Sage-Grouse Conservation Plan

North Magic Valley Sage-grouse Local Working Group

January 2011

1 Introduction

1.1 Overview

1.1.1 Background and Need

In response to a number of petitions to the U.S. Fish and Wildlife Service to list greater sage-grouse under the Endangered Species Act, Idaho and its neighboring states are actively working to develop and implement conservation plans to benefit sage-grouse and their habitats.

The Idaho Department of Fish and Game developed the first statewide sage-grouse conservation plan in 1997. This plan called for the development of sage-grouse Local Working Groups (LWGs) in 13 distinct geographic regions called sage-grouse planning areas (Figure 1).

In July 2006, through a collaborative process, Idaho completed a major revision of the statewide conservation plan. The resulting *Conservation Plan for the Greater Sage-grouse in Idaho* (henceforth referred to as the State Plan), reaffirms Idaho's overarching commitment to a locally-driven, collaborative approach to sage-grouse conservation and identifies LWGs as the heart of Idaho's sage-grouse conservation strategy.

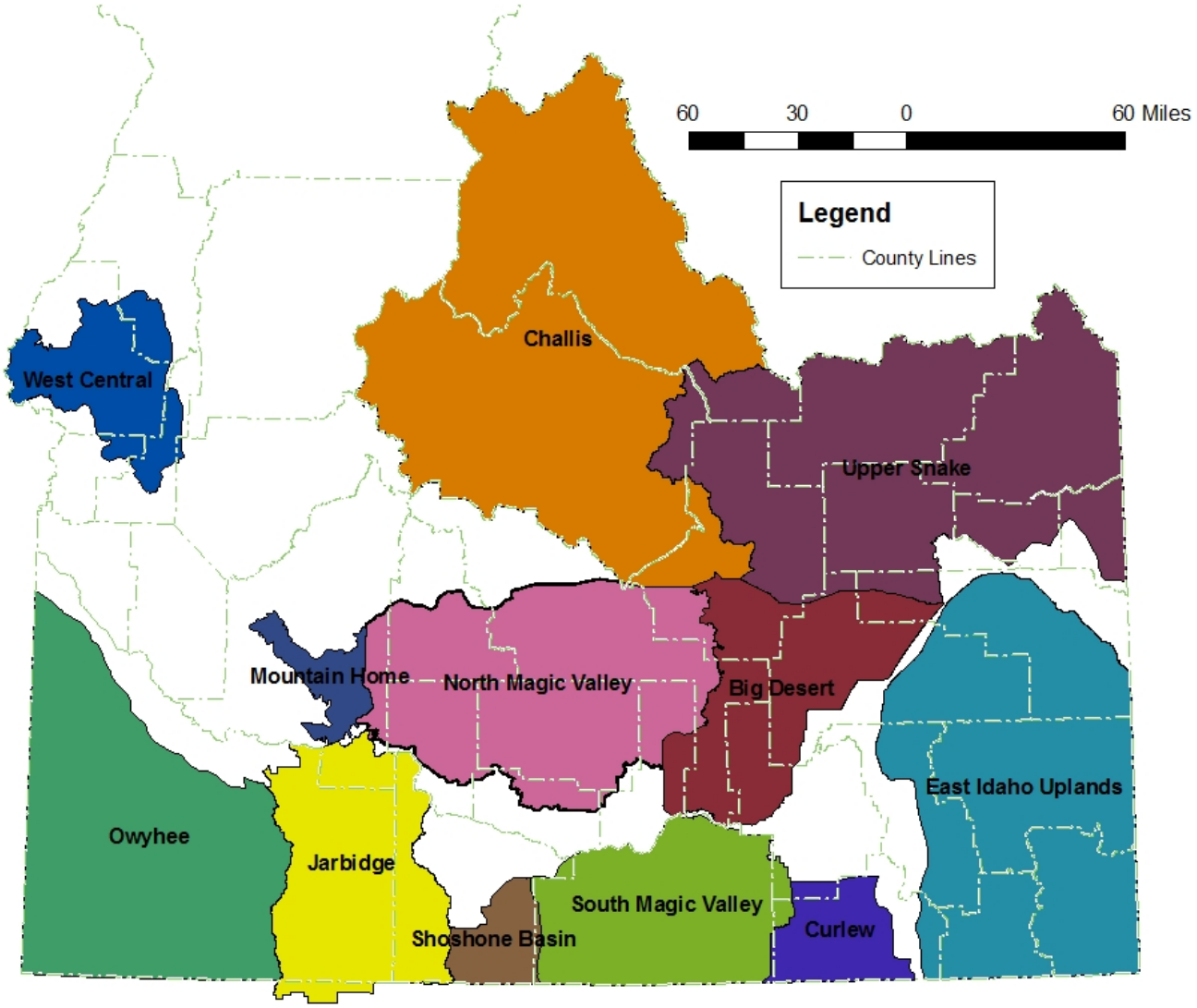


Figure 1. Idaho's sage-grouse planning areas.

The State Plan provides specific direction, recommendations, and tools for LWGs to use in the collaborative development and implementation of locally appropriate conservation plans that benefit sage-grouse and their habitats in each of Idaho's sage-grouse planning areas. A primary goal identified in the State Plan is the initiation of LWGs in all sage-grouse planning areas that do not have active LWGs. At the time the State Plan was completed in July 2006, the East and West Magic Valley sage-grouse planning areas were identified as regions that did not have functioning LWGs.

In January 2007, an interagency team began meeting formally to identify potential LWG participants and to launch a broadly representative LWG or LWGs in the East and West Magic Valley sage-grouse planning areas. The interagency team, in coordination with the Idaho sage-grouse coordinator recommended that at least initially, the East and West Magic Valley LWGs be combined to form a single North Magic Valley LWG.

On March 8, 2007 the North Magic Valley Sage-grouse LWG was formally initiated with a public kick-off meeting held at the Idaho Department of Fish and Game Magic Valley Office.

1.1.2 Relationship of North Magic Valley Local Working Group Plan to State Plan

The State Plan identifies threats at the broad-scale, while also providing a toolbox of mid- and fine-scale conservation measures for use and/or adaptation by LWGs (as appropriate to local population and habitat conditions), and for use in cases where a LWG plan has not been completed, where no LWG currently exists, or where a LWG plan is silent on a particular issue.

The North Magic Valley LWG plan will identify threats and appropriate conservation measures at the mid-and fine-scale. Once completed and approved by the North Magic Valley LWG, the North Magic Valley LWG plan will be incorporated into the State Plan as an appendix.

The State Plan includes a signed Memorandum of Understanding between the State of Idaho by and through the Department of Agriculture, Department of Fish and Game, Department of Lands, Office of Species Conservation and the United States Department of Interior Bureau of Land Management, United States Department of Agriculture's Forest Service (Intermountain Region), Animal and Plant Health Inspection Service (Wildlife Services), and Natural Resources Conservation Service.

The Memorandum of Understanding states that the signatory parties agree to enter into the MOU for the purpose of:

- Supporting and implementing, to the extent practicable and where appropriate, the intent and actions contained in the 2006 *Conservation Plan for the Greater Sage-grouse in Idaho*;
- Continuing to recognize and applaud the efforts of LWGs in conserving sage-grouse; and

- Continuing to support these LWGs and their respective Plans, as they represent the heart of Idaho's sage-grouse conservation strategy.

The completed North Magic Valley LWG Plan will provide guidance that agencies, businesses, and individuals should implement when performing actions in sage-grouse habitats. In general, when sage-grouse concerns arise at the local level, LWGs, agency representatives, landowners, and others will look first to the appropriate LWG plan for specific guidance. If a LWG plan is silent on a particular issue of concern, parties would look next to the State Plan for guidance.

The Plan is intended to be a "living document" that will be periodically updated and/or amended as appropriate (e.g., as new information becomes available, regional and local conditions change, new technologies or techniques become available, and local site-specific data and information is refined).

1.2 Description of the North Magic Valley Sage-grouse Local Working Group

1.2.1 Purpose

The purpose of the North Magic Valley LWG is to collaboratively develop and implement a locally- appropriate conservation plan for sage-grouse populations and their habitats in the North Magic Valley Sage-Grouse Planning Area.

1.2.2 Goal and Objectives

The goal of the North Magic Valley Local Working Group is to:

- ***Maintain, improve, and where possible, increase sage-grouse populations and habitats in the North Magic Valley Sage-grouse Planning Area, while considering the predictability and long-term sustainability of a variety of other land uses.***

Additional objectives include:

- Effectively conserve sage-grouse populations and sagebrush-steppe communities in the North Magic Valley Sage-grouse Planning Area through support of individual and collective efforts of non-governmental organizations, local governments, state and federal agencies, Tribes, and members of the public.

- Acknowledge and respect the different perspectives, interests, and legal mandates of wildlife professionals, land managers, Tribes, non-governmental organizations, private landowners, and all others who share a stake and interest in sage-grouse and sagebrush-steppe communities.

1.2.3 Geographic Scope

The geographic scope of the North Magic Valley LWG (the North Magic Valley Sage-grouse Planning Area or "Planning Area") will encompass portions of Camas, Elmore, Lincoln, Blaine, Minidoka, Gooding, Power, Butte, and Jerome counties. Figure 2 shows the boundaries of the Planning Area.

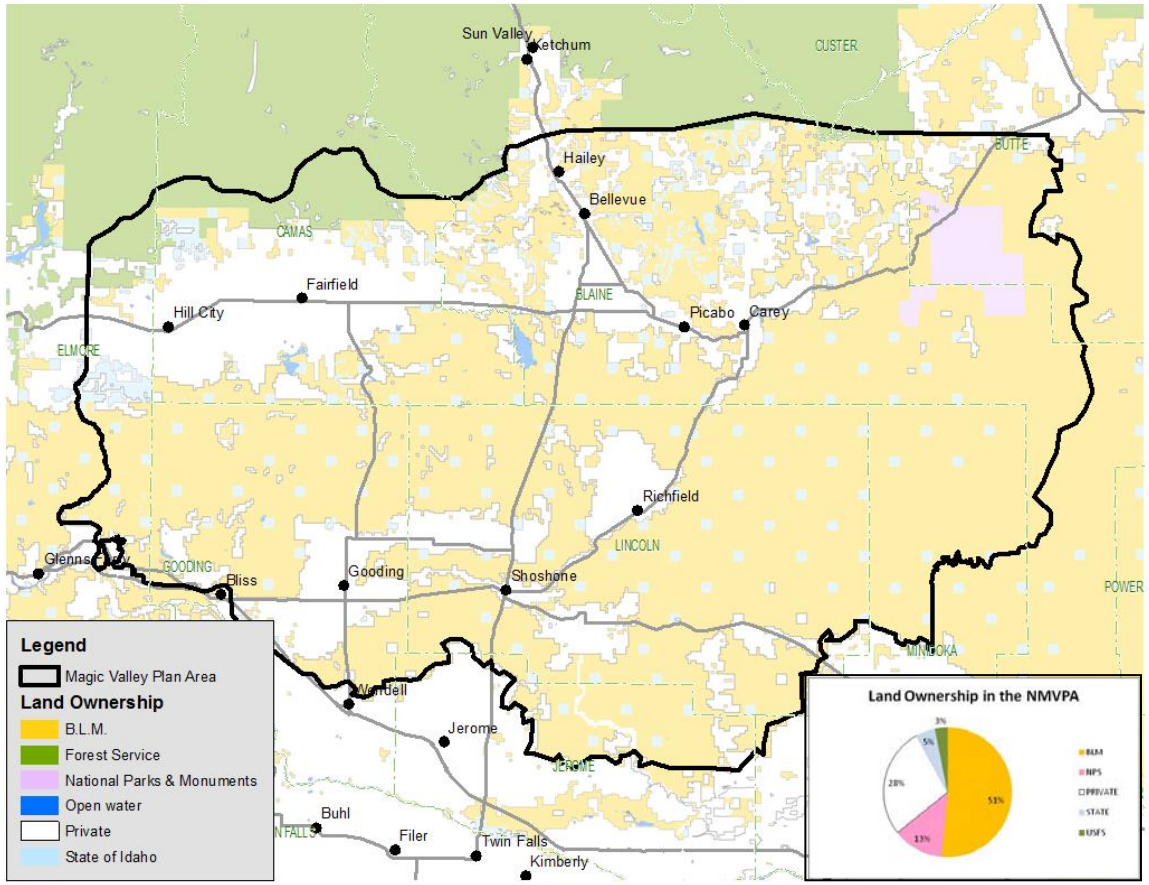


Figure 2. North Magic Valley LWG Sage-grouse Planning Area

1.3 Organization

1.3.1 Participation

The State Plan directs that each LWG should seek to assemble and maintain a diverse membership that includes a broad and balanced representation of interests (e.g., private landowners, ranchers, farmers, citizens, non-governmental organizations, outdoor enthusiasts, conservationists, local government and industry, state and federal agency representatives, Tribal representatives, etc.)

It is the responsibility of the LWG participants to make every effort to regularly attend meetings, to help identify and maintain a diverse LWG membership, and to communicate and effectively coordinate with the agencies, organizations, or interest groups that individual LWG participants represent and/or are affiliated with.

North Magic Valley LWG meetings are open to anyone who wishes to attend; however, those who do attend are required to abide by the ground rules and meeting agreements established by the LWG participants through this Charter.

The use of a trained facilitator is required from the initiation of new LWGs through the development of a completed LWG plan. After the LWG plan is completed, a trained facilitator is strongly recommended by the State Plan, but is optional based on the decision of the participating LWG members. Funding for a trained facilitator will be provided to each LWG.

1.3.2 Roles and Responsibilities

The following section summarizes the roles and responsibilities of participants in the North Magic Valley LWG:

- **Facilitator** – The role of the facilitator is to provide neutral facilitation of the North Magic Valley LWG. The facilitator is responsible for: developing meeting agendas and appropriate meeting processes (with the input of the LWG participants), providing meeting notices, facilitating meetings, writing and distributing summaries of meetings and meeting agreements, coordinating with the Idaho Sage-grouse Advisory Committee and the State Sage-grouse Coordinator, and helping the LWG to develop a LWG plan that is consistent with the guidelines provided in the State Plan.

- **Active LWG participants** – The role of active LWG participants is to develop and implement a collaborative sage-grouse conservation plan for the North Magic Valley. Active LWG participants are responsible for: attending regular

meetings; participating productively and in good faith in LWG meetings; completing homework assignments; actively contributing to the goal and objectives of the LWG; helping to identify and maintain a diverse LWG membership; communicating and effectively coordinating with the agencies, organizations, or interest groups that individual LWG participants represent and/or are affiliated with; abiding by the ground rules and decision-making processes identified by the LWG; and developing, finalizing, approving, and implementing a LWG plan for the North Magic Valley.

- **Passive LWG participants** – The role of passive LWG participants is to provide comment and input on the LWG products (e.g., draft documents) when requested. Passive LWG participants are responsible for keeping apprised of LWG actions by reading the meeting notes and any other review documents the LWG requests input on. Passive LWG participants are responsible for providing timely comments and input upon request from the LWG.

- **Agency representatives** – In addition to their roles and responsibilities as active LWG participants, agency representatives are responsible for ensuring consistent communication and coordination with their respective agencies regarding the efforts and activities of the North Magic Valley LWG. Agency representative are also responsible for keeping the LWG apprised of any agency activities or actions that might impact the LWGs planning activities or implementation of the LWG plan.

- **Sage-grouse Advisory Council representative** – Each LWG is allocated a seat on the Idaho Sage-grouse Advisory Council (SAC). The North Magic Valley LWG chose to designate two representatives (and one alternate), who share a seat on the SAC. Representatives on the SAC are responsible for 1) attending and participating in quarterly SAC meetings; 2) communicating North Magic Valley LWG actions, concerns, and needs to the SAC; 3) presenting LWG approved project proposals; and 4) communicating about SAC actions, initiatives, etc. to the North Magic Valley LWG.

- **Committees and subcommittees** – Specific committees or subcommittee's and their roles and responsibilities will be identified and defined as needed.

1.3.3 Ground Rules

The North Magic Valley LWG will operate in a manner that is consistent with the following group ground rules:

- Respect each other
- Don't grandstand; Allow others to speak
- Follow the agenda
- Stay on topic

- Start and finish meetings on time
- Do your homework and assignments
- Listen actively
- Conflicts that occur at the meeting, stay at the meeting
- One person speaks at a time
- No side conversations

All North Magic Valley LWG participants agree to abide by these ground rules.

1.3.4 Decision-Making Process

North Magic Valley LWG participants will make decisions by consensus.

Consensus in the North Magic Valley LWG is defined as a well-thought out solution, that has been thoroughly discussed, and that everyone can live with. Consensus does not mean that you necessarily love the solution, but it does mean that it is a decision you agree you can live with and will support.

Before a consensus decision is finalized the item under discussion will be clearly described (e.g., written down or otherwise expressed) so that all participants understand what the details of the specific decision or issue.

The consensus decision process may include the following steps*

- *Open the issue*
- *Understand the specific problem and stakeholder needs*
- *Define measures for success*
- *Brainstorm and evaluate alternative solutions*
- *Check alternatives for support from the Group*
- *Identify additional alternatives if needed*
- *Revise as needed to develop Group consensus*

* Note that for minor issues, the Group may decide to abbreviate this process

Those individuals who are physically present at the meeting will make consensus decisions in the North Magic Valley LWG. Note that only those individuals who have attended 6 of 12 consecutive meetings will participate in consensus decisions.

Revisiting / Changing Group decisions: In order to revisit or overturn a previous consensus decision there must be a consensus among those present at the meeting to do so.

1.3.5 Press Protocol

North Magic Valley LWG participants will not communicate independently with the press about LWG activities. All press requests for information or interviews will be directed to the group's facilitator who will bring the request to the LWG participants and help formulate a collective response (or non-response).

1.4 Local Working Group Activities and Requirements

1.4.1 Activities

The North Magic Valley LWG will work collaboratively to develop a locally appropriate conservation plan for sage-grouse populations and their habitats in the North Magic Valley Sage-grouse Planning Area. Specific activities necessary to accomplish this task include:

- **Develop and recommend quantifiable population objectives.** The North Magic Valley LWG, with assistance from agency representatives, should develop and recommend specific population objectives based on lek counts, or best available data. Local Working Group population objectives should contribute to the achievement of broad-scale population objectives presented in the State Plan.

- **Develop and recommend quantifiable habitat objectives.** The North Magic Valley LWG, with assistance from agency representatives, should develop and recommend specific habitat objectives that maintain, and increase where possible, habitat quantity and quality based on local Planning Area conditions and available monitoring data and research.

- **Identify, and to the extent possible, prioritize threats to sage-grouse populations and habitat at the local level.** The State Plan provides a summary and prioritization of threats at a statewide scale. This information is provided to facilitate the identification and prioritization of local threats at the sage-grouse planning area level.

- **Identify appropriate conservation measures/actions to address localized threats to sage-grouse and sage-grouse habitat.** The State Plan includes a "toolbox" of recommended conservation measures for use and/or adaptation by LWGs in their own planning efforts.

- **Identify monitoring and evaluation actions necessary to update population and habitat data, and to gage the effectiveness of conservation actions.** Local Working Groups should coordinate this with Idaho Department of Fish and Game and other agencies.

- **Use the standardized LWG plan outline.** All new LWGs are expected to use the standardized outline for LWG plans presented in Section 1.5.2.2 of the State Plan when developing their LWG plans (see next section).

Local Working Group plans are considered complete when approved by the LWG (based on decision-making process and LWG membership as defined by each LWG).

1.4.2 Required Plan Outline

The North Magic Valley LWG will complete a collaboratively developed North Magic Valley LWG Plan that includes the following *minimum* content:

A. **Introduction**
- Conservation goals and objectives for the Sage-grouse Planning Area
- Summary of LWG participation and planning process

B. **Status of sage-grouse habitat and population in the Sage-grouse Planning Area**
- Population overview
- Habitat conditions overview

C. **Threats to sage-grouse and sage-grouse habitat in the Sage-grouse Planning Area**
- Identify local threats to sage-grouse and sage-grouse habitat
- Use the discussion and prioritization of statewide threats presented in this State Plan as a starting point to identify and prioritize local threats
- Consider using the ranking process employed by the Idaho Sage-grouse Science Panel

D. **Conservation measures to address local threats**
- Identify specific conservation measures (actions) appropriate to address locally identified threats, including potential restoration projects or other treatments

E. **Monitoring and evaluation**

- Identify monitoring actions necessary to ascertain effectiveness of conservation measures and progress towards meeting conservation goals and objectives

F. **Implementation strategy**

- Present an implementation strategy for the LWG plan that includes identification of who, what, when, how and where

G. **Adaptive management**

- Identify a process and/or timeline for updating and/or revising the various components of the LWG plan

H. **Literature citations**

I. **Appendices** (as necessary)

1.4.3 Implementation

The North Magic Valley LWG will work collaboratively to implement a locally appropriate conservation plan for sage-grouse populations and their habitats in the North Magic Valley sage-grouse planning area. Specific activities necessary to accomplish this task include:

- Identify priority conservation actions and related projects based on local habitat and population objectives, local threat characterizations, and other known local factors (e.g., common sense, time-limited opportunities, etc.)

- Federal land management agencies that participate on the LWGs are expected to take the lead in facilitating, preparing, or contracting necessary (NEPA) documentation for specific recommended conservation actions on Federal lands. Although limitations in funding and human resources may in some instances constrain the level of Federal participation, active participation by Federal agencies is vital and should be considered a high priority by the relevant agencies.

- Participating state agencies (Idaho Department of Fish and Game, Idaho Department of Lands, and Idaho Department of Agriculture), the Natural Resources Conservation Service, and in some cases county government, are expected to assume the lead for coordinating with private landowners, pursuing necessary authorizations or

agreements and funding, and cooperating with the implementation of projects or conservation measures on private and state lands.

- Each LWG will provide information necessary to update the Sage-grouse Habitat Planning Map annually. The process for updating the map is described in detail in the Chapter 5 of the State Plan. Detailed reminders, including points of contact will be provided to LWGs each year in the early fall.

- Each LWG will provide a concise, written progress report to the Idaho Sage-grouse Advisory Committee by December 31 of each year summarizing: (1) progress and success of project implementation within the Sage-grouse Planning Area; (2) status of studies, research, or research proposals within the Sage-grouse Planning Area; (3) discussion of new issues, project priorities, and problems; and (4) actions or projects planned for the ensuing year.

- Each LWG should update and/or revise their LWG plans at least every five years.

1.4.4 History of Changes/Plan Revision Dates

Following are target dates [or completion or revision dates] for major North Magic Valley LWG Plan changes or updates.

Date	Revision Summary

2 Sage-grouse Population and Habitat in the North Magic Valley Sage-grouse Planning Area

2.1 Sage-grouse Population Overview / Background

Since regular monitoring began, sage-grouse populations in the North Magic Valley planning area (NMVPA) have undergone considerable fluctuations. Although data prior to the mid-1980s is somewhat inconsistent, counts of 15 Leks that have been regularly monitored indicate that populations in the NMVPA have undergone at least 4 prominent fluctuations since the mid-1970s (Figure 1). Recently, numbers declined during the early 1990s, then rebounded in the mid-1990s, and remained relatively stable until 2007, when counts declined sharply. Numbers in the NMVPA have remained low since the 2007 decline, but have stabilized since 2009.

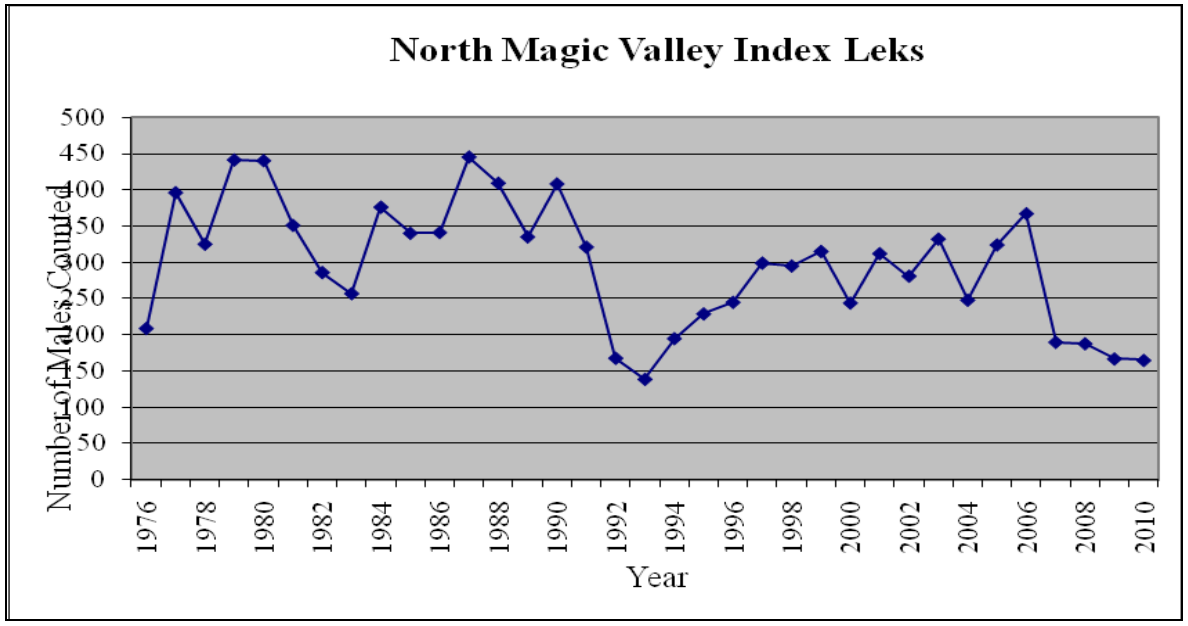


Figure 3. Counts at 15 Leks in the NMVPA that have been run regularly since 1976.

2.1.1 Sage-grouse Population History (from state plan and regional data)

North Magic Valley Population Status

Sage-grouse populations in the North Magic Valley planning area (NMVPA) are currently monitored using several indices, including lek counts on established lek routes, surveys for and counts of leks not currently on established routes, and harvest data. Of these data sources, lek routes provide the most consistent means for assessing population trends; many lek routes have been in place for more than 30 years, and several have been run by the same individual for 15-20 years or more. Harvest data provide information about the sex and age composition of harvested birds, and also supplements population trend data with catch-per-unit-effort data. Surveys for and counts of leks not currently on established routes help determine how closely lek routes index actual population trends, and expand our knowledge of distribution of sage-grouse in the North Magic Valley planning area.

There are nine established lek routes in the NMVPA; eight of these have been run consistently for 20 years or more. Lek route data suggest that sage-grouse populations in the NMVPA have fluctuated over the past 20 years (Figure 2). Following a steep decline between 1987 and 1993, populations recovered somewhat through 2005. However, populations experienced and abrupt decline in 2007 and remained low for the following two years. Since 2009, numbers have begun to increase slightly. This general trend is similar to the larger-scale trend observed throughout the Magic Valley region.

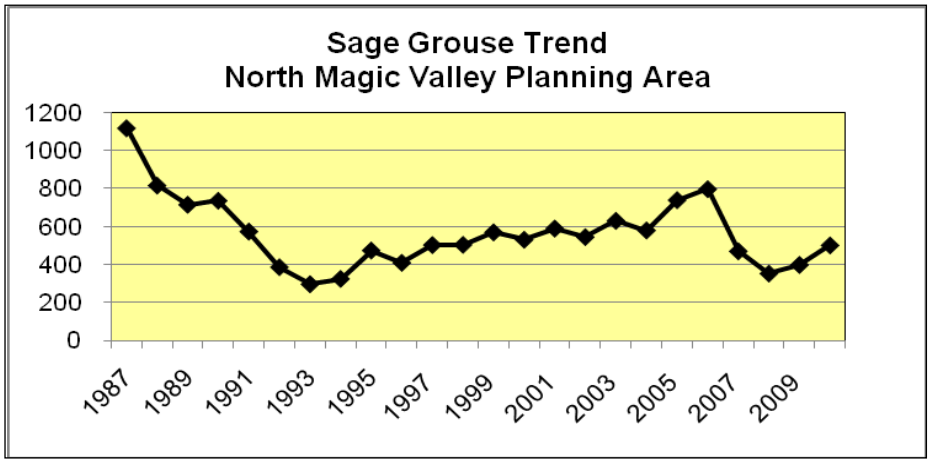


Figure 4. Sage-grouse population trend as indexed by 8 lek routes (Fir Grove, Paddleford, Rock Creek, Bliss-Hill City, N. Shoshone, Timmerman, Picabo, and Lincoln-Minidoka) in the NMVPA.

Hunter harvest can also provide some insights into population trends via catch-per-unit-effort indices. At annual check stations operated on the first weekend of sage-grouse harvest season, hunters are asked how many days they have hunted, how many hours they have hunted, how many birds they observed, and how many birds they harvested. After a recent peak in 2005, hunters observed fewer birds per hour and harvested fewer birds per day between 2006 and 2008. However both of these indices have shown modest increases in 2009 and 2010. These data are collected at a sage-grouse reporting zone scale (Figure 5).

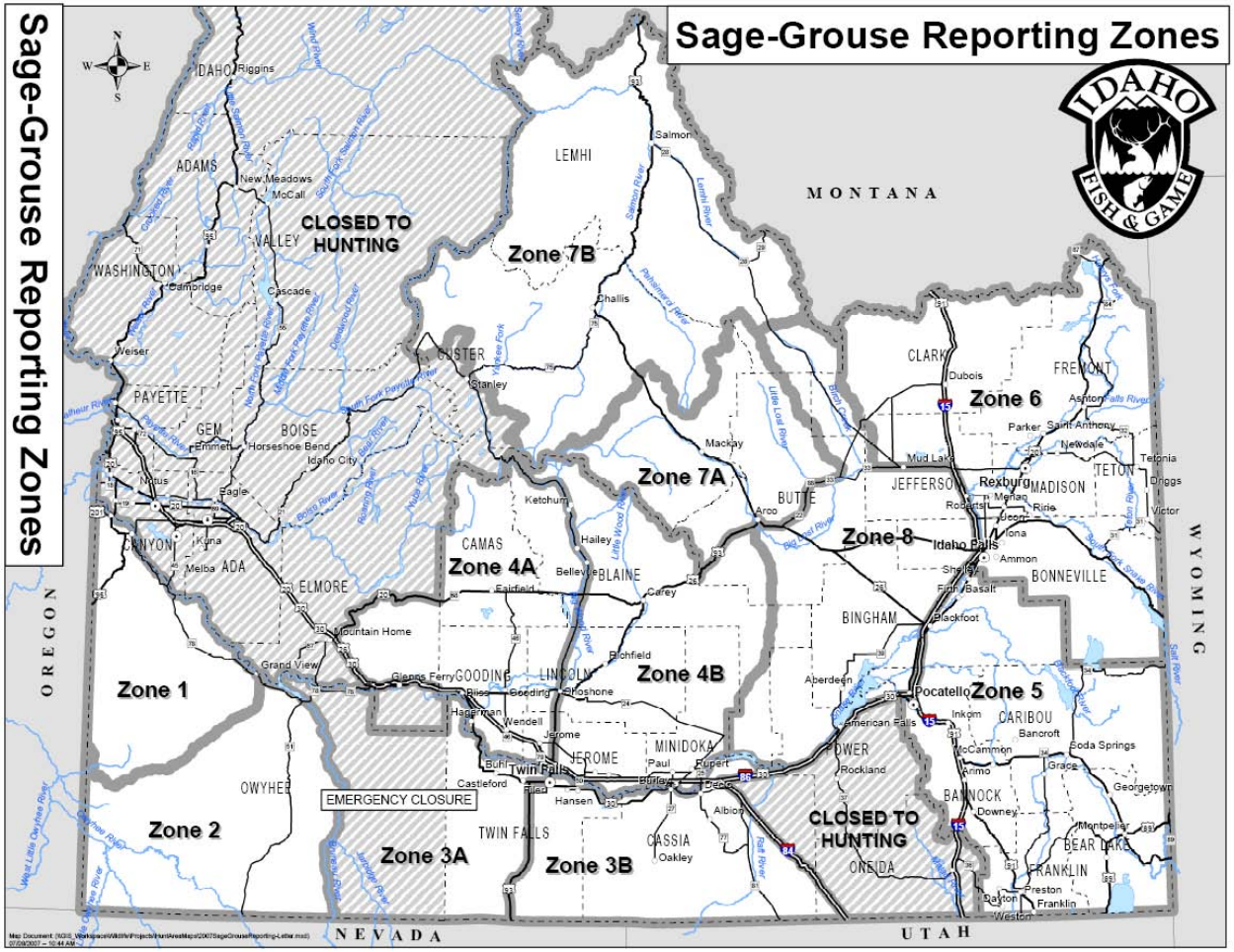


Figure 5. Sage-grouse reporting zones in Idaho.

Wings of harvested sage-grouse are collected at opening weekend check stations and at wing barrels throughout the sage-grouse season. These wings are later examined to determine the gender and age-class of harvested birds. Over time, these data may provide insights into population age structure, chick production, and juvenile survival. However, the scope of these data are limited by sample sizes; often, there are not enough wings collected to make reliable inferences about population-level composition and reproduction. Data from the NMVPA exhibit significant inter-annual and regional variation in both the number of juveniles/100 adults harvested and percent of unsuccessful females in the harvest (Figures 3 and 4).

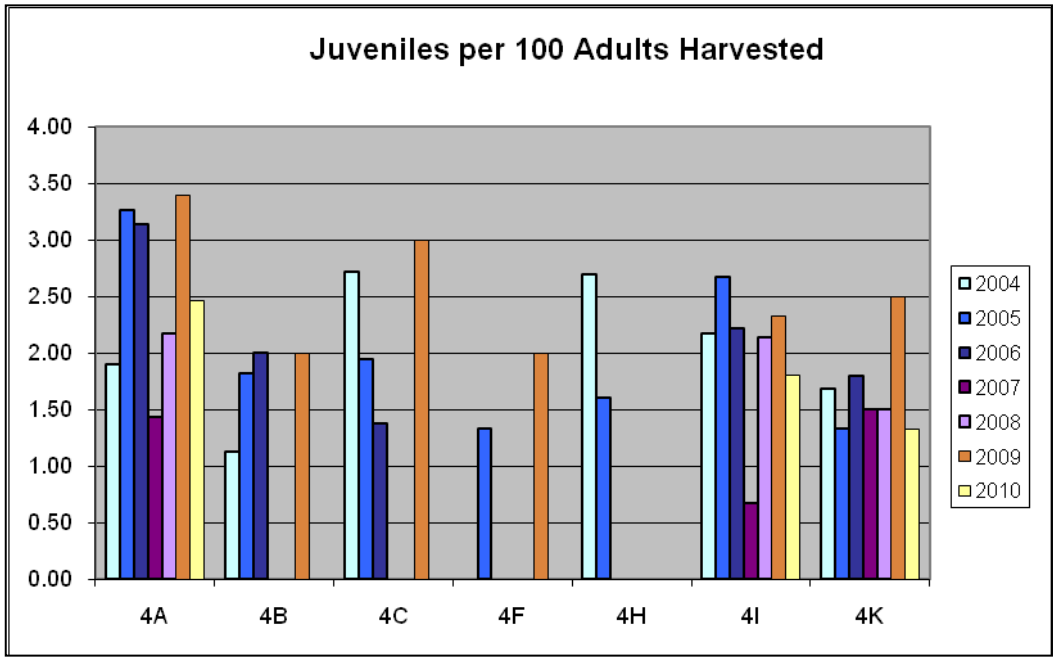


Figure 6. Juveniles per 100 adults harvested, by harvest subunit, in the NMVPA.

