce grasshopper densities to levels equal to or greater than those found on rangeland in a typical year. The use of diflubenzuron for the great majority of treatments would also reduce the risk of mortality to non-target insect species.

Gray Wolf

This alternative is not likely to have direct adverse impacts on the gray wolf. APHIS risk assessments concluded that the use of proposed pesticides, applied using RAATs methodology, would not directly affect large mammals, including the gray wolf, or their ungulate prey. Indirect beneficial impacts may result if successful treatments maintain adequate rangeland forage for wild ungulates, and reduce the likelihood of grasshopper damage impacting rangeland resiliency, as described in more detail under sage-grouse. Grasshopper suppression activities are not likely to jeopardize the continued existence of the species because, by definition, any effects to an experimental non-essential population would not jeopardize the continued existence of the species.

Grizzly Bear

This alternative would have no effect on the grizzly bear. It is not likely that treatments would be conducted in montane forest areas. If treatments are proposed within grizzly bear habitats, individual BLM Field Offices would initiate site-specific consultation with USFWS, as necessary. Grasshopper suppression would have no effect on the grizzly bear.

Canada Lynx

This alternative would have no effect on Canada lynx or its designated critical habitat. It is not likely that treatments would be conducted in boreal forests, or that treatments would indirectly impact lynx by affecting snow shoe hares, their primary prey. If treatments are proposed within Canada lynx habitats, individual BLM Field Offices would initiate site-specific consultation with USFWS, as necessary. Grasshopper suppression activities would have no effect on the Canada lynx or its designated critical habitat.

Wyoming Toad

This alternative is not likely to have direct adverse impacts on the Wyoming toad. Indirect effects from this alternative are also unlikely, as the sole known population occurs on Mortenson Lake National Wildlife Refuge and is maintained by a captive breeding program. No historic or current breeding sites are known to occur on BLM-administered land. However, primary habitat for the Wyoming toad includes approximately 2,400 acres of BLM-administered land. As described in Chapter 2, buffer zones would be used around all aquatic and riparian habitats for both aerial and ground-based application methods to ensure that in general, riparian-dwelling species such as the Wyoming toad would not be directly affected by treatment. Additional buffers detailed in Chapter 2 around the Little Laramie River and Mortenson Lake National Wildlife Refuge would specifically protect the Wyoming toad. It is possible that previously undiscovered individual adult toads may be exposed to pesticides while traversing upland areas between suitable riparian habitats. Exposure could result from direct contact with pesticides, or through ingestion of moribund grasshoppers.

APHIS risk assessments concluded that the use of diflubenzuron and carbaryl, applied using RAATs methodology, would not directly affect amphibians, including the Wyoming toad. Diflubenzuron would be used for the great majority of treatment areas under this proposal and has the least potential to directly affect the Wyoming toad. Malathion has greater potential for adverse effects; it is highly toxic to the immature aquatic stage of amphibians (USDA APHIS 2002, Webb and Crain 2006), and sublethal doses have been shown to increase susceptibility to disease in adults (Taylor et al. 1999).

Riparian and aquatic buffers would protect immature amphibians from exposure to malathion, if any individuals existed outside the Mortenson Lake National Wildlife Refuge; however, no wild breeding populations of Wyoming toad are known to exist. The use of malathion under this alternative would be limited (a maximum of 2,000 acres throughout the entire state); and is most likely to occur on rangeland directly bordering at-risk croplands in the north central and northeastern areas of the state. It is not anticipated that malathion treatments would occur within the Laramie Basin, which covers the full extent of known historical Wyoming toad populations. Grasshopper suppression is not likely to adversely affect the Wyoming toad.

BLM Sensitive Animals

This alternative is not likely to have direct adverse impacts on BLM sensitive species. APHIS risk assessments concluded that the use of diflubenzuron would not directly affect BLM sensitive

mammals, birds, fish, reptiles, or amphibians. Carbaryl would not directly impact most terrestrial BLM sensitive species, including most mammals, birds, reptiles, and amphibians. When ingested, carbaryl is moderately toxic to mammals, and may have adverse effects on small insectivorous mammals, such as BLM sensitive bat species. Malathion would not directly impact mammals and reptiles; but toxicity varies considerably among bird species. Malathion may have adverse effects on certain insectivorous birds and amphibians (USDA APHIS 2002). These potential impacts are discussed in greater detail in Appendix B (Risk Assessment) of the APHIS EIS.

Diflubenzuron is the preferred pesticide proposed for use in this EA, due to its minimal effects on non-target wildlife, as well as its specificity against molting insects such as grasshoppers. Diflubenzuron would be used on at least 85 percent of treatment areas, which would minimize potential direct impacts to BLM sensitive species from grasshopper treatments. All treatments would be conducted using RAATs methodology, further minimizing risks to BLM sensitive species.

Carbaryl treatments would be used on no more than 15 percent of treatment areas, in areas where circumstances or time of year warrant its use (i.e., when diflubenzuron would no longer provide control). APHIS determined that using RAATs methodology (reduced volume and coverage of pesticides) would minimize the risk to susceptible small mammals such as BLM sensitive bat species compared to full coverage treatments. The use of carbaryl in bait form would further reduce the likelihood of effects to BLM sensitive bat species by minimizing the effects to non-target insects and other arthropods. This would reduce the risk of carbaryl exposure through ingestion of affected insects. Night-flying insects (including moths and beetles) form the primary diet for these nocturnal species (NatureServe 2010).

Malathion use would be highly limited (a maximum of 2,000 acres throughout the entire state), and is most likely to occur on rangeland directly bordering at-risk croplands. Even using RAATs methodology, sublethal adverse impacts to certain BLM sensitive insectivorous birds and adult amphibians may occur. However, these effects would be minimal due to the tiny fraction of BLM-administered land (approximately 0.0001 percent) proposed for treatment. Exposure for adult BLM sensitive amphibians would be further limited by the use of riparian and aquatic buffers, which would confine exposure to amphibians traversing through upland habitats at the time of treatment. Riparian and aquatic buffers would also protect immature amphibians from exposure to malathion.

Treatment delivery methods may potentially impact BLM sensitive species. The majority of treatments would be aerial application of diflubenzuron, with limited aerial application of carbaryl. The majority of BLM sensitive species would not likely be impacted by aerial delivery, however low-flying aircraft may cause disturbance to nesting raptors, including bald eagles. Studies report mixed reactions by raptors to aerial disturbance, depending on species, habituation level, age of nestlings, and other factors. Generally, disturbance from fixed-wing aircraft may cause raptors to temporarily flush from the nest and/or startle behaviors on the part of nestlings, but does not appear to contribute significantly to nestling mortality or nest abandonment (Efromyson et al. 2000). Protection measures and buffers around eagle nests detailed in Chapter 2 would ensure that aerial treatments do not cause disturbance in contravention of the Eagle Act. Furthermore, the presence of aircraft near a nest during treatments would be brief.

Limited ground-based treatments that could occur later in the year, when diflubenzuron would no longer be effective, may affect BLM sensitive species. All non-flying BLM sensitive mammals and burrowing owls inhabit burrows in rangeland areas where the need for grasshopper treatments is likely to be greatest. Ground-based applications could potentially impact these species by damaging burrows and injuring or killing any individuals trapped within. Ground nesting birds could also be disturbed by ground-based treatments. The level of impact would depend on the time of year that treatments were conducted; ground based treatments would not likely occur until after July in these areas.

Raptors are also vulnerable to disturbance from ground-based activities; many species' threshold for disturbance from ATV use in the vicinity of a nest is likely to be lower than their threshold for aerial activity (Romin and Muck 2002). The level of impact would depend on species, time of year, and duration of disturbance. Protection measures and buffers around eagle nests detailed in Chapter 2 would ensure that aerial treatments do not cause disturbance in contravention of the Eagle Act.

Impacts from ground-based disturbance to BLM sensitive species would be minimized by the limited nature of proposed ground-based treatments; less than 15 percent of proposed treatments would apply carbaryl, and carbaryl may also be applied aerially depending on circumstances.

Grasshopper treatments could potentially indirectly adversely affect insectivorous BLM sensitive species through a reduction in available insect prey. Affected species include bats, and bird species to varying degrees. The loggerhead shrike and sage thrasher in particular are highly dependent on insects. Additionally, species that predate on insectivores may also be impacted if their prey base is reduced. The swift fox relies on insects for a substantial component of its diet; prey also includes small insectivorous rodents (NatureServe 2010). Insects and insectivores comprise a substantial portion of many raptors' diets, and amphibians also consume high levels of insects. As discussed in more detail under sage-grouse and other ESA-listed species, impacts to insectivores and their predators would be minimized by using RAATs methodology that would only reduce grasshopper densities to levels equal to or greater than those found on rangeland in a typical year. The use of diflubenzuron for the great majority of treatments would also reduce the risk of mortality to non-target insect species, thereby maintaining an adequate forage base for affected BLM sensitive species. Carbaryl bait is the next most likely treatment to be applied, again minimizing effects to non-target insects. Malathion would likely cause a substantial short-term reduction in non-target insects where it is used (USDA APHIS 2002), but the extent of this effect would be limited to a maximum of 2,000 acres across the state, and likely confined to areas bordering high-value at-risk croplands where no other feasible treatment alternative exists. For these reasons it is not likely to adversely impact insectivorous BLM sensitive species.

Mountain Plover

Ground nesting birds such as the mountain plover could be disturbed by ground-based treatments. These limited ground-based treatments could occur later in the year when diflubenzuron would no longer be effective. The level of impact would depend on the time of year that treatments were conducted; ground based treatments would not likely occur until after July in these areas. The proposed treatments would not jeopardize mountain plover populations or contribute to their potential listing.

Grasshopper treatments could potentially indirectly adversely affect insectivorous species through a reduction in available insect prey. The mountain plover is highly dependent on insects. As discussed in more detail under sage-grouse and other ESA-listed species, impacts to insectivores and their predators would be minimized by using RAATs methodology that would only reduce grasshopper densities to levels equal to or greater than those found on rangeland in a typical year. The use of diflubenzuron for the great majority of treatments would also reduce the risk of mortality to non-target insect species, thereby maintaining an adequate forage base for affected BLM sensitive species. Carbaryl bait is the next most likely treatment to be applied, again minimizing effects to non-target insects. Malathion would likely cause a substantial short-term reduction in non-target insects where it is used (USDA APHIS 2002), but the extent of this effect would be limited to a maximum of 2,000 acres across the state, and likely confined to areas bordering high-value at-risk croplands where no other feasible treatment alternative exists. For these reasons it is not likely to adversely impact mountain plover.

Migratory Bird Species

This alternative is not likely to have direct adverse impacts on migratory bird species. Direct and indirect impacts to migratory birds under this alternative would be similar to those described for the ESA-listed yellow-billed cuckoo (a riparian obligate insectivore, and neotropical migrant) and BLM sensitive birds. Migratory birds utilize a range of habitats although riparian areas typically support the greatest diversity of species (Knopf et al. 1988). Therefore, the analysis of effects to yellow-billed cuckoos would apply to many other migratory bird species. Effects to remaining migratory birds would vary depending on individual habitat and diet requirements, as discussed under BLM sensitive species.

4.3.3 Alternative 3 – RAATs with Additional Buffers

General Wildlife

To mitigate potential impact to big game parturition areas under Alternative 3, a buffer area of 1 mile around these seasonally important areas would be incorporated into the treatment methodology. By removing the presence of low flying aircraft during aerial treatments in these areas it would remove the potential stresses which would be associated with this disturbance. As discussed in Alternative 2 ground based treatments would occur after the key calving season for big game and is not anticipated to have adverse impacts on individuals. Aircraft-bird collisions may occur under this alternative.

Impacts to small mammals would be the same as those presented in Alternative 2. Impacts to bird species have been discussed in Section 4.3.2. To lessen impacts on nesting raptor species a buffer zone of 1 mile, around all known active raptor nests, has been incorporated into the aerial treatment methods for Alternative 3. By excluding these areas from aerial treatment it would reduce the risk of disturbance to nesting individuals caused by low flying aircraft.

The buffer zones associated with domestic bee hive areas would be the same as those presented for Alternative 2, and no additional impacts would occur associated with Alternative 3.

As with Alternative 2, the treatment of grasshopper and cricket infestations associated with Alternative 3 would have adverse impacts on non-target insects; using RAATs methodology is anticipated to reduce these impacts.

Threatened, Endangered, Candidate Animals

Greater Sage-grouse

This alternative is not likely to have direct adverse impacts on sage-grouse. Treatments would not occur within a 3-mile buffer zone or occupied or undetermined leks. Approximately 75 percent of sage-grouse core habitat on public lands (5.8 million acres) would be ineligible for treatment based on lek buffers; more habitat would likely be removed from consideration by additional buffers for other wildlife species.

Year-round activity is centered around the lek for resident (non-migratory) sage-grouse populations (Eng and Schladweiler 1972, Wallestad and Schladweiler 1974). Although migratory sage-grouse will use habitats located considerable distances (6+ miles) from the lek (Connelly et al. 1988), on average 64 percent of hens nest within 3 miles of a lek in Wyoming (Bohne et al. 2007). Additional occupied habitat would be removed from consideration for treatment by the buffer zones surrounding known raptor nests, mountain plover nesting areas, and big game calving grounds (described in Chapter 2). As a result, the majority of known sage-grouse populations would likely not fall within potential treatment areas under this alternative. As discussed previously under Alternative 2, any indirect adverse impacts due to potential loss of insect food sources on sage-grouse outside of those protected areas are likely to be minimal when applying the proposed pesticides using RAATs delivery methods, particularly as use of diflubenzuron has minimal effects on non-target insect species (Catangui et al. 2000).