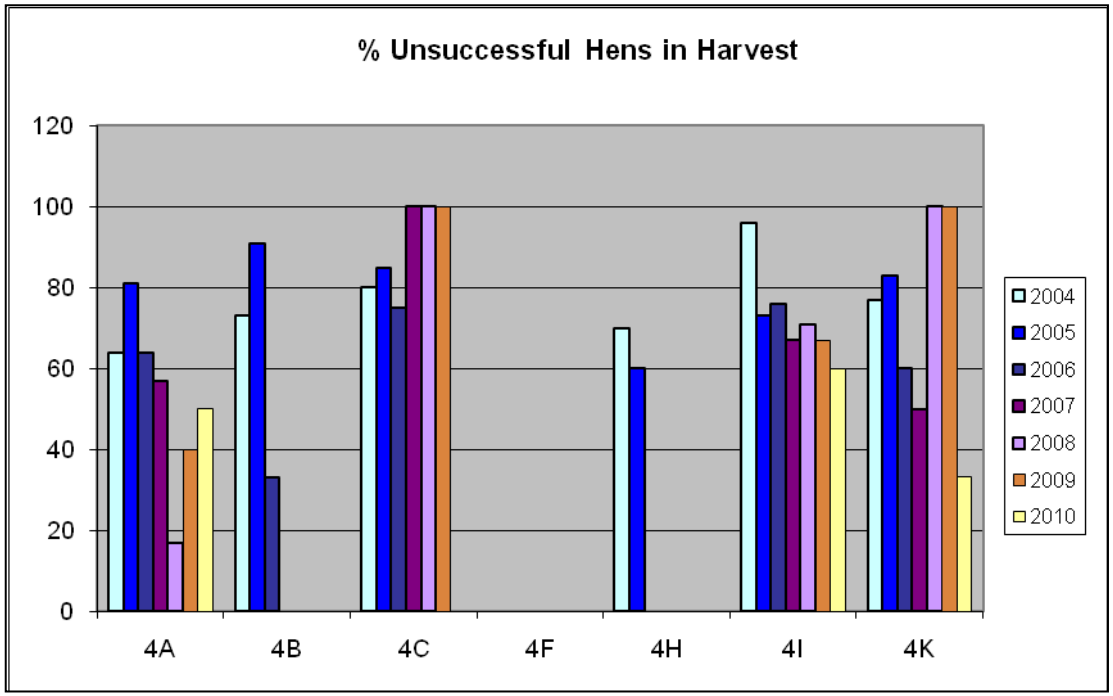


Figure 7. % Unsuccessful hens in harvest, by harvest subunit, in the NMVPA.

Surveys for leks not currently on established routes are conducted by personnel from IDFG, BLM, and the USFS. Between 2007 and 2010, several IDFG volunteers also participated in efforts to survey often-overlooked areas to search for unknown leks and assess the status of historically occupied leks. Across the Magic Valley, these surveys have resulted in visits to approximately 100 additional leks per year. These efforts contribute greatly to our knowledge of sage-grouse distribution across the NMVPA (Figure 5).

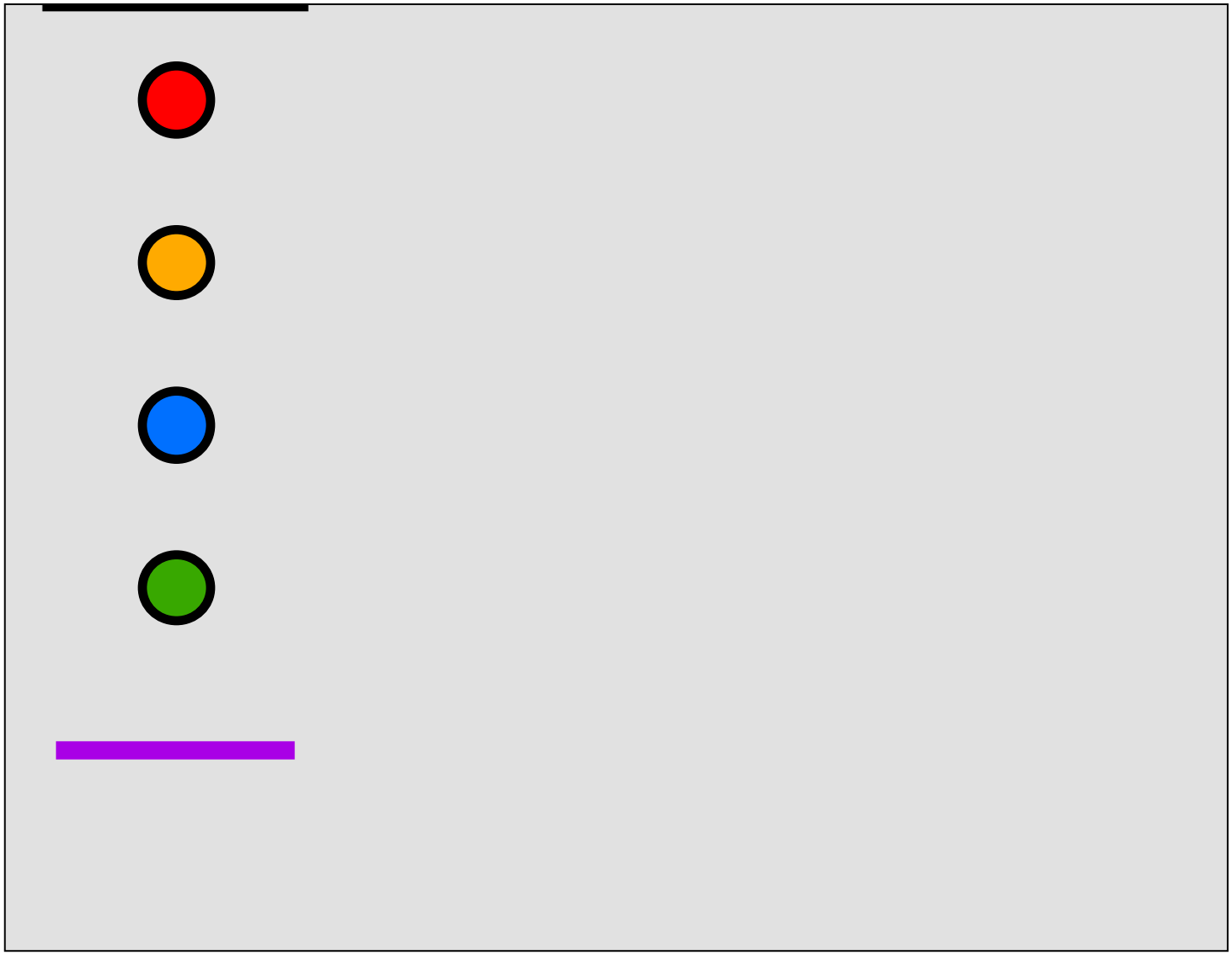


Figure 8. Map of known active leks and lek routes within the NMVPA

2.1.2 **Methods of assessing and monitoring sage-grouse populations within the NMVPA**

The LWG will use the best available data to assess the following metrics for monitoring sage-grouse populations within the NMVPA:

- Populations
- Reproduction
- Survival
- Distribution

These data will be compiled and monitored by an IDFG representative to the LWG, and will be reported to the group at appropriate intervals (following seasonal data collection efforts) during regularly scheduled meetings.

The NMVPA covers a relatively large geographic area with diverse habitats, threats to sage-grouse, and past population trends. Because of this, we propose setting population goals and objectives at two scales: The mid-scale objectives address populations throughout the entire NMVPA; these are primarily derived from compiling long-term lek route data for all of the routes within the NMVPA. However, this scale will also apply to goals and objectives for reproduction, survival, and distribution. The fine-scale objectives address more localized data, and will be derived from individual lek routes and other data regularly collected on leks outside of established routes. This scale will also be used to assess distribution of birds and distribution of data collection efforts. Data on reproduction and survival are insufficient for meaningful analysis at this scale.

In addition to goals and objectives, the LWG also proposes establishing assessment triggers for populations in the NMVPA. These would be based on declining trends or particularly sharp declines in populations, and would prompt the LWG to convene a meeting at which an IDFG representative to the LWG would apprise the group of the current situation, including possible factors contributing to the observed decline. The LWG could then discuss possible responses.

2.1.3 **Specific Planning Area Population Trends and Data**

In the NMVPA, lek routes provide the most consistent source of sage-grouse population trend data. Harvest data can supplement lek route data with catch-per-unit-effort metrics; however, these are indirect measures of population status and should not be used independently of direct measures (such as lek routes and other lek counts). For this reason, goals, objectives, and assessment triggers for NMVPA sage-grouse populations will mostly be derived from lek route data.

- Mid-scale objective

The LWG's mid-scale population objective is to recover sage-grouse populations in the NMVPA to 1987 levels (approximately 1100 grouse observed on NMV lek routes), and maintain grouse populations at or above this level.

- Mid-scale assessment triggers

We have established two assessment triggers for populations at the scale of the NMVPA (Figure 6). The first is based on population trend data. Over the past 20 years, lek counts have indicated that the population generally stays above 450 males. However, when grouse numbers have fallen below 450 for 2 or more years in a row, it has often indicated a significant population decline. We propose that if NMVPA lek counts of displaying males fall below 450 for more than 2 consecutive years, the LWG will convene to discuss potential causes for the decline, and whether our current activities are sufficient or we want to temporarily re-prioritize threats and conservation measures.

The second assessment trigger addresses sudden substantial declines in populations. Only one of the past 20 years has seen grouse numbers at or below 300 males in the NMVPA. We propose that if NMVPA grouse numbers fall below 300 males for even one year, we convene the LWG to discuss potential causes for the decline, and whether our current activities are sufficient or we want to temporarily re-prioritize threats and conservation measures.

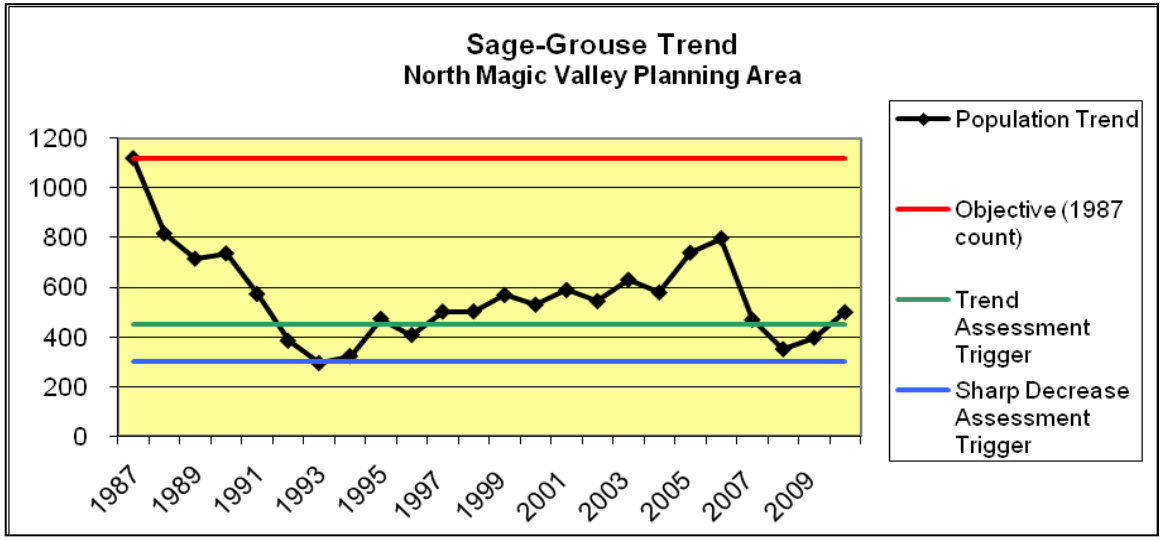


Figure 9. Mid-scale (NMVPA) sage-grouse population objective and assessment triggers.

- Fine-scale objective

The LWG's fine-scale objective is to recover sage-grouse populations on each lek route to the highest population observed since 1987, and maintain grouse populations at or above this level.

- Fine-scale assessment triggers

We have established three assessment triggers to be applied to each consistently-run lek route in the NMVPA. These lek routes are shown on Figure 5; they include:

Fir Grove
Macon Flat
Bliss-Hill City Road
Paddleford
Picabo Hills
Timmerman
Lincoln-Minidoka
Rock Creek
North Shoshone

All of these routes, with the exception of Macon Flat, have been run consistently by IDFG staff for 20 years or more. Macon Flat is a relatively new route, but has been run annually since 2003. The assessment triggers will apply to the 8 routes for which we have $\geq$ 20 years of data.

The first assessment trigger is based on population trend. For each lek route, we will calculate a 5-year running average of the maximum number of males observed at all leks along the route. If we observe a decline of $\geq$ 5% of the previous five-year' average for 3 consecutive years, we will convene the LWG to discuss potential causes for the decline, and whether our current activities are sufficient or we want to temporarily re-prioritize threats and conservation measures.

The second assessment trigger addresses sudden substantial declines in populations. If, in any given year, we see a decline of $\geq$ 30% of the previous year's count, we will convene the LWG to discuss potential causes for the decline, and whether our current activities are sufficient or we want to temporarily re-prioritize threats and conservation measures.

The third assessment trigger also addresses sudden substantial declines in populations. For each lek route, we will calculate the long term (all years with good counts) average high number of males. If, in any given year, the high number of males observed is $\leq$ 50% of the long-term average, we will convene the LWG to discuss potential causes for the decline, and whether our current activities are sufficient or we want to temporarily re-prioritize threats and conservation measures.

2.1.4 Population Data Needs

- Little is known about migration patterns in the North Magic Valley Planning Area. These data would help inform comments on proposed infrastructure, prioritize habitat work, and understand population dynamics.
- Additional wing data could be garnered from additional wing barrels.
- Research projects which focus on nesting success rates and mortality causes would help elucidate the magnitude of different threats during brood-rearing.

2.2 NMV Planning Area Habitat Status and Conditions Overview

2.2.1 North Magic Valley Planning Area Historical Background: Land Use, Disturbance, and Loss of Sage-grouse Habitat

Euro-American settlement of the NMV LWG planning area began in the 1830s (Autenrieth 1981), although settlement of northern portions of the planning area (Camas Prairie and Big Wood River Valley) didn't occur in earnest until late 1870's (USDA 1941). . Prior to settlement, an estimated 85% (2,510,642 acres) of the planning area may have been greater sage-grouse habitat (areas covered by lava, bedrock, or open water were excluded).

Southern Idaho homesteaders began to use the planning area for sheep and cattle grazing, cleared land for crops, and ultimately developed large water transportation projects that enabled further settlement and development. It is unknown what degree sage-grouse may have used areas converted to agriculture, pre-settlement. Much of these areas were covered by basin big sagebrush (*Artemisia tridentata tridentata*) which due to its ability to grow to a large size, may have only been utilized by sage-grouse post-disturbance or during very deep snow years. Additional sage-grouse habitat declines resulted overtime from infrastructure, rangeland "improvements" (crested wheatgrass seedings), and increased rangeland fire frequencies in areas dominated by invasive annual grasses.

Historic and current land conversions have reduced potential sage-grouse habitat to approximately 61% (1,801,997 acres) of the original acreage. Approximately 1% (22,836 acres) of the area has been developed, and nearly 14% (408,800 acres) has been converted to agriculture (Figure 3). More than 70% of the planning area (based on buffering around infrastructure features using criteria from the state plan) is affected by some form of current or planned infrastructure, and the area contains some of the highest linear infrastructure density of Idaho's SGPAs (Figure 12). Currently livestock grazing allotments comprise 65% (1,902,598 acres) of the total planning area, and wildland fires have burned over two million total acres over the past 20 years.

2.2.2 Current Greater sage-grouse Habitat Condition in the NMV LWG Planning Area

2.2.2.1 Broad-scale Habitat Classification and Distribution

Due to growing concerns over sage-grouse trends and populations, biologists from multiple federal, state, and local agencies in Idaho collaborated in 2000 and created a sage-grouse habitat planning map for the state. Habitat types included: Key sage-grouse habitat,

defined as areas of generally in-tact sagebrush that provide sage-grouse habitat during some portion of the year; Potential restoration area Type 1- Perennial, defined as sagebrush limited areas characterized by perennial grass species composition and/ or structure that should provide suitable potential nesting habitat in the future, once sufficient sagebrush cover (at least 10%) is re-established; Potential Restoration Area Type II- Annual Grasslands, defined as areas dominated or strongly influenced by invasive annuals such as cheatgrass or medusahead rye, or similar species. Areas of sagebrush may be present but, in general, understories are not ideal for sage-grouse; and Potential Restoration Area Type III-Conifer Encroachment Areas, defined as areas where junipers and/or other conifer species are encroaching into sagebrush habitat areas.

The map has been updated annually since 2002, based on improved information, the past seasons' wildfire activity, vegetation

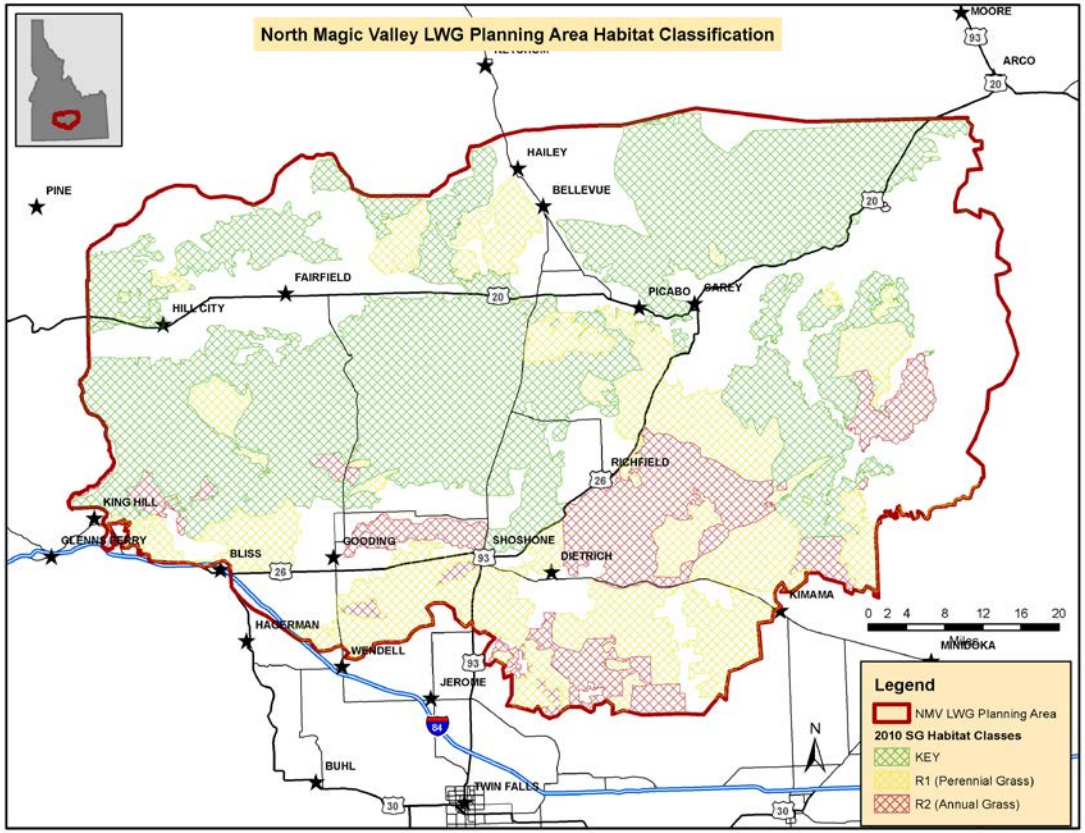


Figure 10. NMV LWG 2009 Greater sage-grouse habitat classifications.

treatments and successional changes noted by field-level biologists. The NMV LWG planning area consists of approximately 2,950,588 acres of mixed habitat types. Based on the 2010 habitat classification for Idaho, the NMV area contains 1,118,191 acres of 'key' habitat, 568,333 acres of 'R1' habitat, 258,938 acres of 'R2' habitat, and no 'R3' habitat types (Figure 1).

2.2.2.2 Mid-scale Habitat Condition

Vegetation

Vegetation types present in the planning area were calculated on a finer scale using an existing vegetation dataset created by the Bureau of Land Management (BLM) Twin Falls District. The existing vegetation dataset was defined by the Fire Regime Condition Class (FRCC) process. FRCC is an interagency, standardized tool for determining the degree of departure from reference condition vegetation, fuels and disturbance regimes. Within areas mapped as key, R1, and R2 sage-grouse habitat in the 2008 habitat map, there are up to 23 vegetation types which were aggregated to 13 (Table 1).

Vegetation Class	Acres
Agriculture	17296
Mountain Big Sagebrush	415543
Three-Tip Sagebrush	36182
Wyoming Sagebrush Steppe	362504
Basin Big Sagebrush	269093
Black and Low Sagebrush	167847
Developed	2791
Forested	17905
Introduced Upland Grasses and Forbs	61798
Introduced Perennial Grasses and Forbs	7979
Native Perennial Grasses and Forbs	38138
Nonnative Annual Grasses and Forbs	208677
Nonnative Perennial Grasses and Forbs	103461
Not Classified	74251

Table 1: NMV LWG vegetation types and acreage within each of the habitat classes.

The majority of the NMV LWG planning area is covered by the BLM Existing Vegetation dataset. Less than 10% of the area along the northern boundary was not covered by the dataset. Thus, the USGS Shrubmap dataset was used to calculate the vegetation types within those areas. The Shrubmap regional dataset was produced using decision tree classifier and other techniques to model landcover. Multi-season satellite imagery (Landsat ETM+, 1999-2003) and digital elevation model (DEM) derived datasets (e.g. elevation, landform, aspect, etc.) were utilized to derive rule sets for the various landcover classes. This dataset was created for assessments of shrubland and associated landcover types. These data are not intended to be used at scales larger than 1:100,000. With the BLM Existing Vegetation and the Shrubmap datasets merged, the NMV area was covered with a seamless vegetation/ habitat dataset (Figure 2). Furthermore, using this information, it was possible to calculate the total acres of agriculture, development, and those areas that have experienced wildfire.

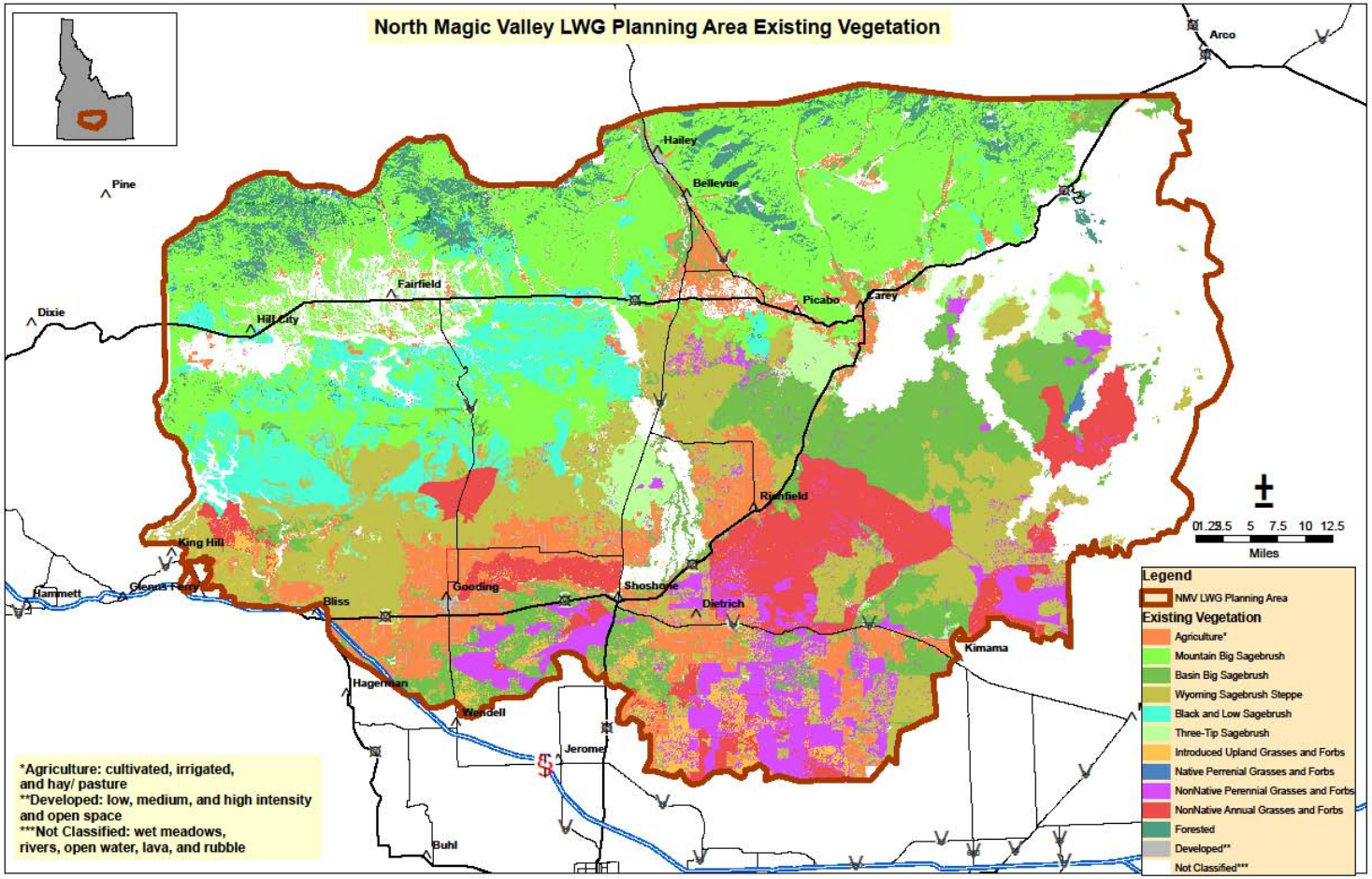


Figure 11. NMV LWG vegetation types.

Based on the landcover datasets used (BLM Existing Vegetation and Shrubmap), the NMV area contains a total of 218,010 acres of land that has been converted to agriculture and 22,836 acres of developed land. However, using aerial photography it was determined a large percentage of the unclassified areas were actually agriculture. Thus, another calculation was made to better estimate the acreage of agricultural lands in the planning area. Based on this calculation, an estimated 14% (408,800 acres) has been converted to agriculture (Figure 3).

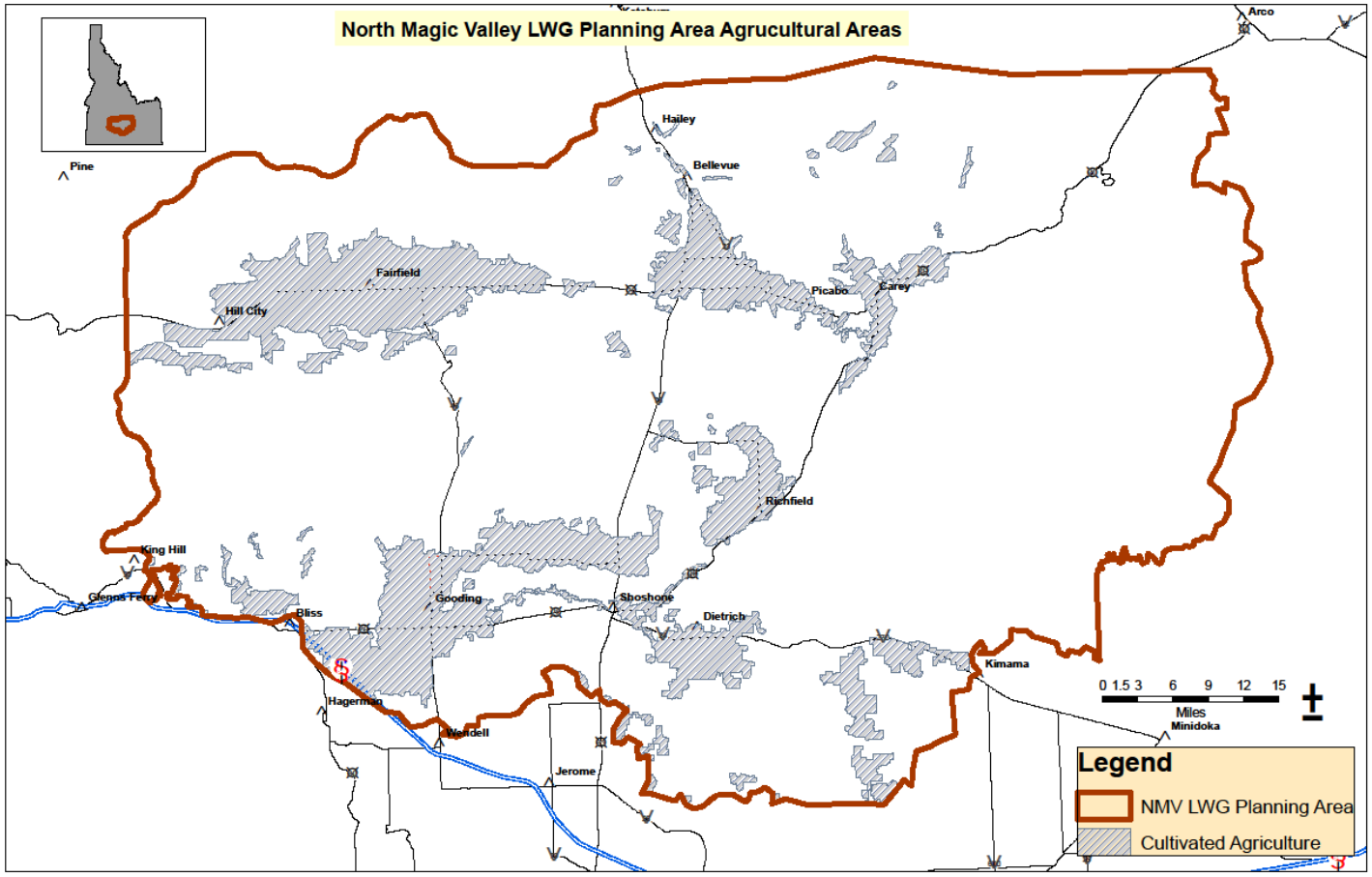


Figure 12. NMV LWG Agricultural Areas.

The BLM, Twin Falls District maintains a fire history database, and between 1988 and 2007, the NMV LWG area has experienced over 1000 fires. The fires have ranged in size from less than 1 acre to almost 180,000 acres. Certain areas, particularly in the south and southeastern portions of the planning area have burned multiple times during the past 20 years (Figure 4).

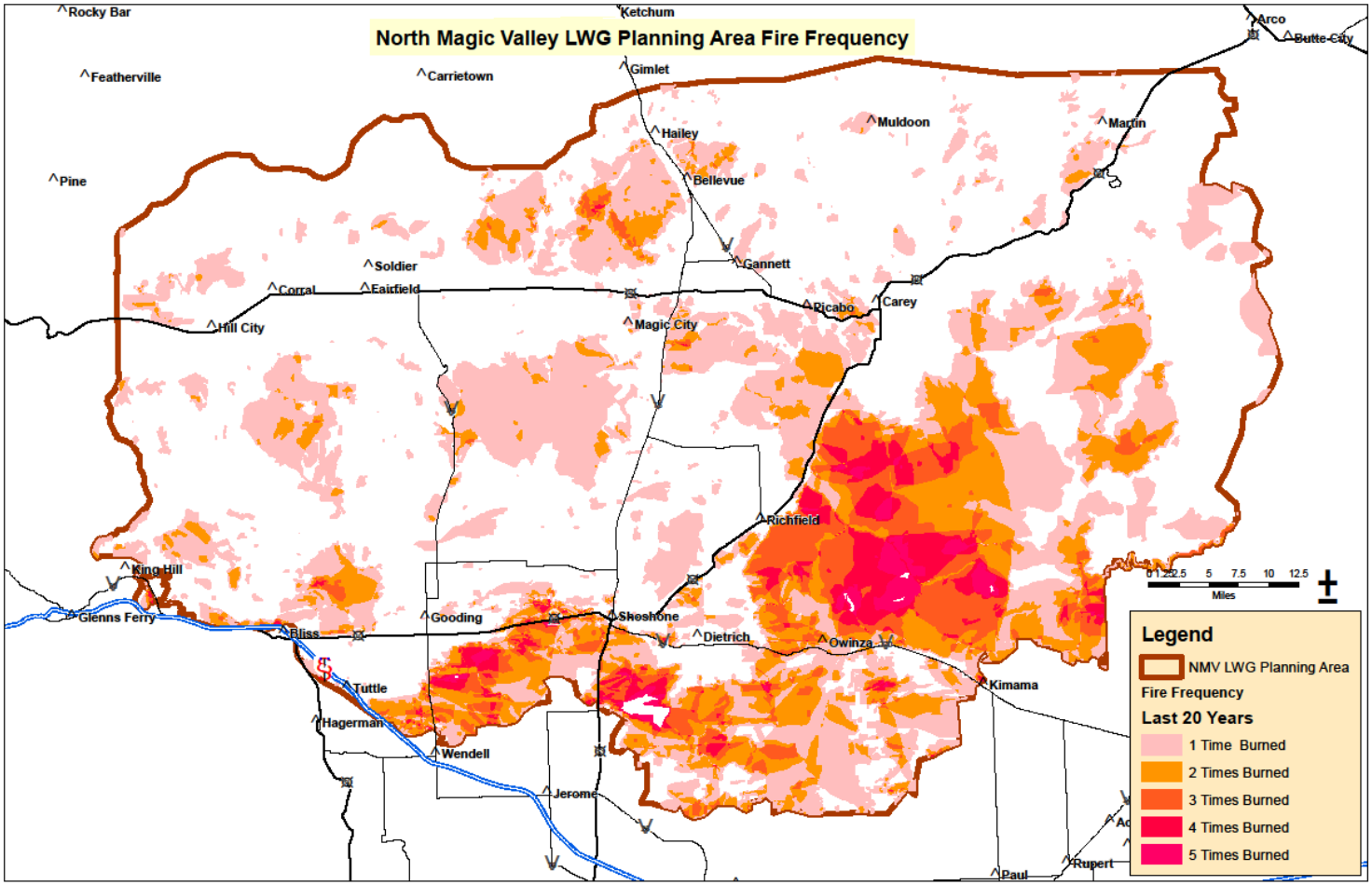


Figure 13. NMV LWG fire frequency.

Grazing Allotments

There are 200 BLM and 25 USFS grazing allotments that fall entirely or partially within the NMV LWG planning area (Figure 5). The grazing allotments currently cover approximately 65% (1,902,598 acres) of the planning area. Each allotment is managed under a 10-year permit, and the permitted livestock type and permitted level of use vary.

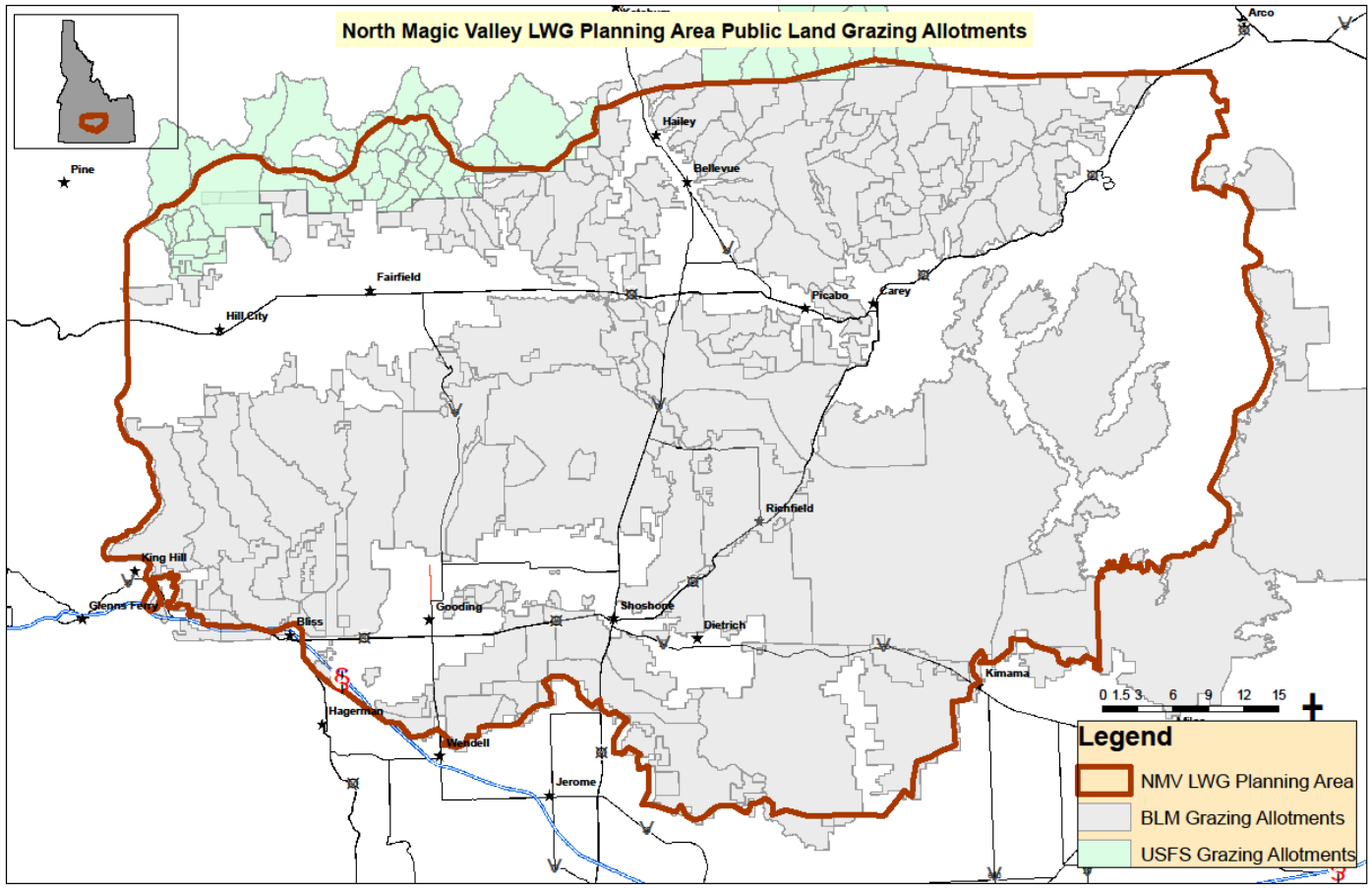
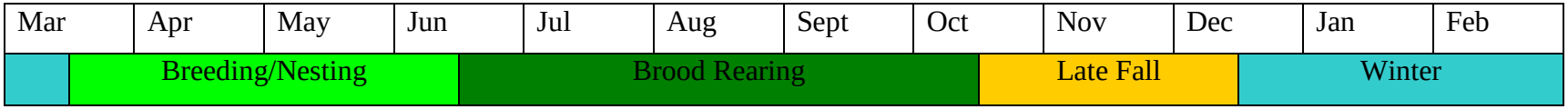


Figure 14. NMV LWG public land grazing allotments.

Seasonal Habitat

Important seasonal time periods specific for sage-grouse populations occurring in the NMV LWG planning area are as follows:



Breeding/Nesting Period – March 15 to June 15

Brood-rearing Period – June 16 to October 15

Late Fall Period – October 16 to December 20

Winter Period – December 21 to March 14

The breeding/nesting period encompasses the displaying period when active breeding is occurring (as opposed to males simply staging at leks and early display efforts) and the nesting season. Female attendance at leks is generally greatest during the first and second week in April for the NMV planning area, and most chicks hatch in the first or second week in June (Skinner, pers. obs.).

The brood-rearing period encompasses both early brood-rearing (young chicks) and late brood-rearing (older chicks) when the diet of sage-grouse includes insects and forbs in addition to sagebrush. During this period, hens with broods utilize mesic habitat such as alfalfa fields, riparian meadows, grasslands, etc. in addition to sagebrush habitat (Connelly et al. 2000). Males may use high elevations during the summer and early fall, including non-traditional habitat such as non-forested alpine areas (Skinner, pers. obs.).

Late fall use occurs during the months of October and November. Sage-grouse in the NMV planning area that use non-sagebrush habitat during the brood-rearing season resume a diet consisting primarily of sagebrush. Observations of sage-grouse in non-sagebrush areas occur much less during this late fall period. In migratory populations (as are found in the western half of the NMV area), sage-grouse may stage at traditional sagebrush areas in preparation for moves to wintering grounds.

Winter period occurs when snow is present in the NMV planning area. Snow may occur much earlier than December 20 in the area, but generally begins to accumulate after mid-December. Elevation in the NMV area ranges from 2,600 feet along the Snake River to 10,000 feet in the Soldier Mountains. At higher elevations in the northern portion of the NMV area, snow may become very deep (> 4 feet).

The migratory populations of sage-grouse in the NMV area fly to wintering grounds during the winter period and larger groups (up to >100 birds) of sage-grouse may be observed. The diet of sage-grouse is almost exclusively sagebrush leaves during the winter (Patterson 1952, Wallestad et al. 1975), and they gain access to water by eating snow. Birds appear to become more widely distributed across the habitat when snow is present (Skinner, pers. obs.).

By late February or early March, male sage-grouse begin returning to traditional lek areas. For non-migratory populations, lek areas and winter habitat may be in the same location (Connelly et al. 2000). While males can be observed staging and even strutting at leks during the winter period, females generally do not arrive at the leks until later. Autenrieth (1981) reported peak hen attendance at leks in the Snake River Plain of Idaho is generally the first week in April and about a week later at higher elevations. Males have been observed standing on several feet of snow at lek sites during this time or attempting to strut on snow free highways (Skinner, pers. obs.).

Seasonal Habitat Mapping

Seasonal habitat was mapped using a geographic information system (GIS) (ESRI, 2008). Recorded observations of sage-grouse were compiled from two Idaho Fish and Game (IDFG) telemetry studies (Lowe 2004-2006 and Palmer 1991-1995), IDFG winter flights (Smith and Remming 2008 and Remming 2010), falconer GPSed bird locations (King 2000-2008, Skinner 2007-2008, Greene 2008), the 2008 IDFG statewide lek database, Craters of the Moon National Park lek data (Munts 1998-2009), Forest Service and volunteer lek data (Skinner 1999-2001, 2005-2009), and personal observations. These observations were then organized by the seasonal time periods as previously described.

Over 1800 non-lek and 511 lek observations were compiled (1991-2009). While this represents a substantial dataset, some limitations exist. With the exception of the IDFG winter flight data, the observations are biased towards road access. The 2008 flight data presented new information not previously recorded; wintering grouse at high elevations in the northeast portion of the NMV planning area and wintering grouse at low elevations in the extreme southwest portion of the area. The 2010 flight data showed that sage-grouse were not using higher elevation areas across the Bennett Hills during the peak winter season.

Breeding/ Nesting Seasonal Habitat

Greater sage-grouse breeding/nesting habitat in the NMV planning area was delineated based on a two mile buffer drawn around known active leks (IDFG 2009, unpub. data) and observations of female sage-grouse during the breeding season (primarily from telemetry studies) (Figure 6). Breeding habitat is synonymous with nesting habitat for the purposes of this effort. While leks can occur in agricultural fields adjacent to sagebrush habitat, only potential nesting habitat (sagebrush) was mapped as breeding habitat. Breeding habitat was also delineated in areas suspected of supporting sage-grouse nesting outside of the two mile lek buffer where

adequate sage-grouse nesting cover occurs between known active leks. In some cases, such as in the Soldier Creek drainage north of Fairfield, the area within the two mile lek buffer was not fully included as breeding habitat due to lack of adequate sagebrush cover.

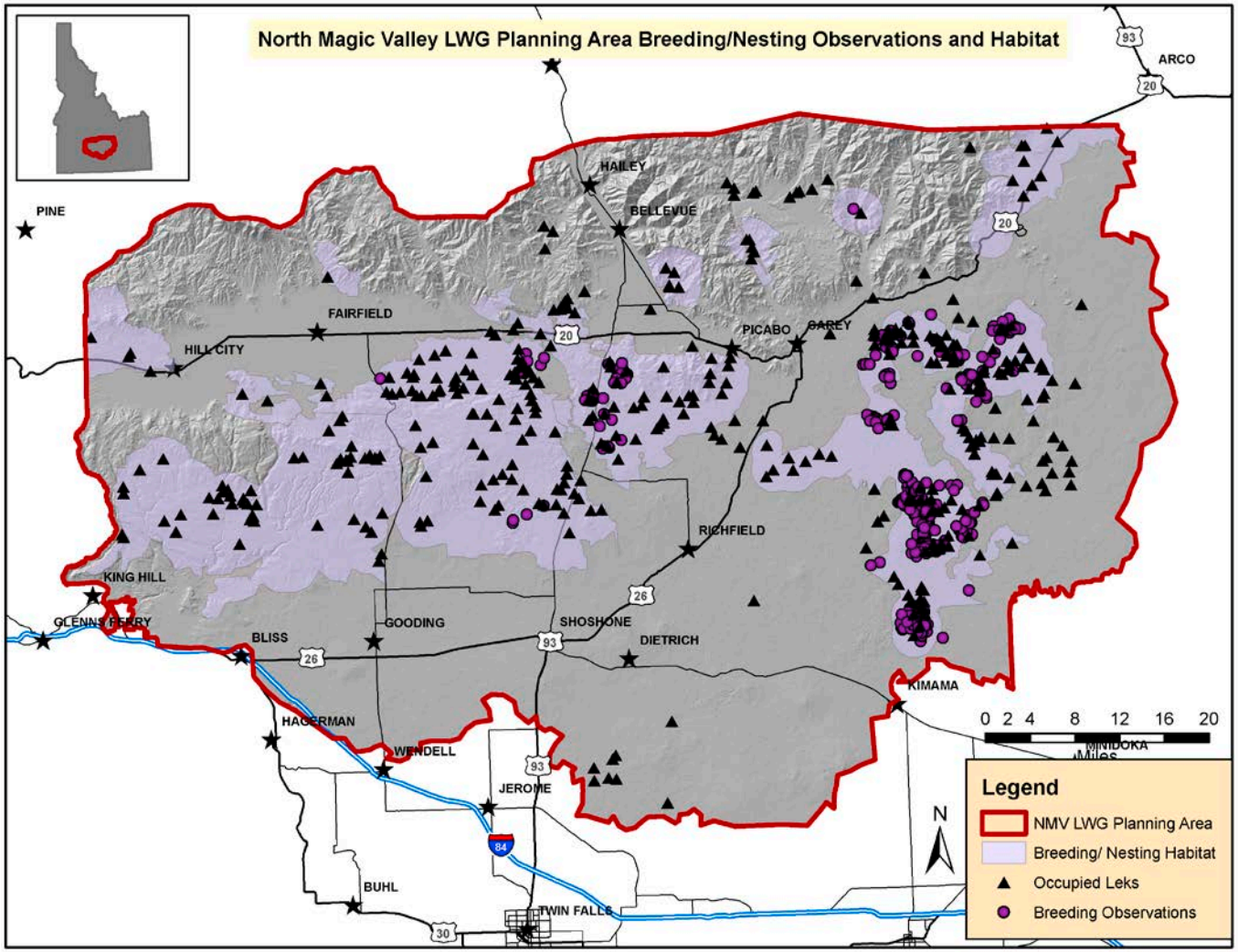


Figure 15. NMV LWG breeding / nesting seasonal habitat

Brood-rearing Seasonal Habitat

Greater sage-grouse can occur in a variety of habitat during the early and late brood-rearing period including alfalfa fields and high elevation meadows in addition to sagebrush areas (Connelly et al. 2000). Therefore, the brood-rearing habitat mapped for the NMV planning area includes agricultural fields within one mile of sagebrush where known observations have been recorded (Figure 7). While sage-grouse have not been observed uniformly across potential brood-rearing habitat in the NMV planning area and appear to show preferences for more mesic sites, this time period has the broadest potential for sage-grouse habitat use due to a diet shift to insects and forbs (Connelly et al. 2000). Sage-grouse are commonly observed near water sources such as reservoirs, canals, ponds, springs, etc. during late summer/early fall (Skinner, pers. obs.).

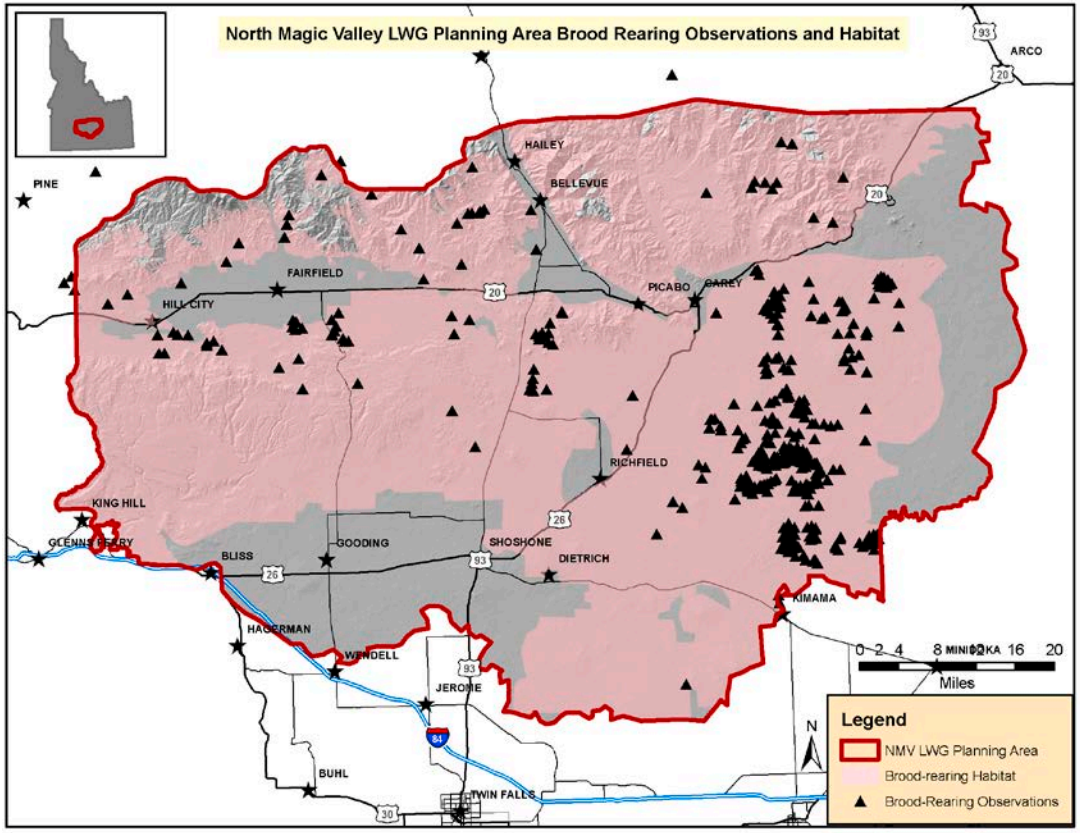


Figure 16. NMV LWG brood rearing seasonal habitat

Late Fall Seasonal Habitat

Due to the shift in sage-grouse diet that occurs during the late fall from insects and forbs to strictly sagebrush, the mapped late fall habitat is narrower in scope than brood-rearing habitat (Figure 8). Areas with known observations in the late fall period (October 16 to December 20) and areas of highly suspected sage-grouse use were mapped. In migratory populations (north western portion of the NMV planning area), sage-grouse begin moving toward wintering areas during this time period.

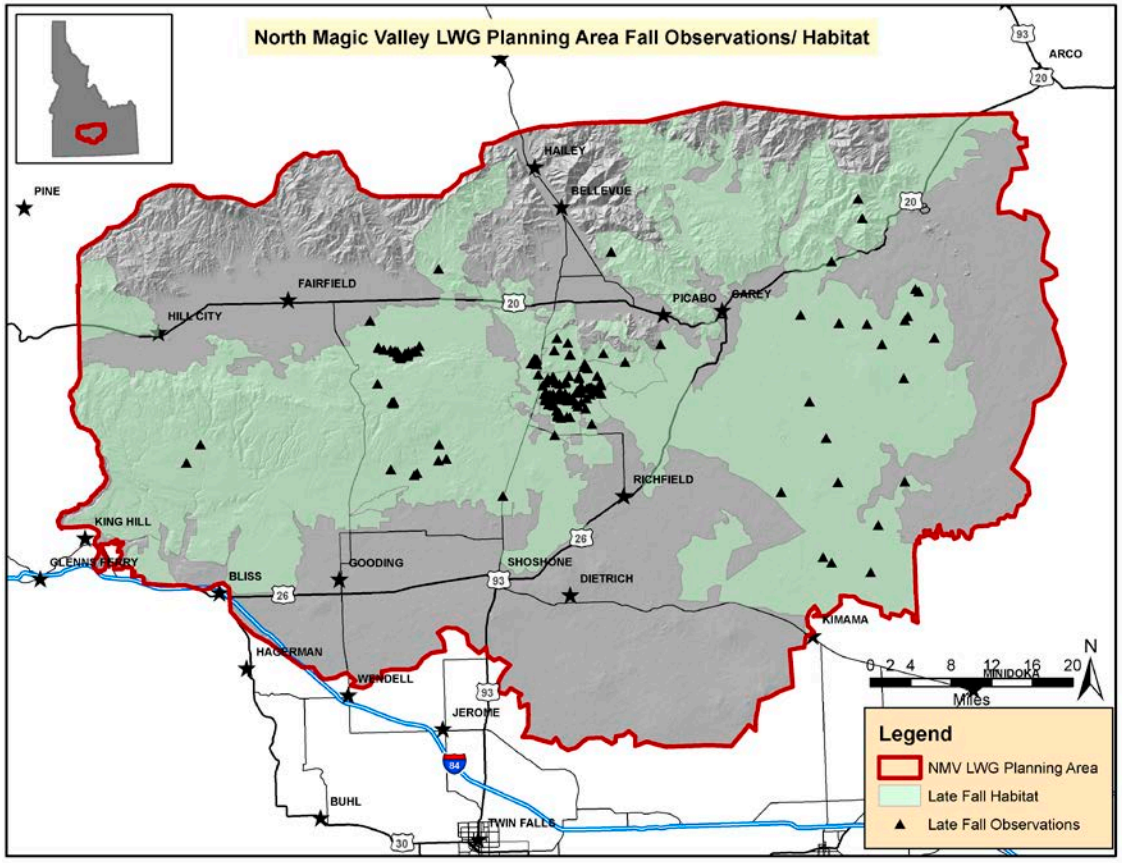


Figure 17. NMV LWG late fall seasonal habitat

Winter Seasonal Habitat

A 5,300 foot elevation contour was used as the northern extent of wintering habitat for the western portion of the planning area based on the 2010 IDFG flight and previous observations that sage-grouse in the western half of the NMV planning area winter below this elevation on the south side of the Bennett Hills e west of Magic Reservoir (Figure 9). Winter habitat in the southern portion was delineated based on the presence or absence of sagebrush, and on winter sage-grouse observations. Cultivated fields lacking sagebrush were not delineated as sage-grouse winter habitat. No known sage-grouse observations have been made in several decades in sagebrush areas between the towns of Gooding, Wendell, and Shoshone; thus, these areas were not delineated as winter habitat. Sagebrush areas east of Magic Reservoir, south to Shoshone and east to the town of Carey are known sage-grouse wintering areas based on wintertime sage-grouse observations (1992-2009).

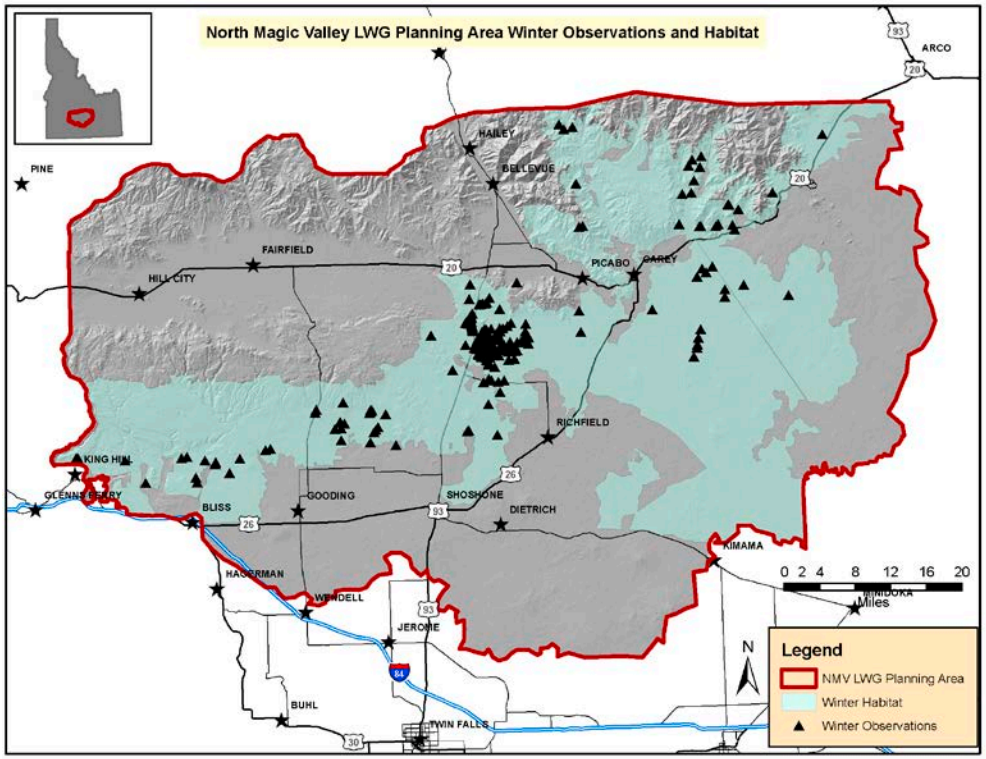


Figure 18. NMV LWG winter seasonal habitat

Sage-grouse winter observations in the northeast portion of the planning area (north of Highway 20 and east of Highway 75) occur at or below 6,500 feet. Therefore, a 6,500 foot contour was used to map the northern extent of the winter habitat. Non-sagebrush habitat including forested areas, farmland, and water were excluded as winter habitat in this area.

Winter habitat east of Highway 93 but south of Highway 20 (Carey to Kimama) was mapped based on the limited number of wintertime sage-grouse observations and fire history. In general, all areas classified as "Key Habitat" from the statewide sage-grouse habitat maps (sagebrush) were mapped as winter habitat. A few areas of "R1" (perennial grassland) and "R2" (annual grassland) were included where winter grouse observations occurred and inclusions of sagebrush exist. Most of the "R2" areas were not mapped as winter habitat because they occur below 4300 feet, and are not expected to recover naturally to "Key" sage-grouse habitat (Habitat Subcommittee personal observations).

2.2.2.3 Fine-scale habitat condition

Restoration emphasis areas

Restoration Emphasis Areas (REAs) are defined as areas with missing, marginal, or degraded sage-grouse habitat characteristics that if successfully improved or restored should result in a positive sage-grouse population response.

REAs in Idaho and the NMV LWG planning area were identified through a collaborative process involving federal, state, and local agencies, as well as interested stakeholders. There are four REA's within the LWG planning area (Figure 10). The acreage of the REAs totals approximately 316,996 acres, and about one half is within the R1 sage-grouse habitat and one half falls within the R2 habitat type.

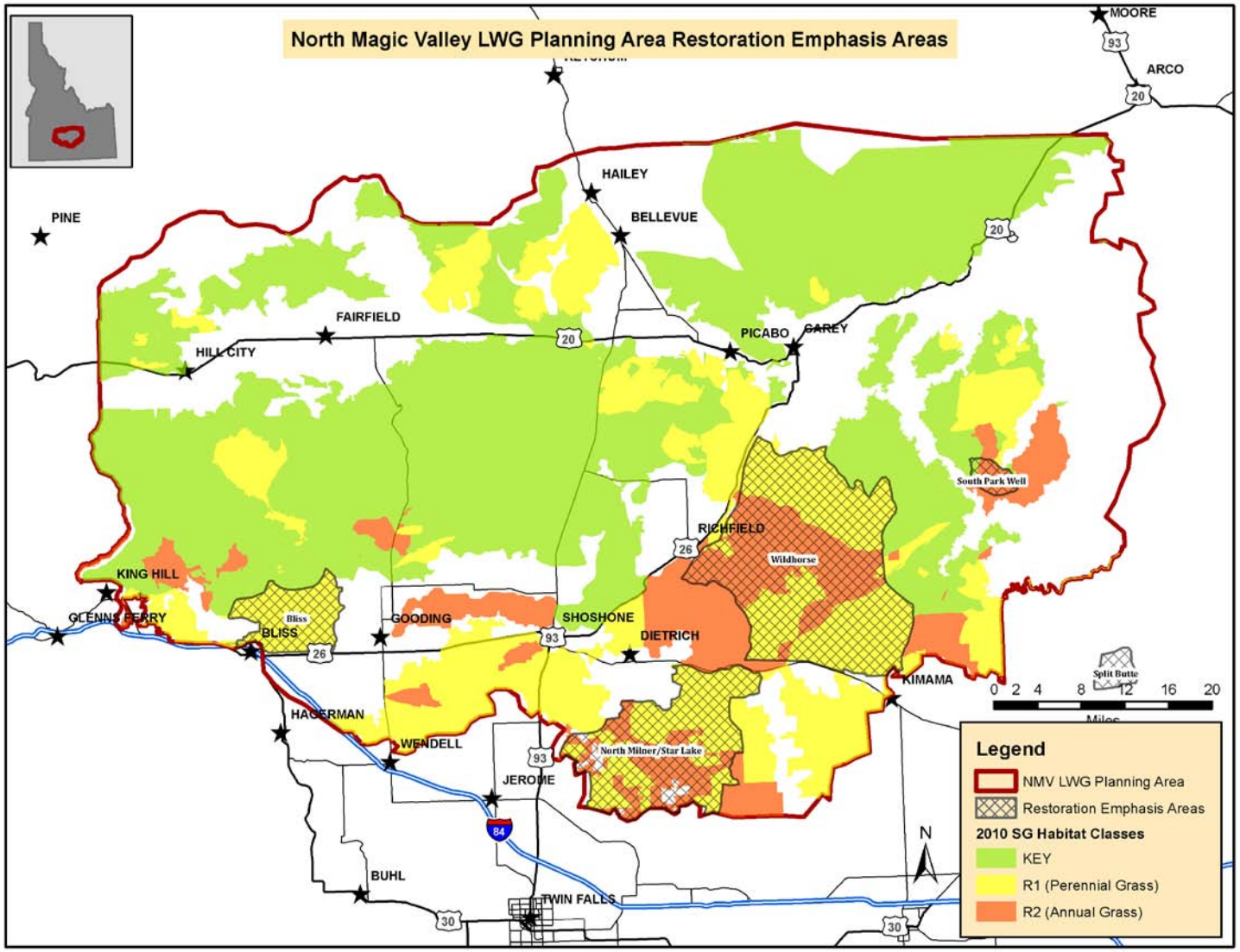


Figure 19. NMV LWG restoration emphasis areas

Infrastructure analysis– habitat fragmentation

Both linear and non-linear infrastructures were assessed for the NMV LWG planning area (Figure 11, Table 2). Spatial buffers were applied to major roads, powerlines, railroads, and oil/gas pipelines as recommended in the Conservation Plan for Greater sage-grouse in Idaho (2006). With the spatial buffers merged, over 70% of the planning area is affected by some form of infrastructure.

Figure 19. NMV LWG infrastructure.

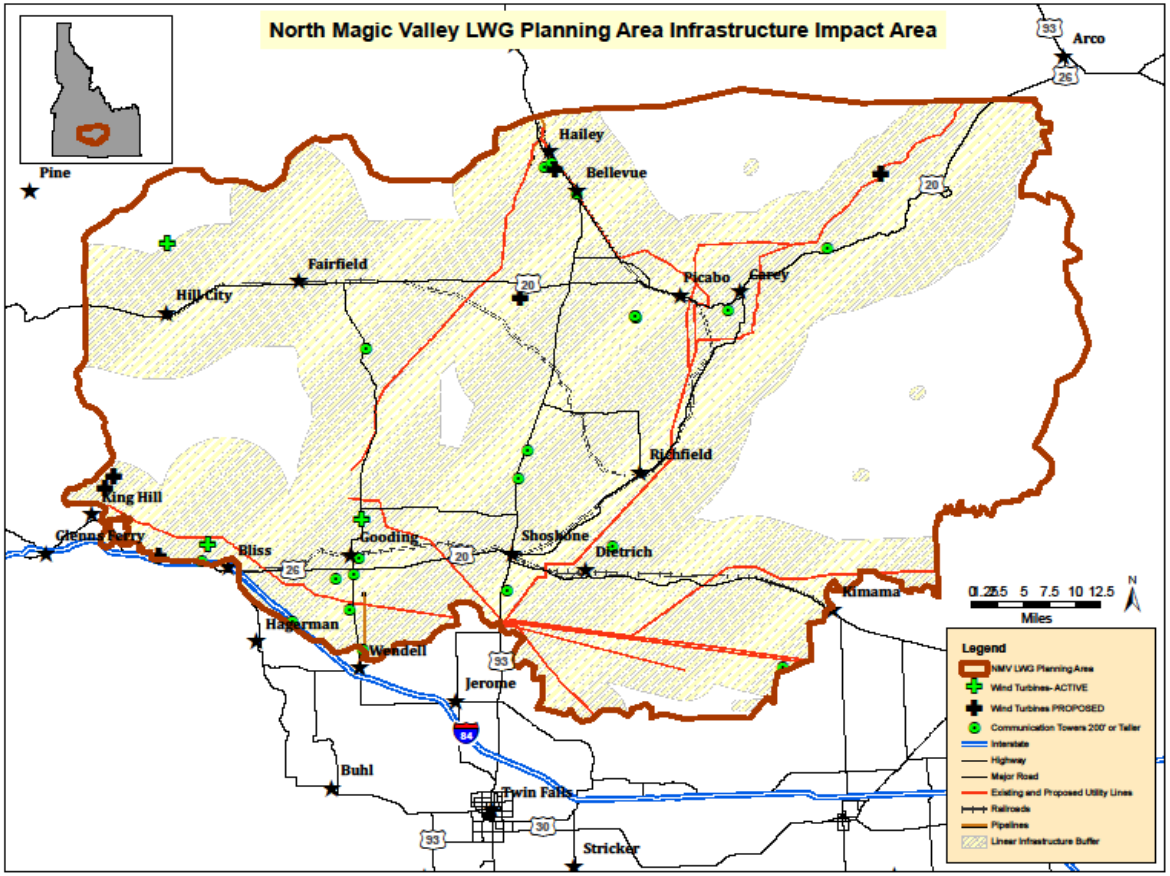


Figure 20. NMV LWG infrastructure.

Infrastructure feature	Buffer Size	Total length (meters)	Total length (miles)	Total area (acres)	Percentage of planning area covered by the buffer
Existing Transmission Line (> 138 kv)	5km	370,249	230	771,011	26%
Add MSTI		204,083	127	530,955	18%
Add Gateway		133,014	83	361,570	12%
Major roads	10km	659,722	410	1,973,803	67%
Railroads	3km	342,786	213	459,544	16%
Oil/Gas Pipelines	1km	194,319	121	107,795	4%
Combined Linear Features				**2,097,475**	**~71%**

Table 2: NMV LWG infrastructure analysis.

For the NMV LWG planning area; the roadways, canals, and railroads were combined and the density of these infrastructure features was estimated (Figure 12). There are approximately 771,921(~26%) acres within the planning area that have linear infrastructure density greater than 2mi/ mi^2. For the purposes of this analysis, it was assumed that the physical footprint of roadways is independent of the level of use on the roads.

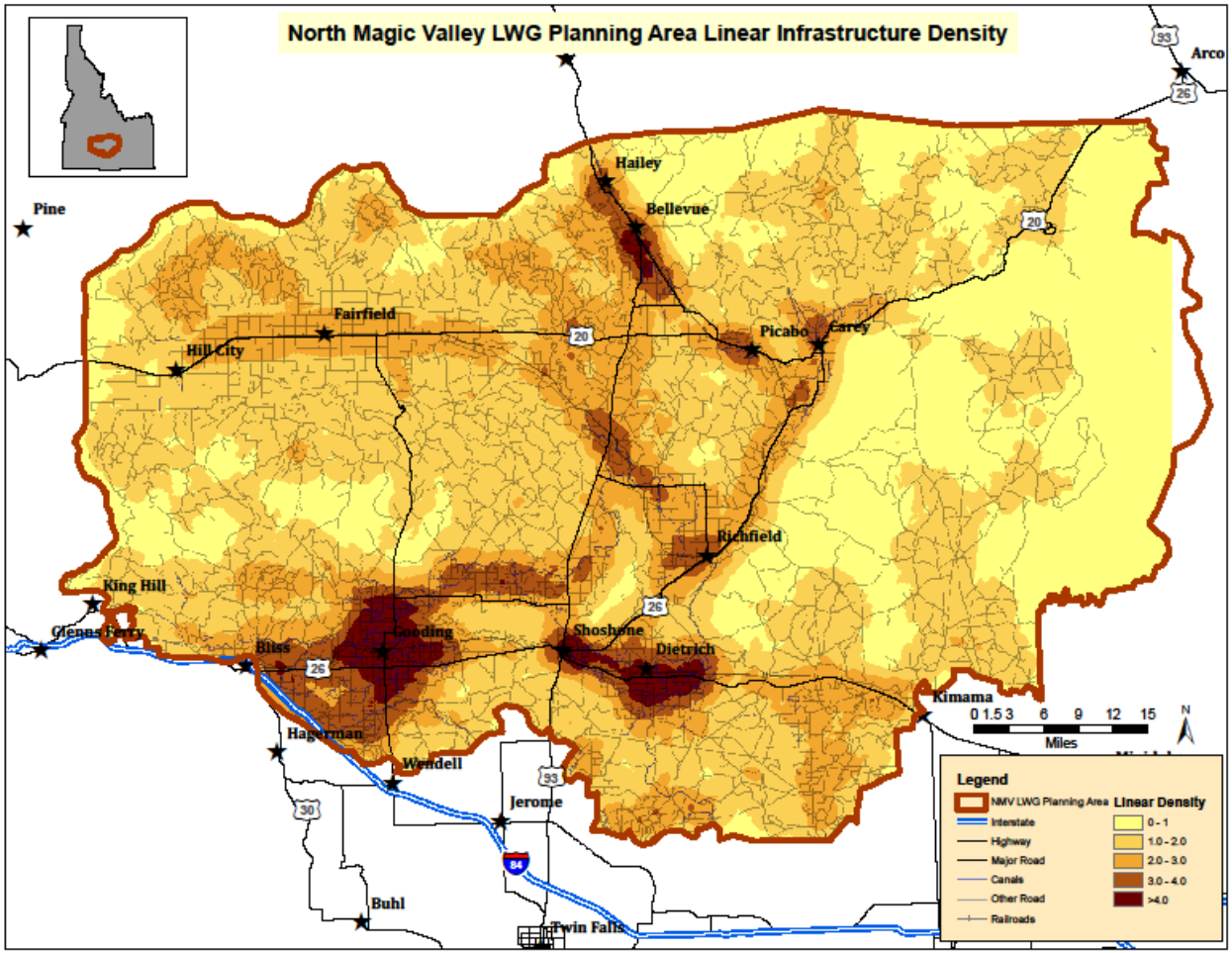


Figure 21. NMV LWG linear infrastructure density.

Information gaps and data needed
A high resolution, accurate vegetation landcover dataset that covers the complete NMV LWG planning area would allow more conclusive vegetation type calculations.

Sage-grouse observations that are not biased towards road access.

Winter flights were not conducted across the entire planning area; thus, data gaps likely exist in the observations. Flights were not conducted in the northwest or extreme south or southeast portions of the planning area. Future information from winter flights and telemetry data in the central and western portions of the planning area would be beneficial to fill in data gaps and help refine and edit the seasonal habitat mapping effort for the NMV planning area.

Level of use on roadways across the planning area would strengthen infrastructure and roadway impact analyses.

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Threats and Conservation Measures for sage-grouse and sage-grouse habitat in the NMV Sage-grouse Planning Area

2.3 Threats Overview

Permanent habitat loss is likely the greatest threat to sustaining Greater Sage-grouse populations in the North Magic Valley Planning Area (NMVPA). Permanent habitat loss to wildfire in xeric sagebrush where non-native annual grasses are likely to dominate post-fire (and increase fire frequency) was ranked the greatest threat to sage-grouse by the North Magic Valley Local Working Group. Permanent loss of occupied sage-grouse habitat to large scale infrastructure development (power lines, wind energy, airports, etc.) and urban/exurban expansion ranks as the second greatest threat to sage-grouse in the NMVPA. Other threats of concern include degradation of existing habitat from mismanaged livestock grazing or inappropriate water development, sagebrush treatment, seeded perennial grasslands, insecticides, haying practices, high nest predation rates, human disturbance, and disease.

2.4 Preliminary Threats Prioritization

Prior to describing threats and related conservation strategies, the Group agreed to prioritize from among the overall list of threats identified in the statewide sage-grouse conservation plan, their priority order for threats affecting the NMV planning area. In addition the Group also combined threats that seemed related, based on the threats application in the NMV planning area.