The most likely indirect adverse impacts from this alternative would stem from the use of buffer zones that would leave all areas untreated within 3 miles of occupied or undetermined leks. The great majority of sage-grouse core areas on BLM lands would not be treated or would be treated later in the season. As discussed in Alternative 1, untreated areas with high grasshopper densities could undergo substantial or total loss of nutritious forage and protective nesting cover. Longer-lasting adverse impacts to sage-grouse habitats could result if grasshopper damage increases susceptibility to colonization by invasive, non-native species, particularly cheatgrass. Its establishment could lead to increased fire frequency, promoting continued cheatgrass expansion and habitat conversion from sagebrush to annual grasslands, with associated loss of suitable sage-grouse habitat. Sage-grouse fidelity would likely magnify the consequences of any loss or degradation of habitat, as discussed in Alternative 1.

Beneficial indirect impacts to sage-grouse from this alternative would be similar to those discussed under Alternative 2; however these impacts would be limited to the minor fraction (less than 25 percent) of core sage-grouse habitat that lie outside the buffer areas and that would be eligible for treatment.

Black-Footed Ferret

Impacts associated with Alternative 3 are the same as those addressed under Alternative 2 for this species because there are no special buffer zones or areas where treatment is excluded which are directly associated with the black-footed ferret or prairie dog communities. Grasshopper suppression activities on BLM-administered lands in Wyoming are not likely to affect black-footed ferrets nor jeopardize their continued existence.

Western Yellow-billed Cuckoo

Impacts associated with Alternative 3 are the same as those described under Alternative 2 for the yellow-billed cuckoo. This alternative is not likely to have direct adverse impacts on the yellow-billed cuckoo. As described in Chapter 2, buffer zones would be used around all aquatic and

riparian habitats for both aerial and ground-based application methods. This would ensure that in general, riparian-dwelling species would not be directly affected by treatment. However, there remains the potential for exposure to pesticides if cuckoos forage in adjacent upland areas, a likely event if grasshoppers - a preferred food source, along with caterpillars and other slow-moving insects (Wiggins 2005) - are present in abundance. Exposure could result from direct contact with pesticides, or through ingestion of moribund grasshoppers.

Gray Wolf

Impacts associated with Alternative 3 are the same as those addressed under Alternative 2 for this species because there are no special buffer zones or areas where treatment is excluded which are directly associated with the gray wolves. Grasshopper suppression activities in Wyoming are not likely to jeopardize the continued existence of the gray wolf in Wyoming.

Grizzly Bear

Impacts associated with Alternative 3 are the same as those addressed under Alternative 2 for this species because there are no special buffer zones or areas where treatment is excluded which are directly associated with the grizzly bear. Grasshopper suppression programs would have no effect on the grizzly bear.

Canada Lynx

Impacts associated with Alternative 3 are the same as those addressed under Alternative 2 for this species because there are no special buffer zones or areas where treatment is excluded which are directly associated with Canada lynx. Grasshopper suppression programs would have no effect on Canada lynx or its designated critical habitat.

Wyoming Toad

Impacts associated with Alternative 3 are the same as those described under Alternative 2 for the Wyoming toad. This alternative is not likely to have direct or indirect adverse impacts on the Wyoming toad. The sole known population occurs on Mortenson Lake National Wildlife Refuge and buffers detailed in Chapter 2 around the Little Laramie River and Mortenson Lake National Wildlife Refuge would specifically protect the Wyoming toad. Grasshopper suppression would have no effect on the Wyoming toad.

BLM Sensitive Animals

Treatment of grasshopper infestations on BLM-administered lands may have an impact on BLM sensitive bird and fish species which occur in coniferous forests, deciduous forests, aquatic or riparian habitats. The adherence to buffer zones which are common to all alternatives (i.e., buffers around aquatic habitat and bald eagle nest sites during nesting season) would limit the impacts to BLM sensitive species such as bald eagle, white-faced ibis, and trumpeter swan as well as amphibian species. Aerial treatments in areas directly adjacent to coniferous and deciduous forest habitats have the potential to impact other raptor and bird species nesting in these habitats. To minimize these impacts an additional buffer zone has been added under Alternative 3 which would buffer all known raptor nests by 0.5 mile for both aerial and ground-based application. The adherence to these buffer zones would be during the nesting season to prevent the short-term temporary impact associated with disturbance, particularly the presence of low flying aircraft during treatment.

The implementation of the raptor nest buffer zones along with the acceptance of human activity by some raptor species would minimize impacts to raptors. Romin and Muck (2002) identified many cases of raptor species nesting and roosting within a couple hundred meters of heavy

human disturbances (i.e., peregrine falcons and prairie falcons have been observed nesting on transmission towers, bridges, and buildings in many cities and raptors, including bald eagles and golden eagles, have nested within a few hundred meters of airports, blasting, construction, quarry, and mine sites). Furthermore, the presence of an aircraft near a nest during aerial applications would be momentary as they would pass by quickly. Ground based treatments are not anticipated to occur within coniferous or deciduous forest habitats during nesting season and would not result in impacts to individuals using these habitats during nesting season.

BLM sensitive mammal species (pygmy rabbit, white-tailed prairie dog, black-tailed prairie dog, swift fox, Wyoming pocket gopher, and Idaho pocket gopher) have the potential to be impacted by the implementation of Alternative 3 in areas where ground based application is applied. These species are all burrowing individuals and in areas where vehicles are used to apply pesticides for grasshopper treatments, there is the potential for damage to burrow systems or for individuals to be run over. To minimize potential impacts to pygmy rabbits a buffer zone of 1,000 feet would be applied to all known pygmy rabbit burrows. The aerial application of diflubenzuron is not anticipated to impact mammals. The treatment of grasshopper infestations within prairie shrub habitats and open prairie/grassland habitats would provide a beneficial impact to these BLM Sensitive mammal species by lessening competition for grasses and forbs within these species habitats. Protection would be afforded to the Preble's meadow jumping mouse by the implementation of the buffer zones around riparian and aquatic habitats, which represent the primary habitat of this species.

The four remaining BLM Sensitive mammal species which occur in basin-prairie shrub habitats include Townsend's big-eared bat, fringed myotis, long-eared myotis, and spotted bat. These species are all nocturnal feeders which feed on flying insects, primarily around desert water holes. The bats and myotis would not be impacted by the implementation of Alternative 3. The application of pesticides would not occur while individuals are active (from dusk to dawn) and the implementation of the buffer zones around aquatic habitats would protect these species' foraging habitats.

The implementation of Alternative 3 would have both beneficial and adverse impacts on the nine BLM Sensitive bird species which occur within prairie shrub habitats and open prairie/grassland habitats. As discussed in Section 4.3.2 treating grasshopper infestations would reduce the food base for bird species which consume insects, especially loggerhead shrike and sage thrasher, which are both known to consume large amounts of both grasshoppers and Mormon crickets (USDA APHIS 2010).

Mountain Plover

The implementation of additional buffer zones around known mountain plover nesting habitats under this alternative would ensure the risk of impacts to individuals is held to a minimum. The establishment of the buffer zone around mountain plover nesting sites would indirectly benefit prairie dog communities, because commonly, mountain plover are found nesting within or in close proximity to prairie dog colonies. The proposed treatments would not jeopardize mountain plover populations or contribute to their potential listing.

Migratory Bird Species

Impact to migratory bird species associated with Alternative 3 would be similar or less than those discussed for Alternative 2. Under Alternative 3 additional protection would be afforded to nesting raptor and mountain plover populations specifically by implementing avoidance

buffers around raptor nests and mountain plover nesting habitat. The implementation of additional buffer zones around known mountain plover nesting habitats would ensure the risk of impacts to individuals is held to a minimum.

4.4 Economic and Social Values

4.4.1 Alternative 1 – No Action

The direct, indirect, and induced socio-economic impacts from this alternative would depend on the intensity and scale of grasshopper outbreaks that occur on BLM-administered rangelands. At low densities grasshoppers play an important role in the functioning of rangeland ecosystems (Mitchell and Pfadt 1974). However grasshoppers also cause more economic damage to rangelands than any other insect. It is estimated that grasshoppers consume 25 percent of available rangeland forage annually in the West (Hewitt and Onsager 1983). The inflation-adjusted cost across 17 western states is estimated at $1 billion per year (Hastings et al. 2009). When grasshopper management is not attempted in outbreak areas, all available forage can be consumed at levels of 30 per square yard. Outbreaks can last 3 to 6 years and have been known to last up to 20 years (Debrey et al. 1993).

Livestock producers utilizing public rangelands (grazing permittees) would be most likely to suffer adverse economic impacts, due to partial or complete loss (depending on density of grasshoppers and number of acres affected) of available livestock forage. Grazing permittees may have to lease rangeland in another area and relocate their livestock, find other means to feed them (such as purchasing hay or grain), or sell their livestock early. Any of these actions would incur costs to the permittee. Grasshopper outbreaks often occur during droughts, when the costs of alternative feed sources are also higher (USDA APHIS 2002). Current National Weather Service Climate Prediction Center drought forecasts are for prevailing “abnormally dry” and drought conditions to persist or intensify across much of Wyoming in 2010 (NOAA NWS 2010).

Cropland adjacent to outbreaks on public lands would also likely incur damage leading to adverse economic impacts, if grasshoppers and Mormon crickets in particular migrate to nearby cropland once rangeland vegetation has been depleted (Pfadt 1994). Additional economic impacts to landowners of both rangeland and cropland adjacent to infested public lands could result from landowners bearing treatment costs to control grasshopper outbreaks that originated on untreated public lands. Treatments would probably not be implemented unless an analysis tool such as CARMA (described in Chapter 3) predicts that the threshold for net economic benefit has been reached. However, the decision to treat still means accepting a certain level of economic cost in order to prevent a greater loss. Average treatment costs can range from $1.05 to $4.24 and more per acre, depending on treatment type and delivery method.

This alternative could possibly result in adverse impacts to bees and beekeepers if untreated grasshopper outbreaks lead to loss of vegetation such as alfalfa that bees pollinate and utilize as a food source (USDA APHIS 2002). Poor nutrition is suspected to be a minor factor in increasing susceptibility to colony collapse disorder (USDA ARS 2009).

There would also be indirect and induced impacts to local communities in outbreak areas stemming from not only the loss in the agricultural sector but also from the potential loss to wildlife habitat and scenic values caused by widespread damage to rangeland vegetation. Studies show that participation in hunting and other non-consumptive wildlife recreation such as wildlife viewing and photography is sensitive to changes in the wildlife resource base. It is

estimated that a 1 percent reduction in the capacity of a range to support wildlife would lead to an approximate 3 percent reduction in hunting and non-consumptive wildlife recreation (Skold and Kitts 2000). Loss of scenic values until vegetation successfully reestablishes could likewise lead to a reduction in other forms of recreation such as camping, hiking, and scenic driving. Tourist income derived from hunters and other recreationists could be reduced, potentially affecting local providers of lodging and food, sellers of recreational equipment, and licensed outfitters, among others. Local residents' quality of life could also be adversely affected. This reduction in quality of life can be summarized as a loss of consumer surplus values as described in Chapter 3, ranging from $24 to $36 per person for each day of recreation lost on affected rangeland.

The duration of potential adverse impacts from this alternative to socio-economic values described above would depend on the level of infestation and damage caused. Substantial loss of vigor due to defoliation, or mortality of vegetation over large areas of rangeland could lead to increased colonization by invasive, non-native species. These could out-compete more nutritious and palatable forage species and reduce the availability of high-quality forage for both livestock and wildlife. Additionally, increases in bare ground cover due to reduction in both vegetative canopy and litter could lead to increased erosion and consequent degradation of rangeland resources. These changes in rangeland health may be long-lasting and both difficult and economically challenging to reverse.

4.4.2 Alternative 2 – RAATs

Under this alternative, analysis with a tool such as CARMA would identify areas where grasshopper outbreaks would likely cause damage above the ET for treatment benefits. Treatment goals would be to reduce grasshopper levels to below the ET, rather than eradication. The effectiveness of RAATs methodology generally averages 80 to 95 percent, which reduces grasshopper levels to those found on healthy rangeland in non-outbreak years (Schell and Lockwood 1997).

Risk assessment studies conducted by APHIS show that RAATs methodology are unlikely to adversely impact livestock or wildlife (USDA APHIS 2002). Successful treatments would have indirect beneficial impacts by maintaining adequate forage and minimizing the economic loss to grazing permittees from reductions in forage on public lands. Forage not utilized by grasshoppers would be available for livestock consumption, reducing the need for costly supplemental feeds. Successful treatments would also likely benefit adjacent landowners, to the extent that fewer grasshoppers remain to migrate onto private rangelands and croplands. As a result, landowners would be less likely to suffer losses due to private rangeland or crop damage. Consequently, the need for landowners to bear treatment costs to control grasshoppers that originated on untreated public lands may be reduced under this alternative.

This alternative could indirectly adversely impact bees and beekeepers, together with businesses that rely on bees for pollination, such as alfalfa seed producers. According to the APHIS EIS, diflubenzuron is relatively non-toxic to bees and would not likely adversely affect bee populations, but liquid carbaryl and malathion can be toxic (USDA APHIS 2002). The use of carbaryl bait would minimize adverse impacts compared to liquid formulations (Alston and Tepedino 2000). The limited application of malathion is proposed for circumstances where its use would be warranted by the situation or time of year. In areas where malathion is used, there would be potential adverse impacts to bees present in the area (USDA APHIS 2002). Exposure

to malathion could lead directly to bee mortality, however even sub-lethal exposure could be detrimental and studies have demonstrated that exposure to multiple pesticides can create synergistic effects, for example, increased toxicity compared to the effects of each individual agent alone (USDA ARS 2009). Impacts would be minimized by following the notification and protection measures detailed in Chapter 2.