Overall Threats Organization

- Annual Grasslands / Wildfires
  - Prescribed fire
- Infrastructure
  - Mines, gravel and landfills
- Agricultural Practices
  - Sagebrush control
  - Insecticides
- Disease
  - West Nile Virus
- Conifer Encroachment
- Isolated Populations
- Predation

- Urban Rural Development
- Poor Livestock Management
- Human Disturbance
- Agricultural Expansion
- Sport Hunting
    - Falconry
- Seeded Perennial Grasslands

Threats Prioritization

Each member of the Group was issued 5 dots to place one each on the threats they believe are the most significant to the NMV Planning area. The purpose of this exercise was to determine the Group's collective view of threat importance and help determine level of effort for threats description.

- Dots Ranking Exercise Results

# Dots Received	**Rank**	**Threat** *(including sub threats as shown above)*
10	1	Urban / Rural Development
9	2	Annual Grasslands / Wildfire; prescribed fire
8	3	Poor Livestock Management
7	4	Infrastructure; mines, gravel, landfills
7	4	Disease; West Nile Virus
6	5	Agricultural Practices; sagebrush control, insecticides
4	6	Predation
2	7	Human Disturbance
1	8	Sport Hunting; falconry
0	9	Isolated Populations
0	9	Agricultural Expansion
0	9	Seeded Perennial Grasslands
0	9	Conifer Encroachment

2.5 Urban / Rural Development

Conversion of sagebrush-steppe habitat to residential or commercial development can result in permanent sage-grouse habitat loss and fragmentation. Development that occurs in areas near sage-grouse habitat can also increase the potential for disturbance, predation (from pets,) and increased collision hazard to sage-grouse (Idaho Sage-grouse Advisory Committee, 2006). Recent increases in technology and affluence have increased encroachment of residential development into sage-grouse habitat (Connelly et al. 2004). Subdivision of agricultural and rangeland areas into "ranchettes" has increased and poses a threat to sage-grouse (Connelly et al. 2004). Also see Infrastructure and Agriculture Sections.

In the North Magic Valley Local Planning Area (NMVPA), there are eight incorporated areas and eighteen labeled communities. Developed communities closest to or located within key sage-grouse habitat include Carey, Gooding, Shoshone, West Magic, and Richfield (Figure 1.) Well construction by decade from 1950 - 2009 was used to visually estimate population growth within the NMVPA. Most wells constructed from 1950 – 1959 were not within key sage-grouse habitat (Figure 2.) However, in the 1980's and 2000's there were a greater number of wells located in key or perennial grassland habitat, particularly southeast of Fairfield and between Hailey and Ketchum.

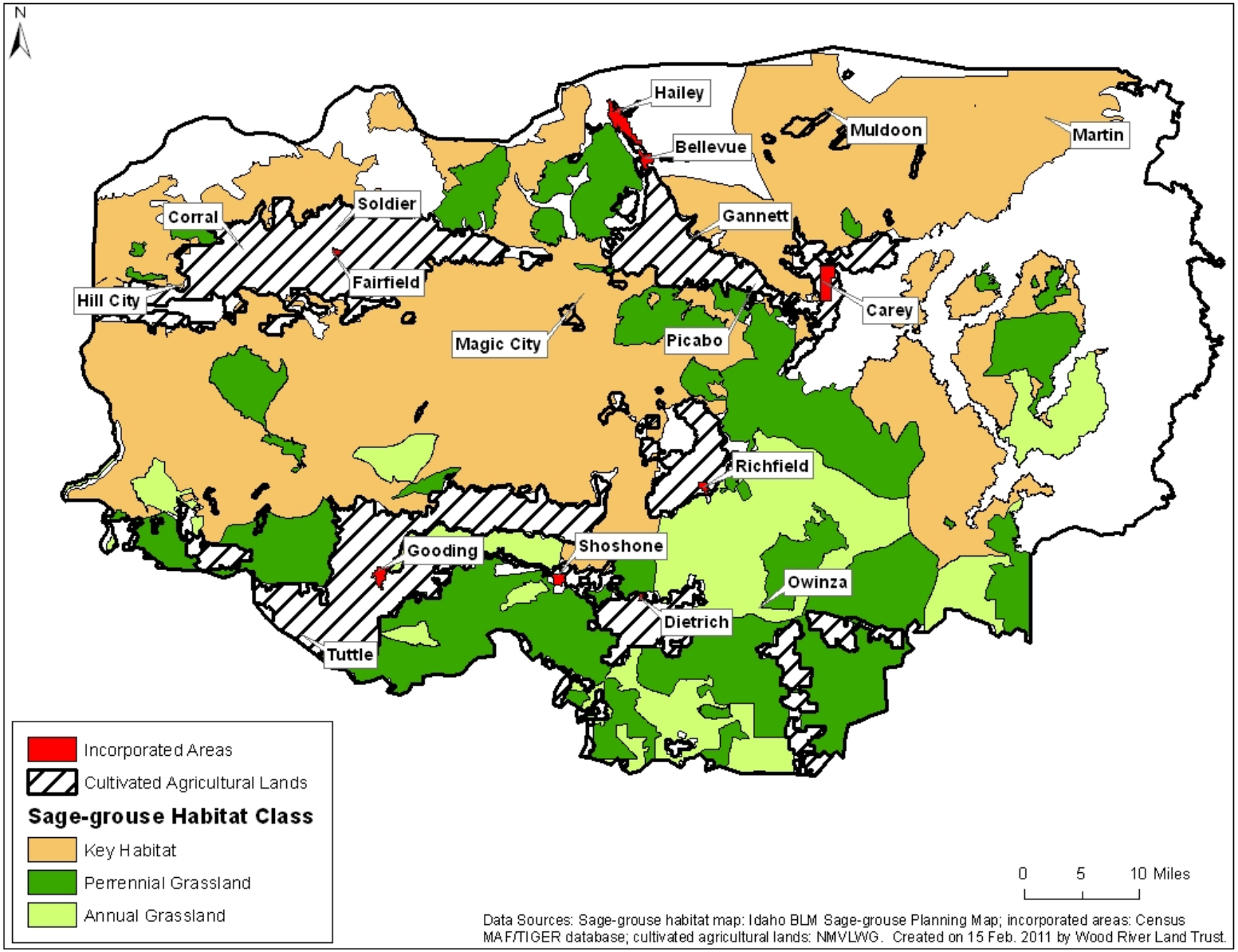

Figure 22. Cultivated Agricultural Lands and Sage-Grouse Habitat Map.

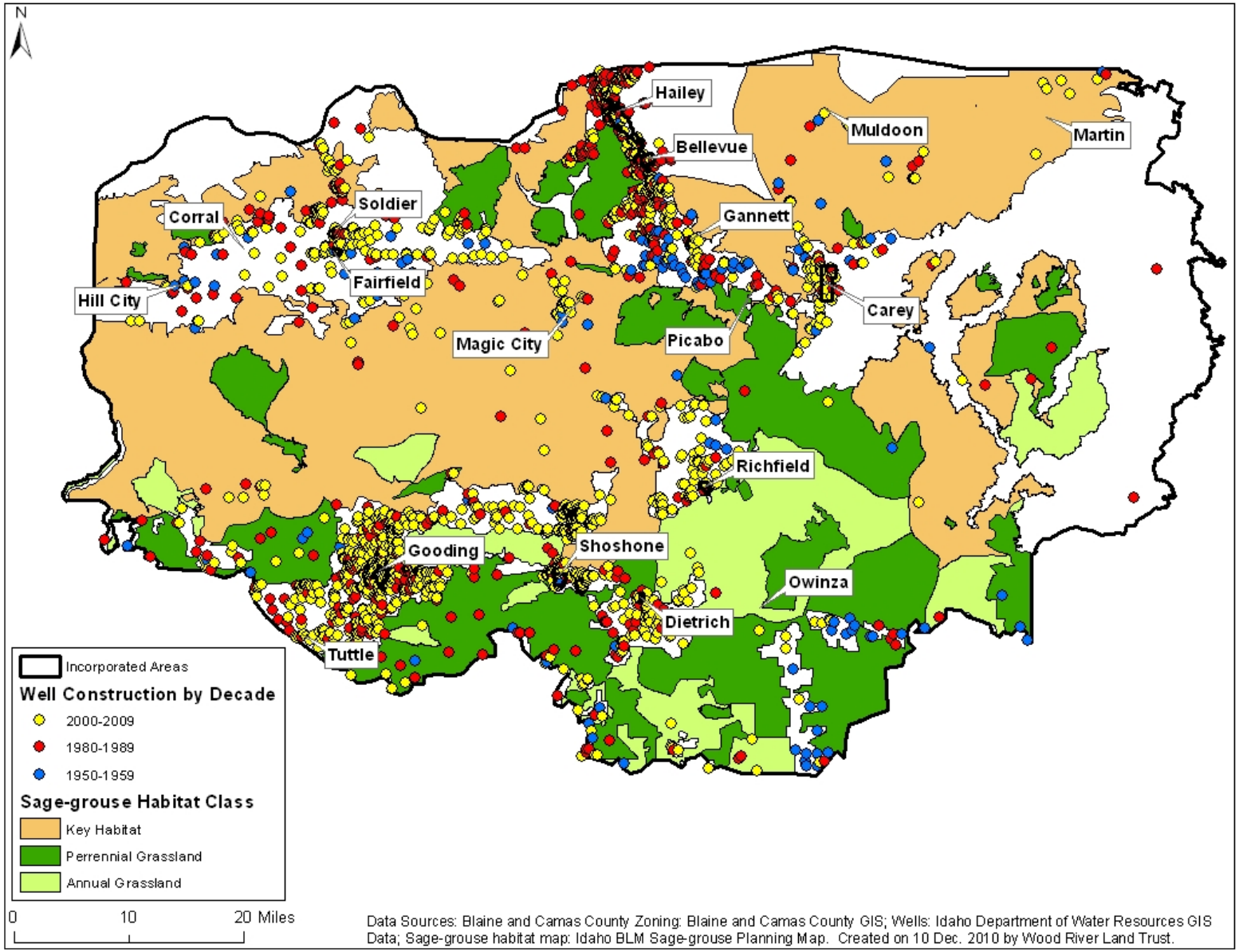

Figure 23. Well Construction and Sage-Grouse Habitat Map.

To evaluate future potential urban and rural threats to sage-grouse, zoning maps were obtained for Blaine, Camas, Lincoln, and Gooding Counties, and were mapped with sage-grouse habitat types, as identified by the Idaho BLM Greater Sage-grouse Planning Map 2009) (Figure 3). Zoning classes were grouped into the following categories: residential, floodplain, agricultural, rural residential, commercial, recreational, and industrial. Residential zoning classes vary among county, and include R-0.5, R-1, R-2, R-5, R-10, R-20, R-40, residential/transitional, subdivision, urban, and area of city impact (Lincoln County). Most of Blaine County is classified as rural residential, and this zone was considered a separate category. Agricultural zoning classes vary among county, and include A-5, A-20, A-40, and Agricultural Transition (Camas County).

Future loss of sage-grouse habitat from urban and rural development is likely to occur where residential, industrial and commercial zoning occur in sage-grouse habitat. In Blaine County, approximately 7,000 acres of residential zoning overlap key habitat and approximately 9,000 overlap perennial grasslands. These areas are mostly between Hailey and Bellevue. In Camas County, approximately 1,600 acres of residential zoning overlap with key sage-grouse habitat. In Gooding and Lincoln Counties, approximately 5,600 and 1,350 acres of residential zoning of overlap with perennial and annual grasslands, respectively, and no residential zoning overlaps with key habitat in these two counties. Conversion of sage-grouse habitat to agricultural lands is also considered a threat, although sage-grouse are observed in cultivated fields close to sagebrush habitat during summer and fall (see Agriculture section).

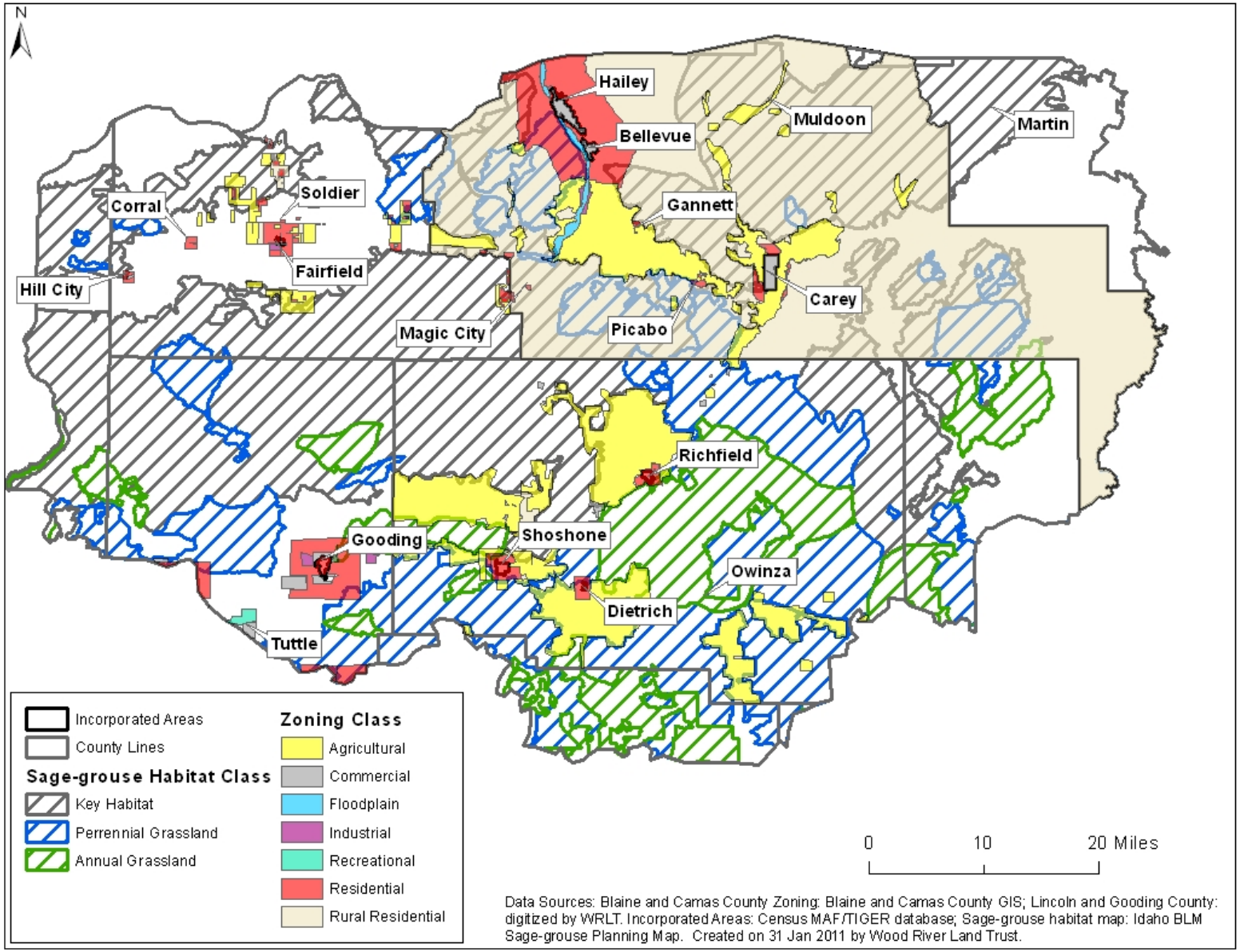

Figure 24. County Zoning and Sage-Grouse Habitat Map.

To locate areas of sage-grouse habitat at highest risk of loss from development, brood-rearing, winter, and nesting habitats, as identified by the NMVLWG, was also mapped with county zoning. Areas of zoning that intersected with the four habitat layers were extracted (Figure 4). The Rural Residential zoning category was not included in these extractions.

The largest areas of residential zoning that overlap with potential sage-grouse habitat are between Hailey and Bellevue and south of Gooding. However these areas do not contain known leks and are not known to currently support sage-grouse. Brood rearing habitat is the most likely seasonal habitat to be affected by development or agricultural conversion. While the majority of brood rearing habitat occurs on public lands, a significant amount (160,000 acres) occurs on private land that has been zoned and may face future development or conversion to agriculture. Increased development of brood-rearing habitat could affect sage-grouse recruitment (number of chicks adding to the population), thereby reducing the overall sage-grouse population. Subdivisions have the potential to be developed in brood rearing habitat in both Blaine and Camas Counties. Cultivated agricultural lands (Table 1) that overlap with key sage-grouse habitat occur near Muldoon, West Magic, and west of Gooding. Areas zoned for agriculture overlap with nesting, brood-rearing, winter, and key habitat and occur throughout the NMV planning area. Based on current zoning, the potential exists for incremental permanent sage-grouse habitat loss to occur from development over time. Fortunately, in the NMVPA, 83% of sage-grouse habitat occurs on public lands, as calculated from the 2009 Idaho Sage-Grouse Habitat Map.

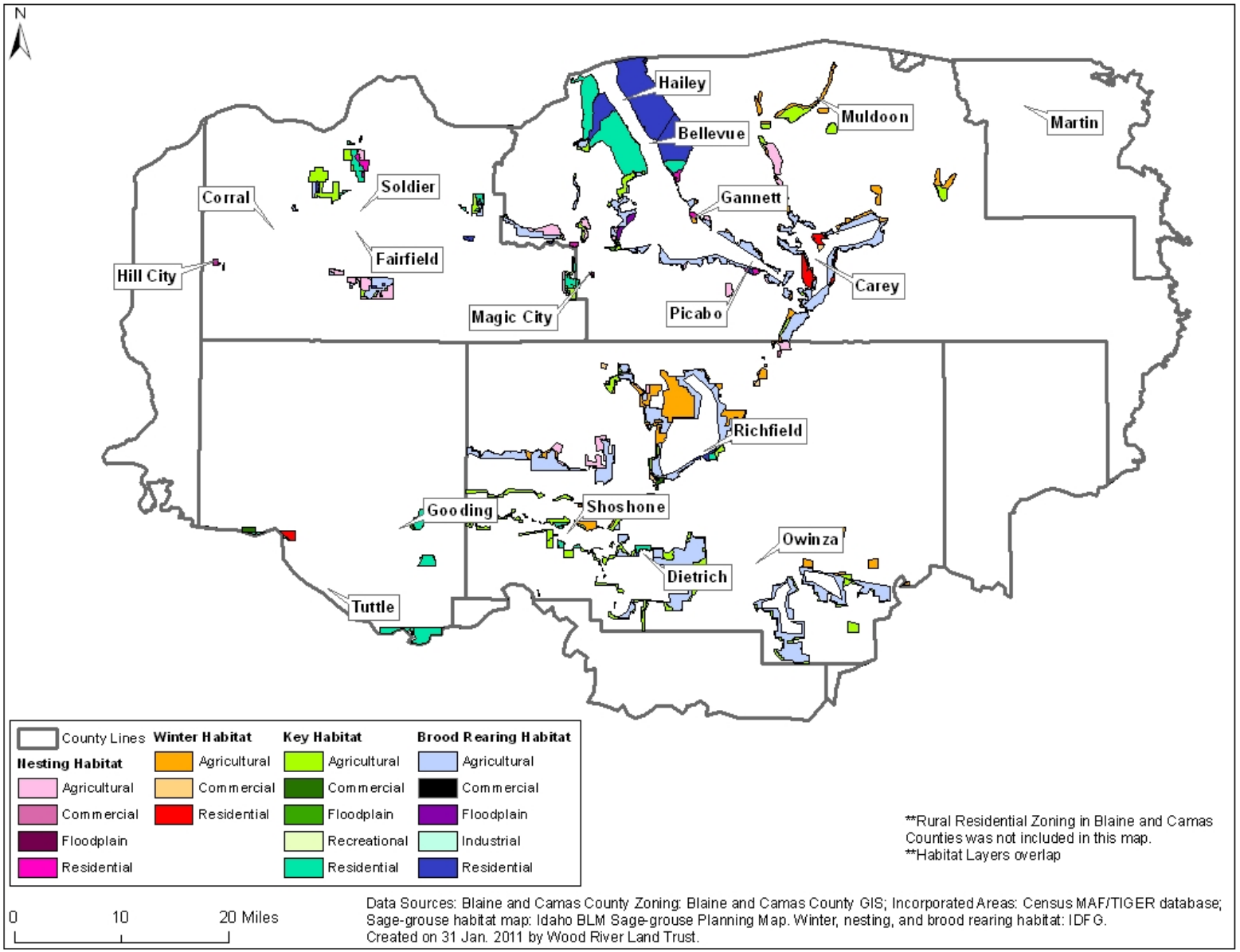

Figure 25. Areas of Overlap among County Zoning and Sage-Grouse Habitat

Habitat Type	Zoning Category	Acres
Key Habitat	Agricultural	29,065
	Commercial	830
	Floodplain	108
	Residential	9,864
Winter Habitat	Agricultural	26,479
	Commercial	890
	Residential	2,869
Nesting Habitat	Agricultural	11,344
	Commercial	101
	Floodplain	18
	Residential	1,818
Brood-Rearing Habitat	Agricultural	115,700
	Commercial	1,436
	Floodplain	872
	Industrial	12
	Residential	43,093
Table A: Acres of Overlap among Sage-Grouse Habitat and County Zoning		

Table 3. Zoning by Habitat Type within the NMVPA.

The Draft Amendments to the Shoshone Field Office Land Use Plans for Land Tenure Adjustment and Areas of Critical Environmental Concern Environmental Assessment identified approximately 45,000 acres of BLM lands for public disposal, under the Federal land Transaction Facilitation Act. Most of these parcels are located in areas where ownership consolidation and improvements to public access would be advantageous. The majority of these parcels are also in key sage-grouse habitat in the Pioneer Mountains and north of Fairfield. Disposal of these parcels may have negative effects to sage-grouse because residential or agricultural development could occur after privatization. There are several smaller parcels located in the south and southeast sections of the NMVPA that are 'potentially suitable for disposal, mostly through exchange' and are in perennial and annual grassland habitats. Within these parcels, there were 5 active leks and 7 with unknown status in 2010.

Comprehensive Plans for most cities and counties within the NMVPA recognize the importance of wildlife habitat and recommend that development have little impact on significant habitat. However, county staff may not have resources to evaluate sage-grouse habitat, and the NMV Local Working Group can provide input on the potential threats to sage-grouse that new development has using these or similar GIS analyses. For example, the largest tract of residential zoning that overlaps brood-rearing and key habitat lies on the east and west sides of the Big Wood River. Blaine County officials may be able to use this data to make informed decisions and help reduce the impact of development on sage-grouse habitat.

2.5.1 Urban / Rural Development Conservation Measures

The overall goal for conservation measures to address threats from urban/rural development is to eliminate, reduce, or minimize human-related disturbance to sage-grouse on important habitats.

Issue Addressed	Rationale	Conservation Measures
Residential and commercial development	Conversion of sage-grouse habitat to residential or commercial development can cause loss and/or fragmentation of habitat	Work with county and city governments and commission to: A. Encourage development to occur in areas with little to no impact on sage-grouse habitat B. Encourage cluster development in areas with little impact to sage-grouse habitat C. Encourage the use of conservation easements with NRCS (GRP, FRPP) or land conservation organizations D. Encourage use of NRCS stewardship programs to enhance wildlife habitat on agricultural lands (EQIP, WHIP, CSP) E. Encourage development to protect riparian areas, meadows, and water sources available to sage-grouse

		F. Provide comment letters to county planning and zoning regarding future development and protection of sage-grouse habitat
BLM Lands for Public Disposal	Lands for public disposal within key sage-grouse habitat could result in habitat loss and fragmentation	1. BLM should retain ownership of parcels in key sage-grouse habitat or exchange for parcels of equal habitat quality 2. BLM should give the highest priority to conservation buyers when disposing of parcels located in key sage-grouse habitat
County zoning	Current zoning and development standards may not take impacts to sage-grouse into consideration	1. Encourage cluster development in areas with little impact to sage-grouse habitat 2. Monitor development impacts to sage-grouse population size and location/use of leks 3. Encourage county wildlife overlay districts to include sage-grouse habitat.
Projects and maintenance activity near leks	Human disturbance can cause disruption of breeding or nesting sage-grouse	1. Encourage construction to occur during late summer/fall after nesting season 2. Construct fences in a manner that minimizes impact mortalities (such as permanent flagging)
Predation	Domestic animals increase sage-grouse mortality	1. Educate landowners about domestic animal predation on sage-grouse

Wildlife appreciation, viewing, and photography at leks	Inappropriate wildlife viewing or disturbance during viewing associated with viewing leks may impact sage-grouse breeding and nesting	1. Educate the public on proper lek viewing protocols, as determined by IDFG. Improve the dissemination of lek viewing information to a wider range of the public
Off-Highway Vehicle Disturbance	OHV activity can disturb sage-grouse, degrade habitat and soil condition, and increase fire risk	1. Restrict OHV use to designated roads and trails 2. Work collaboratively with local OHV user groups to increase awareness of impacts to sage-grouse 3. Confine construction of new roads to areas away from sage-grouse habitat and particularly leks 4. Work with land management agencies to consider sage grouse seasonal habitat use during travel planning processes. 5. Educate private landowners regarding potential effects of OHV travel on sage grouse.

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2.6

Wildfire / Annual Grasslands

The 2006 Idaho Sage-Grouse Conservation Plan ranks wildfire and annual grasslands as the first and third most significant threats to sage-grouse in Idaho. During its ranking process, the North Magic Valley Sage-Grouse Local Working Group (NMVSGLWG) elected to combine these two threats, as fire and annual grasslands are closely linked in sagebrush-steppe ecosystems. The NMVSGLWG considered the combined threat of fire and annual grasslands to be the highest ranked (most significant) threat to sage-grouse in the North Magic Valley Planning Area (NMVPA) because increased fire frequencies resulting from annual grass invasion can lead to permanent habitat loss for sage-grouse.

History of Fire in the NMVPA

Information on fire history specific to the NMVPA is limited, but numerous sources address fire history within Great Basin sagebrush ecosystems or on Idaho's Snake River Plain, and these are likely quite applicable to the NMVPA. Crawford et al. (2004) cite sources (Houston 1973, Burkhardt and Tisdale 1976, Miller and Rose 1999) which report pre-settlement mean fire return intervals (MFRI) of 12-25 years on productive mountain big sagebrush sites, or more than 200 years on more xeric mountain big sagebrush sites (Waichler et al. 2001). Post-settlement, areas that experienced increased dominance of woody species (particularly Juniper) experienced longer MFRIs, while areas that experienced increases in non-native annual weeds experienced shorter MFRIs and loss of native perennial shrubs, forbs and grasses (Crawford et al. 2004).

In the NMVPA, the second scenario (increased non native annual weeds and shorter MFRIs) is far more prevalent than the first. Whisenant (1990) reported that such changes resulted in a reduction of MFRI from 50-100 years pre-settlement to less than 10 years post-settlement on Idaho's Snake River Plain. Because sagebrush is unable to recover under such short MFRIs, the change in fire frequency can result in essentially permanent habitat loss for sage-grouse in the absence of restoration activities (seeding). The Bureau of Land Management's Twin Falls District Office fire database indicates that 41% (1,211,782.98 acres) of the NMVPA experienced wildfire between 1960 and 2010. Mean frequency of fire within that 50-year timeframe is 2.1 – suggesting that in the NMVPA, MFRI is less than 25 years, or one-half to one-quarter estimated historical MFRI on the Snake River Plain.

In addition to changes in MFRI, the NMVPA has likely experienced changes in fire size since pre-settlement times. In the NMVPA, average mean fire size for fires between 1960 and 1970 was 894.66 acres, while average mean fire size for fires between 2000 and 2010 was 3770.65 acres (Figure 1). Such large fire sizes, particularly combined with increased fire frequency, decreases the

likelihood of natural sagebrush re-establishment. The seed base within a frequently burned perimeter is likely scarce, and seed sources from outside a large fire would take a very long time to naturally reseed the interior portions of a burned area.

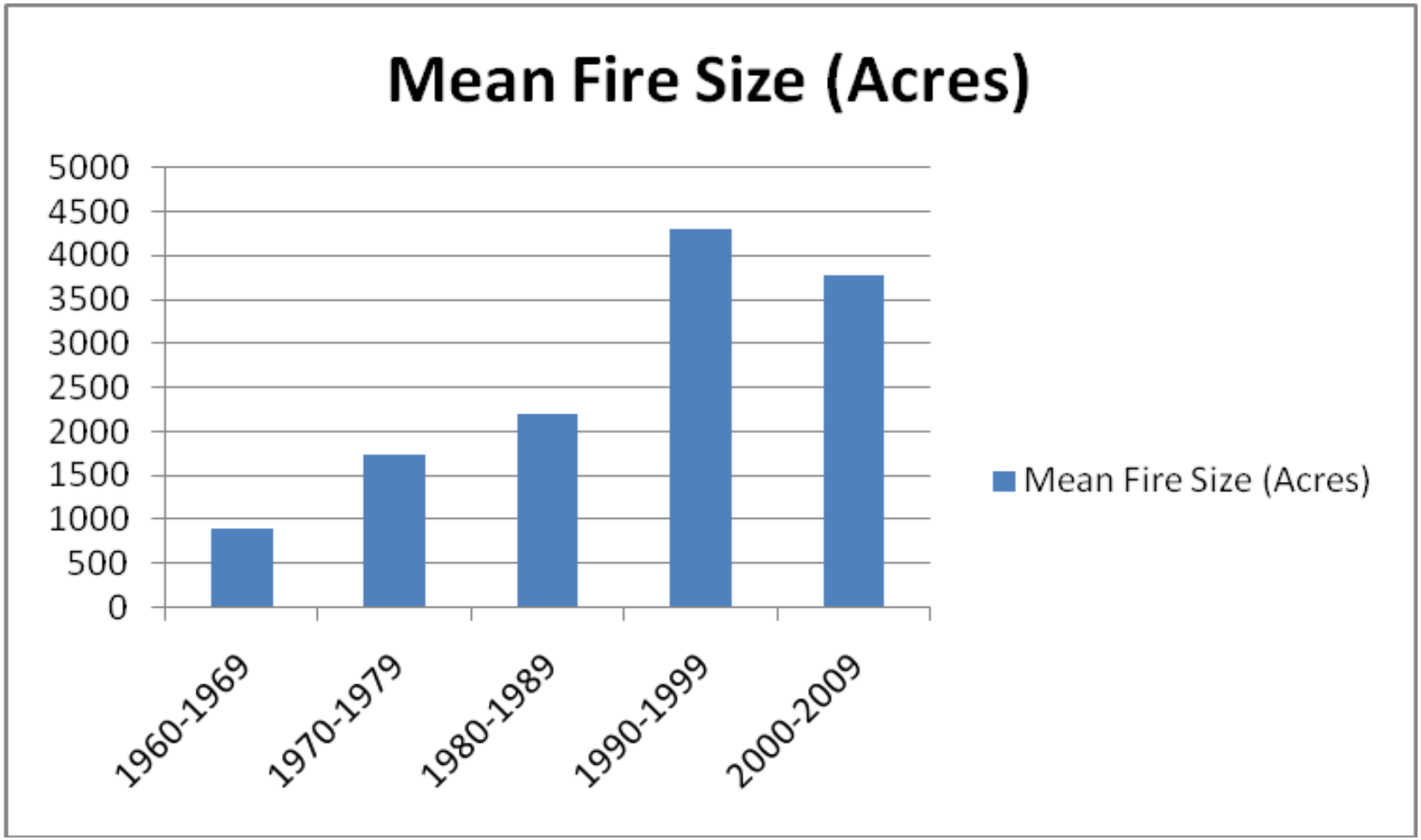

Figure 26. Mean fire size by decade in the NMVPA.

Changes in causes or frequency of fire ignitions may also affect size and/or frequency of fires in the NMVPA. However, there is no readily-available data on historic causes of fire ignitions in the NMVPA. Documenting current causes of fire ignitions may inform conservation measures, however, as some causes (such as lightening) are not controllable while others (such as human-caused ignitions) may be addressed. Causes of 8409 recorded fire starts in the NMVPA between 1970 and 2009 are listed in Table 1.

Ignition Source	Number of Starts	Percentage of Starts
Unknown	135	1.6
Natural/Lightening	3893	46.3
Human	740	8.8
Campfire	533	6.3
Smoking	202	2.4
Arson	316	3.8
Debris Burning/Fire Use	625	7.4
Railroads	312	3.7
Equipment Use	722	8.6
Miscellaneous	931	11.1

Table 4. Fire starts by ignition source type in the NMVPA, 1970-2009.

History of Annual Grasses in the NMVPA

Pellant (1990) reported that two primary events in the last century "significantly altered the vegetation composition and fire frequency in the Great Basin": overgrazing of native vegetation by domestic livestock and introduction of alien annual species. The most common of these annual species is cheatgrass. By 1949, cheatgrass was common on approximately 4 million acres of Idaho rangeland (Stewart and Hull 1949).

Cheatgrass matures earlier than many native species, and provides easily ignited fuels. This makes fire suppression on cheatgrass rangelands more difficult (Pellant 1990, Pellant 1996). Furthermore, cheatgrass establishes readily, particularly on disturbed sites. Because of this, species that are slower to establish (such as sagebrush species), are likely to be outcompeted by more rapidly established species, and may not resprout on a burned site.

In the NMVPA, the BLM currently classifies nearly 300,000 acres (10.1%) of the planning area as either annual grassland or nonnative annual. The NMVPA also exemplifies the close relationship between fire and nonnative annual grasses: of the 297,368 acres of cheatgrass, 140, 972 acres (47.4%) have burned two times or more in the last 50 years. Conversely, of the 1,211,782.98 NMVPA acres that have experienced fire in the last 50 years, 207,232.14 acres (17%) are classified as annual grass sites.

How Changes in Fire Regimes and Annual Grasses may affect Sage-Grouse

To understand the magnitude of potential effects of fire and annual grasslands on sage-grouse in the NMVPA, it is important to understand how the extent of these threats within different sage-grouse habitat types. Table 2 illustrates the prevalence of both fire and annual grasses within the NMVPA:

Habitat Description	Total Acres in NMVPA	Acres that have experienced fire since 1960	% of Habitat that has experienced fire since 1960	Acres that are classified as Annual grasslands	% of Habitat classified as Annual Grasslands
Key Habitat	1,118,043.94	282,559.58	25.27	5,651.11	0.51
R1	560,786.65	509,610.28	90.87	33,687.41	6.01
R2	266,994.00	218,091.78	81.68	214,858.53	80.47
Winter Habitat	1,120,357.45	507,971.77	45.34	74,307.59	6.63
Nesting Habitat	828,129.88	330,117.74	39.86	24,613.47	2.97
Brood Rearing Habitat	2,151,906.57	935,024.37	43.45	213,495.16	9.92

Table 5. Fire and Annual Grassland acreage by habitat type within the NMVPA.

As the statewide "Conservation Plan for the Greater Sage-Grouse in Idaho" points out, annual grasslands and wildfire pose several threats to sage-grouse. The simple spatial extent of annual grasses within the NMVPA poses threats to sage grouse by vastly reducing quality habitat, fragmenting existing areas of quality habitat, deterring re-establishment of native shrublands, and increasing the likelihood of frequent and extensive wildfires.

Connelly et al. (2000) recommend minimum sagebrush canopy cover of 15% - 25% and active fire suppression in all breeding habitats. As indicated in the table above, a significant proportion of the NMVPA is classified as annual grassland. Furthermore, annual grasslands in the NMVPA represent nearly 1/3 of all annual grasslands in the state. These acreages represent areas that could provide habitat to sage-grouse, and likely did prior to European settlement, but that currently exhibit insufficient diversity and structure to support sage-grouse during critical life stages.