RAATs methodology could cause minor short-term impacts to recreational use of public rangelands, if, following notification regarding planned treatment areas, local residents or tourists choose to temporarily avoid those areas. This could cause a short-term reduction in local tourist income and perceived quality of life. However, this impact would be minor compared to the long-term benefits of maintaining wildlife habitat and scenic values by protecting rangeland vegetation through successful reduction in grasshopper densities.

4.4.3 Alternative 3 – RAATs with Additional Buffers

Under this alternative, the implementation of buffers around critical wildlife habitats and other protected areas would alter the timing of treatments on portions of public lands. Treatment of approximately 5.4 million acres (31 percent) of public lands would be delayed until after specific dates associated with nesting and parturition, by implementing buffers around sage-grouse leks and big game calving grounds. As a result, impacts in these areas would likely be similar to those discussed in greater detail under Alternative 2. Delayed treatments due to seasonal restrictions may result in some impact to rangeland vegetation resulting in impacts to grazing permittees. These impacts would be associated with partial loss of available livestock forage. The level of impact would be associated with the severity of infestation prior to treatment. Private rangelands and croplands adjacent to areas protected by buffers on public lands would be at increased risk for economic losses due to forage or crop loss as a result of delayed treatment on public lands. In addition, the cost of treatment may be increased compared to Alternative 2 if more costly ground-based treatments are conducted due to timing restrictions. Using ground-based treatments may become cost prohibitive over large areas because the ET criteria for treatment is no longer met and because of the greater potential for ecological impacts; thus treatment may not occur.

Impacts for the remaining public lands outside buffer areas and eligible for treatment would be similar to those discussed in greater detail under Alternative 2. Potential adverse impacts to bees and beekeepers would be minimized by following procedures outlined in Chapter 2. Grazing permittees, adjacent landowners, and recreationists would likely benefit from treatments that protect rangeland to maintain adequate forage supplies, protect scenic values, and reduce the risk of grasshopper infestations spreading to adjacent private lands. Overall, beneficial socio-economic impacts would be reduced compared to Alternative 2 proportionally to the reduction in public land acreage eligible for treatment.

4.5 Soils

4.5.1 Alternative 1 – No Action

Under this alternative no insect management methods would be utilized to suppress grasshopper infestation outbreaks. There would be no direct impacts to soils from pesticide applications. However, large infestations where more than 15 individuals occur per square meter have the potential to indirectly impact soils. These indirect impacts would result from the removal of plant protective cover in the infested area due to increased grasshopper consumption of

rangeland plants. In dry sparsely vegetated habitats typical of Wyoming rangeland, existing vegetative cover is a key component in soil and moisture retention. Grasshopper consumption of existing plant cover could leave soils exposed and increase the risk of soil erosion by wind and water. These impacts would be greatest in areas which have been identified as having highly erodible soils.

4.5.2 Alternative 2 – RAATs

Implementation of this alternative could protect over 1 million acres of BLM land (RAATs treatments on up to 557,000 acres) through use of pesticides to suppress grasshopper outbreaks. The majority of the treatments would be comprised of aerial application which would result in no direct soil disturbance. However, up 15 percent of the acreage could be treated through ground-based application of pesticides, which has the potential to disturb soils. Ground-based treatments (e.g., via ATV) may result in impacts to vegetation and disruption of the soil surface. These impacts are anticipated to be minimal and isolated.

In areas where treatments are prohibited because of protective buffers, the risk of soil impacts would be the same as those presented under Alternative 1. In the untreated areas, consumption of native perennial vegetation by grasshoppers would increase the risk of soil erosion by wind and water. However, because the overall size of the infestation would be smaller under this alternative due to treatment in adjacent areas it is likely that there would be fewer grasshoppers migrating into those buffered areas.

4.5.3 Alternative 3 – RAATs with Additional Buffers

Implementation of this alternative would also use pesticides to suppress grasshopper outbreaks but fewer acres would be treated than under Alternative 2 because additional acres would be excluded from treatment. The overall treatment acreage would be reduced but because exact timing and locations of treatments cannot be identified it is not possible to determine what the reduction would be in terms of aerial versus ground based treatments. In general, it can be predicted that because fewer acres would be treated overall there would be fewer direct impacts to soils from ground-based pesticide application.

The potential for consumption of native perennial vegetation by grasshopper infestations would be greater than under Alternative 2 because the amount of untreated acres would be greater; consequently, the potential for increased risk of soil erosion by wind and water would also be increased compared to that alternative. The potential for indirect effects to soils from loss of vegetation related to the grasshopper infestation would be less than from the No Action Alternative.

4.6 Cultural Resources

4.6.1 Alternative 1 – No Action

Under this alternative no insect management methods, such as pesticide application, would be utilized to suppress grasshopper outbreaks. There would be no impacts to artifacts from grasshopper infestations since they are not a typical food source. There could be affects to traditional plant resource collection areas from the denuding of native perennial vegetation by grasshopper infestation.

4.6.2 Alternative 2 – RAATs

The BLM's consultation with the Advisory Council on Historic Preservation and the SHPO for this project would be consistent with the cultural resources programmatic agreement signed in 1997 and amended in 2009 (USDI BLM 1997b and USDI BLM 2009b). Under this agreement site-specific inventories for cultural resources are required before any surface-disturbing activities can begin. The agreement also requires adverse effects on significant resources to be mitigated, or the resources themselves be avoided to the extent possible, and those sites listed on, or eligible for, the NRHP be protected.

Pictographs and petroglyphs are vulnerable to damage by liquid pesticides. To mitigate potential impacts to these resources, a buffer zone determined by the local field office archaeologist would be implemented around these locations. For ground-based application methods, the local field office archaeologist would determine if impacts to significant prehistoric and historic sites are expected and develop appropriate procedures to avoid or mitigate the impacts in accordance with the BLM-SHPO Protocol.

Tribal plant resource gathering areas may be affected by the application of pesticides. However, the risk of impacts would be lessened by following product labels. In addition, reduced agent and area applications as described in Chapter 2 would lessen impacts to tribal plant resource gathering areas. Identified traditional Native American plant gathering areas would be avoided to the extent possible by designating a buffer zone around the resource area.

4.6.3 Alternative 3 – RAATs with Additional Buffers

Potential impacts associated with the implementation of Alternative 3 would be the same as those presented for Alternative 2. The additional buffer zones associated with this alternative are not directed to the protection of cultural resources; however, indirectly they may protect cultural resources from disturbances associated with ground based treatments within the buffer zones because fewer acres would be treated overall.

4.7 Recreation

4.7.1 Alternative 1 – No Action

Direct impacts from this alternative would depend on the intensity and scale of grasshopper outbreaks that occur on BLM-administered rangelands. Impacts to recreational opportunities in outbreak areas could stem from potential loss to wildlife habitat and scenic values caused by widespread damage to rangeland vegetation. Studies have shown that a reduction in the capacity of an area to support wildlife correlates to reduced utilization of recreation opportunities, including wildlife-viewing and hunting (Skold and Kitts 2000). This would impact two of the most popular recreation activities in Wyoming (USDI BLM 2009c); the effect is discussed in greater detail under socio-economics. Similarly, it is highly likely that widespread defoliation of vegetation would adversely impact recreation opportunities based on scenic values, including scenic driving and viewing, hiking, and camping.

The duration of potential adverse impacts to recreation values from this alternative would depend on the level of infestation and damage caused. Substantial loss of vigor due to defoliation, or mortality of vegetation over large areas of rangeland could lead to increased colonization by invasive, non-native species, causing long-lasting reductions in the quality of available wildlife habitat (Connelly et al. 2004). Additionally, increases in bare ground cover due to reduction in

both vegetative canopy and litter could lead to increased erosion and consequent degradation of wildlife habitat, reducing wildlife-related recreation opportunities beyond the year of original impact. Scenic values may also take several years to fully reestablish following substantial defoliation, also impairing recreationists' experiences beyond the current year.

4.7.2 Alternative 2 – RAATs

Public notification of treatment locations would be coordinated with APHIS and local weed and pest districts. Grasshopper suppression programs using RAATs could cause minor, short-term impacts to recreational use of public rangelands, if, following notification regarding planned treatment areas, recreationists choose to temporarily avoid treated locations. Risk assessments conducted by APHIS have determined that RAATs methodology using the proposed pesticides would be unlikely to adversely impact human health (USDA APHIS 2002); however it is possible that recreationists would prefer not to enter an area while treatments are occurring. This could cause a short-term reduction in local recreation opportunities. If individuals choose to enter an area where treatment is occurring or if they enter an area unaware of a planned treatment, there is the potential that they could be caught in the spray drift. Applicators take into account droplet size, wind pattern and speed, temperature, humidity, and topography, to minimize impacts to recreation areas or other identified sensitive areas and they typically attempt to turn the spray off if they notice individuals on the ground during aerial applications, thereby reducing the potential for adverse effects to recreationists. Any short-term adverse impacts would likely be minor compared to the long-term recreational benefits of maintaining wildlife habitat and scenic values by protecting rangeland vegetation through successful reduction in grasshopper densities.

4.7.3 Alternative 3 – RAATs with Additional Buffers

This alternative removes a considerable portion of BLM-administered lands from consideration for treatment. Treatment of infestations on approximately 5.4 million acres (31 percent) would be precluded due to implementation of buffers around sage-grouse leks, raptor nests, big game parturition areas, and mountain plover nesting areas among others. Impacts for areas ineligible for treatment would be similar to those discussed in more detail under Alternative 1; the severity of potential adverse impacts associated with the lack of treatment within the buffer areas, to recreational values would depend on the levels and duration of grasshopper infestations.

Impacts for the remaining BLM-administered lands eligible for treatment would be similar to those discussed under Alternative 2; again it is likely that the temporary loss of recreational opportunities while treatment is occurring would be outweighed by the long-term benefits of maintaining wildlife habitat and scenic values by protecting rangeland vegetation.

4.8 Areas of Critical Environmental Concern

4.8.1 Alternative 1 – No Action

Under the No Action Alternative, there would be no direct impacts to ACECs. The potential for indirect effects to ACECs corresponds to the potential for effects to the resources for which an individual ACEC is designated. The indirect impacts resulting from severe grasshopper infestations on individual resources in the absence of any treatment is described above by resource topic. Effects to vegetation that could result in the absence of treatment would be of concern in ACECs that have been designated for protection of sensitive plants or unique

vegetative complexes (e.g., Five Springs Falls, Kemmerer and Rock Springs SSP Species, Blowout Penstemon, and Sand Hills/JO Ranch ACECs). Similarly effects to soils resulting from the removal of vegetation in areas of severe grasshopper infestation would be of concern in certain ACECs (e.g., Carter Mountain, Dubois Badlands, Upper Owl Creek) as would the effects of vegetation removal on wildlife habitat (e.g., East Fork, Green Mountain, Rock Creek, New Fork Potholes, Oregon Butte). Refer to the vegetation, soils, and wildlife sections for anticipated effects from the No Action Alternative that could adversely affect the resources for which these ACECs were designated.

4.8.2 Alternative 2 – RAATs

As described previously, this alternative would protect vegetation, soils, and wildlife habitat as compared to the No Action Alternative and thus would provide protection to those resources for which ACECs are designated. Refer to the vegetation, soils, wildlife, and cultural resources sections for anticipated effects on those resources from this alternative. Management restrictions approved during the RMP process to protect ACEC resources would be followed to reduce the potential for adverse impacts from treatment activities. If ground-based treatments are planned for locations that overlap ACEC boundaries, all restrictions such as OHV travel prohibitions would be followed. No surface disturbing or disrupting activities (e.g., off-site dust, air pollutants, etc.) would be allowed in the Rock Springs Field Office SSP Species ACEC to protect the special status plant species and their habitat. No activities would take place in the Spanish Point Karst ACEC because chemical control of pests is prohibited.

4.8.3 Alternative 3 – RAATs with Additional Buffers

Effects to ACEC resources from this alternative would be the same as described above; refer to the vegetation, soils, wildlife, and cultural resources sections for anticipated effects on those resources from Alternative 3. Additional buffers in place under this alternative would overlap some of the ACEC boundaries reducing the acreage treated within the ACECs. For instance buffers under this alternative would be extended from the 1,000-foot buffer for bald and golden eagles under Alternative 2, to a 1-mile buffer for the protection of all raptors. This would reduce the amount of area treated in ACECs designated for raptor habitat (e.g., Jackson Canyon, Sand Hills/JO Ranch, Cedar Canyon, Natural Corrals, and Oregon Buttes ACECs).

Additional buffers to protect sage-grouse would reduce or delay the size of area treated in the Sand Hills/JO Ranch ACEC which was designated to protect nesting and foraging habitat for this species as well as potentially other ACECs that overlap habitat for this species. No aerial or ground treatments would occur within 3 miles of known leks or brood rearing areas until after June 30 to ensure no additional disturbance occurs around those areas. The amount of acreage treated in the New Fork Potholes ACEC would similarly be reduced or delayed due to the buffer for big game parturition areas. Additional reductions in acreage could result if ACEC boundaries overlap the 1-mile buffer for known mountain plover nesting areas or the 1,000 foot buffer for known pygmy rabbits burrows. Effects of these buffers would be the same as described in the wildlife section previously.