2.6.1 Fire and Annual Grasses Issues and Conservation Measures

Issue Addressed	Rationale	Conservation Measures
Spatial extent of annual grasslands in the NMVPA; reduction of sage-grouse habitat	Annual grasslands do not provide suitable habitat to meet the seasonal habitat needs of greater sage-grouse	1.) Improve mapping of annual grasslands, and use that in conjunction with sage-grouse population and habitat maps to develop annual grassland restoration priority areas throughout the NMVPA. 2.) Work with landowners and land managers to restore sagebrush to interior portions of areas dominated by annual grasslands. 3.) Work with land managers to ensure that seed mixes used for rehabilitation include a mixture of native shrubs, forbs and grasses desirable to sage-grouse. 4.) Work with land managers and landowners to eradicate noxious weeds, and to ensure that seed mixes are weed-free. 5.) Monitor success of seedings and assist with multiple treatments, if necessary.
Altered fuels and fire regimes	Areas dominated by cheatgrass or medusahead have higher frequency of wildfire and minimal habitat value.	1.) Use fire breaks and/or greenstripping in areas dominated by annual grasses in order to slow the spread of fire, 2.) Work with land managers to prioritize areas for fire suppression, based on sage-grouse populations, sage-grouse habitat, and potential for sage-grouse habitat improvement. 3.) Support research into effective and sustainable methods of cheatgrass control

		and removal. 4.) In road or railroad rights-of-way areas convert existing exotic annuals to perennial grasses. 5) Seed (with perennial species) new road cuts or where road or railway right-of-way maintenance activities expose soil to potential exotic annual grass spread.
Human caused ignitions	Over half of wildfires in Idaho are caused by human-related sources.	1.) Improve educational efforts (including signing) to deter people from activities that may ignite wildfires. 2.) Work with land managers to close important and fire-prone areas to human use during periods of high fire danger. 3.) Develop more efficient and effective reporting systems for the public to report behavior likely to ignite a fire.
Restoration and burned area rehabilitation	Deliberate seeding of some areas is essential to ensure that needed habitat components are restored, or are restored in a relatively short time frame.	1.) Work with landowners and land management agencies to ensure that seed mixes are comprised largely of native seed and include mixes of forbs, grasses, and shrubs appropriate to specific sites. 2.) Pursue funding to rehabilitate important sage-grouse habitats on private land. 3.) Work with land management agencies and livestock producers to set standards that will ensure that rehabilitated areas are protected from grazing for a sufficient time to ensure growth and establishment of new plants. 4.) Work with landowners and land managers to develop monitoring protocols

		and re-treat areas where needed. 5.) Prohibit new water developments in burned areas that were previously classified as breeding or brood rearing habitat and that do not have a history of significant livestock grazing.
Fire suppression in and adjacent to sage-grouse habitats.	Large fires within remaining sage-grouse strongholds can cause long-term setbacks in efforts to bolster sage-grouse populations.	1.) Develop a map quantifying fire risk in relation to sage grouse populations, seasonal habitat, and potential habitat improvement projects. 2.) Work with land managers to employ fire suppression tools (such as fire breaks, green strips, and road improvement and development) that have minimal negative impacts on sage-grouse or other wildlife species. 3.) Require washing of fire vehicles to prevent spread of noxious weeds among areas. 4.) Planning for fire suppression should account for recent and predicted climate conditions. 5.) When large (>50,000 acre) fires occur within sage-grouse habitat, convene a meeting of the NMV LWG to discuss potential ramifications of the fire and develop recommendations for rehabilitation and other responses.
Drought	Drought conditions can promulgate the ignition and spread of wildfires	1.) Monitor drought conditions, and when counties declare official drought, convene a meeting of the NMV LWG to discuss potential ramifications and develop actions to minimize negative effects to

		sage-grouse.

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2.7 Livestock Management

Introduction

Livestock grazing is the most widespread and pervasive human use across the range of sage-grouse. Livestock have become a keystone species in sagebrush ecosystems, shaping the structure and composition of vegetation and thus affecting which species can persist including sage-grouse (Knick et al. 2011). The ecological effects of livestock grazing can be direct and obvious such as with the denudation of vegetation around water developments or diffuse and subtle such as with the reduction of forb diversity and removal of residual cover. The species of livestock also can affect sage-grouse habitat variously. In sagebrush habitat, cattle diets consist mostly of grasses and cattle tend to graze on flatter terrain while domestic sheep diets typically consist of a greater percentage of forbs and sheep tend to use steeper terrain than cattle. Structured grazing systems, fencing, and water developments have expanded the distribution of livestock across the landscape compared to historic patterns of season-long drift grazing. Because both management practices and livestock numbers affect how grazing alters habitat, we can't conclude that a decline in livestock numbers over the past century translates into decreased effects of livestock grazing. Because of increased management intensity, the area that is grazed has increased and, coupled with historic grazing that lowered range productivity; livestock are grazing over greater area on rangelands of reduced productivity (Knick et al. 2011). Livestock grazing is considered one of the principal threats to sage-grouse populations across their range (Connelly et al. 2011). Ron will find USFWS statement on livestock grazing and get it to Regan.

The history of livestock grazing in the North Magic Valley Local Working Group planning area ("planning area") is similar to the broader history of grazing across sage-grouse range: in the late 1800s, cattle were the dominant grazer; by the early 1900s domestic sheep came to dominate, and then cattle regained dominance by the mid 1900s. Today in the planning area, cattle AUMs (animal unit months) outnumber sheep about four-fold. Livestock graze much of the private lands and most of the public lands within the planning area. The largest landscape not grazed by livestock is the inaccessible lava flows within the Craters of the Moon National Monument and Preserve.

Livestock grazing on federally managed public lands occurs on 200 BLM and 25 Forest Service allotments that occur fully or partially within the planning area (refer to the Habitat Section of this document for more information and a map). In addition, approximately 134,201 acres of state land are grazed by livestock in the planning area. In many public land cattle allotments, sheep also trail through the allotments prior to annual cattle grazing. Over the past 20 years, the number of livestock grazing BLM lands in the planning area has fluctuated with greater numbers in the mid 1990s and fewer in recent years based on the number of AUMs billed each year (see Figure 1. About 80% of the livestock are cattle. During the past 20 years, cattle and sheep numbers grazing public lands were highest

in 1996. Cattle numbers were lowest in 1992 and sheep numbers were lowest in 2008. The total number of AUMs billed in 2009 (110,328) was about half the authorized AUMs in 2010 (204,624).

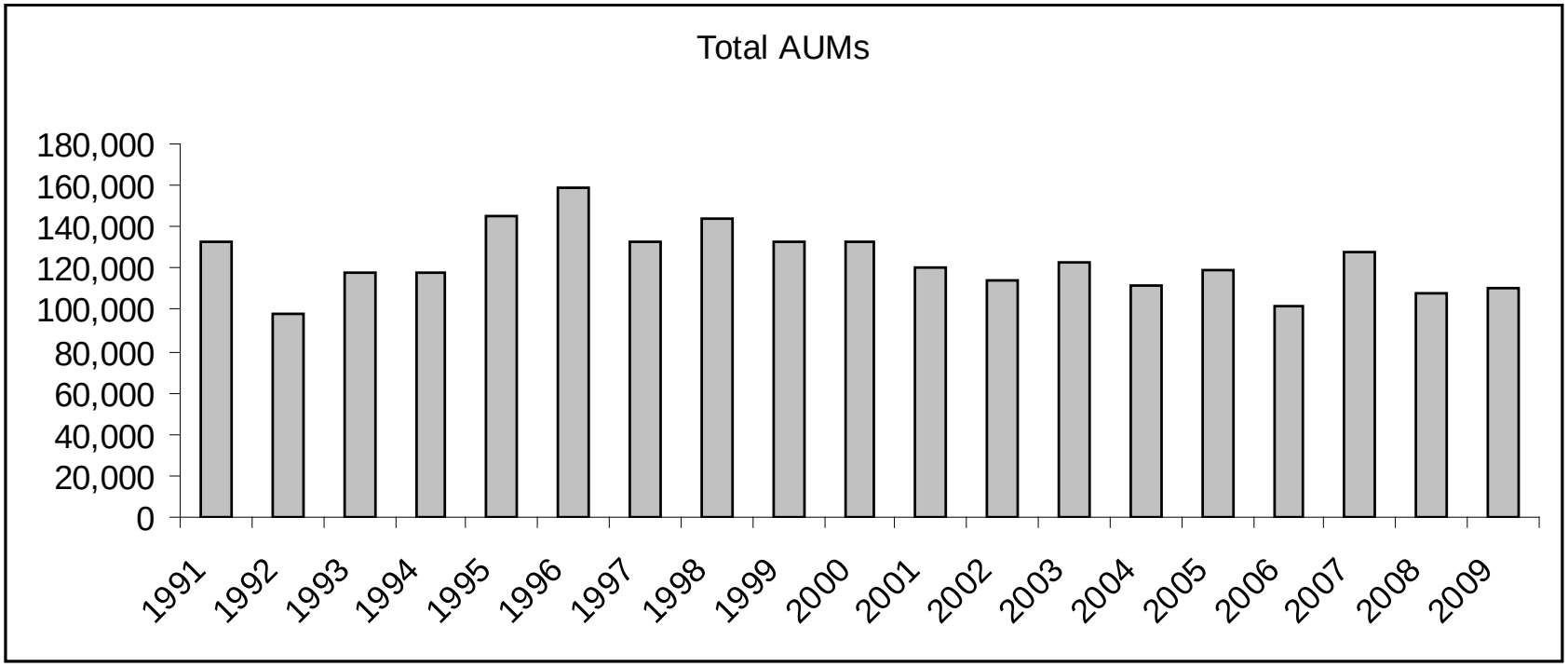

Figure 27. Total number of AUMs billed from 1991 through 2009. Cattle AUMs average about 82% of the total, sheep AUMs average 18%, and horse AUMs < 1%.

Public land managers periodically assess the habitat conditions within each grazing allotment relative to standard federal guidelines. Since 1997, the BLM in Idaho has conducted assessments on eight "Standards for Rangeland Health." For threatened and endangered plants and animals (Standard 8, which includes guidelines for sage-grouse habitat condition), some allotments within the planning area failed to meet these federal guidelines for various reasons in the most recent assessments. About a dozen allotments failed to meet standards with livestock grazing as a significant factor contributing to that failure (note that it is usually only a portion of an allotment that fails to meet habitat standards, not the entire allotment). Habitat that has been delineated as key sage-grouse habitat overlaps

many of these allotments not meeting standards both because of livestock and other factors. These areas of overlap between key sage-grouse habitat and allotments not meeting standards suggest areas to be considered as priorities for projects sponsored by the LWG. In addition, allotment management plans for livestock grazing on federal land are updated through the National Environmental Policy Act (NEPA) process approximately every ten years. These updates present opportunities for the public (including the LWG) to make specific recommendations about specific allotment management plans in relation to sage-grouse habitat.

Grazing Infrastructure

On public lands within the BLM Shoshone Field Office management area, currently there are > 1,400 miles of fences. Fences may pose a risk to sage grouse from collision, particularly in areas close to leks, winter concentration areas, or where narrowly fenced-off riparian areas occur in important late brood-rearing habitat (see Infrastructure Section). Opportunities exist to remove unneeded fence or to place visibility markers on fences to reduce the sage-grouse collision hazard.

The habitat bordering seeps, springs, and streams is an important resource to sage grouse, particularly during the late brood rearing period of late summer and early fall. Water developments for livestock grazing can alter the hydrology of this important habitat and thus reduce the availability of water and food for sage-grouse. Unfenced livestock water ponds may increase the risk of bacterial infection for sage-grouse that drink from water heavily polluted with livestock feces. Narrow fenced exclosures of springs or other water sources used for livestock water developments may impair the ability for sage-grouse to easily access water or forage associated with riparian areas and/or increase risk or mortality or injury from collision. In addition, new water developments may increase livestock use in areas previously receiving little utilization, potentially reducing nesting cover or resulting in localized rangeland habitat degradation. Within BLM allotments in the planning area, about 150 springs have been developed for livestock use. These springs produce > 3,600 gpm.

Grazing Management

The principal aspects of livestock grazing that managers can control are the timing and intensity of defoliation. Currently, grazing management relative to sage grouse primarily is aimed at reducing the impacts of livestock grazing rather than using grazing to improve habitat (although there may be some opportunities for this, e.g. see Crawford et al. [2004]). For example, Halloran et al. (2005) report that annual grazing in sage grouse nesting habitat has a negative impact on the following year's nesting success. Beck and Mitchell (2000) recommend the removal of livestock from nesting areas to maintain residual growth of grasses which provides security cover. Other recommendations for grazing sage-grouse habitat include shifting grazing to the period after principal tall bunchgrass seed ripens (mid summer to fall), grazing at light to moderate levels of utilization (typically ≤ 40% utilization of principal bunchgrasses [Holechek et al. 2001]), grazing so as to retainlevels of residual growth suggested by Connelly into the following spring

for nesting security cover, and providing periods of annual rest to allow recovery of native plant vigor (Beck and Mitchell 2000, Crawford et al. 2004, Knick et al. 2011, and many references cited within these references and elsewhere).

Four principal habitat conditions prevail within the planning area. These conditions and recommended management objectives aimed at maintaining or improving rangeland health are listed below:

1. native rangeland in good condition with the objective to protect and maintain vigorous native plant composition
2. native rangeland with sparse/reduced herbaceous understory with the objective to improve the vigor of the native herb layer and protect from non-native invasive plants such as cheatgrass
3. artificially restored rangeland (perennial grasslands) using a mix of native and non-native grasses and forbs with the objective to improve sagebrush cover and increase the composition of native herbs
4. annual grass-dominated rangeland with usually cheatgrass as the principal herb along with other non-natives, sometimes with a sagebrush overstory with the objective to increase the composition of natives or other fire-resistant non-natives

In those situations where the management objective is to improve existing habitat conditions as noted above, there may be possibilities for actively managing livestock grazing as part of the restoration effort. Fall grazing can favor forb production in brood-rearing habitat and light grazing in riparian habitat can stimulate forb growth and reduce the height of vegetation making forbs more accessible (Crawford et al. 2004 and citations within). Selective grazing might be used to control invasive weeds. In habitat dominated by annual grasses, there is the possibility to use livestock grazing to reduce fine fuels and hence reduce the risk of catastrophic fires that then consume adjacent high quality habitat.

2.7.1 Livestock Management Conservation Measures

Conservation issues pertinent to management of livestock grazing in sage-grouse habitat have been more thoroughly described in the Idaho's conservation plan for sage-grouse (Idaho Sage-grouse Advisory Committee 2006). These issues include:

- Rangeland health
- Herbaceous plant cover
- Leks
- Late brood-rearing habitat
- Livestock management during drought
- Salt & mineral supplement placement
- Placement of fences and other structures relative to leks, etc. (removal of fences wherever possible)
- Water developments
- Habitat rehabilitation and restoration efforts

Goal:

The overall goal for the livestock management threat and conservation strategies is to manage grazing to maintain soil conditions and ecological processes necessary to protect and maintain properly functioning sagebrush communities that meet the long-term needs of sage-grouse and other sagebrush associated species.

Issue Addressed	Rationale	Conservation Measures
Livestock management and rangeland health.	Some livestock management practices impair rangeland health.	1. Use established scientifically-based agency protocols and procedures for evaluating rangeland health and sage-grouse habitats. 2. Establish specific habitat objectives and implement effective grazing management practices and/or vegetative manipulation to achieve those objectives, and maintain or improve vegetation conditions or trends. 3. Provide private landowners with incentives to achieve sage-grouse objectives.
Livestock management and herbaceous plant canopy cover	In some cases, livestock grazing may reduce the availability of suitable nesting or early brood-rearing habitat.	1. If fine-scale habitat assessments or monitoring indicates that current livestock grazing practices are limiting sage-grouse nesting habitat quality and/or quantity, and/or reproductive success by limiting herbaceous understory characteristics - design and implement grazing management systems that maintain or enhance herbaceous understory cover, height, and species diversity that occurs during the spring nesting season. Grazing systems must be consistent with ecological site characteristics and potential. The primary objective is to provide desirable perennial grass and perennial forb cover during the spring nesting season (approximately April 1-June 15 in much of Idaho). Design management programs to minimize grazing effects on the cover and height of primary forage species in occupied habitat during the nesting season. The following is a list of management actions or strategies that should be employed singly or in combination in the development and implementation of grazing management programs:

		A. Establish stocking rates or rest in breeding habitat areas to ensure adequate nesting cover (consistent with recommendations in Connelly et al. 2000). B. If the area is lacking or deficient in herbaceous cover, reduce livestock utilization, immediately prior to and during, the nesting season. C. Employ grazing management systems that ensure adequate nesting habitat within the breeding landscape. D. When use pattern mapping or monitoring shows opportunity to adjust grazing use distribution to benefit occupied sage-grouse breeding habitat, include as appropriate herding, salting and water source management (e.g., turning troughs/pipelines on/off, extending pipelines/moving troughs) in grazing management programs. E. When available and feasible, utilize exotic perennial grass seedings and/or annual grasslands for livestock grazing to avoid breeding season use of occupied sage-grouse habitat. F. When alternative forage is available and/or other incentives can facilitate changes, delay spring turnout to reduce grazing use of occupied breeding habitat. G. Use NRCS incentive programs as related to private lands and sage-grouse/sagebrush habitats. Current programs that may provide some opportunities for economic offset of certain conservation measures include the CSP, WHIP, and EQIP programs. Landowners are encouraged to discuss the various opportunities available with their local NRCS district conservationist. H. Develop strategically located forage reserves (seedings) to shift early season livestock-use. (Note: the establishment of such forage reserves may be particularly relevant in areas that have minimal or no potential for sage-

		grouse habitat restoration.) Reduce or eliminate spring grazing in sage-grouse breeding habitat. I. Permanently exclude livestock from certain important sage-grouse nesting areas through fencing or other means (i.e., to protect native ranges within exotic seedings). J. Maintain residual herbaceous vegetation at the end of the grazing season to contribute to nesting and brood-rearing habitat during the coming nesting season.
Livestock management and leks.	Bedding of sheep bands on or near leks can disturb breeding grouse and interfere with lek/population monitoring.	1. Use lek route or other relevant information to identify leks where the placement of sheep camps, bed grounds, herding or related activities is repeatedly disturbing displaying birds on active leks. Dates of concern are from March 15 through May 1 in lower elevation habitats and March 25 through May 15 in higher elevation habitats. Once such leks are identified, land management agencies should work closely with sheep ranchers, LWGs and the IDFG to identify mutually agreed upon alternative sites or herding routes that eliminate or reduce disturbance. In selecting such alternative sites/routes, focus on areas away from leks and that do not provide breeding habitat characteristics. If such lek-specific conservation measures cannot be developed (due to time or logistical constraints), domestic sheep grazing activities described above will be avoided within the lesser of 0.5 mile or direct line of sight of any such lek during the lekking periods. 2. Ensure that sheep operators and herders are aware of the location of occupied leks. Show operators/herders these locations in the field, provide maps, or mark the perimeter of occupied leks, etc. as appropriate).
Livestock management and late brood-rearing habitat.	Livestock grazing may reduce the availability of suitable late brood-rearing habitat.	1. Due to the preference of forbs by domestic sheep, manage sheep allotments using grazing management techniques that promote and maintain a diversity of desirable annual and perennial forbs. Suggestions include:

		A. Alternate or rotate areas for spring turnout. B. Promote light, once-over use of vegetation, as opposed to repeated use during the same season by the same band or successive bands of sheep. C. Ensure that permittees, foremen, herders and sheep camp tenders are informed of management and movement requirements, such as avoidance of recent burns, burned area rehabilitation seedings or other restoration sites. D. Employ open (loose) herding of sheep as opposed to tightly bunched sheep. 2. Manage grazing of riparian areas, meadows, springs, and seeps in a manner that promotes vegetation structure and composition appropriate to the site. In some cases enclosure fencing may be a viable option. However, in some cases, (e.g., enclosed meadows); the availability and quality of herbaceous species may be improved by periodic grazing use of enclosure and should be considered in the grazing management program. 3. In agricultural fields where sage-grouse use has been documented or is likely, willing landowners may wish to avoid or limit use of alfalfa by livestock after the last cutting, to provide residual alfalfa for use by sage-grouse broods.
Livestock management during periods of drought	Drought conditions can intensify the effects of livestock grazing on upland and riparian vegetation.	1. If a county within the planning area has an official "disaster" declared due to drought, the LWG would convene a meeting to determine if the following recommendation should be given to public grazing managers: In sage-grouse nesting and brood-rearing habitats, adjust livestock use (season, utilization, stocking, intensity, and/or duration) during drought to minimize the additional stress placed on herbaceous species. This is anticipated to reduce impacts on perennial herbaceous cover, plant species diversity, and plant vigor. (these activities may need to be continued in the year following drought as well) 2. Foster the coordination of drought management activities and

		outreach through the Idaho Rangeland Drought Subcommittee.
Placement of salt and mineral supplements.	The placement of salt and mineral supplements can affect sage-grouse habitat quality.	3. When using salt or mineral supplements: a) place them in existing disturbed sites, areas with reduced sagebrush cover, seedings, or cheatgrass sites (for example) to reduce impacts to sage-grouse breeding habitat, b) place them away from water or mesic areas to reduce impacts to brood-rearing habitat, and c) use salts or mineral supplements to improve management of livestock for the benefit of sage-grouse habitat.
Placement of fences and other structures.	The placement of fences or other structures near important seasonal habitats can increase the risk of collision mortalities or may facilitate predation by eagles, hawks and ravens.	1. Biologists, in cooperation with LWGs and willing landowners, are encouraged to use existing knowledge, allotment/pasture maps and lek distribution maps, to determine which fences may pose the greatest risk for collision mortality. Removal of unnecessary fencing that pose risks should be required. 2. If sage-grouse mortality due to collision with fences is documented, or if collisions are likely to occur due to new fence placement, implement appropriate actions to mitigate impact. Such actions might include marking key sections of fences with permanent flagging or other suitable means. Field personnel and landowners should use their best judgment in determining where fence marking is required to lessen the impacts to sage-grouse. 3. Placement of new fences and structures should include consideration of their impact on sage-grouse. New fences should not be constructed within 1 km (0.6 mi) of occupied leks (adopted from Connelly et al. 2000b). Place new, taller structures such as corrals, loading facilities, water storage tanks, windmills etc. at least 1km from occupied leks to reduce opportunities for perching raptors. Careful consideration, based on local conditions, should also be given to the placement of new fences or structures near other important seasonal habitats (winter-use areas, movement corridors etc.) in order to reduce potential impacts. (consider alternatives to fencing)
Design and placement of	Water developments can: result	1. New spring developments in sage-grouse habitat should be

water developments.	in mortality of sage-grouse due to drowning; affect the flow of springs/wet meadows; foster the spread of invasive plants; or encourages grazing or disturbance of previously unused or lightly used breeding or early brood habitat.	designed to maintain or enhance the free-flowing characteristics of springs and wet meadows by the use of float valves on troughs or designs that take only excess water. Retrofit existing water developments during normal maintenance activities. 2. Ensure that new and existing livestock troughs and open water storage tanks are fitted with ramps to facilitate the use of and escape from troughs by sage-grouse and other wildlife. Do not use floating boards or similar objects, as these are too unstable and are ineffective. See Wildlife Watering and Escape Ramps on Livestock Water Developments (Sherrets 1989) for suggestions for ramp designs. 3. When placing new water developments in sage-grouse breeding habitat, choose sites and designs that will provide the greatest enhancement for sage-grouse and sage-grouse habitat. Consider development of associated sage-grouse "watering facilities" when creating new water developments (particularly from wells), i.e. creation of small wet areas from overflow pipes or storage tanks that are protected from livestock but easily accessed by sage-grouse. 4. Prohibit placing water developments into existing breeding/early brood rearing habitats that have not had significant prior grazing use.
Management of livestock during rehabilitation and restoration efforts.	The practicality of extensive rangeland rehabilitation and restoration efforts is dependent upon adequate plant establishment time (rest) before grazing resumes	1. Identify and establish strategically located forage reserves focusing on areas unsuitable for sage-grouse habitat restoration, or lower priority habitat restoration areas. These reserves (such as seedings) would serve to provide livestock operators with temporary alternative forage opportunities during the resting of recently seeded restoration or fire rehabilitation areas and could serve as additional fuel breaks depending on location and configuration. 2. Identify and utilize economic incentive programs to assist

		private landowners in implementation of appropriate sage-grouse habitat conservation actions on private lands.
Drought	Drought conditions can promulgate the ignition and spread of wildfires	1. Monitor drought conditions, and when counties declare official drought, convene a meeting of the NMV LWG to discuss potential ramifications and develop actions to minimize negative effects to sage-grouse.

Research, monitoring or evaluation needs:

Research is needed to better understand the impacts of livestock management (systems and individual practices) on sage-grouse populations, and habitat. Monitoring and evaluation is also necessary to better identify and determine the impacts of current grazing management practices on sage-grouse populations, and habitat. Monitoring of herbaceous cover (height) during the nesting season (April 1 – June 15) within in mapped nesting habitat is needed to determine if grazing practices are limiting nesting cover. Document the extent of sage sage-grouse collision with fences and conduct effectiveness monitoring of flagged or tagged fences. Research whether or not sage-grouse "watering facilities" developed in association with livestock water developments has benefits for sage-grouse, particularly in areas lacking available water or mesic habitat during the late brood-rearing period.

Identify and map existing high-quality sagebrush steppe habitat by allotment and pasture regardless of whether sage-grouse are currently using that habitat. Also map out areas within pastures that are known to be highly utilized by sage-grouse.

Identify and map areas by allotment and pasture where livestock grazing would have little impact on sage-grouse or sagebrush steppe habitat as areas for potential forage reserves or drought mitigation areas

There is a need for finer scale maps of rangeland condition; areas within the NMV LWG planning area should be prioritized by pastures and allotments.

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2.8 Infrastructure

Infrastructure Threat Summary

For this plan, infrastructure relates to human-made features on the landscape that provide or facilitate transportation, energy, and communication activities.

The sage-grouse habitat within the NMV LWG planning area is affected by roads, power lines, and other networks and land uses (Table 1; Figure 1) necessary to maintain human populations. In the NMVPA, both linear and non-linear infrastructure features occupy space on the landscape, and their presence has the potential to disrupt survival or sage-grouse habitat use. Additionally, associated access roads, ground disturbance, and increased human presence and activity may be of concern.

Infrastructure development, while essential for society, can nonetheless effectively result in irretrievable loss or fragmentation of sage-grouse habitat, foster the spread of invasive plants, facilitate predation, increase risk of mortality, increase human-disturbance or access, and/or influence the behavior of sage-grouse. The significance of these threats is difficult to quantify and is likely to depend on site-specific influences. The "2006 Conservation Plan for the Greater Sage-grouse in Idaho" (2006 State Plan) outlines six types of infrastructure features that currently or could potentially affect sage-grouse and sage-grouse habitat in Idaho: utility lines, roads, active railroads, and oil and gas pipelines (grouped in the State Plan as "Linear Features"); wireless communication towers and wind energy facilities (grouped in the State Plan as "Nonlinear Features"). Where linear infrastructure features have been quantified below, the term "buffer" refers to the area *potentially influenced* by the presence of the features on the landscape. Below is a brief summary of the research with respect to each type of threat as well as the potential magnitude of each infrastructure threat. It should also be noted that other types of both linear and nonlinear features, such as geothermal facilities, oil and gas drilling platforms, and solar energy "farms" are not currently prevalent in Idaho but may also pose threats to sage-grouse or their habitat in the future, and must be considered.

Naugle et al. (2009) state the need to shift conservation efforts for sage-grouse from a local to a landscape scale, and the necessity of planning tools that allow the best remaining habitat to be overlaid with the extent of both current and anticipated development. Thus, current research and spatial tools related to the potential impacts from route density, the distance of infrastructure features to sage-grouse leks, and an inclusive human footprint metric were also consulted and considered for the planning area; they are discussed below.

Infrastructure feature	Buffer Size	Total length (miles)	Total area (acres)	Percentage of planning area covered by the buffer
Existing Transmission Line (> 138 kv)	5km	464	1,192,730	36%
Add MSTI		42	168,341	5%
Add Gateway		82	287,038	9%
Major roads	10km	410	1,973,803	60%
Railroads	3km	213	459,544	14%
Oil/Gas Pipelines	1km	121	107,795	4%
Combined Linear Features			**2,097,475**	**~63%**

Table 6. NMV LWG Linear Infrastructure Analysis.

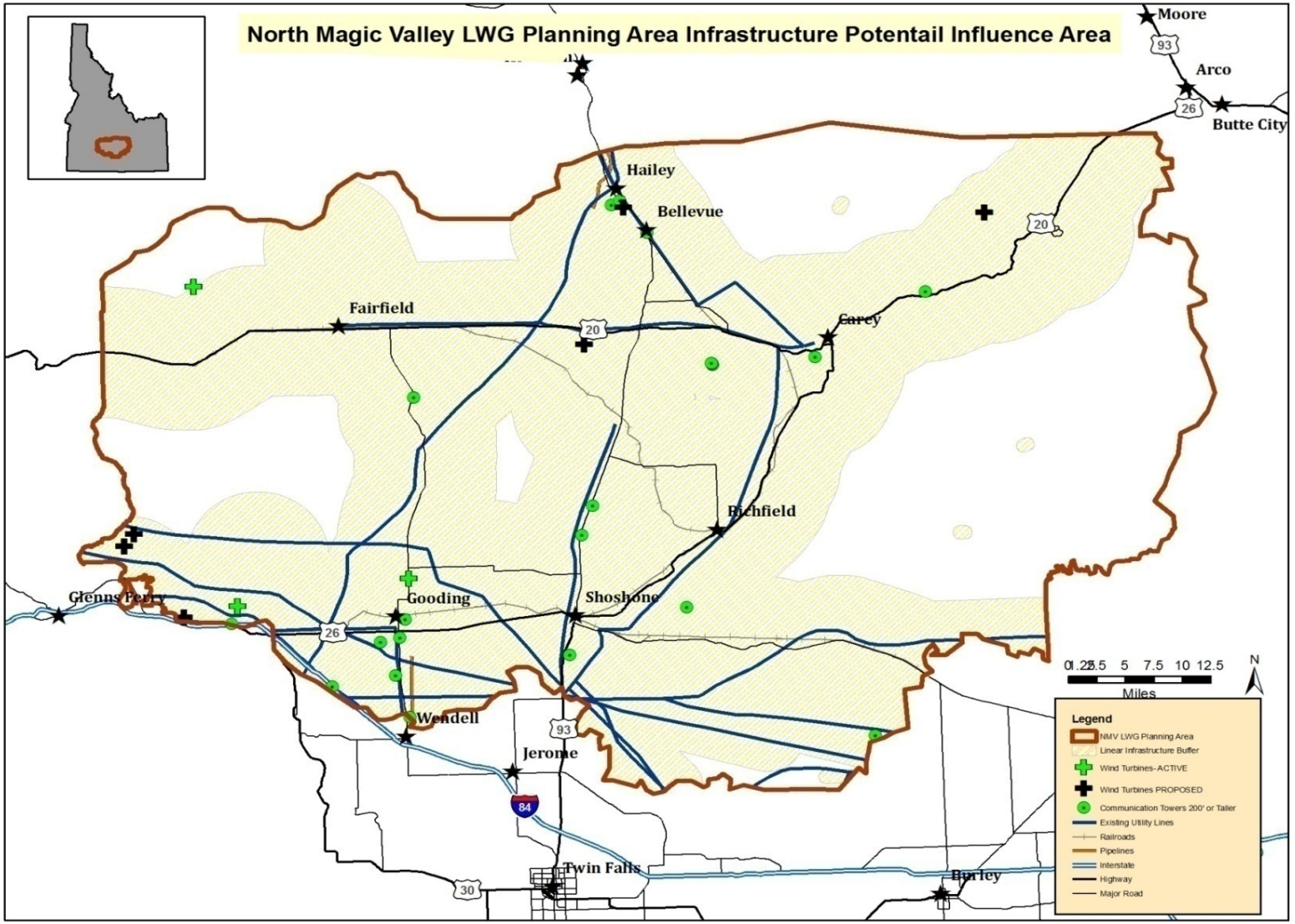

Figure 28. NMV LWG Planning Area Potential Infrastructure Influence Area; the total area covered by the buffered existing infrastructure and potentially impacting sage-grouse is approximately 47% of the planning area.

2.8.1 Linear and Non-linear Features

Utility Lines

Structures associated with utility corridors provide perches and nesting substrates for raptors and ravens (Knight and Kawashima 1993, Steenhof et al. 1993). Such structures may result in an increased concentration of raptors and ravens along utility corridors, which may pose a threat to sage-grouse by increasing their risk to avian predation in some areas. Because of these threats, sage-grouse may also avoid utility lines and other tall structures. Connelly et al. (2004) recommended applying a 5 km buffer on each side of major power transmission lines to account for potential influences of avian predation.

There are currently 464 miles of existing utility lines >138 kV in the NMV planning area. Applying a 5 km buffer applied to either side of the utility lines yields an area of potential influence of approximately 1,192,730 acres, or 40% of the planning area (Figure 1).

There are at least two additional large-scale utility lines proposed that would cross the NMVPA (Gateway West and Mountain States Transmission Intertie). The preferred centerline alternative for both lines would add an additional 124 miles of 500 kV utility line within the planning area (Figure 2). Applying a 5 km buffer to the two proposed lines and merging them with the buffer around the existing lines increases the total potential area of influence from utility lines to approximately 2,097,475 acres, or about 63% of the total planning area.

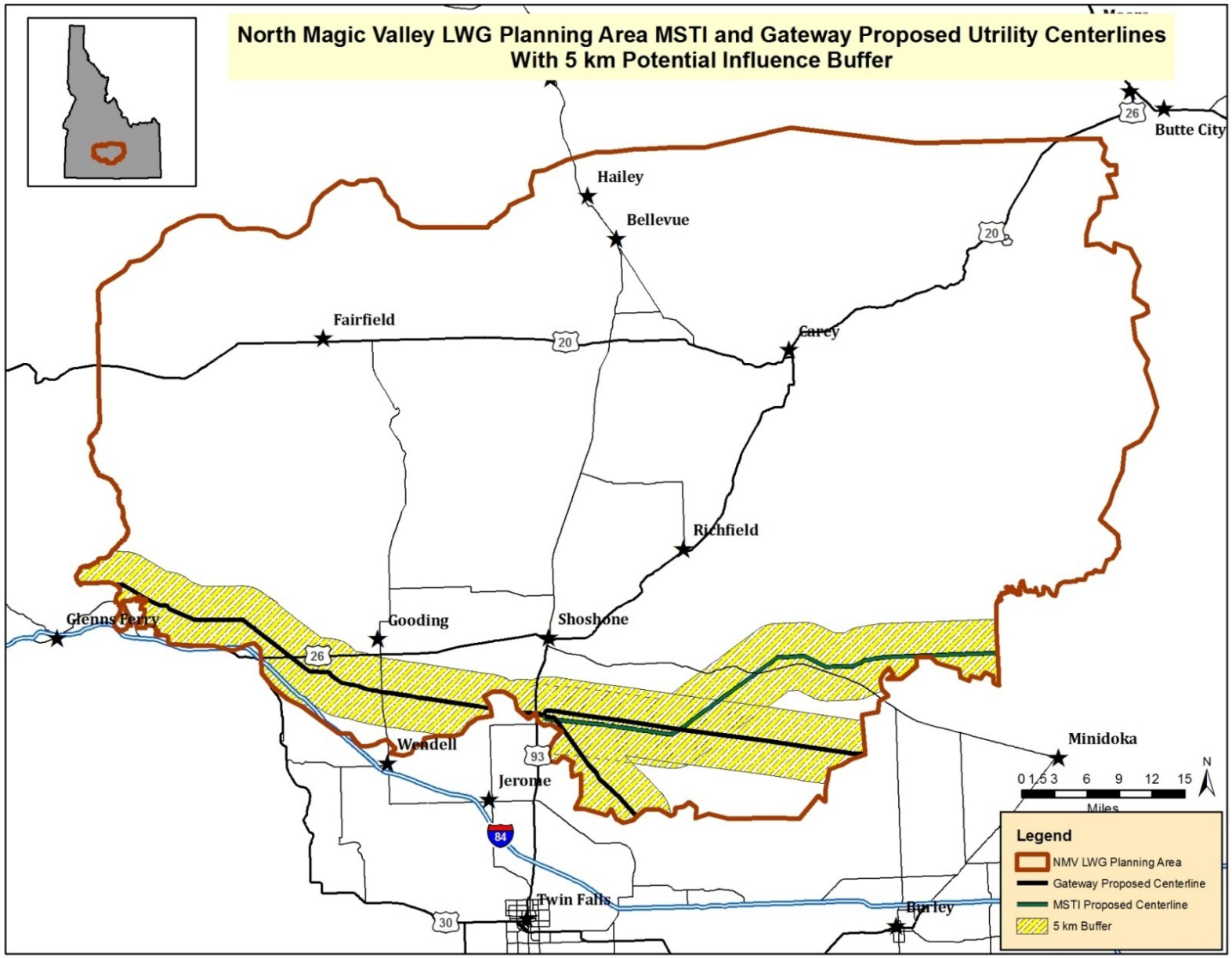

Figure 29. NMV LWG Planning Area with Mountain States Transmission Intertie and Gateway West 5kv Proposed Centerlines and associated 5 km Buffer; the area covered by the buffer is approximately 455,379 acres.

Roads

Roads are associated with many factors that may negatively affect sage-grouse, including (but not limited to): increased human activity, spread of invasive plant species, direct mortality from vehicle collisions, increased prevalence of human-caused fires, and landscape fragmentation. Roads can also facilitate some activities that may be beneficial to sage-grouse, including fire suppression and access for habitat and population monitoring. The degree of impact a road may have is dependent on sage-grouse use of the areas adjacent to the road, the level of human use on the road, and the presence or absence of other structures (such as fences and power lines) often associated with roadways. Connelly et al. (2004) recommended using a 10 km buffer along each side of all major paved roads to account for an influence from predation and noise disturbance.

There are few guidelines to account for disturbance along secondary roads, which also pose threats to sage-grouse (spread of invasive plants, increased human disturbance, vehicle collisions). However, Gelbard and Harrison (2003) found a significant increase in percent native grass cover at a distance of >1000m from a road when compared with distances $\leq$ 100m from a road. Human activity along secondary roads can be quantified, and may assist with developing buffers to account for human disturbance near road corridors. With limited data, Johnson et. al. (2009) found a declining trend for counts on leks within 5 km of an interstate highway, while trends on leks adjacent to other federal or state highways were more independent of distance to roadways.

Within the NMV LWG planning area, there are 410 miles of major highways (State, U.S., and/or Interstate Highways). Applying the recommended 10 km buffer yields an area of approximately 1,973,803 acres, or 67% of the planning area, that may be influenced by major paved roadways.

Active Railroads

Two primary threats are posed by active railways: the spread of invasive plants and wildfire ignition. The State Plan cites that from 1980-2003, railroads accounted for 10-14% of wildfire ignitions in the NMVPA. Because of this, impacts of active railways can extend far beyond the railway corridor itself. There are 113 miles of railroads within the NMVPA. With a 3 km buffer applied, the area of potential influence is approximately 459,544 acres or 14% of the planning area. However, many of stretches of railroad are currently inactive, resulting in a smaller area of influence. Active versus inactive railroads need to be better mapped, so that the NMV LWG can better understand their potential influence in the planning area.

Oil and Gas Pipelines

The corridors created by oil and gas pipelines may foster the spread of invasive plants, fragment habitat, and increase human disturbance because of activities associated with pipeline construction and maintenance. Recently, Holloran et al. (2010) found that yearling males avoided leks near the infrastructure of natural gas fields, and females avoided nesting within 950 m of the same infrastructure. Although natural-gas fields have not been developed extensively in the planning area, research on natural gas

infrastructure may provide some insights into how sage-grouse could to wind energy developments. There are 121 miles of oil/ gas pipeline documented in the planning area. With a 1 km buffer applied, this amounts to 107,795 acres or 4% of the area.

Wireless Communication Towers

Wireless communication towers create unnatural vertical structures on the landscape that provide perch or nest sites for raptors or ravens. Furthermore, construction of these towers involves increased human activity at local sites. Recent research (Johnson et. al. 2009) has shown that lek male counts generally trend downward with distance to nearest towers.

Wind Energy Facilities

Because recent national energy policies have encouraged development of renewable energy resources, wind energy facilities represent one of the fastest-growing types of energy development within Idaho. As of the completion of the State Plan, there were no operating wind turbines within SGPAs. Since then, wind turbines have been erected on the eastern edge of the Mountain Home SGPA, and there are proposals in several SGPAs adjacent to the NMVPA. There are currently no wind turbines proposed for the NMVPA.

The effects of wind energy development on sage-grouse are largely undocumented. However, there have been numerous studies examining the effects of wind turbines on other birds and wildlife species (Drewitt and Langston 2006, Cohn 2008, Kunz et al. 2007). Potential impacts include: increased human disturbance during construction and maintenance of wind energy facilities, establishment of unnatural tall structures that may serve as perching or nesting sites for ravens or raptors, habitat reduction, alteration, or fragmentation, direct mortality from blade strikes, and introduction of exotic plants. Furthermore, creation of wind energy facilities may also involve construction of new roads, fences, power lines or other structures that may adversely affect sage-grouse.

Linear Feature Density

Studies have suggested that route densities exceeding 2mi/mi^2 begin to impede animal movements (Wisdom et al. 2000). For the NMV LWG planning area, the cumulative density of all roadways, canals, and railroads indicates that approximately 771,921 (~26%) acres within the planning area have linear infrastructure density greater than 2mi/ mi^2 (Figure 3). For the purposes of this analysis, it was assumed that the physical footprint of roadways is independent of level of use. There are approximately 395,733 acres of classified sage-grouse habitat within the area where linear feature density exceeds 2mi/mi^2.

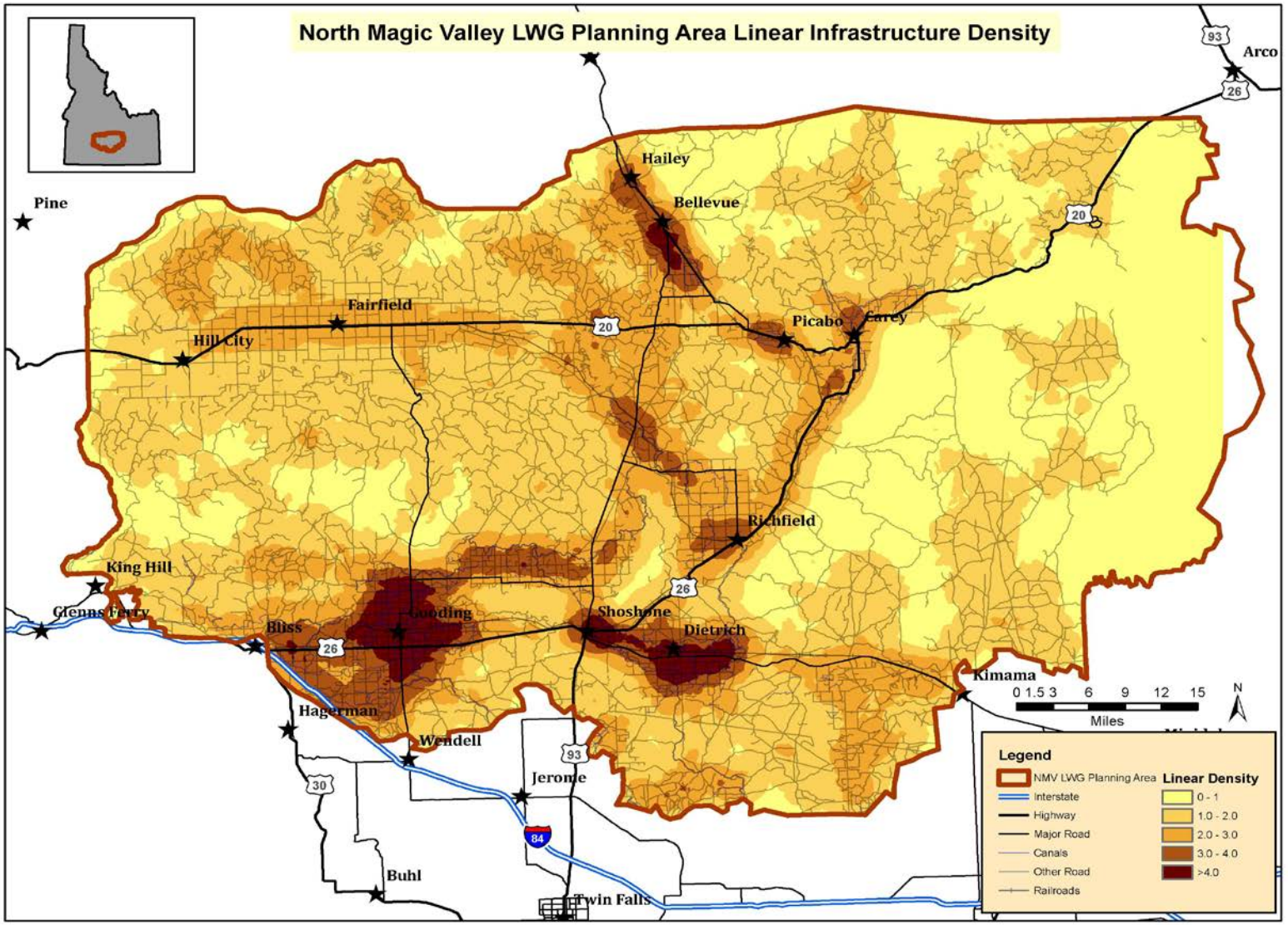

Figure 30. NMV LWG Planning Area Linear Infrastructure Density; there are approximately 395,733 acres of classified sage-grouse habitat with linear density > 2 mi/ mi^2.

2.8.2 **Distance to Sage-grouses leks**

Braun (2006) recommends no new road construction, no surface occupancy, and seasonal closures on roadways within 5.5 km of active leks. Lyon and Anderson (2003) investigated both nest success and movement of female sage-grouse within 3 km of disturbed leks. Disturbance was based on the presence of oil and gas development, and their results suggest that vehicular disturbance during the breeding season may reduce nest initiation rates and increase the distance females move from leks to a selected nest site. Based on a thorough literature search, the (Thompson et al. 2005) recommended that seasonal closures be implemented on travel routes within 3 miles of sage-grouse leks to preserve breeding functions.

For the NMVPA, active leks were buffered by 5.5 km, and the mileage of existing roadway that traverse the buffer was calculated (Figure 4). Approximately 569,855 acres of classified sage-grouse habitat within the planning area fall into a 5.5 km buffer placed around the 2009 active sage-grouse leks. Within this sage-grouse classified acreage, there are 1,243 miles of both primary and secondary roads.

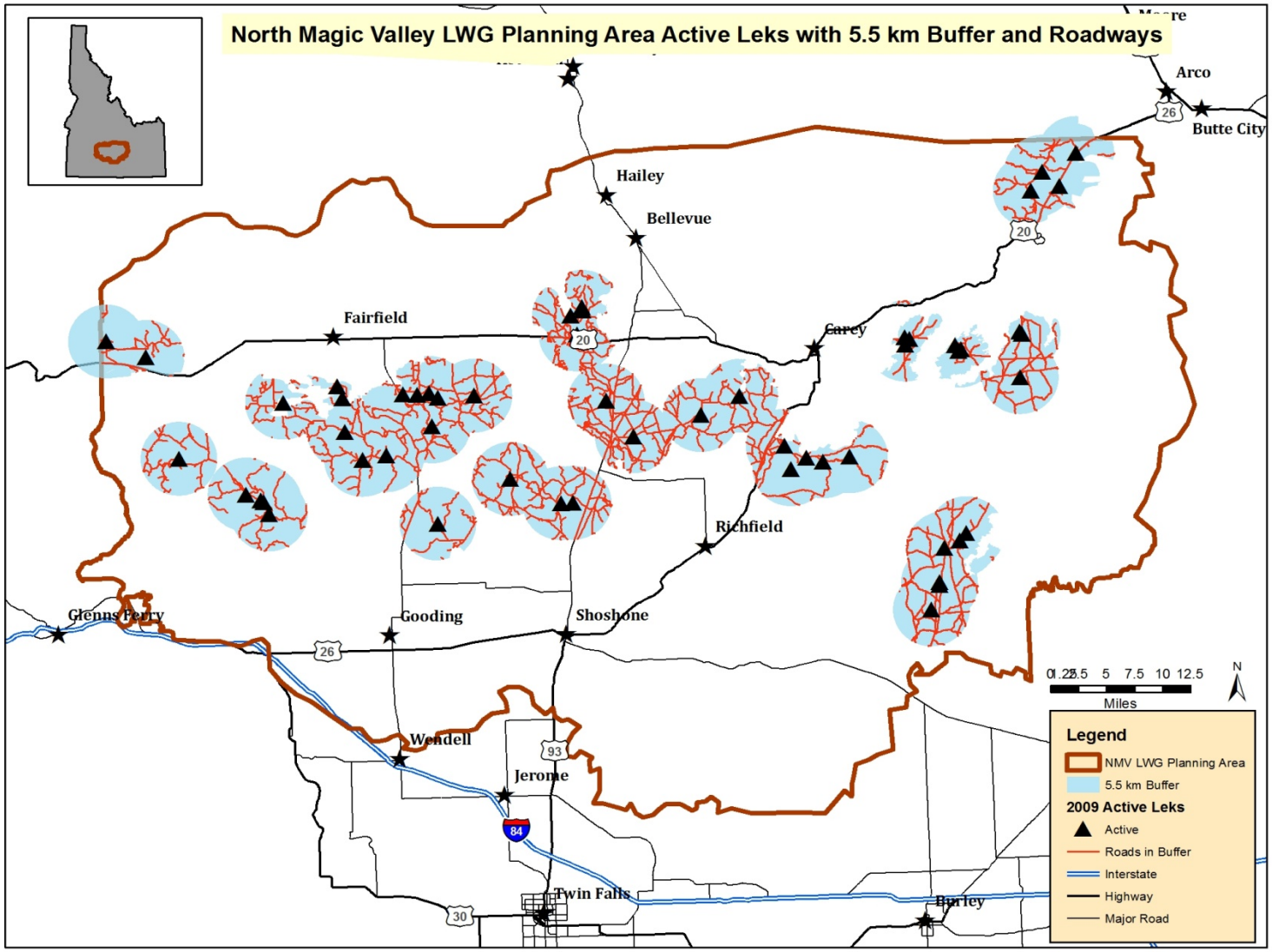

Figure 31. NMV LWG Planning Area 5.5 km Buffer Around 2009 Active Sage-grouse Leks, and the roadways that fall within that buffer; there are approximately 1,234 miles of roadway.

2.8.3 **The Human Footprint**

Both the linear and non-linear infrastructure threats discussed here constitute anthropogenic influences. Thus, a final anthropomorphic metric was considered. The human footprint (Leu et al. 2008) is a derived index that combines 14 landscape structural and anthropogenic features: human habitation, interstate highways, federal and state highways, secondary roads, railroads, irrigation canals, power lines, linear feature densities, agricultural lands, campgrounds, highway rest tops, landfills, oil and gas developments, and human-induced fires. Values of the human footprint range from 0-10 and are a cumulative measure of the anthropogenic features. Leu et al. 2008 found that the high-intensity human footprint areas (class 8–10) overlapped highly productive low-elevation private landholdings and low intensity areas (class 1–3) were confined to low-productivity high-elevation federal landholdings.

In the planning area, there are 122,091 acres of high intensity area, and 31% of this is classified as sage-grouse habitat (Figure 5).

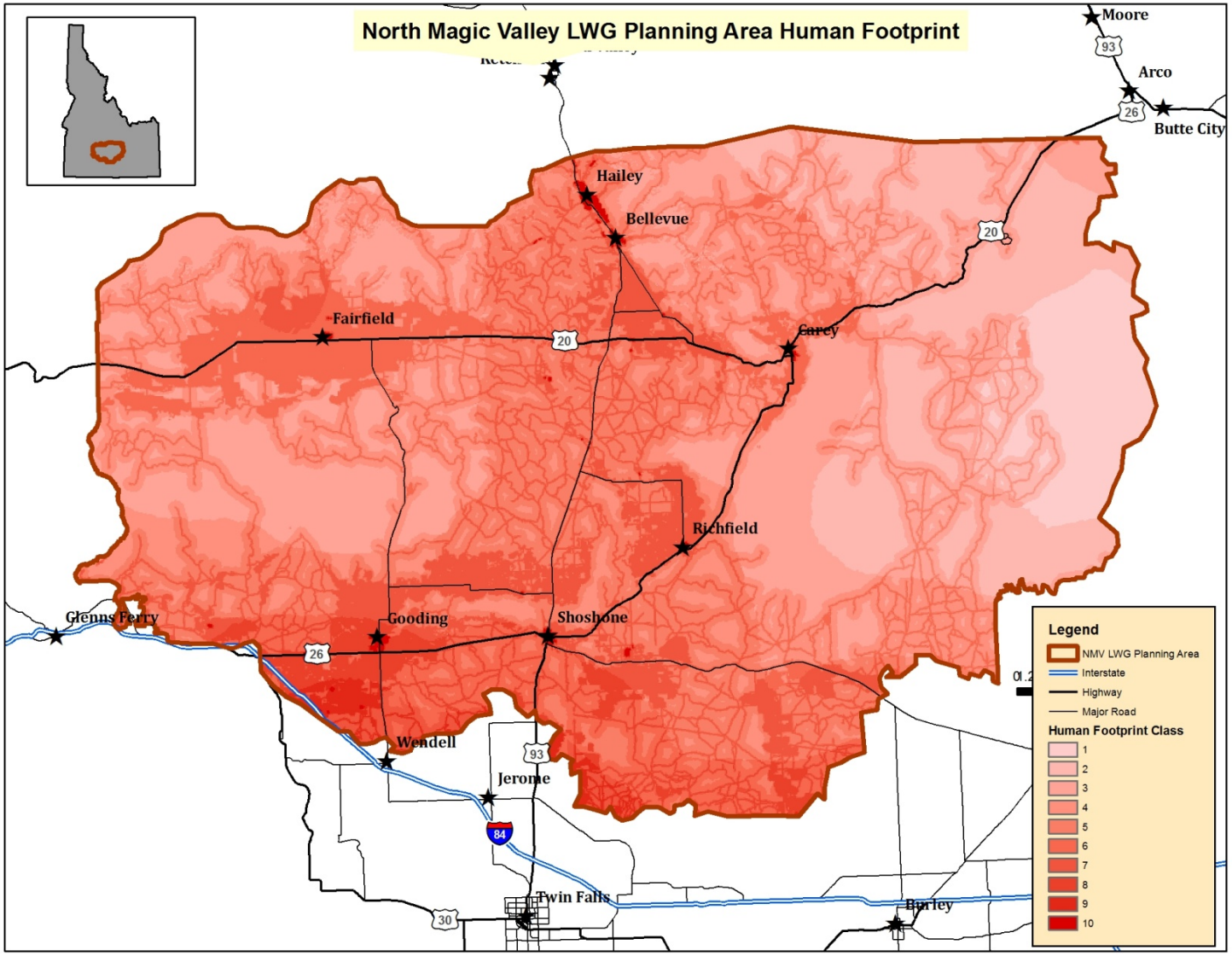

Figure 32. NMV LWG Planning Area Human Footprint (Leu et al., 2008); the darker shades of red represent a higher intensity of anthropogenic influences.

2.8.4 **Adjacent Infrastructure Projects**

Local working group planning areas immediately adjacent to the NMV LWG area include the Big Desert, Upper Snake, and Mountain Home. Adjacent land status includes US Forest Service, National Park Service, Idaho state land, and private property. It is the intent of the working group to ensure coordination and communication regarding any large scale infrastructure project proposals that may impact sage-grouse populations and their habitat within the planning area. For example, as wind turbine projects become more prevalent and project proposals arise on adjacent land, the group will stay informed and at a minimum submit comments providing information regarding potential impacts.

2.8.5 **Summary**

Both linear and non-linear infrastructures were assessed for the NMV LWG planning area (Figure 1, Table 1). Spatial buffers were applied to major roads, power lines, railroads, oil/gas pipelines, communication towers, and wind turbines as recommended in the Conservation Plan for Greater Sage-grouse in Idaho (2006). With the spatial buffers for the six features merged, over 60% of the planning area could be affected by some form of infrastructure. The degree of potential impact will vary by location and site-specific influences. The 'buffers' are areas potentially influenced by the features, and are based on assumptions of noise, predator foraging distances, and the likelihood of invasive plant establishment (Connelly et al. 2004).

The percentage of classified sage-grouse habitat that falls within the cumulative potential area of influence is 1,400,395 acres or approximately 47% of the planning area.

2.8.6 **Infrastructure Conservation Measures**

Issue Addressed	**Rationale**	**Conservation Measures**
Disturbance associated with human activity near leks	The construction, maintenance, and operation of infrastructure near leks is likely to increase human activity, which may adversely affect breeding sage-grouse	1.) We recommend no new construction of infrastructure within 1 km of occupied sage-grouse leks Where maintenance or other human activities must be conducted between March 15 and May 15 within one kilometer of a lek, conduct activities between 9 am and 6 pm to avoid disturbance during likely lekking times of 6:00 PM to 9:00 AM.
Tall structures associated with infrastructure,	Improper placement of utility lines,	1. Use of guy-wires on towers should be avoided. Where guy-wires must be used in sage-grouse habitat, guy-wires must be marked to improve visibility to sage-grouse.2. Where existing utility lines, including smaller power

including utility lines, wireless towers, or wind towers.	wireless towers or related structures can disrupt sage-grouse behavior, increase mortality due to collisions, lead to increased avian predation, or spread of invasive vegetation.	distribution lines, telephone lines, or wireless communication towers are known to be causing adverse impacts locally, or where such impacts are likely, LWGs and/or land-management agencies should work closely with power companies and related entities in assessing problem areas and developing creative solutions. 3. New above ground major power transmission lines should be sited in a manner that avoids sage-grouse habitat, or they should be buried. 4. New, smaller power distribution lines, or similar structures (e.g., telephone lines, communications towers) should be buried (as appropriate) or sited as far as possible, preferably at least 3.2 km (~2 miles) from occupied leks and other important sage-grouse seasonal habitats (Connelly et al. 2000), as determined locally. 5. The placement of raptor perch deterrents on power poles and other structures, such as telephone poles, should be standard practice in areas where population impacts from raptors or ravens is likely or is a documented problem. Areas that may be of particular concern include fragmented habitats with high raptor and/or raven activity. See "Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996" (APLIC 1996). 6. Utility companies should ensure access roads, rights-of-ways and disturbed areas associated with their facilities are managed in a manner that restores disturbed areas to perennial vegetative cover, and controls the spread of noxious weeds and invasive plant species. Coordinate with land-management agencies and others in selecting the most appropriate plant species. Use fire-resistant species in high fire-frequency/ cheatgrass areas. Encourage companies to participate in Coordinated Weed Management Areas. LWGs may be of assistance in helping to identify particular problem areas.
Road Construction	Construction of roads facilitates the spread of noxious weeds, increased human activity and disturbance, and vehicle	1.) No roads should be constructed within 5.5 km of active sage-grouse leks (Braun 2006). 2.) LWGs should identify specific roads or road sections where sage-grouse mortality has been documented. Work collaboratively with the appropriate agency(s) to develop measures such as speed limits, brush control, signing,

	collisions.	and public educationto reduce the risk of road-related mortalities of sage-grouse. 3.) Reduce the risk of vehicle or human-caused wildfires, and spread of invasives, by planting perennial vegetation (e.g. green-strips) paralleling road rights-of-way. This measure is applicable to existing as well as new paved or gravel roads in sage-grouse habitat. The need for the green-strips should be evaluated on a case-by-case basis depending on fire risk, vehicle activity, vegetation type, importance of the area, or other factors. Avoid use of species palatable to sage-grouse adjacent to roads. 4.) Manage existing roads and trails to minimize disturbance to occupied leks or other important seasonal habitats. Employ seasonal closures, permanent closures, rerouting of existing roads/trails or other measures, as deemed locally appropriate.
Fences	Fences in occupied sage-grouse habitat can serve as raptor perches (and thereby increase predation on sage-grouse) and increase the risk of fence collision mortality.	1.) Minimize construction of new fences in occupied sage-grouse habitat. 2.) Fences in sage-grouse use areas should be no more than 3 strands with the bottom wire being barbless. 3.) Fences should be marked to minimize collision potential. 4.) Unused fences should be removed.
Active railroads	Disturbed areas along railroads can facilitate the establishment and spread of invasive plants. Certain invasives (e.g., cheatgrass) increase the likelihood of wildfire ignitions from trains.	1.) Railroad companies should work closely with agencies and private landownersto reduce or control invasive plants along railroad rights-of way. 2.) Railroad companies should work closely with agencies and private landowners to manage fuels along railroad rights-of-way to reduce fire risk. Where cheatgrass or other vegetation along rights-of-way presents a high-fire risk, replace with suitable perennial species.
Gas and Oil Pipelines	Oil/gas pipeline construction can fragment habitat	1.) Locate new oil or gas pipelines and related facilities as far as possible (at least 3.2 km (approximately 2 mi)) from occupied leks or place along existing corridors to the extent possible. LWGs and/or land management

	and facilitate the spread of invasive plants.	agencies will work closely with gas/oil companies and related entities in identifying potential problem areas and creative solutions. 2.) Oil/gas companies should work closely with agencies and private landowners, as appropriate, to reduce or control invasive plants along pipeline rights-of-way and access roads. This should include ensuring that disturbed areas are seeded to an appropriate perennial seed mix.
Wind Energy Development	Wind energy development involves an array of potential direct and indirect adverse impacts to sage-grouse and sage-grouse habitat.	1. Due to the complexity of wind energy development and related support facilities, we refer the reader to USDI BLM (2005*b*) and USDI FWS (2003) for a more comprehensive list of mitigation measures and site evaluation guidelines. Key conservation measures recommended for Idaho include: A. Wind energy project and design approval must focus on avoiding, or restoring habitat degradation (on-site mitigation). Implement one or more of the following specific recommendations: • Do not place turbines and related infrastructure in breeding or winter habitat. If turbines must be sited within breeding habitat, ~~avoid~~ do not place turbines within five miles of occupied leks ~~where feasible~~. • Do not locate turbines and related infrastructure in known sage-grouse movement corridors, migration pathways or in areas where sage-grouse are highly concentrated (e.g., wintering areas). • Eliminate potential fragmention large, contiguous tracts of sage-grouse habitat. Focus wind energy development on lands already altered or cultivated and away from areas of intact and healthy native habitats. If this is not practical, select fragmented or degraded habitats for development, rather than relatively intact areas. • Minimize roads, fences, or other infrastructure. • Use tubular supports with pointed tops rather than lattice supports to minimize bird (raptor, raven) perching and nesting opportunities. Do not place external ladders and platforms on tubular towers. This will minimize perching and nesting by raptors and ravens. • To reduce the risk of collisions, do not use of guy wires for turbine or meteorological tower supports. All existing guy wires should be marked with bird deterrent devices.

		• Place electric power lines underground or on the surface as insulated, shielded wire to avoid electrocution (and collisions) of birds. 2. Measures to mitigate impacts at off-site locations should also be employed to offset alteration and losses of sage-grouse habitat. Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities. 3. Where extensive damage to sage grouse habitat from wind energy development is unavoidable, moving the project(s) to a different location must be considered. 4. Where wind energy development within sage-grouse habitat is implemented, monitor sage-grouse populations and habitat (a) for at least 3 years before project construction; (b) during construction, and (c) for at least 5 years after construction is completed and implementation has begun, to complement the existing knowledge of impacts and to help in the design of future conservation measures. 5. Industry proponents should work closely with IDFG, land-management agencies, private landowners and LWGs, in designing the appropriate monitoring strategy.
Research on various types of infrastructure	Some types of infrastructure have little data detailing their effects on sage-grouse	1. Support research into the understudied effects of infrastructure on sage-grouse, such as sage-grouse responses to noise disturbance, potential effects of artificial lighting (including lights atop tall structures) etc.

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2.9 Disease

Description of Threat and Literature Review

Prairie grouse are susceptible to a number of micro- and macro-parasites and diseases (Peterson 2004, Christiansen and Tate *In Press*). However, the effects of most of these organisms on grouse populations are largely unknown. There is some speculation that under certain conditions (eg. drought), parasitic or disease infections may further limit grouse populations (Peterson 2004).

Recently, West Nile Virus (WNV) has emerged as the most significant disease posing an immediate threat to sage-grouse populations. Between 1999 and 2005, 284 species of birds were reported to the Centers for Disease Control and Prevention (CDC) WNV avian mortality database. The primary vector of the disease appears to be mosquitoes.

In greater sage-grouse, WNV was first detected in Northeast Wyoming, eastern Montana, and southeast Alberta in summer 2003 (Naugle 2004). Infected birds in the field often show a lack of mobility, tilted or drooping head, or drooping wings when roosting, or weak flight when flushed (Walker et al. 2004).

Studies in Montana and Wyoming suggested that sage-grouse in populations affected by WNV experienced markedly lower survival rates than nearby populations with no confirmed WNV infections (Walker et al. 2004). Although Walker et al. (2004) captured live sage-grouse that tested positive for WNV antibodies, there is no conclusive evidence that sage-grouse are able to develop immunity to WNV.

In Idaho, WNV began appearing in birds in 2004. During 2005, there was an increase in the number of birds that tested positive for WNV. During 2006, most Idaho counties had confirmed both human and avian infections with WNV. In addition, sage-grouse carcasses recovered in Owyhee and Twin Falls Counties tested positive for WNV during 2006.

A History of, and Data Specific to, Disease in Sage-Grouse in the NMVPA

There is little data specific to the effects of disease or parasites in the NMVPA. During the 2006 sage-grouse hunting season, a subsample of harvested birds was tested for WNV antibodies. NONE of the sampled birds tested positive for WNV exposure. However, sage-grouse tend to show clinical signs and then die relatively quickly after becoming infected with WNV, and few birds successfully mount an immune response to WNV (M. Drew, personal communication, Christiansen and Tate *In Press*). Therefore, hunters are unlikely to harvest sick birds.

Anecdotal evidence suggests that WNV may have had a substantial effect on NMV sage-grouse populations during 2006. Several members of the NMV LWG have mentioned finding dead sage-grouse during late summer and early fall 2006 (T. Gregory and D. Skinner, personal communication). Prior to 2006, spring lek counts suggested a growing sage-grouse population in the NMVPA. However, beginning in 2007, lek counts in many parts of the NMVPA declined (see population section for details). This, combined with the spike in mortalities of sage-grouse and other birds during 2006, suggests that the 2006 WNV outbreak may have had a noticeable effect on local sage-grouse numbers.

Specific Disease Issues and Conservation Measures

Issue Addressed	**Rationale**	**Conservation Measures**
Lack of information regarding immunoresistance to WNV in Sage-Grouse	Future outbreaks of WNV may have significant effects on Sage-Grouse numbers	1.) Support research into grouse resistance to WNV infection
Lack of information regarding continued prevalence of WNV in NMVPA	Limited post-outbreak testing of birds, humans and mosquitoes has resulted in lack of knowledge about reservoirs of WNV within the NMVPA	1.) Support mosquito abatement efforts in areas adjacent to sage-grouse brood rearing habitats 2.) Continue to test dead sage-grouse for possible WNV exposure

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2.10 Agricultural

Specific threats to sage-grouse from agriculture covered in this section include conversion of sagebrush habitat to agricultural fields, sagebrush control treatments, haying activities, and insecticide use. Conversion of sage-steppe habitat into agricultural lands can result in sage-grouse habitat loss and fragmentation. Since settlement, approximately 408,800 acres of native habitat within the North Magic Valley Planning Area (NMVPA) has been converted to cultivated or irrigated pasture agricultural lands. This represents a nearly 14% conversion of potential sage-grouse habitat in the NMVPA. It is unknown to what extent these acres were used by sage-grouse historically. It also should be noted that sage-grouse are regularly observed in agricultural lands within the NMVPA in the late summer and early fall, specifically alfalfa fields in close proximity to key sagebrush habitat (personal observations Skinner, Gregory, Peavey, and Josaitis 1995-2010).

Since the late 1980's, little conversion of sagebrush to cultivated fields has occurred in the NMVPA due to a moratorium on filing for new water rights for agricultural purposes (IDWR 1993). Private sagebrush lands can be converted into non-irrigated farmland, but no evidence exists of this occurring in the NMVPA. Transfer of existing water rights is allowed and has, at least in two cases, resulted in expansion of irrigated farmland into sagebrush habitat in the NMVPA since 1990 (personal observations Skinner, Gregory, Josaitis, and McClain 1991, 2004). The North Magic Valley Local Working Group (NMVLWG) feels that future wide-spread conversion of sagebrush habitat into irrigated agricultural fields is unlikely and have ranked this threat to sage-grouse as very low for the NMVPA.

Examples exist of sagebrush habitat conversion to non-irrigated pasture grass in the NMVPA (i.e. disking and seeding of approximately 50 acres of private land in Soldier Creek, Camas County (Figure 1). While sage-grouse may utilize areas dominated by

grass during the late-brood rearing period, these areas are not utilized for nesting or wintering (Connelly et al. 2000). Conversion of sagebrush habitat into perennial grasslands is discussed under the Perennial Grassland Threat section of this plan.

Specific treatments to reduce sagebrush density (typically done to increase herbaceous vegetation primarily for livestock grazing) that have occurred in the NMVPA include mowing, chaining, chemical spraying, and prescribed fire (Skinner, Gregory, and Josaitis personal observations; Figure 2). These activities were commonly used at smaller scales (<1000 acres) in sage-grouse habitat on BLM and National Forest lands in the past, but are less common in the present primarily due to concern for sage-grouse habitat (Skinner personal observation). Sagebrush treatments in sage-grouse habitat continue to occur on private lands in the NMVPA however, and in some case have been carried out with the aid of USDA Farm Bill programs (Skinner, Gregory, and Josaitis personal observations). Sagebrush treatments (also called brush management) generally result in temporary or short term reduction in sagebrush density and may reduce the likelihood of sage-grouse utilizing the area until sagebrush densities return to 10-30% (Connelly et al 2000). Brush management may be utilized for restoration of late brood-rearing habitat where brush densities exceed 35% canopy cover (Connelly et al. 2000). In general, brush management should not be used in wintering or breeding habitat.

Figure 33. Conversion of sagebrush in the Soldier Creek drainage to non-irrigated pasture

Figure 34. Mowed sagebrush on private land in Camas County (completed in 2008 within 1 mile of an active lek).

Prescribed fire has been carried out on private sagebrush lands in the past decade primarily in sage-grouse breeding and brood-rearing habitat in the northwest corner of the NMVPA (Skinner and Gregory personal observations). In several instances these fires have not been adequately contained and have escaped onto adjacent public lands. These fires have been conducted primarily in mountain big sagebrush (*Artemisia tridentata vaseyana*) and are expected to recover to native grasses and forbs, and will likely be dominated again by sagebrush within 20 years (Connelly et al. 2004, Skinner personal observation). Until the sagebrush canopy cover reaches approximately 15%, these areas will not provide adequate nesting cover for sage-grouse (Connelly et al. 2000).

Approximately 28% of the 408,800 acres of cropland in the NMVPA are mapped as potential sage-grouse brood-rearing habitat (see Figure 3). Sage-grouse are regularly observed within some areas of the NMVPA in alfalfa fields in close proximity to sagebrush habitat during summer and fall (personal observations Skinner, Gregory, Peavey, and Josaitis 1995-2010). Increased hazards may exist for sage-grouse using cropland, including mortality of chicks from haying activities, increased predation, increased potential of collision with anthropogenic structures, increased disturbance from human activities, and risk of poisoning from insecticides (Blus et al. 1989, Idaho Sage-grouse Committee 2006). In addition, habitat loss may occur if alfalfa is converted to grains or other crops not utilized by sage-grouse. For more information on threats from predation, collisions, and disturbance, refer to the predation, infrastructure, human disturbance, and urban development sections of this document.