4.9 Rangeland Resources

4.9.1 Alternative 1 – No Action

Under the No Action Alternative no grasshopper suppression would occur. As stated previously, grasshopper infestations of 15 or more individuals per square meter, can remove the majority of the grasses and forbs within a given area. Predicted grasshopper outbreaks could reduce forage material available to livestock and damage rangeland to the point it does not meet the standards and guidelines outlined in the *Standards & Guidelines* (USDI BLM 2008g). In particular, Standards #3 and #4 (upland vegetation consisting of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance ; and rangelands are capable of sustaining viable populations and a diversity of native plant and animal species appropriate to the habitat, respectively) – could be affected.

Overall herd and rangeland health could be adversely affected if grazing continues to occur on grasshopper damaged rangeland. It is likely BLM would suspend a number of AUMs in order to counteract damage done by grasshoppers and to remain in compliance with the *Standards & Guidelines*. If warranted by the conditions, BLM managers may elect to close allotments in order to protect the resources (43 CFR 4110.3-3(b)). It could take years for damaged rangeland to return to pre-grasshopper outbreak conditions and the number of AUMs for which an allotment was previously permitted. Livestock management practices may be altered by private ranchers who have to lease rangeland in another area and relocate their livestock, purchase hay or grain for livestock sustenance, or sell their livestock early.

4.9.2 Alternative 2 – RAATs

Grasshopper suppression using RAATs methodology would decrease impacts to livestock grazing resources. Treated swaths would reduce the loss of grasses and other forage material and provide a seed bank and plant base to assist in recovery of adjacent untreated areas. Grasshopper damage to rangeland health would not be as severe or persistent, leading to greater retention of AUMs within allotments. If damage occurs in some locations, allotments or portions of allotments may be closed for resource protection as described for Alternative 1 (43 CFR 4110.3-3(b)) but the impacts would not be as severe.

Livestock would not be affected by consuming plants sprayed with pesticides. Because of their mode of action and low toxicity the pesticides being used would not directly affect or be toxic to livestock (refer to the 2002 APHIS EIS, Chapter 5 and Appendix B, for more detailed information).

The potential for grasshopper damage within buffer zones cannot be alleviated and thus impacts to these areas would be the same in all three alternatives. Portions of the allotments within riparian and other buffer zones may be degraded to the point they do not meet the *Standards & Guidelines* and AUMs available to livestock could decrease.

4.9.3 Alternative 3 – RAATs with Additional Buffers

The impacts to livestock grazing associated with Alternative 3 are similar to those presented for Alternative 2 and treated areas would decrease impacts to livestock grazing resources including plant forage production.

4.10 Cumulative Impacts

As stated at the beginning of this chapter, analysis of cumulative effects addresses the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). The three components of this definition as they relate to this cumulative impact analysis are: (1) incremental impact of the action when added to (2) impacts from all past, present, and (3) reasonably foreseeable future actions. The first component, incremental impacts of the action (i.e., grasshopper suppression), is described for each resource as direct and indirect effects in Sections 4.2 to 4.9. The second component, impacts from all past and present actions, are not considered in this cumulative impacts analysis; they are encompassed within the description of baseline conditions presented in Chapter 3 in that the descriptions reflect the effects of past and present actions. The third component, reasonably foreseeable future actions, was identified by reviewing RMPs and reasonably foreseeable development (RFD) scenarios for the field offices. This discussion is tiered (40 CFR 1502.20) to the analyses in those documents in order to eliminate repetitive discussions of the same issues and to focus on the issues specific to this action. The cumulative impact analysis uses the geographic areas and timeframes identified in the RMPs and RFDs for the field offices.

Because of the nature of this project it is not practical to exhaustively analyze all possible cumulative impacts. Neither is it required by CEQ who indicates that cumulative impact analysis should focus on meaningful impacts (CEQ 2005). To focus the scope of cumulative impact analyses, the discussion considered whether reasonably foreseeable future actions described in RMPs and RFD scenarios are anticipated to have environmental impacts similar to the incremental impacts identified for this project. Therefore, not all issues identified for direct or indirect impact assessment in this EA are analyzed for cumulative effects. This analysis focuses on effects to vegetation and wildlife (including bees) in order to identify meaningful impacts.

Review of actions in the RMPs for the State of Wyoming reveal that most reasonably foreseeable future actions could be expected to produce some environmental impacts to vegetation and wildlife similar to the incremental impacts anticipated for the grasshopper suppression treatments but also many impacts that are more intensive. For example, when implemented, most projects identified are anticipated to involve surface-disturbing activities or will allow removal of vegetation and soil disturbance and many will cause habitat loss or fragmentation. (Refer to the RMPs for other actions occurring on or planned for BLM-administered lands and the types of impacts expected to result). While this project would cause limited vegetation and soil disturbance and temporary disruption of wildlife it would not cause habitat loss or fragmentation.

Of the general types of actions examined in the RMPs and RFD scenarios, oil and gas development activities (e.g., exploration, production, and pipeline development) and other development activities such as wind energy present the highest likelihood for contributing to potential cumulative impacts on BLM-administered lands when added to activities associated with this project. Grasshopper suppression treatments implemented on state and private land have the greatest potential to contribute to cumulative effects in the locations where those treatments occur.

Effects to Vegetation: Direct disturbance and indirect effects to pollinators are the primary types of effects to vegetation that would result from grasshopper suppression. Limited ground-based

application poses the risk of trampling/running over vegetation, soil compaction, and the introduction of invasive plant species where ATVs are used. Other ground disturbing actions occurring on BLM-administered land (e.g., oil and gas development, wind energy development, OHV use, fire suppression, and recreational activities) have the potential to result in similar although more widespread effects to vegetation. In addition to grasshoppers and other insects, livestock and wildlife species also consume rangeland vegetation. Dependent upon intensity, frequency and timing, this use can reduce vegetative cover and change composition of plant communities over time, including increases in invasive plant species. Plant cover and composition is also changed by drought, wildfire and climatic changes. Because of the limited amount of disturbance expected from ATV use under this project, the potential contribution from this alternative to cumulative effects to vegetation is negligible.

Indirect effects to vegetation may occur through effects to non-target, plant pollinating insects (e.g., bees) from use of carbaryl and malathion. Because use of those two pesticides would be limited in favor of diflubenzuron, which has the least effect on non-target insect species and does not affect bee pollinators (USDA APHIS 2002), effects would be limited. However, pollinators present in areas treated with carbaryl and malathion sprays may be adversely affected. Pollinator reduction would decrease seed production and regeneration of rangeland plants. Other actions that affect pollinators could contribute to cumulative effects to vegetation, specifically pesticide application on private and state lands that may use malathion or carbaryl on a more widespread basis. Grasshopper suppression on private and state land would also reduce grasshoppers and potentially non-target insect species such as bees and thus could contribute to cumulative effects. Implementation of the impact minimization measures described in Chapter 2 to protect pollinators would reduce the potential for this project to contribute to cumulative effects.Grasshopper suppression would also have beneficial effects on rangeland vegetation, preserving rangeland vegetation and reducing rangeland degradation. Other BLM actions such as vegetation treatments and grazing management, and grasshopper suppression on state and private lands would also beneficially affect vegetation resources.

Effects to Wildlife (Including Bees): Temporary disturbance of some wildlife species is one type of effect that could result from grasshopper suppression. Ground-based application via ATV or aerial application using low flying aircraft s may cause temporary disturbance to some species. Aerial flights conducted to survey a variety of wildlife cause impacts similar to those anticipated from grasshopper suppression using the RAATs methodology. The potential for cumulative impacts would be reduced because impacts from both of those actions would be short-term and not persist beyond the immediate duration of treatment. In addition, seasonal and spatial buffers would help to minimize effects to species of concern.

Most other actions on BLM lands also cause some temporary wildlife disturbance but primarily result in longer term habitat loss and fragmentation. Because the disturbance created by grasshopper suppression would be temporary, the potential contribution to cumulative effects from this action in relation to other actions on BLM-administered lands would be negligible.

Grasshopper suppression on private and state land would likely result in the same types of temporary effects to wildlife.

Another type of effect that was considered important in the analysis of cumulative effects was the reduction in available insect prey. This represents the greatest potential adverse impact for sage-grouse and other insectivores and omnivores. The use of diflubenzuron for the great

majority of treatments would reduce the risk of mortality to non-target insect species and to species that prey on grasshoppers. All treatments would be conducted using RAATs methodology, further minimizing risks to wildlife species. Use of carbaryl and malathion represent a greater risk and could cause a reduction in non-target insects in limited areas where these pesticides are used. Review of RMPs and RFDs did not identify other actions on BLM-administered lands with the potential to cause a decrease in insects. However, grasshopper suppression on private and state land would also reduce grasshoppers and potentially non-target insect species and thus could contribute to cumulative effects. This would be particularly true where pesticide application on private and state lands consists of malathion or carbaryl application rather than diflubenzuron. Although effects to non-target insects would be greater with use of these pesticides, use of RAATs methodology and low application rates would help ensure insect populations remain.

Grasshopper suppression could indirectly adversely impact bees. While diflubenzuron is relatively non-toxic to bees and would not likely adversely affect bee populations, use of liquid carbaryl and malathion could result in adverse effects (Mullin et al. 2010). The application of malathion – although limited – would adversely impact bees present in the treated area. Exposure to malathion could lead directly to bee mortality or detrimental synergistic effects could result from sub-lethal exposure from multiple pesticides (USDA ARS 2009). Grasshopper treatment on private and state land has the potential to produce cumulative effects to bees. The potential for cumulative impacts would be minimized by following the notification and protection measures detailed in Chapter 2.

Grasshopper suppression would likely have beneficial indirect effects on wildlife if treatment successfully reduces outbreak levels of grasshoppers to levels typically found on rangeland. Successful treatment would help achieve WGFD sage-grouse habitat management goals (Bohne et al. 2007), including maintaining the forb, grass, and litter component needed to provide nutritious food sources and nesting cover. Beneficial indirect effects to wildlife, including BLM sensitive species and migratory birds, could result from successful treatments that maintain rangeland forage productivity, resiliency, and resistance to invasion by non-native species by minimizing grasshopper defoliation of native vegetation. Grasshopper suppression on private and state land would also reduce grasshoppers and contribute to overall beneficial cumulative effects.

4.10.1 Relationship Between Local Short-term Uses and Long-term Productivity

Section 102(C) of NEPA requires discussion of the relationship between local, short-term uses of man's environment and the maintenance and enhancement of long-term productivity of resources. As described in the introduction to this chapter, short-term impacts are defined as anticipated to occur during or immediately after implementation of treatment. Long-term impacts are defined as those that follow the initial implementation. Most of the effects of the action alternatives would be short-term. Consequently, the decision to implement grasshopper suppression treatment would represent a trade-off between a short-term affect on resources and the maintenance of resources in their natural, most productive condition for the long term. Any action implemented under the EA includes appropriate mitigation measures to minimize the effect of short-term uses on long-term productivity.

4.10.2 Unavoidable Adverse Impacts

Section 102(C) of NEPA requires disclosure of any adverse effects that cannot be avoided if an action alternative is implemented. Unavoidable adverse impacts are those residual impacts that remain following the implementation of mitigation measures or those for which no mitigation measure exists.

Limited ground-based application by ATV or backpack sprayers poses the risk of trampling/ running over vegetation, soil disturbance and compaction, and the introduction of invasive plant species in limited areas. While these impacts would be mitigated by staying on roads as much as possible, some effects could occur where off-road travel is required for treatment. The potential for grasshopper damage within buffer zones and untreated areas cannot be alleviated and indirect impacts to vegetation and soils could result in these areas. Portions of allotments may be degraded resulting in a decrease in available AUMs, which could indirectly affect permittees.

Aerial application could cause minor, short-term impacts to recreational use of public rangelands, if, following notification regarding planned treatment areas, recreationists choose to temporarily avoid treated locations. This could cause a short-term temporary reduction in local recreation opportunities.

Plant pollinating insects present in areas treated with limited aerial application of carbaryl and malathion sprays may be adversely affected. Pollinator reduction would decrease seed production and regeneration of rangeland plants. This could indirectly adversely impact bees and beekeepers, together with businesses that rely on bees for pollination, such as alfalfa seed producers. Although impacts would be minimized by following the notification and protection measures detailed in Chapter 2 there is still the potential for adverse effects to occur.

Ongoing scientific research has identified the potential impacts of “greenhouse gas” emissions (including carbon dioxide, methane, nitrous oxide, water vapor, and several trace gases) on global climate. Through complex interactions on a regional and global scale, these greenhouse gas emissions are thought to cause a net warming effect of the atmosphere. Although greenhouse gas levels and corresponding variations in climatic conditions have varied for millennia, recent industrialization and burning of fossil carbon sources are thought to have caused carbon dioxide concentrations to increase noticeably and likely to contribute to overall climatic changes, typically referred to as global warming.

The assessment of greenhouse gas emissions and climate change is in its formative phase; it is not yet possible to know with confidence the net impact to global climate. However, the Intergovernmental Panel on Climate Change (2007) recently concluded that “warming of the climate system is unequivocal” and “most of the observed increase in globally average temperatures since the mid-twentieth century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations.”

The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts. While fossil fuels would be burned during implementation of this project the cumulative contribution to global climate change and the types of effects that would be produced cannot be quantified.

4.10.3 Irreversible and Irretrievable Commitment of Resources

Section 1502.16 of CEQ regulations requires that the discussion of environmental consequences include a description of “…any irreversible or irretrievable commitment of resources which

would be involved in the proposal should it be implemented." An irreversible commitment of a resource is one that cannot be reversed (e.g., the extinction of a species, disturbance to protected cultural resources, or extraction of fossil fuels). A resource is irreversibly committed when an action alters the resource so that it cannot be restored or returned to its original or predisturbance condition and the resource or its productivity or utility would be consumed, committed, or lost forever. An irretrievable commitment of resources is one that directly removes the resource from availability or that renders its productivity or utility lost for a period of time. If a resource is irretrievably committed it results in the loss of production or future use of the resource for a short to medium period of time (years).

In considering these types of commitments of resources what is important is understanding that selection of an action alternative would commit resources for a period of time and, in some cases, prevent use or opportunity by future generations. There are resources that would be expended in the treatment authorized by the alternatives. These resources include energy in the form of petroleum products for fueling planes and vehicles and the actual pesticides that would be applied to the treated areas. These resources, once expended, are irreversibly and irretrievably committed because their reuse for some other purpose would be impossible or highly unlikely. No other nonrenewable resources would be affected and there would be no other irreversible commitment of resources. Similarly, none of the actions would result in the loss of production or use of a resource that would represent an irretrievable commitment of resources.

5 Consultation and Coordination

This chapter lists individual BLM resource specialists who participated in the preparation of this EA, as well as others who contributed or were contacted during its development. The alternatives and issues analyzed in detail were produced through input from those identified below.

5.1 Public Notice

The BLM mailed approximately 30 letters to agencies, tribes, and other interested organizations to initiate a 14-day scoping period. The general public was notified by press releases to local newspapers and a web notice on the BLM website (see Scoping and Identification of Issues in Chapter 1). A summary of the comments received was developed and relevant comments were incorporated into the EA (see Appendix A). Notice of availability of the EA will also be released requesting public comment before a decision is issued.

5.2 Tribes, Agencies, and Organizations Contacted or Consulted

The following Native American Tribes, agencies, and organizations were informed of the project and were given an opportunity to provide comments and request a copy of the EA for review. Coordination with the USFWS on this project is documented in Appendix B.

Tribes
Eastern Shoshone
Crow
Northern Arapahoe
Northern Cheyenne

Agencies
USDA APHIS, Wyoming State Office
U.S. Fish and Wildlife Service
Wyoming Game and Fish Department
Wyoming State Department of Agriculture
Wyoming State Geological Survey
Wyoming State Historic Preservation Office

Organizations
Greater Yellowstone Coalition
Rocky Mountain Elk Foundation
Trout Unlimited
Western Watersheds Project
Wyoming Outdoor Council

5.3 List of Preparers

Bureau of Land Management

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Jerry Jech	Natural Resource Specialist, Cody Field Office
Chris Keefe	Wildlife Biologist, Wyoming State Office
Carrie Nelson	Wildlife Biologist, Rock Springs Field Office
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Cooperating Agencies

Justin Gentle	Domestic Program Coordinator, USDA APHIS PPQ
Alex Schubert	Fish and Wildlife Biologist, U.S. Fish and Wildlife Service

Non-BLM Preparers (North Wind, Inc.)

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Keri Evans	Rangeland Ecologist
Tim Funderburg	GIS Analyst
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Scott Webster	Wildlife Biologist

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Appendix A
Summary of Public Comments

The following tables summarize the comments that were received during scoping and during the public comment period for EA# WY-030-EA10-239, Grasshopper and Mormon Cricket Suppression on Lands Administered by the Bureau of Land Management in Wyoming.

Scoping Comments

Commentor Name and/or Organization	Support or Oppose	Specific Comments	Summary of Comments	Action Taken if Any
Nancy Carson	oppose	Need to develop a more ecologically sane solution	Develop a more ecologically sane solution	Ecological impacts are considered in the EA.
Nancy Taylor	oppose	Opposes spraying of pesticides on BLM land particularly from the air. Unforeseen results. Full impact on other creatures is unknown. Many beneficial species will be killed. Balance of the soil can be compromised. Health of birds and other creatures that inhabit spraying area. Known carcinogenic links to pesticides. Not easy to control drift of pesticides into inhabited areas. Shortsighted proposal. Grasshoppers are part of natural cycle.	Oppose aerial spraying. Cause unforeseen results. Impact to non-target species such as birds and other wildlife. Effects to soils. Pesticides are carcinogenic. How will BLM control drift into inhabited areas. Grasshoppers are part of natural cycle.	Impacts to non-target species and soils are addressed in the EA. Effects to human health were addressed in the APHIS EIS. A mitigation was added to the EA to address drift into inhabited areas.
WWP Wyoming Office	N/A	Do you have a map of these predicted 1.2 million acres?	Treatment area map.	A treatment map is included in the EA.
Todd Berkenfie	oppose	PLEASE RECONSIDER spraying. The food chain is particularly critical for the species that inhabit deserts. Grasshoppers provide food within the chain of biological diversity. We certainly don't need toxic hunt animals because they have ingested others who have ingested the poisoned spray. We in this state eat off the land and should NOT have to be concerned about more toxins in our food, nor having the spray filter into our gardens by wind	Food chain effects – grasshoppers are food. Effects to animals that are hunted for food that have ingested pesticide. Spray drifting onto gardens/food.	Effects to wildlife are considered in the EA. Effects to human health are addressed in the APHIS EIS. Mitigations to address drift were added to the EA.
Frederick W. Linton	N/A	Long term effect aerial pesticides on adults and kids when spraying this material over campsites and open areas where people might be walking, playing or whatever. How will it affect people with respiratory problems, could people get cancer down the road? How will it affect birds and animals that feed on the grasshoppers and Mormon crickets?	Long term effect to humans who are recreating, people with respiratory problems, cancer effects? Food chain – effects to birds and animals that feed on hoppers.	Effects to human health were addressed in the APHIS EIS. Effects to wildlife are discussed in the EA.
Wyoming State	N/A	No problems or issues related to this proposed	No problems or	No action taken

Geological Survey, Alan J. Ver Ploeg		action.	issues.	in EA
Jeff Stines	N/A	How does spraying for crickets/grasshoppers on BLM lands support or conflict with Sage Grouse management? Grouse eat crickets? Any studies going to be done about the effects of spraying pesticides over a big area and what this might do to sage grouse in the area.	Does action match sage grouse management? Effects to sage grouse food source. General effects to sage grouse.	Effects to sage-grouse are addressed in the EA.
Fred Craft	support	Supports reducing the grasshopper population	Supports proposal.	No action taken in EA
John L. Baker	support	Thanks for being proactive	Supports proposal.	No action taken in EA
Hilary Eisen GYC	oppose	Concerned about the impacts of this suppression on species that depend on an insect diet. Effects that aerial pesticide application will have on non-target species, water quality, and farmers or ranchers whose property borders BLM lands. Provide detailed explanation of how they plan to minimize effects to non-target species including other insects, aquatic species such as fish, and terrestrial vertebrates. In addition, while it may be necessary to control grasshopper and cricket populations in Wyoming this summer, I urge the BLM to consider the important role these insects play in the diets of many other species. The BLM must ensure that enough insects remain to sustain the wildlife populations that depend on this important source of protein. How pesticide application will affect human population. How aerial spraying will impact surface water quality. How do they plan to minimize pesticide drift onto adjacent property when spraying? Organic farmers and ranchers in Wyoming whose business would be negatively impacted by pesticides drifting onto their property. Notify the public when and where spraying will occur. Those who recreate on BLM lands in Wyoming would appreciate an advance warning of aerial spraying in order to avoid these areas during treatment.	Food chain – concerned about species that depend on insects. Ensure enough insects remain for food source. Consider the important role these insects play in the diets of many other species. Effects to non-target species. Effects to water quality. Effects to farmers and ranchers with adjacent property. Effects to human population. Mitigation measures and particular how will they reduce effects to non-target species including other insects, aquatic species and terrestrial vertebrates, minimize drift, and notify the public, and people who recreate so they can avoid areas. Effects to organic farmers and ranchers	Effects to non-target species and water quality are addressed in the EA. Mitigation measures are included in the EA regarding minimizing drift and avoiding effects to non-target species. Mitigation addresses notifying the public, recreationists, organic farmers, etc.
Wyoming Stock Growers Association, *Jim Magagna*	support	Commend proactive approach toward preparedness. Urge that control efforts on public lands be carefully coordinated with efforts on private and state lands.	Coordinate with private and state efforts.	Coordination is discussed in the EA.
Carol LeResche	N/A	Organic farmers cannot use pesticides or herbicides not certified by organic rules.	Organic farmers – mitigation to allow	Buffers are employed

		When you are considering how you will apply any pesticides please allow a method whereby organic farmers may protect their farms from pesticide applications by air or land.	them to protect their farms.	between public land and private land.
Wyoming Game and Fish, John Emmerich	N/A	Wyoming G&F commented on APHIS EA. Agree with RATTs application of dimilin consistent with core area strategy and governors order. If use malathion or carbaryl to protect sage habitat document why and effects.	Agree with RATTs application of dimilin consistent with core area strategy and governors order. If malathion or carbaryl is used in sage-grouse habitat need to document effects.	Effects of the three pesticides are analyzed in the APHIS EIS and the EA.
Sweetwater Fishing Expeditions, LLC, George Hunker	oppose	Opposed to pesticide use. Not cost effective. Don't really know their affect on greater environment, especially concerning sage-grouse. Grasshoppers are a prized and preferred trout food when available. Concerned about pesticide use anywhere near riparian areas.	Not cost effective. Effects unknown – particularly for sage-grouse. Grasshopper food for trout. Effects to riparian areas.	Costs are analyzed in the EA. Effects to sage-grouse and riparian areas are analyzed in the EA.
Bonnie Kreps	N/A	Concerned that spraying will harm the wildlife and livestock that will eat the vegetation.	Food chain concerns – vegetation eaten by wildlife and livestock. Effects to wildlife and livestock from eating sprayed vegetation.	These concerns are addressed in the APHIS EIS.
Wyoming Outdoor Council, Bruce Pendery	N/A	Carefully consider the potential ramifications of spraying diflubenzuron, carbaryl, and possibly malathion on sage-grouse habitat, particularly in core sage-grouse areas. Doing so may significantly reduce an important food source for juvenile sage-grouse. By killing insects upon which the young birds depend, the widespread use of insecticides may indirectly impact juvenile sage-grouse, thereby reducing future recruitment into already-declining and potentially-vulnerable sage-grouse populations. BLM National Instruction Memorandum 2010-071 and Wyoming State Office Instruction Memoranda WY-2010-012 and WY-2010-013, as well as BLM Manual section 6840 (special status species management), all of which mandate protective management efforts on behalf of the sage-grouse. Although the effects of grasshopper and Mormon cricket suppression may depend on insect densities before spraying, large-scale reductions in insect numbers that follow aerial	Effects to sage-grouse habitat, particularly core areas. Effects to juvenile sage-grouse by reducing grasshoppers and other non-target insects that are an important food source. Effects to sage grouse chicks from further reducing the availability of insects that are essential to the growth and survival of grouse chicks. BLM must carefully evaluate whether these potential benefits outweigh the potential costs	Effects to sage-grouse are analyzed in the EA as are effects to other avian sagebrush obligates such as sage sparrows and Brewer's sparrows and other migratory birds.

		spraying programs are likely to have an adverse impact on grouse (Johnson 1987). Insects may comprise as much as 75 percent of juvenile sage-grouse diets in Wyoming during late May and June (Patterson 1952). In a Wyoming study, grasshoppers occurred in 70 percent of the sage-grouse chicks that were examined and ranged from17 to 96 percent of the total food content documented in these birds (Post 1951). Grasshoppers constituted the largest animal portion of the diet in sage-grouse chicks in a Montana study (Peterson 1970). Research has shown that the quantity of insects in the diet of young sage-grouse is correlated with chick survival and growth (Johnson and Boyce 1990). Insects are particularly critical to the survival and development of sage-grouse less than 21-days-old (Johnson and Boyce 1990). In a Wyoming study, all captive-reared chicks that were experimentally deprived of insects died between the ages of 4 and 10 days whereas 100 percent of those that were fed insects survived (Johnson 1987). Therefore, any substantial reduction in insect numbers could be detrimental to juvenile grouse (Johnson 1987). Diflubenzuron, carbaryl, and malathion are all effective on a variety of insects. As a result, in addition to eliminating grasshoppers, their use could impact other non-target insects that serve as an important food source for juvenile sage-grouse, further reducing the availability of insects that are essential to the growth and survival of grouse chicks. Insect reductions resulting from pesticide use have been implicated in population declines (Stromborg 1982, Potts 1986) or lower juvenile survival rates (Potts 1981, Potts 1986, Warner 1984) of several gallinaceous species. BLM must carefully evaluate whether these potential benefits outweigh the potential costs of eliminating a vital food source for juvenile grouse and the concomitant adverse impact on sage-grouse populations in sprayed areas. Given that most passerines and many other bird species also depend heavily on insects when feeding young, the BLM also must evaluate the potential impacts of reducing insect availability on avian sagebrush obligates such as sage sparrows and Brewer's sparrows and other migratory birds, many of which are experiencing significant population declines (North American Bird Conservation Initiative 2009).	of eliminating a vital food source for juvenile grouse and the concomitant adverse impact on sage-grouse populations in sprayed areas. Potential impacts of reducing insect availability on avian sagebrush obligates such as sage sparrows and Brewer's sparrows and other migratory birds.	