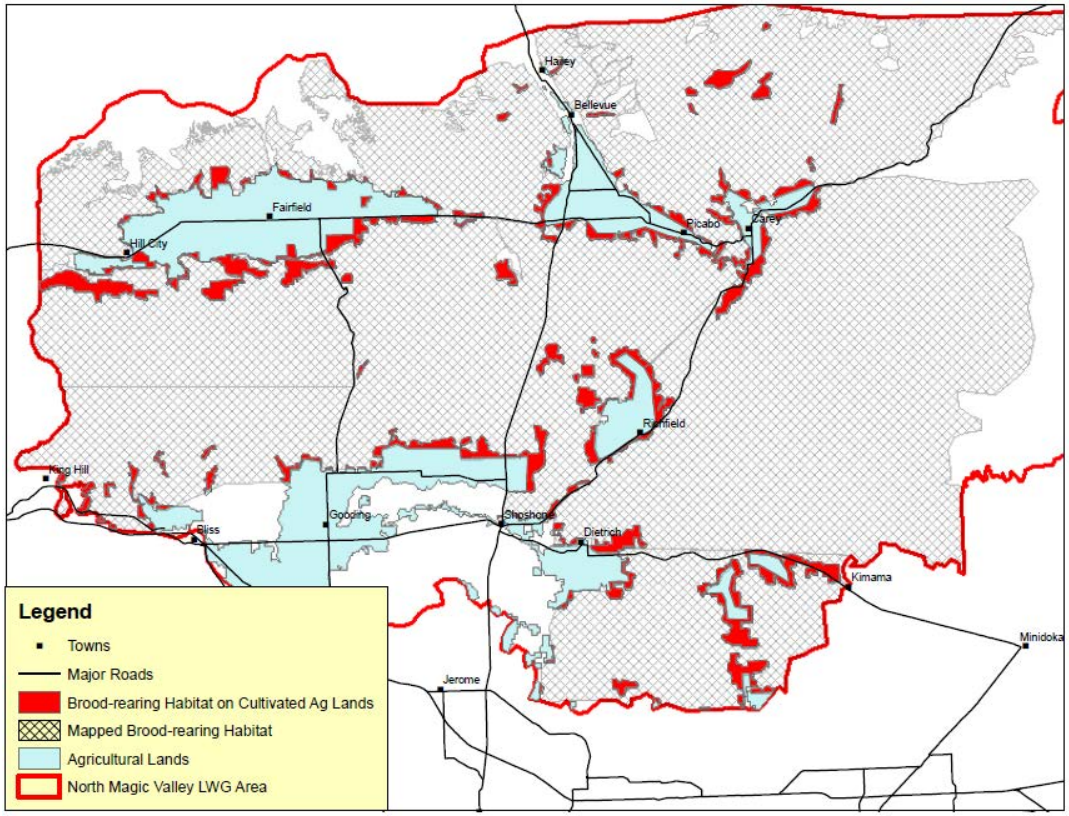

Figure 35. Mapped sage-grouse brood-rearing habitat on agricultural lands

Timing of cutting alfalfa fields adjacent to sagebrush habitats may be a factor in mortality of sage-grouse chicks within the northern half of the NMVPA. The annual first cutting of alfalfa generally occurs in mid to late June within the northern half of the NMVPA depending on seasonal weather. This corresponds with post-hatching activities of hens with broods moving to areas of increased forb production (Connelly et al. 2000). In some cases, broods move into alfalfa fields that border nesting (sagebrush) habitat. Sage-grouse mortality has been observed by "swathing" activity, particularly on chicks which are less able to avoid machinery than adults (John Peavey personal communication 2007). Time of day (night-time swathing) and increased speed of modern swathing machinery

compounds the issue. Modern farming equipment has advanced the speed at which alfalfa may be cut thereby increasing the likelihood of mortality. First cutting of alfalfa in the southern half of the NMVPA occurs up to one month sooner than in the northern portions and may not pose as much threat since chicks have either not yet hatched or have yet to move from nesting (sagebrush) areas. The extent to which annual mortality from haying activities affects sage-grouse population recruitment in the NMVPA is unknown and worthy of investigation.

Insecticide use to combat grasshopper or Mormon cricket outbreaks occurs on most years within the NMVPA. There is concern that secondary poisoning could affect individual sage-grouse, and reductions in crickets and grasshoppers could affect food supply of sage-grouse during the late brood-rearing period. Past use of organophosphate insecticides, such as dimethoate and methamidophos, led to die offs of sage-grouse foraging in alfalfa in SE Idaho (Blus et al. 1989). In the mid-20th century, synthetic organochlorine insecticides were utilized which accumulated in birds and mammals that consumed poisoned grasshoppers, eventually leading to toxic levels (USDA 2010). Currently, the most commonly used EPA-approved insecticides available to private landowners to treat grasshoppers/Mormon crickets are carbaryl bait, diflubenzuron (Dimilin 2L), and malathion (USDA 2010). Most insecticide treatments for Mormon crickets/grasshoppers occur within rangeland adjacent to agricultural fields (those same areas used often by sage-grouse during the late brood-rearing period).

Currently, two government sponsored programs are available for grasshopper/Mormon cricket control. The Idaho State Department of Agriculture (ISDA) annually cost-shares aerial applications of diflubenzuron on blocks of private land 320 acres or greater. Diflubenzuron affects immature grasshoppers by disrupting the formation and deposition of chitin in the exoskeleton and interrupts their ability to molt, but does not affect mature grasshoppers. In 2010, over 12,000 acres of private land in Lincoln County alone were sprayed through this program (Christi Falen, Lincoln County Extension Agent personal communication 2010). ISDA also provides carbaryl bait to private landowners with infestations on five or more agricultural acres. Carbaryl kills both immature and mature grasshoppers and some other insects, but must be ingested to be lethal. Distributions of carbaryl bait by ISDA occurred in each of the counties found within the NMVPA in 2009, with greatest treatments occurring in Lincoln County and eastern Blaine County (ISDA 2009).

The second government sponsored grasshopper/Mormon cricket control program is administered by the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS). This program treats outbreaks of grasshoppers/Mormon crickets primarily on federally managed rangelands where infestations are likely to affect adjacent cropland (in 2010 treatments in South Central Idaho under this program were limited to within one mile of cropland)(USDA 2010). Treatments only occur at the request of the land management agency. Application of insecticides on federal land is subject to the National Environmental Policy Act (NEPA) and both a range-wide programmatic environmental impact statement (USDA EIS 2002) and an annual site specific (South

Central Idaho) environmental assessment (EA) was completed for this program (USDA 2010). These documents detail potential environmental effects of the use of carbaryl bait, diflubenzuron, and malathion to treat grasshopper outbreaks on federal rangelands.

Both the 2002 EIS and the 2010 EA report that use of carbaryl bait, diflubenzuron, and malathion at proposed application rates (lower than EPA maximum allowable rates), would not likely result in direct toxicity to upland birds and would have little, if any, bioaccumulation. Both carbaryl and malathion can have sub-lethal effects to nervous system functions, however, and can lead to decreased survival (USDA 2010). Reduction in both target and non-target insects result from application of these insecticides and could potentially reduce food supply for sage-grouse. The extent of insecticide application under the USDA program is limited (within one mile of cropland) and therefore unlikely affect insect availability (food supply) across the planning area. However, as previously stated, sage-grouse commonly utilize rangelands in the vicinity of alfalfa fields due to access to water, forbs, and insects. Therefore treatments in these areas could have potential effects. The degree that insecticide use and resulting reductions of insects has affected populations of sage-grouse in the NMVPA is unknown.

The NMVLWG adopted the Conservation Measures from the State Plan (Idaho Sage-grouse Committee 2006) for threats from agricultural expansion, sagebrush control, prescribed fire, and insecticides. In addition, the NMVLWG will attempt to influence future and continued funding for the CRP program to benefit sage-grouse habitat.

2.10.1 **Agricultural Conservation Measures**

Issue Addressed	**Rationale**	**Conservation Measures**
Habitat loss and fragmentation	Conversion of additional sagebrush lands to agriculture may adversely affect sage-grouse	1. Utilize the Conservation Reserve Program, Wetland Reserve Program, Grasslands Reserve Program, Farmland Protection Program or similar USDA incentives programs to recover habitat for sage-grouse. 2. Avoid additional agricultural expansion into key habitat or potential restoration areas to the greatest extent possible. 3. Where there are willing landowners, identify and prioritize parcels available for purchase or exchange that could be restored to perennial grasses, forbs and shrubs. 4. With willing landowners, identify options for lands on the Snake River Plain recently withdrawn from irrigation. Options may exist for collaboratively

		funded restoration projects or development of forage reserves. 5. Where opportunities allow (incentives, partnerships, willing landowner, etc.), off-site mitigation should be employed to offset unavoidable alteration and losses of sage-grouse habitat. Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats.
Reduction of already limited or fragmented habitat	Inadequate planning and implementation of prescribed burns, or other sagebrush treatment projects, may adversely impact sage-grouse seasonal habitats and/or sage-grouse populations.	1. Utilize seasonal habitat mapping from the NMVLWG to ensure that proposed project areas have been evaluated on the ground in the context of the appropriate seasonal habitat characteristics. 2. Avoid the use of prescribed fire, and other sagebrush reduction projects, in habitats that currently meet or are trending toward meeting breeding or winter habitat characteristics or in areas where sagebrush is limiting on the landscape. 3. If the analysis shows that a vegetation treatment may still be advisable, design habitat manipulation projects to achieve the desired objectives, considering the following: A. Where prescribed burning, or other treatments, in sage-grouse habitats may be warranted (e.g., sagebrush cover exceeds desired breeding or winter habitat characteristics; understory does not meet seasonal habitat characteristics and restoration is desired; there is a need to restore ecological processes; or a proposed treatment site is in an exotic seeding being managed for overall sage-grouse benefits on the surrounding landscape): • Project design should be done with interdisciplinary input, and in cooperation with IDFG. • Ensure that any proposed sagebrush treatment acreage is actually needed to improve sage-grouse habitat in the context of surrounding seasonal habitats and landscape. • Ensure that treatments are configured in a manner that promotes use by sage-grouse (see Connelly 2000 for additional discussion). • Leave adequate untreated sagebrush areas for loafing/hiding cover near leks for sage-grouse.

		4. Evaluate and monitor prescribed burns, and other treatments, as soon as possible after treatment and periodically thereafter to determine whether the project was successful and is meeting or trending toward desired objectives.
Expansion of exotic plant species	Inadequate planning, implementation and follow-up of prescribed burns or other sagebrush treatments may result in the expansion of cheatgrass or other invasive plant species.	1. Avoid the use of prescribed fire or other sagebrush treatments in habitats prone to the expansion or invasion of cheatgrass or other invasives unless adequate measures are taken to control the invasives and ensure subsequent dominance by desirable perennial species. In many if not most cases, this will likely require chemical treatments and reseeding.
Risk of escaped prescribed fire	Escaped prescribed fires can threaten surrounding habitats.	1. Prescribed fires must be planned, executed and monitored in a manner that provides for adequate control and provision for contingency resources. 2. Ensure burn plans address the importance of preventing escaped fires when prescription fires are planned in the vicinity of stronghold and key habitat.
Mortality of sage-grouse (chicks) from haying activities	First cutting of alfalfa in northern portions of the NMVPA occurs when sage-grouse broods may use these fields and can result in direct mortality to sage-grouse.	1. Encourage research of the extent of this issue, the degree which annual mortality from haying activities affects sage-grouse population recruitment in the NMVPA, and potential alternatives to reduce risk to sage-grouse from this threat. 2. Investigate potential subsidy programs to pay farmers to wait to cut alfalfa fields adjacent to sage-grouse habitat until July or later when sage-grouse chicks may be better able to escape machinery.
Impacts of agricultural lands on sage-grouse	Sage-grouse using agricultural lands may be exposed to increase risks, including mortality from haying, chemicals, increased predation risk,	1. Where there are willing landowners, identify and prioritize parcels available for purchase or exchange that could be restored to perennial grasses, forbs and shrubs. 2. With willing landowners, identify options for lands on the Snake River Plain recently withdrawn from irrigation. Options may exist for collaboratively

	and increased risk with colliding with structures.	funded restoration projects or development of forage reserves.
Impacts of agricultural pesticides on sage-grouse	Some agricultural chemicals can cause direct or indirect mortality of sage-grouse foraging in farm fields or adjacent rangelands.	1. Eliminate the use of organophosphates on fields utilized by sage-grouse. Encourage incentive or enhancement payments to offset economic impacts. 2. Work with plant and insect specialists to develop strategies that could be used to protect crops near sage-grouse habitat from insects, thus minimizing the use of insecticides. Planting the outside field borders with certain plants that attract, repel or control insects may be feasible. 3. As alternative brood habitat, manage nearby native habitats, especially moist meadows and riparian areas to be more attractive (e.g. cover, forb availability and diversity) to sage-grouse and broods. 4. LWGs, Cooperative Extension agents, NRCS, IDFG, NAGP and other partners should collaborate to inform farmers of concerns with insecticide use and to develop collaborative solutions to reduce adverse impacts to sage-grouse. 5. Initiate research into determining the degree that insecticide use and resulting reductions of insects has affected populations of sage-grouse in the NMVPA.
Impacts of Mormon cricket and rangeland grasshopper control on sage-grouse.	Mormon cricket and rangeland grasshopper control may reduce food availability for sage-grouse in certain areas.	1. LWGs, land management agencies, landowners, IDFG, IDA, and APHIS-PPQ should continue to collaborate closely to ensure annual control efforts focus on key problem areas, better delineate treatment avoidance areas, determine the treatment of least risk to sage-grouse, and monitor results.

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2.11 Predation

Description of Threat and Literature Review

Predation on sage-grouse is a contentious issue, both within the scientific community and within the North Magic Valley Local Working Group (NMVLWG). This, in part, is due to the complexity of the role that predation plays within ecological relationships. While brainstorming topics to include in a discussion of predation, the group concluded that this threat description include: human subsidy of predator populations, human introduction of non-native predators to an ecosystem, the effects of alternative prey species on predation's role in an ecosystem, interactions among predators (including mesopredator release), and differential effects of nest predation and direct predation. Most of the debate about predation focuses on the extent to which predation has population-level effects on sage-grouse.

The majority of reported mortalities for grouse species, including sage-grouse, are due to predation (Bergerud 1988; Connelly et al. 2000). However, the extent to which predation affects grouse populations is a matter of some debate among researchers (Connelly et al. 2000). Several species, including golden eagles, ferruginous hawks, red-tailed hawks, swainsons hawks, northern goshawks, cooper's hawks, common ravens, magpies, coyotes, red foxes, bobcats, and badgers have all been reported to prey on sage-grouse (Schroeder et al. 1999). Some of these function more as nest predators (badgers, common ravens, magpies), while most of the raptors, along with coyotes, bobcats, and badgers, and also prey on adult and juvenile sage-grouse. Therefore, predation has the potential to affect sage-grouse populations by reducing nest success, reducing the survival of juveniles, and/or reducing the survival of adult birds (Connelly et al. 2004).

There is general agreement that recruitment (the result of nest success, survival of juvenile sage-grouse, immigration, and emigration) has the greatest effect on growth of sage-grouse populations (Beck et al. 2006, Crawford et al. 2004). Habitat loss or degradation may concentrate nesting female sage-grouse or force them to nest in less suitable areas, thereby facilitating increased predation (Bergerud 1988). Many researchers agree that predation can have a substantial effect on sage-grouse populations where habitat is limited or habitat conditions are poor (Schroeder and Baydack 2001, Beck et al 2006). For example, drought is believed to affect sage grouse populations through increased nest predation caused by decreased herbaceous cover and forb availability (Braun 1998). Where adequate nesting habitat is relatively limited and found in clusters, these clusters may act as predator sinks. Conversely, the presence of good and well distributed quality nesting and brood-rearing habitat may reduce the effects of predation on sage-grouse recruitment (Beck et al. 2006). Because of this, many researchers agree that rates of predation, and the overall effect of predation on sage-grouse populations, is closely correlated with habitat quality (Crawford et al. 2004, Braun 1998).

Many people cite the fact that sage-grouse evolved with predators to argue the point that predators have little impact on sage-grouse populations. While this is true, increasing human presence within sage-grouse habitats has also likely affected the relationship between sage-grouse and their predators. For example, increased human presence in and near sage-grouse habitats may affect the predator community (Manzer and Hannon 2005, Webb et al. 2004). There has been ample research into how human subsidy affects raven populations (Boarman et al. 2006, Manzer and Hannon 2005) and how the absence or reduction of larger predators may result in an increase in populations of smaller, mesopredators (Crooks and Soule 1999, Trewby et al. 2008). Furthermore, human creation of tall infrastructure may create perches for raptors and increase the efficiency of their predation on sage-grouse. These studies indicate that predator prey relationships involving sage-grouse are complicated, and that the effects of human activities are not always straightforward.

Predator control is often cited as a potential tool for reducing the impact of predation on local sage-grouse populations. Predator control has been shown to have a positive effect on grouse populations in Europe, but has been justified there by the small and isolated nature of remaining habitat (Schroeder and Baydack 2001). In North America, predator control has been used more sparingly, and predator management for prairie grouse species has more commonly been addressed by manipulating habitat (Schroeder and Baydack 2001, Coates and Delehanty 2004). These studies have had mixed results. Some researchers have found that predator removal does increase reproductive success, and therefore suggest that predator removal may provide a quick, short-term boost to upland bird populations while habitat quality improves (Coates and Delehanty 2004, Tapper et al. 1996). Other researchers indicate that predator removal is an ineffective means of improving game bird populations (Parker 1984). Most researchers agree that predator removal proves to be a short-term solution; predator populations in most studies have reestablished within one year of removal efforts (Tapper et al. 1996, Beasom 1974).

Furthermore, some researchers have suggested that some forms of predator control (e.g. coyote removal) may have unintended negative consequences for grouse populations, such as mesopredator release (increased numbers of smaller predators in areas where larger predators have been reduced or eliminated) or increasing populations of alternative prey (which may prove to be competitors with sage-grouse for limited forage resources) (Crooks and Soule 1999, Mezquida et al. 2006). There is some agreement that predator control should be considered in areas where habitat is deemed to be extremely poor or limited (Schroeder and Baydack 2001), and should be conducted in conjunction with habitat restoration and expansion efforts.

A History of, and Data Specific to, Predation on Sage-Grouse in the NMVPA

In the NMVPA, there is limited data on predator numbers or the effects of predators on upland game bird populations. There are four Breeding Bird Survey (BBS) routes within the NMVPA that provide some insights into changes or trends in populations of golden eagles, ferruginous hawks, red-tailed hawks, swainsons hawks, northern goshawks, cooper's hawks, and common ravens. However, these data are only indices to these populations and do not specifically address the effects these species may have on sage-grouse

populations. For most of these species, data is extremely limited, and of little value even as an index for such a relatively small area. Below is depicting BBS data for each of the four routes for common ravens.

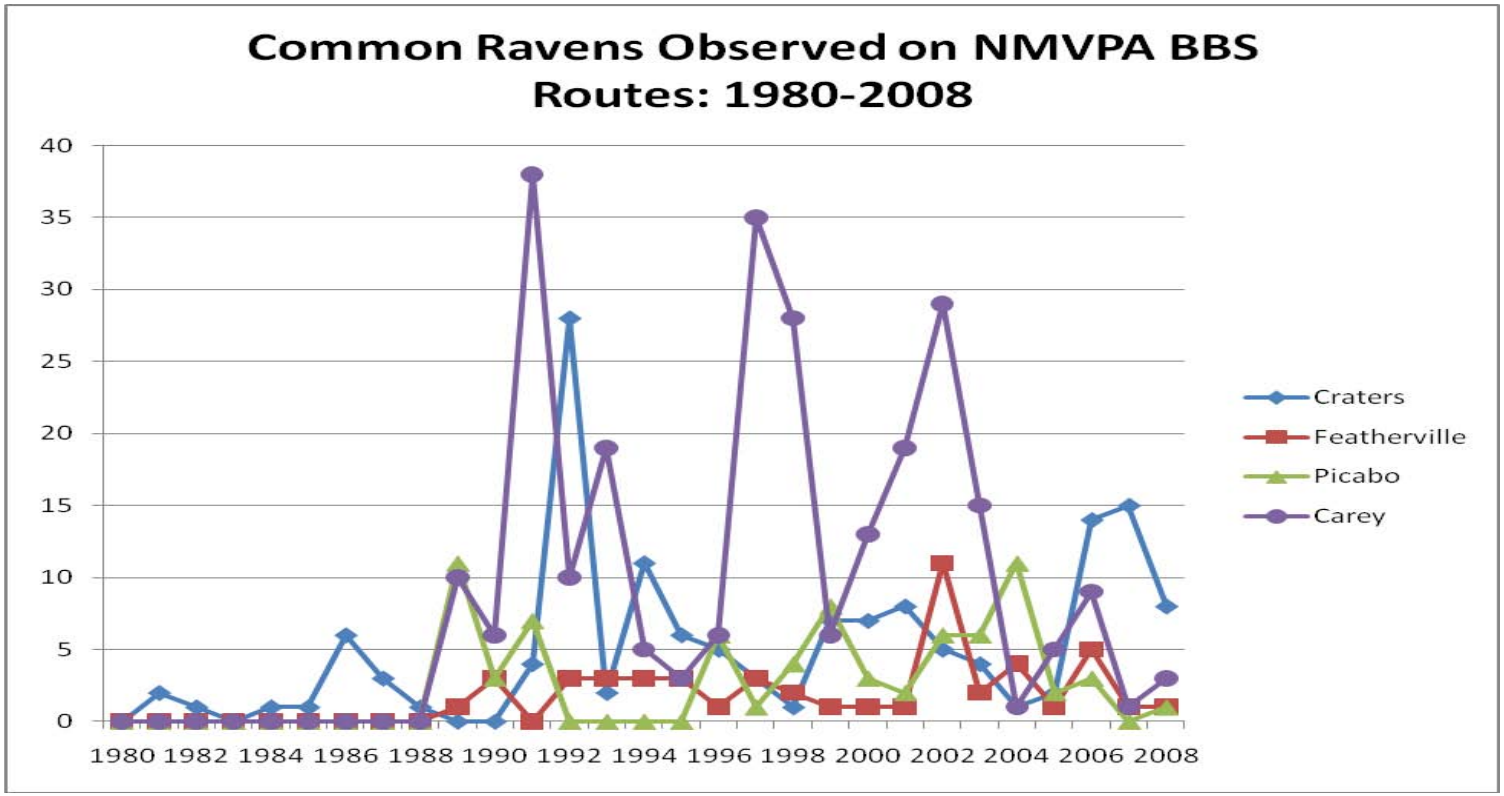

Figure 36. Ravens observed on 4 Breeding Bird Survey routes in the North Magic Valley Planning Area, 1980-2008.

There have been no studies specifically addressing the effects of predation on sage-grouse populations in the NMVPA. The most closely related study was a 1995-1996 evaluation of the effects of predator removal on pheasant populations (Nohrenberg 1999). The researchers removed foxes, skunks and feral cats in some areas, and compared pheasant population indices, pheasant hen survival and nest success in these areas to hen survival in "control" areas where predators were not removed. Both hen survival and nest success were slightly higher in areas where predators had been removed, but researchers found no difference in population indices between control and removal areas.

Considerations for addressing sage-grouse predation issues in the NMVPA

Because the effects of predation on sage-grouse populations are complex, unclear, and contentious, the NMVLWG should evaluate the following questions when determining the nature and extent of potential predator problems in a specific area.

1. What is the status of the sage-grouse "population" in question (on a three-year running average)?
   - Is the population considered isolated or is it a stronghold?
   - Is the population migratory or non-migratory?
   - Is the status of each lek known? Are lek counts conducted annually?
   - Is production assessed annually?
   - Are population trend indices (e.g., lek counts) declining, stable, or increasing?
   - If population trend is down, what are the reasons?
   - Has there been a recent drought or large wildfire or other factor influencing trend?
   - Is annual productivity, as determined by the fall ratio of juveniles/ hen below 2.25? (Note: 2.25 juveniles/hen is the suggested indicator for stable or increasing populations, Connelly and Braun 1997 and Edelmann et al.1998).
   - Is nest success (proportion of nests that hatch at least one egg per season) less than 25%? Connelly et al. (2004) reported a range of 14.5% to 86.1%.
   - Is average adult female survival rate less than approximately 45%? Connelly et al. (2004) report a range of 48-75%.

   Is annual hunter harvest within recommended WAFWA Guidelines?
2. What is the status of sage-grouse habitat in the area?
   - Are the important seasonal habitats known (breeding, late brood, winter)?
   - Are seasonal habitats generally contiguous or fragmented?
   - Do the respective seasonal habitats generally meet WAFWA Guidelines, or is there a considerable departure from the Guidelines for one or more of them?
   - If there is a departure from Guidelines, what can be done to restore desired habitat conditions (long-term habitat restoration combined with short-term predator control)?
   - What is the land status? Predominantly private, public, mixed?

3. What is the nature and extent of other threats in the area?
   - Is infrastructure (e.g., power pole cross-arms or other man-made structures) providing opportunities for ravens or raptors to perch or nest in proximity to important habitats?
   - Is conifer encroachment inhibiting lek quality or activity?
   - Is human disturbance of leks or breeding habitat a significant factor?

4. What is the status of predation and predators in the area?
   - What potential predator species are present?
   - Do the predator species of concern have legal protection through state or federal law (e.g., game or protected non-game, Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, etc.)
   - Who has management authority for the predator species?
   - Is the suite of predators or population levels present inconsistent with what is expected in healthy sagebrush steppe habitats? Are there nonindigenous predators present?
   - Has excessive predation of nests, juveniles or adults been documented?
   - What is the predicted population response of other predator species to removal of the target species?

5. If predator control is recommended:
   - Is a viable control method and adequate funding available?
   - Have humane predator control techniques been attempted as a first option?
   - Have clear objectives been defined that describe when successful control has been achieved?
   - Can the predator species of concern be identified and effectively targeted?
   - If so, is lethal take recommended or are there non-lethal or passive control alternatives?
   - Are surrounding landowners supportive?
   - Has the appropriate environmental analysis been completed?
   - Has the proposed action been adequately designed with suitable control and treatment areas, so effects can be assessed and documented?
   - Have pre-treatment and post-treatment monitoring protocols been established?

2.11.1 Predation Conservation Measures

Issue Addressed	Rationale	Conservation Measures
Excessive levels of predation can be detrimental to sage-grouse populations	The scale, quality, or configuration of habitat, infrastructure, non-indigenous predator species or artificially high predator	1. Evaluate effects of predation and other contributing factors using above guidelines. 2. Evaluate predator control for at-risk populations 3. If excessive predation is a result of poor habitat conditions: - Take actions to correct the habitat deficiencies (long-term solution) - Evaluate predator control for at-risk populations as a short-term measure 4. If excessive predation is the result of artificial structures:

	populations may contribute to excessive predation.	- Work closely with utilities, agencies, and landowners to document problem areas - Advise utilities, agencies and landowners on construction of new structures to ensure they have minimal effects on sage-grouse populations 5. If excessive predation is the result of non-native or artificially high predator populations: - Eliminate subsidies or other factors contributing to artificially high predator populations -
Lack of information specific to the NMVPA on effects of predators on sage-grouse populations	No research has been conducted on the effects of predation on sage-grouse populations in the NMVPA	1. Any predator control programs should be research-based, and include treatment and control areas and a well-developed research plan prior to implementation.

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2.12 Human disturbance

Threat summary and background

Human disturbance focuses on activities that cause sage-grouse to flush or to avoid potential habitat. These disturbances primarily affect birds during breeding at leks, during nesting, and during other seasonal time periods. Off-highway vehicle (OHV) use in Idaho has increased almost exponentially since 1973 (Idaho Department of Parks and Recreation 2004 in Idaho Sage-grouse Conservation Plan 2006), and there is considerable concern about the potential for disturbance to sage-grouse on leks or other important seasonal habitats, ground disturbance, spread of invasive plants, and increased fire risk.

Project construction and maintenance activities primarily near leks are also matters of concern, and encompass a host of activities associated with other potential threats such as infrastructure, mines and gravel pits. Human activities associated with management of cattle or sheep on or near occupied leks may also cause disturbances under some circumstances. Finally, wildlife viewing and photography, while an important aspect of public education and non-consumptive use, nonetheless can result in disturbance to birds at leks. In general, when humans approach occupied leks grouse often flush and may or may not return the same day (Call 1979).

Summary of key conservation issues

Off-highway vehicle (OHV) disturbance: Off-road vehicles, including four wheel drives, all terrain vehicles (ATV) and motorcycles can potentially disturb sage-grouse activity at leks and threaten other important seasonal habitats (nesting, brood-rearing, fall/winter). Examples of specific impacts include: increased human presence, noise, ground disturbance, and spread of weed seeds, direct damage to sagebrush plants and other vegetation, and risk of human-caused wildfire. In some areas, OHVs are used extensively to search cross-country for shed antlers in the spring, and adverse impacts to sage-grouse or sage-grouse habitat are likely. In some areas, mountain biking also may pose a potential disturbance during lekking and nesting periods.

The use of certain types of OHVs in Idaho is increasing substantially statewide. Although some of this increase may be due to improved compliance with registration, Idaho Department of Parks and Recreation (IDPR) statistics indicate that motorbike and ATV registrations in Idaho have nearly doubled between 1999 and 2003 (Idaho Department of Parks and Recreation 2004). Registrations for south-central Idaho, which includes the NMVPA, showed an increase of about 86% in the 5-year period, 1999 – 2003.In the eight counties encompassed by the North Magic Valley Local Working Group area, registrations of OHVs have increased almost 275% over the past decade (Figure 1). [Note: low compliance in early years likely underestimates the number of OHVs in use; improved compliance in more recent years likely improves accuracy of estimates of use based on registrations; (Jeff Cook, IDPR, pers.

commun.). Although not addressed in the Idaho State Plan, snowmobile use also may be disturbing sage-grouse on wintering areas during years with sufficient snow pack. The extent that winter recreation may affect sage-grouse in the NMVPA is currently unknown, and bears more evaluation.

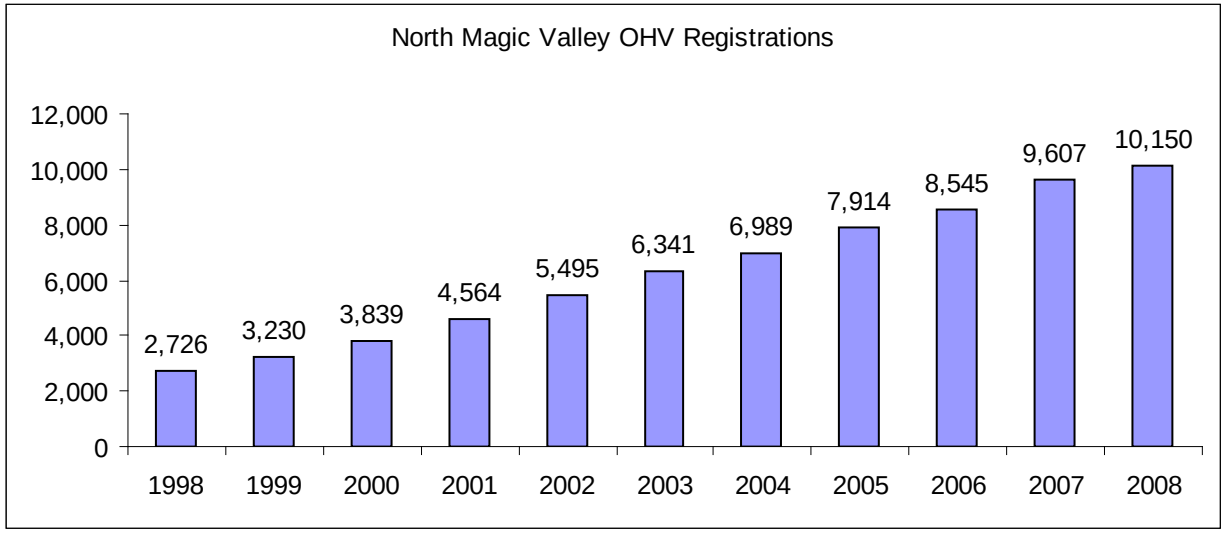

Figure 37. Number of OHV registrations for Blaine, Butte, Camas, Elmore, Gooding, Jerome, Lincoln, and Minidoka counties Source: Idaho Parks & Recreation

Members of the NMV LWG have raised concerns that year-round outdoor activities by the SUWS Adolescent and Youth Program may occur in important sage-grouse areas and has potential to disturb sage-grouse at leks, nests, and/or wintering concentration areas. What impact SUWS activities may have on sage-grouse is relatively unknown. The NMV LWG has received information and maps of SUWS activities on public lands from the BLM. Of particular concern is the placement of year-round camps within proximity of leks or winter concentration areas.

Project and maintenance activity near leks: Construction and maintenance activities associated with rangeland improvements and vegetation manipulation projects; roads, utilities and communication structures; and other similar activities near occupied leks during the breeding season have the potential to disturb sage-grouse. The significance of the threat is a function of proximity, timing, and duration of the activity. For example, one current project of particular concern to the NMVPA is the proposed relocation of the Friedman Memorial airport to an important sage-grouse wintering area south of Timmerman Hill.

The current level of disturbance and impacts of these factors on Idaho sage-grouse populations are unknown, but in many cases, can likely be reduced or minimized. Suggested buffers vary. Connelly et al. (2000*b*), in the context of human disturbance associated with energy exploration, recommended minimizing human activities within view of or <0.5 km (0.3 miles) of active leks. Stinson et al. (2004) and Utah Division of Wildlife Resources (2002) recommend a 1 km buffer.

Human activity associated with management of livestock: Livestock grazing is widespread in the NMVPA. Human activities associated with livestock management (e.g., fence construction, sheep camps, etc.), near sage-grouse leks have the potential to disturb lek activity or hens nesting in the vicinity of leks (see also Infrastructure 4.3.2 and Livestock Impacts 4.3.4 in Idaho State Plan).

Wildlife viewing/photography at leks: The viewing and photography of sage-grouse at leks is an interest pursued by a relatively small, but in all likelihood, growing number of enthusiasts. Instances of photographers camping on leks have been noted, as has the presence of temporary blinds. Such activities have potential to disturb breeding sage-grouse. Viewing from automobiles does not appear to disrupt courtship activity, but grouse flush when people leave cars to get a closer look (Stinson et al. 2004). We do not know how prevalent this is in NMVPA.

2.12.1 **Human disturbance conservation measures**

The overall goal of conservation measures to address human disturbance issues is to eliminate, reduce or minimize human-related disturbance to sage-grouse on important seasonal habitats.

Issue Addressed	**Rationale**	**Conservation Measures**
OHV disturbance	OHV activity can disturb sage-grouse, adversely impact vegetation and soils, and increase fire risk.	1. Limit OHV use to existing designated roads and trails to eliminate or minimize disturbance to sage-grouse and reduce the risk of wildfire and other habitat disturbances associated with cross-country travel. Institute a "closed unless posted open" approach. 2. Do not increase road and trail densities in sage-grouse habitat. We recommend efforts that decrease road and trail densities in sage-grouse habitat. Route new trails in a manner that minimizes disturbance. Evaluate -re-routing existing trails if they have been shown to regularly displace sage-grouse or impact populations. 3. Where existing roads or OHV trails are near occupied leks, apply use-restrictions where needed and appropriate, to minimize nonessential activity between 6:00 PM to 9:00 AM. In general this guideline should be applied from approximately March 15through May 15, where OHV or vehicular disturbance is a problem. 4. Work collaboratively with OHV user groups to increase awareness of the potential adverse impacts of OHVs on sage-grouse and other wildlife and to develop solutions to reduce conflict.
Projects and maintenance activity near leks	Human disturbance can cause disruption of breeding or nesting sage-grouse	1. Prohibit human activities such as fence and pipeline maintenance or construction, facility maintenance, utility maintenance, SUWS activities, or any project or related work at or near (1 km or 0.6 miles) occupied leks that result in or will likely result in disturbance to lekking birds from approximately 6:00 PM to 9:00 AM. In general this guideline ~~should~~ is to be applied from approximately March 15 through May 15.
Human activity associated with SUWS	Human activities associated with SUWS	1. Work collaboratively with SUWS operators (and BLM and IDFG) to increase awareness of the potential adverse impacts of SUWS activities

operations	operations near sage-grouse leks have the potential to disturb sage-grouse lek activity or hens nesting in the vicinity of leks.	on sage-grouse and develop solutions to eliminate impacts to sage grouse. 2. Prohibit permitted "permanent" SUWS camps (year-round wall tents and associated activities) within 3km of active sage-grouse leks or winter concentration areas (provide SUWS operators with lek and wintering area maps). 3. Prohibit SUWS groups from camping or hiking within 1km of occupied leks from approximately 6:00 PM to 9:00 AM. from approximately March 15 through May 15 (provide lek maps).
Human activity associated with management of livestock	Human activities associated with livestock management near sage-grouse leks has the potential to disturb lek activity or hens nesting in the vicinity of leks.	1. Prohibit trailing or overnighting livestock within 1 km of occupied leks (as identified on an annually provided lek map) from approximately 6:00 PM to 9:00 AM from approximately March 15 through May 15. 2. Sheep camps and related issues. Please see Livestock management and leks Conservation Measure No. 1 in the Livestock Impacts section in Idaho State Plan

Research, monitoring or evaluation needs:
Evaluation is needed to document areas in the NMVPA where general recreation, and especially OHV activity, may be causing unacceptable disturbances to leks, nesting sage-grouse, or damage to important seasonal habitats. Suggested approaches: (1) map areas of high OHV use based on collective knowledge of agency recreation planners (i.e., Dave Frieberg and John Kutz, BLM Shoshone FO) and members of NMV LWG; (2) determine the spatial extent and possible expansion through time of impacts by OHVs in NMV LWG using satellite imagery and change detection GIS software (possible project funded by SAC). Areas where potential conflicts may be occurring with human activities related to livestock management, e.g., sheep bedding and leks, herding and important nesting areas need to be identified and mapped. The existence of impacts to sage-grouse by the SUWS program should be identified and eliminated.