USFWS	N/A	Protective measures for threatened and endangered species and migratory birds in accordance with the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703, and the Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668.	Protective measures for threatened and endangered species and migratory birds.	The EA includes protective measures for T&E species and migratory birds.
		Black-footed Ferret (Shirley Basin): Canada lynx; gray wolf; grizzly bear; Yellow-billed Cuckoo	Consider effects to identified T&E animal species.	The EA considers effects to these species.
		Blowout penstemon; Colorado Butterfly Plant; Desert Yellowhead; Ute ladies'-tresses	Consider effects to identified T&E plant species.	The EA considers effects to these species.
		Depletions of water from any system that is tributary to the Colorado River that may affect the endangered Bonytail (Gila elegans), Colorado pikeminnow (Ptychocheilus lucius), Humpback chub (Gila cypha), and Razorback sucker (Xyrauchen texanus) downstream in the Green and Colorado River systems. In addition, depletions may contribute to the destruction or adverse modification of designated critical habitat for these four species. If the proposed action may lead to consumptive use of water or have the potential to affect water quality in the Platte River System, there may be impacts to threatened and endangered species inhabiting the downstream reaches of this river system. Kendall Warm Springs Dace	Effects of depletion of water on fish species.	The project would not result in depletion of water. No action was taken for the EA.
		The Service recommends surveys when a proposed project will occur within 1-mile of Mortenson Lake or Hutton Lake National Wildlife Refuges. These guidelines may change as new sites for Wyoming Toad populations are established.	Effects to Wyoming toad.	The Wyoming toad is discussed in the EA.
		Activities that result in loss or degradation of sagebrush habitats that are important to this species should be closely evaluated for their impacts to sage-grouse. If important breeding habitat (leks, nesting or brood rearing habitat) is present in the project area, the Service recommends no project-related disturbance March 15 through June 30, annually. Minimization of disturbance during lek activity, nesting, and brood rearing is critical to sage-grouse persistence within these areas. Likewise, if important winter habitats are present, we recommend no project-related disturbance November 15 through March 14. Contact the Wyoming Game and Fish Department to identify important greater sage-grouse habitats within the project area, and appropriate mitigative measures to minimize potential impacts from the proposed project. Consultation on the core area strategy as it	No project activities that may exacerbate habitat loss or degradation should be permitted in important habitats. Sage grouse – evaluate loss or degradation of sagebrush habitats if any. Minimize disturbance during lek activity, nesting, and brood rearing. Recommends no project-related disturbance March 15 through June 30, annually.	Effects to sage-grouse are addressed in the EA and mitigations have been included for this species.

		relates to this project. No project activities that may exacerbate habitat loss or degradation should be permitted in important habitats.	If important winter habitats are present, recommend no project-related disturbance November 15 through March 14. Work with F&G to identify important sage grouse habitat and appropriate mitigations. Consult on core area strategy.	
		Species of concern: white- and black-tailed prairie dog; Wyoming Pocket Gopher; mountain plover; pygmy rabbit;	Consider impacts to species of concern	The EA considers effects to these species.
		Work that could lead to the take of a migratory bird or eagle, their young, eggs, or nests (for example, if you are going to erect new roads, or power lines in the vicinity of a nest), should be coordinated with our office before any actions are taken. Enclosed please find our general recommendations for the protection of bald eagles and other raptor species. We strongly encourage project proponents to fully implement the protective measures described in the enclosures in order to help ensure compliance with the MI3TA and the BGEPA.	Any take of migratory birds should be coordinated with service. Implement general recommendations for protection of bald eagles and other raptor species	Mitigations are included in the EA for bald eagles and other raptors.
		Wetlands may be impacted by the proposed project. If wetlands may be destroyed or degraded by the proposed action, those wetlands in the project area should be inventoried and fully described in terms of their functions and values. Riparian or streamside areas are a valuable natural resource and impacts to these areas should be avoided whenever possible. Any potential, unavoidable encroachment into these areas should be further avoided and minimized. Measures to compensate for unavoidable losses of riparian areas should be developed and implemented as part of the project. Best Management Practices (BMPs) should be implemented within the project area wherever possible.	Mitigations would be needed if wetlands may be destroyed or degraded by the proposed action. And riparian areas should be avoided or mitigate effects.	Mitigations are included to protect wetlands and riparian areas.
Wanda Houck	oppose	Reconsider and eliminate the possibility of aerial spraying. Wyoming is renowned for its clean air and water. There is no way to contain these poisons under consideration. These chemicals can cause birth defects and will affect all the wildlife.	Oppose aerial spraying. Protect air and water. Concerned about drift. Birth defects. Effects to wildlife.	Air and water resources and wildlife are discussed in the EA and in more detail in the APHIS EIS. Human health

				effects are discussed in the EIS. Mitigations to address concerns about drift were added to the EA.
Penney Miller	oppose	Opposed to the use of pesticides especially via aerial application. Can't control drift. The use of diflubenzuron is questionable at best and may wipe out non-target insects that are beneficial like the parasitic wasp and can be highly toxic to both aquatic invertebrates and crustaceans because they are both chitin producers. The possible use of Carbaryl (Sevin – or Black Death) is also unacceptable as it is destructive to honeybee populations, lady bug populations and wasps and toxic to aquatic organisms like rainbow and lake trout. Carbaryl has a half-life in the air of one to four months. Effects to birds and bees Don't use malathion a highly toxic chemical Spraying in strips is not comforting. Basic evolution will show that if we spray something some insects will survive and become resistant. Serious health risks and risks to beneficial insect population.	Oppose aerial application. Drift. Diflubenzuron affects non-target insects and toxic to aquatics. Carbaryl affects honeybees and other non-target and aquatics, birds. Carbaryl has long half life. Don't use malathion. RAATs will cause resistance. Health risks.	Potential for pesticide drift is discussed in the EA. Effects to non-target species are discussed in the EA. Use of malathion would be very limited as described in the EA. Human health risks are discussed in the APHIS EIS.
Board of Lincoln County Commissioners-Jonathan Teichert	support	Support suppression treatments. Lands should be managed to prevent loss of resources. Concerned about adjacent private lands. Insecticides can be used that pose little risk to birds, insects, wildlife	Support treatment to prevent resource loss. Protect adjacent land. Insecticides pose little risk	No action taken in EA
Lake DeSmet Conservation District Niki Lohse	N/A	Concerns on the management of the grasshopper and other insects, as it pertains to the grouse's dietary needs and habitat. We hope that BLM is acknowledging the protocol established by Johnson County Weed & Pest in their upcoming management program. The Lake DeSmet Conservation District has been, and is, actively involved in enhancing sage grouse habitat on private lands within our District boundaries. Again, we strongly urge cooperation with the Johnson County Weed & Pest District to assure that the chemicals being considered have no negative impact to Sage Grouse and their habitat. We support the use of diflubenzuron (dimilin) for rangeland protection ONLY.	Sage grouse dietary needs and habitat concerns. Make sure chemicals don't impact sage grouse. Acknowledge Johnson County Weed & Pest management protocol. Support the use of diflubenzuron (dimilin) for rangeland protection only	Sage-grouse effects are analyzed in the EA. EA states that the BLM will coordinate with Weed and Pest Districts.
Penney Miller	oppose	"Honeybees' pollen and hives are laden with pesticides." Killing bees will affect food source.	Spraying affects bees and our food source	Effects to bees are analyzed in the EA and the

				APHIS EIS.
Dudley and Marilyn Mackey	support	Experienced a large infestation of grasshoppers in 2009. The economic loss to our ranching operation was a 30-50% reduction in forage. This also translates into a reduction of forage available for wildlife. It takes several years for the rangeland to recover following severe grasshopper infestation. Our private ranch land is intermingled with BLM. If a grasshopper control program is to be effective, BLM lands need to be sprayed along with the private landowners. Utilize livestock grazing as a management tool.	Economic loss of forage on private land and forage for wildlife. It takes a long time for range to recover after a large infestation. Protect private land interspersed with BLM land. Utilize livestock grazing as a management tool.	Economic effects are analyzed in the EA as are effects of loss of forage for wildlife. Utilizing livestock grazing as a management tool was not considered in the EA due to the size and extent of the infestation expected.

N/A – Didn't specifically state support or opposition

Environmental Assessment Comments

Commentor Name and/or Organization	Support or Oppose	Specific Comments	Summary of Comments	Action Taken if Any
Bruce Pendery Wyoming Outdoor Council	Generally support Alternative 3	Support Alternative 3 with some modifications. This alternative would provide sufficient grasshopper and Mormon cricket control on BLM lands, while ensuring that important natural resources are adequately protected. This alternative provides better protection than does Alternative 2 for greater sage-grouse, whose vulnerable population status was recently underscored by the U.S. Fish and Wildlife's "warranted but precluded" listing decision. Given that the sage-grouse is now considered an ESA candidate species, we support taking a conservative approach to applying pesticides in known sage-grouse breeding areas since grasshoppers, Mormon crickets, and other insects can be a significant food source for sage-grouse even if they do pose a threat to vegetation. We also believe that additional buffers are important to sustaining mountain plover nesting areas, protecting pygmy-rabbit burrows, and minimizing disturbance to raptors and big game.	Alternative 3 provides better protection for sage-grouse. Support conservative approach in known sage-grouse breeding areas because insects are important food source. Additional buffers are important for mountain plover, pygmy-rabbits, and raptors and big game.	Comment noted. Upon consideration of economic threshold levels of infestation and resources of concern, buffers described in the EA for Alternative 3 could be put in place at the discretion of the field manager, as documented in the Decision Record.
		Avoid the Use of Malathion Given the documented negative impacts of malathion on amphibians (e.g., Taylor et al. 1999, Relyea 2004, Sparling and Fellers 2007, Budischak et al. 2008), as well as on fish, aquatic invertebrates, and certain insectivorous birds (USDA APHIS 2002), we believe that this pesticide should not be used by the BLM during the course of its grasshopper and	Malathion should not be used given the number of sensitive amphibian, fish, and insectivorous bird species in Wyoming. If malathion is	Malathion use is restricted to no more than 2,000 acres and only in limited situations (EA page 14). There are buffers described in the action alternatives

		Mormon cricket control activities. Although the BLM plans to use malathion sparingly on no more than 2,000 acres, EA at 14, we believe that this pesticide's documented negative impacts on wildlife make it a poor choice for use by a federal land management agency. The BLM admits that "Even using RAATs methodology, sublethal adverse impacts to certain BLM sensitive insectivorous birds and adult amphibians may occur." EA at 71. Given the number of sensitive amphibian, fish, and insectivorous bird species in Wyoming, we believe that such a risk, even on limited acreage, is unwarranted. Nevertheless, if the BLM is committed to spraying malathion when it believes that circumstances warrant its use, water bodies should be given a larger no-spray buffer because of the documented adverse impacts that malathion has on aquatic invertebrates, fish, and amphibians, and the potential for aerially-applied pesticides to drift. Although direct and sublethal effects of malathion are well documented, recent research has also revealed that malathion can have latent and long-term adverse effects on tadpoles, and likely other aquatic organisms (Budischak et al. 2008).	used, water bodies should be given a larger no-spray buffer because of impacts to aquatic invertebrates, fish, and amphibians.	that would prevent use of malathion (and other chemicals) near water bodies (EA pages 15-16).
		Provide Additional Protection for the Wyoming Toad Although, grasshopper control activities are unlikely to occur in the Laramie Basin, we are particularly concerned with the risks that pesticides pose to the highly vulnerable Wyoming toad. The BLM should increase its proposed 0.25 mi buffer around Mortenson Lake National Wildlife Refuge (MLNWR) and the Little Laramie River to ensure that this species is adequately protected. We believe that the BLM should provide a three mile no-spray buffer around MLNWR, the Little Laramie River, and Wyoming toad reintroduction sites. The BLM erroneously claims that the toad is extinct in the wild and that reintroductions are occurring only at MLNWR. EA at 42. In actuality, Wyoming toad reintroductions have not occurred at the MLNWR since 2003, because of the discovery of the chytrid fungus (*Batrachochytrium dendrobatidis)* in this population. Nevertheless, MLNWR now hosts the *only* population of successfully breeding wild toads, and toad reintroductions are occurring at three additional properties in the Laramie Basin (Personal Communication with Doug Keinath,	Concerned with the risks of pesticides to Wyoming toad. Increase its proposed 0.25 mi buffer around Mortenson Lake National Wildlife Refuge (MLNWR) and the Little Laramie River to a three mile no- spray buffer and extend it to Wyoming toad reintroduction sites to ensure protection. Pesticide applications may adversely affect tadpole and neonate development and	The buffer for the Wyoming toad (EA page 17) is adequate to protect this species, per concurrence with the U.S. Fish and Wildlife Service.

		Senior Zoologist, Wyoming Natural Diversity Database, April 7, 2010). If the BLM is willing to forego aerial applications of malathion and carbaryl within three miles of endangered and threatened plants to protect their pollinators, the agency also should be willing to provide three mile protective buffers for populations of Wyoming's highly-endangered, endemic amphibian. Given that the MLNWR toad population is the only one that is reproducing successfully, this area merits particular protection. Since the toads use the saturated habitat adjacent to the lake, pesticide applications should remain as far from the toad's habitat and food sources as possible. We urge the BLM to carefully consult with the U.S. Fish and Wildlife Service regarding these issues. The BLM states that "Primary habitat for the Wyoming toad includes approximately 2,400 acres of BLM-administered land, and may be indirectly adversely impacted if untreated grasshopper infestations consume all available rangeland vegetation and migrate into adjacent riparian areas." EA at 64-5. We are more concerned that toads that may be using this habitat will be adversely affected by pesticide applications than by loss of rangeland vegetation. Wyoming toads appear to frequent more open areas with shorter grasses and less vegetation (Personal Communication with D. Keinath, April 7, 2010), so consumption of vegetation by grasshoppers within their range is unlikely to pose a significant threat to them. More concerning is the possibility that pesticide applications will adversely affect tadpole and neonate development and survival, and reduce the toad's food supply.	survival, and reduce the toad's food supply. Carefully consult with the USFWS regarding these issues.	
		Provide Additional Protection for the Kendall Warm Springs Dace Although the endangered Kendall Warm Springs dace occurs on the Bridger-Teton National Forest and is unlikely to be affected by the BLM's pesticide control activities, EA at 43, the BLM provides a 0.25 mile protective buffer for the species. EA at 17. If the BLM is going to provide a protective buffer for this imperiled species, we believe the agency should provide a three mile buffer since this species could be particularly vulnerable to applications of malathion. Buffers for the Kendall Warm Springs dace and the Wyoming toad should be included in the comparison of Alternatives in Table 3.	Provide a three mile buffer since this species could be particularly vulnerable to applications of malathion. Buffers for the Kendall Warm Springs dace and the Wyoming toad should be included in alternative comparison (Table 3).	The buffer for the Kendall warm springs dace (EA page 17) is adequate to protect this species, per concurrence with the U.S. Fish and Wildlife Service.
		Provide Additional Protection for Greater	Recommend that	The buffers

		Sage-grouse We appreciate that the BLM's proposed protective buffers will apply to all sage-grouse leks, and not just those in core sage-grouse areas. Given the vulnerability of sage-grouse populations in Wyoming and the West and our lack of knowledge about the role that non-core area populations may serve in maintaining the genetic connectivity of core populations, we support conservation measures that afford statewide protections for grouse. However, we do recommend that the BLM expand its recommended three mile buffer to four miles since research has shown that 74-80 percent of female grouse nest within four miles of leks (Moynahan 2004, Holloran and Anderson 2005). Providing a larger buffer would still allow the BLM to control grasshopper and cricket populations while ensuring that a majority of nesting females and their young broods had adequate food supplies during critical developmental periods.	the BLM expand its recommended three mile buffer to four miles.	described in the action alternatives (EA pages 16 and 17) are adequate to protect greater sage-grouse. These actions are consistent with Wyoming Game and Fish strategies and with BLM policies regarding conservation of greater sage-grouse.
		Ensure Adequate Oversight by the BLM It appears that this control program essentially will be conducted by the Animal and Plant Health Inspection Service (APHIS) and local county weed and pest control districts. EA at 18. Up to 557,000 acres will be treated, EA at 18, 19; however, "[t]he exact location of the proposed grasshopper suppression activities is unknown." EA at 20. We believe that BLM should ensure that it has close and careful involvement in the implementation of this control program and the standards that BLM will apply to its oversight of this program should be clearly stated in the decision document for this project. While the EA indicates that suppression efforts would occur when grasshopper infestation levels were "determined by the field office in cooperation with APHIS to be at an ET [economic threshold] level that warranted suppression treatments", EA at 20, this statement is somewhat obscure and far from specific, so it is not clear that BLM will fully and carefully oversee this program. We feel that such BLM oversight is critical and should be ensured by the BLM so as to ensure that the provisions in this EA are fully implemented. Quite simply, APHIS and local weed control districts may be less concerned with the details that are provided in this EA than BLM is, so BLM's close and continuing involvement with this program should be ensured in the decision	BLM should ensure that it has close and careful involvement in the implementation of this control program and the standards that BLM will apply to its oversight of this program should be clearly stated in the decision document for this project. It is not clear that BLM will fully and carefully oversee this program. BLM oversight is critical to ensure that provisions in EA are fully implemented. BLM's close and continuing involvement with this program should be ensured	The manager in each field office will have overall authority for this program within the bounds of the field office. Approval of any suppression activities would be in compliance with the Decision Record.

		document for this EA. In particular, we feel that the BLM should carefully articulate when ETs that require control have been reached, or at least it should articulate the standards and processes that will be applied to reach these decisions. On page 4 of the EA, BLM states that historically grasshopper densities of 8 per square yard were viewed as the ET level where control should be instituted. However it then states, "[m]ore recent research has shown that the ET is a dynamic number that can vary from place to place, year to year, or even within a season, and is based on many factors including economic use of available forage or crops; grasshopper species, age, and density present; rangeland productivity and composition; accessibility and cost of alternative forage; and weather patterns. EA at 4 (citing USDA APHIS 2002). Given this more complicated picture, the BLM should commit to ensuring that this careful approach to determining an ET is adhered to, ensure that its Field Offices recognize and analyze all these factors, and perhaps most importantly, ensure that neither APHIS or local weed and pest control districts can use a predetermined threshold numerical density (such as 8 grasshoppers/sq. yd.) to institute control efforts without a more rigorous analysis of all the relevant factors. An important part of this analysis should be a consideration of not only what *harms* might be caused by a given density of grasshoppers, but also a recognition of any *benefits* (such as food for sage-grouse chicks) they might provide, and the *costs* associated with any control effort in relation to the perceived benefits.	in the decision document. Carefully articulate when ETs that require control have been reached, or at least articulate the standards and processes that will be applied to reach these decisions. Commit to ensuring careful approach to determining an ET is adhered to, ensure that FOs recognize and analyze these factors, and ensure that neither APHIS or local weed and pest control districts can use a predetermined threshold numerical density to institute control efforts without a more rigorous analysis of all the relevant factors.	
		The BLM Should Not Commit to Spraying a Predetermined Acreage We are also concerned about the potential implications of the statements made in footnote 2 on page 19 of the EA. The BLM first states that the 557,000 acre spraying level may not change under Alternative 3 (despite its additional buffers) because many of the buffers are only seasonal. However, the BLM then follows with this troubling statement: ". . . but treatments in other locations could make up the difference in the total number of acres that are treated under Alternative 3." The implications of this statement are that BLM plans to achieve spraying of 557,000 acres no matter what. We believe that any such predetermined numerical	Predetermined numerical objective is misguided and shortsighted. Goal is to engage in a grasshopper control program as necessary to prevent ET level damages, rather than trying to meet a predetermined acreage goal. No basis for	There is no predetermined acreage that must be treated. The 557,000 acres described in the EA (EA pages 18 and 19) represent the maximum acreage that would be treated should a widespread outbreak occur at high levels. Only the minimum number of acres needed to address

		objective is misguided and shortsighted. In our view the goal is to engage in a grasshopper control program as necessary to prevent ET level damages (while still protecting other resources), rather than trying to meet a predetermined acreage goal. BLM has no basis for claiming that spraying 557,000 acres will achieve the stated purpose and need, which is implementing a program that "is needed to enable land managers to treat pests on public lands in order to reduce population levels to below economic thresholds." EA at 5. Thus, any indication that 557,000 acres will be sprayed "no matter what" should be stricken from the EA and the BLM should simply do what is needed to achieve the stated purpose and need, even if that is, for example, only spraying 200,000 acres. Careful analyses of whether ET densities have been reached—using the factors mentioned above—should drive the acreage that is sprayed, not predetermined numbers.	claiming that spraying 557,000 acres will achieve the stated purpose and need. Any indication that 557,000 acres will be sprayed "no matter what" should be stricken from the EA and the BLM should simply do what is needed to achieve purpose and need.	the problem would be treated.
		Maintain Flexibility in Implementing Control Program to Adequately Protect Natural Resources Finally, in Figure 3 a conceptual 50 percent aerial application rate spraying pattern is portrayed. While we generally support application of this concept as an important element of Alternative 3, just as with preconceived total acreages targeted for spraying, we urge that this pattern not necessarily be strictly followed. We ask the BLM to consider modifying this pattern as needed in any particular case so as to protect other resources, while still achieving grasshopper control. Allowing some flexibility in how this general pattern is actually applied could be an important means of protecting sage-grouse and the sensitive species we have discussed above. We recognize that altering this simple pattern could present challenges and we definitely would not urge any modifications that created risks to pilots, but we suspect that at least in some circumstances modification might be possible and desirable, and we believe the BLM should recognize and provide for this.	BLM should consider modifying 50% RAATs pattern as needed in any particular case to protect other resources. Allowing some flexibility in how this general pattern is applied could be an important means of protecting sage-grouse and other sensitive species. modification might be possible and desirable, and BLM should recognize and provide for this	The field managers have the flexibility to decide what level of treatment and what resource conservation measures would be implemented through the Decision Record.
Jon and Ginnie Madsen	N/A	Some time ago I read a study in the Wyoming Wildlife magazine which found a high correlation between the survival rate of young sage grouse and the plentitude of grasshoppers available for them to eat. At this time of concern for these birds it strikes me as worth considering in the decision to treat or not to	Consider effects of reducing grasshoppers on sage-grouse.	Several BLM instruction memoranda, the BLM National Sage-grouse Habitat Conservation

		treat large areas of BLM land with chemicals to eliminate grasshoppers as this land is often prime sage grouse habitat. Maybe less chicks will survive with fewer grasshoppers available? Maybe chicks will die from eating poison grasshoppers? Maybe chicks who eat these poison grasshoppers or otherwise ingest trace amounts of the poison(s) used will have less successful nests in the future?		Strategy, and other agency guidelines provide direction for the protection of greater sage-grouse and their habitat. These protective measures are included in the action alternatives (EA pages 16 and 17) and effects to sage-grouse are discussed (EA pages 62-63, 66-68, and 74).
Rod Litzel Supervisor, Johnson County Weed & Pest	Supports Alternative 2	On behalf of the nearly 400 landowners that have financially committed to participate in a mitigation program designed to control an expected economic outbreak of grasshoppers in Johnson County this season, the District hereby supports Alternative 2 of the BLM's EA. Specifically the District supports the use of Dimilin 2L a RAAT's, Integrated Pest Management, technique. The District agrees that in the spirit of cooperation with neighboring private landowners, the proposed treatment to abnormally high populations of grasshoppers will help reduce weed spread and invasion; help with livestock and wildlife grazing needs; help protect vegetative cover critical to birds and other wildlife, and especially sage grouse survival; and help maintain the overall health of the ecosystem. The goal of the proposed treatment is to reduce grasshopper populations to a manageable level and yet leave a prey base for birds, especially sage grouse chicks; furthermore, Dimilin has very little impact to other non-target prey species such as ants and beetles. The District does however disagree with some of the buffers associated with Alternative 2 in table 3, Comparison of Alternatives. Dimilin is labeled to be safe over honeybees and research has shown there has been no detectable residues of Dimilin found in the honey to affect the food chain. As such, the District contends there does not need to be a two-mile buffer around bees under a Dimilin application. The NE Wyoming Sage Grouse Working Group has gone on record as supporting the District's Grasshopper Management Plan without any	Supports use of Dimilin 2L through RAATs. Disagree with some of the buffers associated with Alternative 2. Dimilin is labeled to be safe over honeybees so there does not need to be a two-mile buffer around bees under a Dimilin application. The activity is temporary and certainly less than the 1-hour BLM guideline. District requests that all buffer restrictions referenced in the EA be removed as unnecessary for aerial applications.	The text indicates (EA page 14) that when using malathion or carbaryl spray, a 2 mile buffer for domestic bees and a 4 mile buffer for leaf cutter bees would be enforced either by the movement of bees or with buffer zones. No buffers are specified for diflubenzuron use near bees. To clarify this point, Table 3 was modified to indicated that the buffers only apply to carbaryl and malathion.

		buffer restrictions because of the potential benefit to sage grouse from the treatment. The activity is also temporary and certainly less than the 1-hour guideline established by BLM. Therefore, the District requests that all buffer restrictions referenced in the EA be removed as unnecessary for aerial applications. Again, the District supports Alternative 2 in the EA for the BLM and appreciates the proactive approach the Bureau has taken towards the management of a potential outbreak of grasshoppers and the subsequent aversion to a perceived ecological disaster.		
Wyoming Game and Fish Department	Supports use of difluben-zuron in RAATs methodology, but not use of other chemicals	During presentation to the local working groups, APHIS personnel indicated the preferred method of treatment would be the use of chitin growth inhibitor, diflubenzuron in the RAATs approach. There was broad consensus among the group members that this was the most appropriate method to use and that such a method was consistent with Governor Freudenthal's sage-grouse executive order and the state's "core area strategy." WGFD supports this consensus. Unfortunately, both EAs contain alternative language to allow the use of the insecticides carbaryl and malathion, which have substantially greater environmental risks and toxicity. WGFD does not support the use of carbaryl and malathion. With proper planning, the infestation should be addressed with Dimilin in a RAATs approach. Finally, to be compliant with the executive order and core area policy, any state funding for grasshopper control in sage-grouse core areas should only be provided in those instances where Dimilin is applied in a RAATS approach.	Use of diflubenzuron in the RAATs approach is consistent with sage-grouse executive order and the state's "core area strategy." Carbaryl and malathion have greater environmental risks and toxicity and their use is not supported. State funding in sage-grouse core areas should only be for use of diflubenzuron	The desire of the BLM is to complete all treatments early in the season using diflubenzuron (EA page 15). However, there may be limited situations later in the season where carbaryl or malathion use is appropriate (EA page 15). The use of these chemicals will be limited (as described in the EA on page 14) to less than 15% of all BLM-treated acres in the case of carbaryl, and to less than 2000 total acres in the case of malathion. To the extent possible, treatment with these chemicals in sage-grouse core areas would be avoided.
		We have no aquatic concerns with the application of insecticides for the control of rangeland grasshoppers and Mormon crickets as long as the operational procedures for water bodies are followed.	No aquatic concerns as long as procedures are followed.	Suppression activities near aquatic areas would restricted in compliance with the Decision Record.

N/A – Didn't specifically state support or opposition

Appendix B
U.S. Fish and Wildlife Coordination

United States Department of the Interior

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CHEYENNE, WY

BUREAU OF LAND MANAGEMENT
Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82003-1828

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In Reply Refer to:
6840 (932)

APR 27 2010

Memorandum

To: Field Supervisor, U.S. Fish and Wildlife Service, Wyoming

From: Donald A. Simpson
State Director

Subject: Request for consultation and coordination over the Grasshopper Suppression Environmental Assessment for BLM Wyoming Administered Lands.

An Environmental Assessment (EA) has been prepared for proposed grasshopper and Mormon cricket suppression efforts on Bureau of Land Management (BLM) administered lands within the State of Wyoming. The purpose of the EA is to assess the potential effects of this proposed action, including any potential impacts to Federally-listed species.

This memorandum presents the BLM's request to initiate and complete the requirements for Section 7 Consultation and Coordination with the Service on information contained within the EA and draft Finding of No Significant Impact (FONSI) for the proposed action. A copy of the EA, including maps and information has been sent to your office through U.S. Fish and Wildlife Service (USFWS) biologist, Alex Schubert.

All appropriate buffers, protection and impact minimization measures that would accompany any approval for suppression activities on BLM lands are analyzed within the EA and these measures will serve to protect all threatened and endangered species and their recovery within Wyoming. It should also be noted that site-specifically, additional measures may also be applied by the authorized officer (i.e., Field Manager) to ensure all Federally-listed species and other public land resources are protected during the implementation of efforts to suppress infestations of grasshoppers and/or Mormon crickets on Federal rangelands.

Thank you for your attention to this matter. Please contact Chris Keefe (307-775-6101) or Ken Henke (307-775-6041) if you have any questions concerning this request.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

APR 30 2010

In Reply Refer To:
ES-61411/WY10I0250

Memorandum

To: State Director, U.S. Bureau of Land Management, Wyoming State Office, Cheyenne, Wyoming

From: for Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne Scott Hicks

Subject: Consultation and coordination over the Grasshopper Suppression Environmental Assessment for Bureau of Land Management Wyoming-administered lands

This memorandum is in response to your correspondence dated April 27, 2010, received April 28, and the Final Environmental Assessment entitled Grasshopper and Mormon Cricket Suppression on Lands Administered by the Bureau of Land Management in Wyoming (EA) (BLM 2010) received April 30, 2010. Your memorandum requested initiation of section 7 consultation and coordination pursuant to section 7(a)(2) of the Endangered Species Act of 1973 (Act), as amended, 50 CFR 402.13 for potential effects to listed species from the U.S. Bureau of Land Management's (Bureau) Grasshopper and Mormon Cricket Suppression Program.

This correspondence addresses potential effects to the Colorado butterfly plant, (*Gaura neomexicana* var. *coloradensis*), blowout penstemon (*Penstemon haydenii*), Ute ladies'-tresses (*Spiranthes diluvialis*), desert yellowhead (*Yermo xanthocephalus*), black-footed ferret (*Mustela nigripes*), gray wolf (*Canis lupus*), grizzly bear (*Ursus arctos horribilis*), Canada lynx (*Lynx canadensis*), Wyoming toad (*Bufo baxteri*), Kendall Warm Springs dace (*Rhinichthys osculus thermalis*) and their designated critical habitats from the Bureau's Grasshopper and Mormon Cricket Suppression on Lands Administered by the Bureau of Land Management in Wyoming (BLM 2010) as well as the Bureau's commitment to the Conservation Measures listed in the EA (BLM 2010)(see Appendix)(Proposed Action). In addition, the greater sage-grouse (*Centrocercus urophasianus*), and the western population of the yellow-billed cuckoo (*Coccyzus americanus*) are currently candidates for listing under the Act, and the Bureau has included conservation measures for these species in their EA as well. Furthermore, the Bureau has also chosen to address the potential effects to the mountain plover from the Proposed Action.

The Proposed Action would take place on Bureau-administered lands in Wyoming and Nebraska. The Bureau administers approximately 18 million acres of land in Wyoming. Based on grasshopper abundance data from 2009, it is likely that the largest numbers of grasshoppers will occur in the northeast and north-central part of Wyoming within the Buffalo, Casper, and Newcastle Field Offices, and in the Big Horn Basin in the Washakie, Cody, and Big Horn Field Offices. Activities associated with the proposed action are scheduled to occur during the late

spring and summer of 2010. It is our understanding that the majority of treatments will consist of the use of diflubenzuron, known by the tradename as Dimilin®, using the Reduced Agent Area Treatment (RAAT) method. As needed, the Bureau has also stated in the EA that up to 15 percent of the total treatment area could be covered by the use of carbaryl and up to 2000 acres could be treated by the use of malathion.

Based on your commitment to implement the impact minimization measures (Appendix) identified in your EA, the U.S. Fish and Wildlife Service (Service) concurs that the Kendall Warm Springs dace (*Rhinichthys osculus thermalis*) and the Wyoming toad (*Bufo baxteri*) are not likely to be adversely affected by the suppression program.

The Service also concurs with your not likely to adversely affect determination for blowout penstemon (*Penstemon haydenii*) based on the information from the Bureau that the remote, sparsely vegetated areas inhabited by this plant are not likely to be high priority areas for treatment. Furthermore, if grasshopper or Mormon cricket population control becomes necessary near any of the known populations of blowout penstemon, then the Bureau will employ measures such as buffer zones (see Appendix).

The Service also concurs with your not likely to adversely affect determination for the desert yellowhead (*Yermo xanthocephalus*), Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*), and Ute ladies'-tresses (*Spiranthes diluvialis*) and their designated critical habitats based on your commitment that should a treatment occur near occupied habitat, the Bureau will employ the following protective measures: (1) no aerial application of malathion or carbaryl will occur within 3 miles of occupied habitat of the plant for the protection of the pollinators, (2) only carbaryl bran bait or diflubenzuron combined with RAATs will be used within a 3 mile buffer, and (3) no application of carbaryl bran bait will be applied within a 0.25 mile buffer of occupied habitat of these plants.

The Service concurs with your determination that treatment activities are not likely to adversely affect endangered black-footed ferrets because there are no populations of black-footed ferrets known to exist in Wyoming outside of the Shirley Basin, experimental, non-essential population. If ground-based treatments were proposed to occur within the Shirley Basin, the Bureau is committed to completing site-specific consultation with the Service as warranted by the Bureau's Rawlins Field Office. By definition, any effects to a non-essential, experimental population will not jeopardize the continued existence of the species.

The Service concurs that the grasshopper treatments will not likely jeopardize the continued existence of the gray wolf (*Canis lupus*) because, by definition, any effects to an experimental non-essential population would not jeopardize the continued existence of the species. The Bureau has also determined that the Proposed Action will have no effect on the Canada lynx (*Lynx canadensis*) and its designated critical habitat and the grizzly bear (*Ursus arctos horribilis*). When the Bureau makes a "no effect" determination, concurrence from the Service is not required although we do appreciate receiving the information used to make that determination.

The Bureau expects the majority of grasshopper treatments to consist of aerial treatments of diflubenzuron in a RAAT pattern, early in the season, while the grasshopper nymphs are in their early instars. The mountain plover primary nesting season coincides with this timeframe. Aerial treatment in a RAAT pattern are not expected to disturb nesting mountain plovers. Furthermore, because aerial treatments will occur in alternating 100-foot strips in areas with heavy grasshopper nymph numbers, it is expected that mountain plover chicks, if present, would not be

limited by foraging opportunities. It is expected that limited ground-based treatments of adult grasshoppers with carbaryl or malathion, if necessary, would likely occur later in the season. These ground-based treatments could disturb nesting mountain plovers. However, the majority of mountain plover nesting efforts are expected to have concluded by that time. For these reasons, the Service concurs with your determination that the proposed action will not jeopardize the continued existence of the mountain plover.

The Service has recently determined that the greater sage-grouse (*Centrocercus urophasianus*) warrants listing under the Act (75 FR 13910). At this time, the development of a listing proposal is precluded by other higher priority listing actions giving the greater sage-grouse "candidate species" status. Candidate species are reviewed annually by the Service to determine if they continue to warrant listing or to reassess their listing priority. Ideally, sufficient threats can be removed to eliminate the need for listing in which case greater sage-grouse would no longer be a candidate species. If threats are not addressed or the status of the species declines, a candidate species can move up in priority for a listing proposal. Regarding protection of the greater sage-grouse, the Service currently supports the recommendations from the Wyoming Game and Fish Department in their letter to the Bureau dated April 22, 2010, offering comments on the proposed action.

The Service agrees with the Bureau's recommendation that buffers be maintained around water bodies as follows: a 500 foot buffer for aerial liquid insecticides, a 200 foot buffer for aerial bait, and a 50 foot buffer for ground bait. In addition, at least 25 feet of the buffer around the water body would need to be comprised of vegetation.

This concludes informal consultation and coordination pursuant to the regulations implementing the Act. This project should be re-analyzed if new information reveals effects of the action that may affect listed or proposed species or designated or proposed critical habitat in a manner or to an extent not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to a listed or proposed species or designated or proposed critical habitat that was not considered in this consultation; and/or, if a new species is listed or critical habitat is designated that may be affected by this project.

The Service requests that any visual observation of threatened and endangered species during suppression activities be reported to our office as soon as possible. We appreciate your efforts to ensure the conservation of endangered, threatened, and candidate species and migratory birds. If you have further questions regarding this letter or your responsibilities under the Act, please contact Alex Schubert of my staff at the letterhead address or phone (307) 772-2374, extension 238.

cc: BLM, Cheyenne, Pest Management Specialist (K. Henke)
FWS, Denver, Environmental Contaminants Coordinator (K. Johnson)
FWS, Idaho, Field Supervisor (R. Williams)
FWS, Reno, Field Supervisor (J. Foss)
WGFD, Cheyenne, Statewide Habitat Coordinator (M. Flanderka)
WGFD, Lander, Non-Game Coordinator (B. Oakleaf)

APPENDIX – CONSERVATION MEASURES FOR THE ENVIRONMENTAL ASSESSMENT FOR THE GRASSHOPPER AND MORMON CRICKET SUPPRESSION ON LANDS ADMINISTERED BY THE BUREAU OF LAND MANAGEMENT IN WYOMING

These conservation measures are taken from the Environmental Assessment for the Grasshopper and Mormon Cricket Suppression on Lands Administered by the Bureau of Land Management in Wyoming (BLM 2010)(BLM 2008b). Implementation of the following conservation measures are intended to minimize, or eliminate, adverse impacts to threatened, endangered, candidate, and proposed species that are likely to result from implementation of the Grasshopper and Mormon Cricket Suppression on Lands Administered by the Bureau of Land Management in Wyoming. The U.S. Bureau of Land Management (Bureau or BLM) has committed to implementing the following conservation measures. The Bureau has been active in conservation of listed and candidate species, and is committed to playing a key role in the recovery effort for these species.

The binding conservation measures that follow will reduce potential effects to those species and their habitats and highlight the steps the Bureau can take to work towards recovery of the species. The following conservation measures will be implemented within the Wyoming where there is potential for listed species to occur. Conservation measures are binding measures which the Bureau will implement to facilitate the conservation of threatened, endangered, candidate, and proposed species.

Species Conservation Measures

1. A 0.25 mile buffer for aerial spray would be maintained on each side of the Little Laramie River and no treatments would be applied within a 0.25 mile buffer of Mortenson National Wildlife Refuge in Albany County to protect populations of the endangered Wyoming toad (*Anaxyrus baxteri*).

2. A 0.25 mile buffer would be maintained around the Kendall Warm Springs site in Sublette County for carbaryl, diflubenzuron, and ground applications of malathion to protect the endangered Kendall Warm Springs dace (*Rhinichthys osculus thermalis*).

3. To protect the endangered blowout penstemon (*Penstemon haydenii*) habitat in Carbon County, no aerial application of malathion or carbaryl would occur within 3 miles of the ACEC as defined by BLM; only carbaryl bran bait or diflubenzuron combined with RAATs methodology would be used within the 3 mile buffer; and no application of carbaryl bran bait would be applied within a 0.25 mile buffer of the plant.

4. To protect the threatened Colorado butterfly plant (*Gaura neomexicana* var. *coloradensis*) and its designated critical habitat (primarily found in the southeast counties of Platte, Goshen, and Laramie), no aerial application of malathion or carbaryl would occur within 3 miles of the critical habitat or known occupied habitat of the plant; only carbaryl bran bait or diflubenzuron combined with RAATs methodology would be used within the 3 mile buffer; and no application of carbaryl bran bait would be applied within a 0.25 mile buffer of critical habitat or known occupied habitat of the plant.

5. To protect the threatened Ute ladies'-tresses (*Spiranthes diluvialis*) populations, no aerial application of malathion or carbaryl would occur within 3 miles of occupied habitat; only carbaryl bran bait or diflubenzuron combined with RAATs methodology would be used within the 3 mile buffer; and no application of carbaryl bran bait would be applied within a 0.25 mile buffer of occupied habitat of the plant.

6. To protect the threatened desert yellowhead (*Yermo xanthocephalus*) plant and its designated critical habitat in Fremont County, no aerial application of malathion or carbaryl would occur within 3 miles of critical habitat; only carbaryl bran bait or diflubenzuron combined with RAATs methodology would be used within the 3 mile buffer; and no application of carbaryl bran bait would be applied within a 0.25 mile buffer of critical habitat of the plant.