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2.13 Sport Hunting

A Brief History of Sport Hunting in the Magic Valley Region

Over the past 30 years, season length and bag limits have varied in the NMVPA. Generally, hunting pressure (number of hunters afield and number of birds harvested) has declined throughout the Magic Valley Region over the past 30 years. Hunter and harvest data specific to the NMVPA are not available for the time period detailed below, so these numbers reflect harvest statistics for the entire Magic Valley Region.

Year	NMVPA Season Length/Bag Limit	Magic Valley Region Sage-Grouse Hunters	Magic Valley Region Sage-Grouse Harvested
1979	9/2	3304	3666
1980	9/2	4243	3287
1981	9/2	2685	2371
1982	9/2	2499	1251
1983	9/1	4002	465
1984	9/1	858	407
1985	9/2	2153	1290
1986	14/2	2824	2169
1987	14/2	2359	1961
1988	16/2	2459	2092
1989	16/2	2018	1580
1990	30/3	2375	2833
1991	30/3	2429	1525
1992	30/3	1847	870
1993	30/3	1709	729
1994	30/3	1647	1213
1995	30/3	1303	520
1996	23/2	938	555
1997	23/2	1033	421
1998	23/2	888	497
1999	23/2	1036	661
2000	23/2	1009	556
2001	23/2	873	479
2002	23/2	1029	540
2003	23/2	1127	686
2004	23/2	1164	623
2005	23/2	989	833
2006	23/2	1001	672
2007	7/1	598	229
2008	7/1	491	194

Table 7. Data on hunting seasons and hunting results in the North Magic Valley Planning Area, 1979 – 2008.

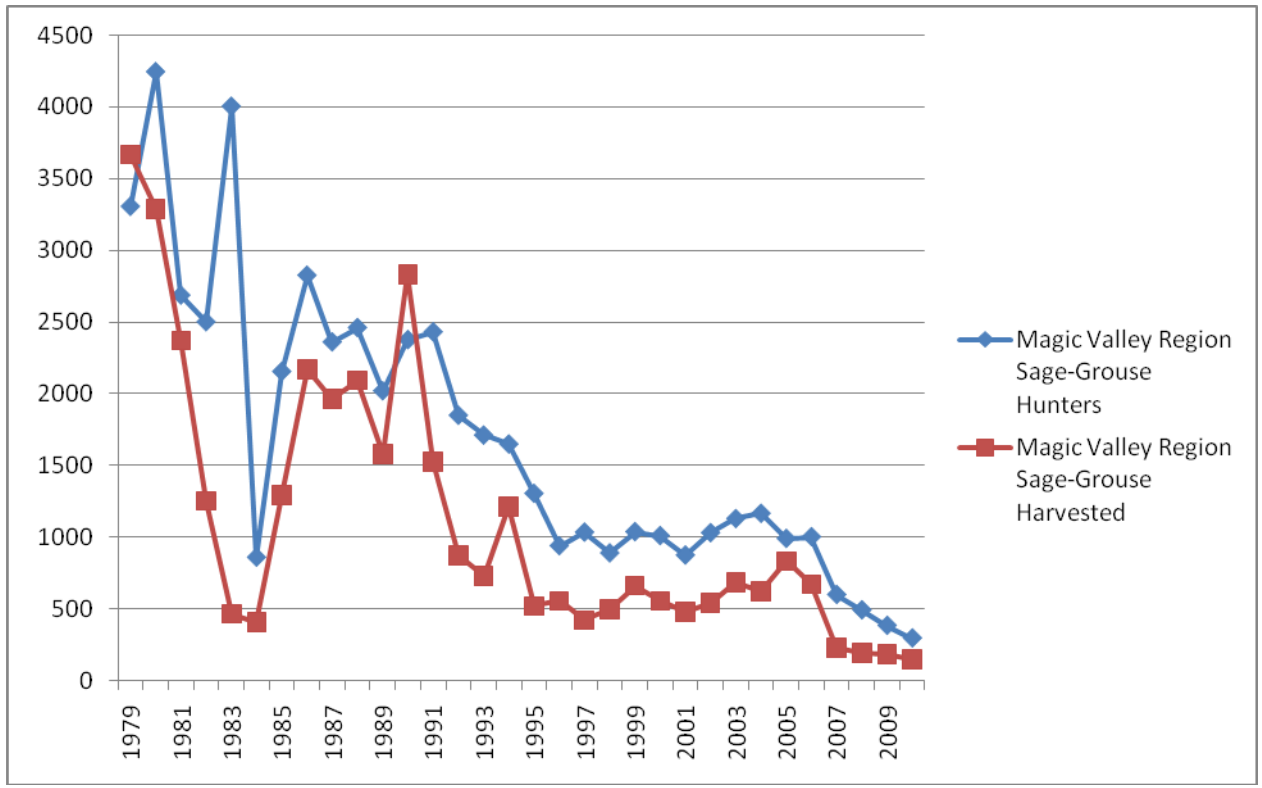

Figure 38. Sage-grouse hunters and sage-grouse harvested in IDFG's Magic Valley Region, 1979 – 2010.

Description of Threat

There is significant debate, both among researchers and within the North Magic Valley Sage-Grouse Local Working Group (LWG), regarding the impacts of sport hunting on sage-grouse populations. The debate centers around whether hunting is primarily compensatory (the birds that die from harvest would have died from another cause even if hunting did not occur) or additive (the birds that die from harvest would not have died if hunting had not occurred, and therefore add to deaths from other causes). Most research supports the assertion that modern harvest regulations (short, late seasons and small bag limits) are unlikely to have significant impacts on sage-grouse populations (Connelly et al 2000a, Braun 1998, Connelly et al. 2003). However, higher levels of harvest can be additive to other forms of mortality, and even low levels of harvest may affect populations under some circumstances (such as poor habitat conditions, following steep population declines, or in years with higher-than-average winter mortality) (Crawford and Lutz 1985, Johnson and Braun 1999). Generally, most researchers seem to concur that conservative harvest levels have minimal

population-level impacts (Schroeder et al. 1999, Connelley et al. 2000b, Braun 1998) There is no research specific to hunting impacts in the NMVPA; therefore, current conservation measures should reflect current research, and NMVPA research projects should focus on evaluating the impact of sport hunting in this area.

Current Management/LWG Involvement in Sport Hunting Conservation Measures

The Idaho Sage-grouse Conservation Plan establishes guidelines for developing hunting seasons and bag limits in response to changes in the sage-grouse population. Each year, IDFG invites LWGs to participate in the season setting process by reviewing the most recent sage-grouse data (primarily lek counts and harvest statistics) in relation to population trends. The North Magic Valley LWG has engaged in this process annually, and intends to continue to provide NMVPA-specific input into sage-grouse hunting seasons and bag limits. In 2008, the group recommended, and the state adopted, a 1-week sage-grouse season with a 1-bird bag limit. The season structure has remained "restrictive" (1 week, 1 bird) until completion of this plan in 2011.

2.13.1 Sport Hunting Conservation Measures

Issue Addressed	Rationale	Conservation Measures
Need for better juvenile production data	Juvenile production data are crucial to sage-grouse management and wing collection from hunters is currently the only feasible way to collect these data	1.) Expand use of wing barrels in the NMVPA.
Better evaluate impact of harvest on sage-grouse populations	Data specific to NMVPA is scarce	1.) Analyze existing data to determine what % of the estimated fall population is harvested; compare to guidelines published in literature 2.) Research projects in the NMVPA should include a survival analysis and an evaluation of cause of mortality

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2.14 Isolated Populations

Based on lek data, it appears that sage-grouse populations within the North Magic Valley Planning Area (NMVPA) are relatively contiguous and not isolated (Figure 1). Furthermore, sage-grouse populations that occur within the NMVPA are relatively contiguous with populations in neighboring sage-grouse planning areas (Figure 2). Therefore, isolated populations currently pose little threat to NMVPA sage-grouse. The one notable exception to this is the Snake River plain. Currently dominated by agriculture, it provides little (if any) habitat for sage-grouse, and therefore serves to separate populations north and south of the plain from one another.

However, as was recently evidenced by the Murphy Complex fire in the Jarbidge Planning Area, large-scale habitat changes may have the ability to rapidly affect the connectivity of sage-grouse populations within and adjacent to the NMVPA. For this reason, the degree of isolation of sage-grouse populations should be reviewed by the group following any major habitat-altering event, including: large wildfires, extensive development, infrastructure, or disease.

Furthermore, little is known about sage-grouse distribution and seasonal use in some areas of the NMVPA, particularly along the far eastern edge of the NMVPA and the northwest portion of the NMVPA. Efforts should be directed at learning more about distribution and seasonal use and movements of birds in these areas.

2.14.1 Isolated Populations Conservation Measures

Issue Addressed	Rationale	Conservation Measures
Need for evaluation and monitoring of other threats that may affect isolated populations	Future large-scale changes in habitat may reduce connectivity of sage-grouse populations	1.) Work with land management agencies to accurately monitor and map large wildfires 2.) Work with land management agencies to ensure rehabilitation efforts promote connectivity of sage-grouse habitat and populations 3.) Fully evaluate cumulative effects of proposed development or infrastructure projects with other existing or proposed projects and uses. 4.) Monitor effects of disease throughout NMVPA and in adjacent areas
Need for better information related to distribution and	Gaps in data may reveal gaps in sage-grouse distribution	1.) LWGs and agencies should coordinate in refining and delineating distribution and seasonal habitat use and movements 2.) Efforts should focus on areas where little is known about sage-grouse abundance,

seasonal habitat use and movement		distribution, or seasonal habitat use

2.15 Seeded Perennial Grasses

Attempts at managing degraded rangelands began in the 1960s. Initial efforts by the BLM involved the use of crested wheatgrass (*Agropyron cristatum*) in large monocultures. The result was that crested wheatgrass was found to be effective in controlling annual grasses and in some instances sagebrush. However, the large monocultures failed to provide sufficient diversity (of forage and structure) to benefit sage-grouse and other wildlife. None-the-less, the scene was set for extensive use of crested wheatgrass over the next few decades. Conversion of sagebrush areas into exotic perennial grasslands resulted in temporary or essentially permanent habitat loss for sage-grouse dependant on sagebrush recolonization. Within the NMVPA, the BLM no longer intentionally converts sagebrush areas into crested wheatgrass monocultures.

Grass seeds and leaves are not eaten by sage grouse and thus provide no forage value (Braun 2006). However, sage-grouse require complex vegetational structure for nesting and hiding cover, which includes grasses of sufficient height and canopy cover in combination with sagebrush (or some structurally similar brush species) and native forbs (Connelly et al. 2000). Studies in Idaho have documented successful sage grouse nesting with grass heights ranging from 15 to 34cm and canopy cover of 3 to 30% (Connelly et al. 2000). These same studies documented associated sagebrush heights of 58 to 79cm with canopy covers of 15 to 38%. Hens with broods (through 12 weeks old) are typically found where forb abundance is greatest. For example, Sveum et al. (1998a) reported greater than 20% canopy cover of forbs at brood-rearing sites (Crawford et al. 2004). Invasive annual grasses such as cheatgrass (*Bromus tectorum*) and medusahead wild rye (*Taeniatherum caput-medusae*) do not provide forage or cover value and are known to increase fire frequency thereby perpetuating themselves at the expense of native habitat components especially at low elevation (<1000 meters) and xeric sites (Crawford et al. 2004).

Current rehabilitation efforts by BLM in the NMVPA usually follow wildfire (when funding is available). Seed mixes used in recent rehabilitation efforts have been improved by adding a variety of native perennial grasses and forbs. Well into the mid-1990's, crested wheatgrass (including Siberian and varieties) was by far the dominant grass species planted. Since then an increasing amount of native grass species have been included in mixes however crested wheatgrass continues to be used. A history of acres of seeding completed by the Shoshone Field Office of the BLM by seeding type/method can be found in Figure 1. Newer seed mixes provide increased diversity that benefits a broader range of wildlife while still providing forage for livestock. Additionally, a separate seeding of sagebrush often follows the initial grass and forb seeding.

Site specific seed mixes vary depending upon pre-burn vegetative conditions, soil types, and landscape (for example rangelands vs. riparian areas). The current goals of seeding projects are generally multi-faceted, but are primarily to stabilize the soil in an area, to

prevent dominance or invasion by undesirable species (such as cheatgrass and medusahead), and to provide a diversity of forage and cover for multiple wildlife species. The ultimate goal is to achieve a healthy and productive sagebrush ecosystem.

	Acres								
	Aerial Seedings	Drill Seedings	Broadcast	Broadcast & Harrow	Seeding	Hand Planting	Green Stripping	Unknown	Total
2000's	325272	211926	1618	279		22		30360	569477
1990's	37791	91725				110	1715	60984	192325
1980's	11106	89686		63	88	399		18522	119864
1970's	49576	95857						2822	148255
1960's	9618	79309	9994					12360	111551
1950's	4844	42760	4828	5757	2120			4508	64817
1940's	1573	4767							6340

Table 8. BLM Shoshone Field Office Seedings

The sum of any row may not equal the "Total" as more than one treatment may have been applied to an area.

Records of seed mixes used in rehabilitation efforts are incomplete; however, some information can be gleaned from the type of seeding effort. Although the relationship is imperfect, in general, drill seedings tend to be dominated by grasses, while other methods tend to be mixes of grasses, forbs, and shrubs.

The 2009 Sage-grouse Habitat Map for Idaho showed 560,787 acres of the NMVPA to be covered by perennial grasslands (see Figure *2*). This estimate is developed from coarse scale information and only includes public lands. The perennial grassland state is generally post-fire (result of rehabilitation efforts) and is likely temporary (occurs sagebrush re-colonization reaches at least 10% canopy closure). On private lands in the NMVPA, sagebrush may be removed and replaced by perennial grasses for livestock grazing purposes (irrigated or non-irrigated pasture, see Agriculture section).

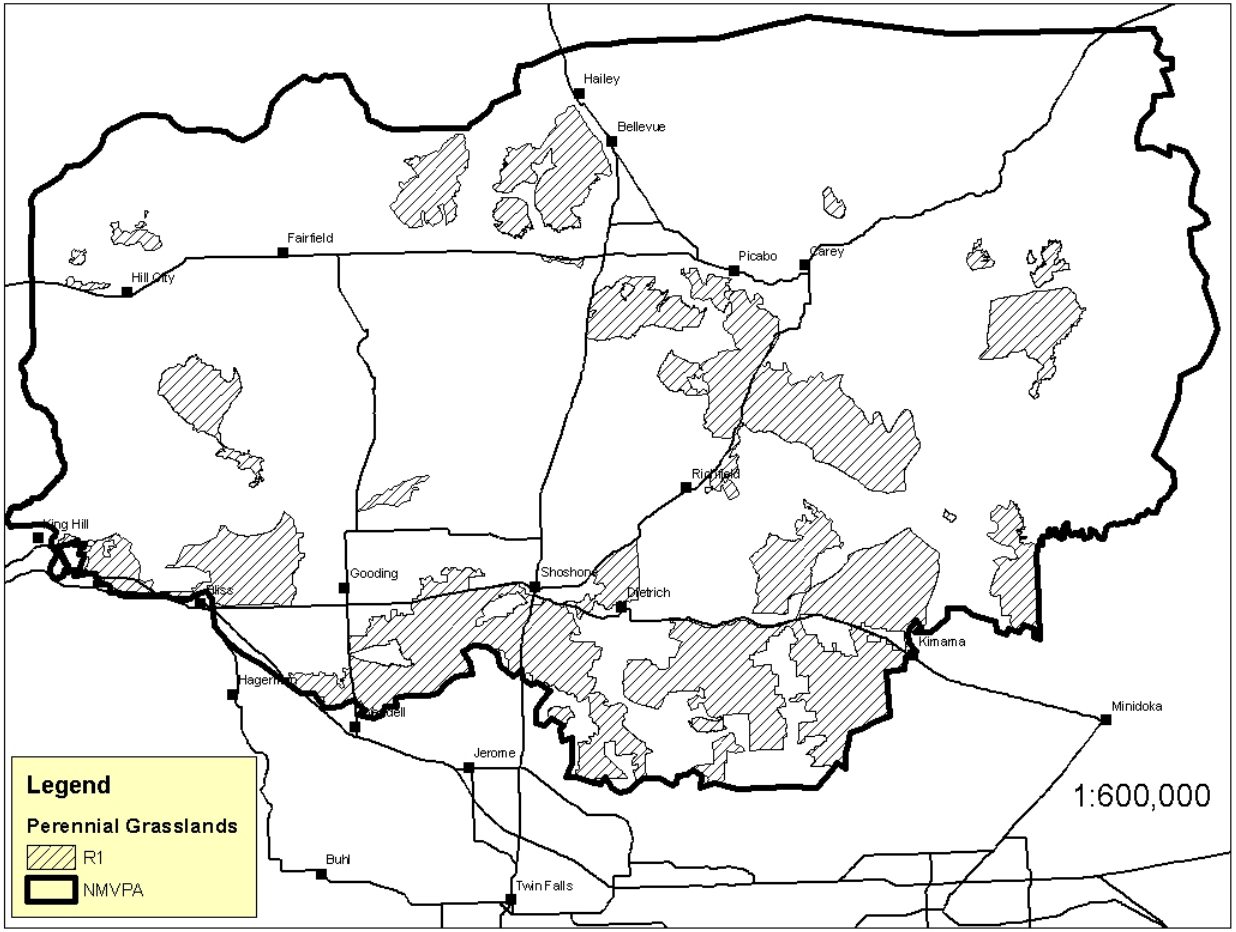

Figure 39. Perennial grasslands in NMVPA (data from 2009 Sage-grouse Habitat Map for Idaho).

2.15.1 **Seeded Perennial Grasses Conservation Measures**

Issue Addressed	**Rationale**	**Conservation Strategies**
Desired plant height	Minimum residual plant height is important to sage grouse habitat	1. In view of the studies conducted in Idaho the minimum residual height should follow Connelly guidelines: ≥18 cm for native perennial grasses.
Desired minimum canopy cover	Minimum canopy cover is important to sage grouse habitat	1. The minimum canopy cover for perennial grass should be 3-30% (Connelly et al. 2000) of native perennial grasses depending on site potential (i.e. crested/siberian wheatgrass should not be included in this calculation).
Fire rehabilitation seedings may not include species that benefit sage-grouse foraging	Forbs needed for sage-grouse as forage	1. All seedings in potential sage grouse habitat must include a significant amount of native forbs useful to sage grouse as forage (should include at least 4 different forb species).
Fire rehabilitation seedings may not include adequate amount of sagebrush	Sagebrush is critical for sage-grouse habitat	1. All seedings in potential sage grouse habitat should include a significant amount of sagebrush.

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3 Research, Monitoring and evaluation

Although a great deal is known about sage-grouse ecology and habitat, additional research is needed in order to better understand the range of factors that affect sage-grouse populations, sage-grouse habitat, and the relationship between them. Research is also needed to identify better ways of addressing both population and habitat needs. Additional evaluation and monitoring activities are essential to recognizing and understanding population and habitat trends. Equally important, monitoring and evaluation are crucial to determining the effectiveness of conservation measures and, if appropriate, adjusting or otherwise changing those measures. For these reasons it is particularly important that monitoring and evaluation follow standardized and accepted procedures and protocols wherever they are available.

3.1 Summary of Needs By Threat Category

The following section presents a summary of needed research, monitoring and evaluation relative to sage-grouse. Research, monitoring and evaluation needs were presented at the end of each set of conservation measures in Chapter 4 in order make clear the potential uncertainties associated with identifying conservation actions in some cases, to illustrate the limitations associated with conservation actions in other cases, and to underscore the importance of monitoring and evaluation in relationship to most conservation measures. However, they are presented again here as a consolidated unit, for the convenience of those using this document, and in particular, to facilitate planning and budgeting by the primary agencies who are likely to coordinate and fund research, monitoring and evaluation activities.
Research, monitoring and evaluation take place at multiple spatial and temporal scales.

3.1.1 Urban/Rural Development

- Monitor development impacts to sage-grouse population size and location and attendance at leks.

3.1.2 Wildfire/Annual Grasslands

- Monitor success of seedings and assist with multiple treatments, if necessary.

3.1.3 Livestock Management

- Research is needed to better understand the impacts of livestock management (systems and individual practices) on sage-grouse populations and habitat. Monitoring and evaluation is also necessary to better identify and determine the impacts of current grazing management practices on sage-grouse populations and habitat. An effort should be made to document the extent of sage-grouse collisions with fences and conduct effectiveness monitoring of flagged or tagged fences. Researching whether sage-grouse "watering facilities" developed in association with livestock water developments have benefits for sage-grouse, particularly in areas lacking available water or mesic habitat during the late brood-rearing period.
- Identify and map existing high-quality sagebrush steppe habitat by allotment and pasture regardless of whether sage-grouse are currently using that habitat. Also map areas within pastures that are known to be used by sage-grouse.
- Identify and map areas by allotment and pasture where livestock grazing would have little impact on sage-grouse or sagebrush steppe habitat as areas for potential forage reserves or drought mitigation areas.
- There is a need for finer scale maps of rangeland condition; areas within the NMVPA should be prioritized by pastures and allotments.
- Identify and prioritize fences that are close to leks for marking and/or removal.

3.1.4 Infrastructure:

- Where wind energy development within sage-grouse habitat is unavoidable, monitor sage-grouse populations and habitat (a) for at least 3 years before project construction; (b) during construction and (c) for at least 5 years after construction is completed and implementation has begun, to complement the existing knowledge of impacts and to help in the design of future conservation measures
- Support research into understudied effects of infrastructure, such as noise, displacement, changes in reproductive or overall fitness, etc.

3.1.5 Disease

- Support research into grouse resistance to WNV infection
- Continue to test dead sage-grouse for possible WNV exposure.

3.1.6 Agriculture

- Evaluate and monitor prescribed burns, and other treatments, as soon as possible after treatment and periodically thereafter to determine whether the project was successful and is meeting or trending towards desired objectives.
- Prescribed fires must be planned, executed and monitored in a manner that provides for adequate control and provision for contingency resources.

- Initiate research into determining the degree that insecticide use and resulting reductions of insects has affected populations of sage-grouse in the NMVPA.

3.1.7 Predation

- Any predator control programs should be research-based, and include treatment and control areas and a well-developed research plan prior to implementation

3.1.8 Human Disturbance

- Evaluation is needed to document areas in the NMVPA where general recreation, and especially OHV activity, may be causing unacceptable disturbances to leks, wintering birds, or damage to important seasonal habitats. Suggested approaches: (1) map areas of high OHV use based on collective knowledge of agency recreation planners and members of the NMV LWG; (2) determine the spatial extent and possible expansion through time of impacts by OHVs in NMVPA using satellite imagery and change detection GIS software. Areas where potential conflicts may be occurring with human activities related to livestock management, e.g., sheep bedding on leks, herding and important nesting areas need to be identified and mapped. The extent of impact to sage-grouse by the SUWS program should be determined from use permit and monitoring.

3.1.9 Isolated Populations

- Research projects in the NMVPA should include a survival analysis and an evaluation of cause of mortality

3.1.10 Data Gaps identified by U.S. Fish and Wildlife Service

In the discussion of the factors contributing to the greater sage-grouse not warranted
Finding, participants in the USFWS structured range-wide science panel identified a number of data gaps that if resolved, could reduce uncertainty in their assessment of the likelihood of extinction within a certain time frame or even change their estimates (USDI-FWS 2005).
This information is included in this Plan because it provides an important window into some of the uncertainties and research, monitoring and evaluation needs that exist at the broad-scale (e.g., state or range-wide) and that might factor into future decisions regarding potential listing of the species.
The areas of uncertainty identified by the USFWS experts included:

- Systematic (e.g., species, subspecies) relationships among various grouse species;
- Underlying mechanisms by which sage-grouse populations respond to habitat changes;
- How to scale grouse habitat preference up to the level at which federal land is managed;
- Lack of studies across the range limits inferences;

- Effects of invasive plants;
- Application of grazing techniques to favor sagebrush habitat;
- Underutilization of the case study approach for sage-grouse management;
- Future gas and oil development impacts;
- Future advances in horticulture and fire suppression;
- The role of crested wheatgrass in sagebrush management; and
- The effectiveness of USDA Conservation Reserve Program or other easement and incentive programs.

3.2 Sage-grouse population monitoring

3.2.1 Monitoring breeding populations

Sage-grouse gather on traditional display areas called leks each spring that allow wildlife managers to track breeding populations by counting males associated with these leks. However, lek locations must be documented before a monitoring program is developed. A recent report on sage-grouse habitat and population monitoring (Connelly et al. 2003*b*) provides information on locating leks from the air and ground. Much of the sage-grouse habitat in southern Idaho has been searched for leks over the past 10-15 years. The identification of lek locations should be an ongoing task because some areas may develop breeding habitat (e.g., recovery of a burned area) and other areas may be altered by vegetative manipulation (e.g., sagebrush control projects or a change in grazing) or construction of various structures (e.g., power lines, wind turbines).

Lek counts have been widely used in Idaho and other western states to track sage-grouse breeding populations. Male sage-grouse are counted on 1 or more leks in a particular area using accepted protocols (see below). However, leks may be widely separated and such counts are not used to assess a single breeding population. Changes in lek attendance may be due to birds moving to other leks (fire) or disturbance (golden eagle, sheep camp, etc.) rather than an actual change in population. Unless all leks are counted in a given area, there is no means of assessing the cause of the change in lek attendance, and the lek count technique may produce erroneous results. Lek counts do serve another purpose, however, in that they provide important information to land managers as to the presence of occupied or unoccupied leks, regardless of value for trend analysis.

To overcome some of the problems associated with a lek count, a group of leks that are relatively close and represent part or all of a single breeding population are counted together (Connelly et al. 2003*b*) to monitor trend. This approach, termed a lek route, facilitates repetition by different observers, increases the likelihood of recording new or satellite leks, and helps to account for birds moving to other nearby leks (Connelly et al. 2003*b*). Lek routes should be established so that all leks along the route can be counted within 1.5

hours. Due to funding and manpower limitations, sampling intensity (e.g., the number of lek routes that should be run in a given year in a given area) will vary across the state. The minimum number of lek routes run in a planning area will vary depending on size of the area and accessibility. Generally, lek routes should be well distributed throughout a planning unit and should sample all or most major known breeding populations. Secondary routes should be used to support and enhance data on breeding populations, or track changes in habitats that are being rehabilitated. Secondary routes should be run a minimum of every four years. This approach should stabilize annual workloads of management biologists while still maintaining a quality database.

The Statewide sage-grouse conservation plan recommends a minimum of 4 primary lek routes in the NMVPA for adequate sampling of breeding populations. Currently, there are 8 consistently run lek routes in the NMVPA, suggesting that current sampling regimes are more than adequate for measuring trends in breeding populations.

For effective and consistent monitoring of sage-grouse breeding population trends in Idaho, IDFG has adopted a standardized methodology for conducting lek routes, summarized below. This protocol will be employed by all individuals including professional wildlife biologists, technicians, volunteers, or others assisting with population monitoring. Document lek survey data, as appropriate, on the standardized forms provided by IDFG is recommended for use in documenting new leks, or for monitoring individual leks not associated with an established lek route. IDFG's most current lek route survey form should be used when running lek routes.

3.2.2 General instructions for conducting a lek route

1. All new lek route participants must take lek route training available at IDFG regional offices.
2. Run each route four times per spring (four replicates for each route). This will ensure that peak male attendance is encountered at some point during the 4 route replicates.
3. All leks along a route during a particular replicate must be censused on the same morning.
4. Run each lek route from one-half hour before sunrise to one hour after sunrise.
5. All four route replicates should be run by the same observer.
6. Space route replicates roughly ten days apart.
7. Begin March 25 and run through April 30 for low elevation areas.
8. Begin April 5 and run through May 10 for high elevation areas.
9. Conduct lek routes only during good weather. Clear to partly cloudy, winds <10 knots (<12 mi) per hour.
10. Drive <25 mph along route between leks.
11. Count all males observed along the lek route and all males and females at a particular lek.
12. If weather conditions deteriorate outside the accepted parameters during the running of a lek route, the route should nonetheless be completed that day if possible, but subsequently run again in its entirety under acceptable weather conditions. While data from the

initial attempt would not be useable for trend monitoring purposes, they may nonetheless be of some value in documenting occupancy of certain leks, especially if for some reason the route cannot be rerun that year.
13. Submit completed lek route forms to the appropriate regional IDFG contact by June 1 of each year.

3.2.3 Instructions for monitoring a specific lek

1. Locate a spot that provides good visibility of the entire lek. Two or three observation points may be necessary for a large lek.
2. If a lek does not appear to be occupied, turn off the engine, step out of the vehicle and listen for displaying birds.
3. Record the time the count begins and ends as well as other pertinent information on the standardized form (observer name, lek name/number, weather conditions, etc.). Do not record data on scrap paper or nonstandardized forms. This will ensure that all participants consistently account for all necessary information.
4. First, count birds from right to left, wait 1-2 minutes. Second, count birds from left to right, wait 1-2 minutes. Finally, count birds from right to left again.
5. Record the highest number of males and females separately. If no birds are present, it is very important that you record a zero. Do not leave a space blank.
6. Proceed to the next lek and repeat steps 1-5. Watch carefully for new leks. If new leks are encountered along the way, stop and do a count following steps 1-5. Make a note on the form regarding the new lek.
7. Obtain GPS positions of all lek locations if this has not been done previously. Obtain a new GPS position if a lek moves greater than 0.25 mile.
8. If a new lek has been discovered, be certain to coordinate with the appropriate
IDFG wildlife manager or data steward in assigning the appropriate lek identification number to the new lek.

3.2.4 Breeding population data administration

The Idaho sage-grouse lek database will be maintained by the IDFG Conservation Data Center. Data will be made available to cooperating agency biologists and LWGs.

3.2.5 Production monitoring

Currently, the only practical way to monitor sage-grouse chick production is by classifying wings from hunter-harvested birds. The wing from a sage-grouse can provide information on the age (juvenile, yearling, or adult), gender, and reproductive status (for yearling and adult females successful or unsuccessful at nesting). Wings are collected at hunter check stations and from wing barrels distributed throughout southern Idaho. In late fall or early winter, the wings are classified by IDFG biologists and other trained

volunteers during annual “wing bees”. Future wing bees will provide opportunities for participation by members of LWGs. Data collected during the wing bees is recorded by harvest unit, however, data can also be grouped by Sage-grouse Planning Areas.

3.2.6 Harvest monitoring

An annual telephone survey of sage-grouse hunters will be used to estimate harvest, number of hunters, effort, and birds per hunter. Check stations will be used to monitor hunter success (birds per hunter and hours per bird) and trends in hunting pressure. Regional IDFG personnel will advise LWGs of planned sage-grouse check stations and participation by LWG members will be encouraged. Additionally, wing barrels will provide an index to harvest although their primary purpose is to increase samples of wings for estimating production.

3.2.7 The future of population monitoring

Idaho and other sage-grouse states currently monitor sage-grouse populations in a generally standardized manner within state boundaries. However, the aggregation and analysis of population data at scales encompassing multiple states has been problematic, due to differing protocols or standards for data collection. In an effort to resolve this issue, sage-grouse biologists and statisticians convened in Pocatello, Idaho, May 17-18, 2005 to explore options to improving methodologies for use at broader scale. In general, participants agreed there is a compelling need for standardization of population monitoring protocols and standards range wide, and a need for a hierarchical sampling approach that would facilitate the inference of population status and trends across geographic areas and multiple scales. Idaho sage-grouse researchers are at the forefront of this important issue, as new approaches to monitoring populations and managing data are developed, Idaho’s existing monitoring protocols will be modified as appropriate.

The National Wildlife Federation in Montana has developed an “Adopt-a-Lek” Program to encourage private landowners, sportsmen and others to assist agencies in monitoring leks. In 2008, IDFG’s Magic Valley Region began sponsoring a similar program, in which volunteers attend a lek monitoring training and then are “assigned” certain leks to monitor during the spring. This effort has continued through 2011, with some funding support from the Office of Species Conservation (via a grant application from the NMV LWG), and enables the Magic Valley Region to survey approximately 100 additional leks annually.

3.3 NMVPA Monitoring Goals

- Continue monitoring current lek routes for long-term trends.
- Continue to work with volunteers to survey leks of unknown status throughout the NMVPA

3.4 Sage-grouse habitat evaluation and monitoring

The evaluation and monitoring of sage-grouse habitats and selected threats are crucial components in the implementation of this Plan. Standardized approaches for the collection and aggregation of spatial and tabular data across multiple scales are presented in this chapter along with specific tasks, timelines, and responsible parties. In some cases processes or protocols still need to be developed; in these cases suggested tasks and timelines are identified to facilitate further action. The general approach presented in this chapter is to address monitoring needs and tasks first at the NMVPA-scale and the fine-scale (e.g., watershed or specific habitat restoration project). In general, tasks related to data acquisition and management for broad and mid-scales will be accomplished at the state-office level, and tasks at the fine scale will be the responsibility of land-management agency field offices and the IDFG Regional-level offices. Private landowners who wish to contribute information are encouraged to work closely with their respective IDFG Region and/or NRCS offices. Because of the hierarchical, multi-scale nature of habitat data, it is essential for agency field and state office level entities to coordinate closely. More specific discussion and details are provided in the following sections.

3.4.1 **NMVPA-Scale Monitoring**

The monitoring of trends in acreage of Key Habitat, Perennial Grasslands, Annual
Grasslands and Conifer Encroachment Areas at the mid- and broad scales are crucial in determining progress toward meeting the goals and objectives in the NMV Sage-grouse Conservation Plan. To that end, mapped habitats within the NMVPA will be reviewed and updated annually, based on the past year's wildfire, habitat restoration, sagebrush/fuels management and related activities occurring on federal, state and private (volunteer landowner) lands. Updates will be made available to the SAC and partners.
As mapping technology and the resolution and accuracy of digital map products improve, they will be considered for use in refining or replacing the habitat planning map.

The NMV LWG will continue to monitor changes in habitat fragmentation that may occur as a result of habitat changes (such as fire), infrastructure, or human development.

3.4.2 **Infrastructure monitoring**

Baseline infrastructure, maps and statistics for major paved roads (state, federal, interstate), major power lines (>138 kv), active railroads, oil/gas pipelines, communications towers, and wind energy development/monitoring sites have been incorporated into the Infrastructure Threat description using data available as of late 2010. Periodic updates of infrastructure metrics will be necessary due to anticipated increases of these features on the landscape. Infrastructure data compiled at the local level will be aggregated to the broad- and mid-scale as needed

Fine-Scale Monitoring
The monitoring of the status and trend of resource conditions and sage-grouse habitat characteristics at the fine-scale is particularly important since many aspects of habitat-selection by grouse occur at this scale (e.g., nest site selection), and many land-use decisions and habitat effects also occur at the fine-scale. Fine-scale data can also be valuable in helping summarize our knowledge of conditions across broader landscapes, and is essential for accurately describing seasonal habitats.

There currently is no universally adopted methodology or process in place for evaluating and monitoring habitat characteristics across agency jurisdictional boundaries. The statewide Sage-Grouse plan outlines a standardized approach for measuring greater sage-grouse habitat characteristics. The state plan also describes characteristics of different seasonal sage-grouse habitats, mostly derived from Connelly et al. (2000). Furthermore, the state plan outlines suggested steps for successfully and accurately mapping seasonal sage-grouse habitats. The reader should refer to the state plan for more information on these topics, as they do not vary between this plan and the state plan.

Monitoring selected geographic areas
In the future, certain important areas may warrant more detailed, long-term monitoring. For instance, it may be useful to collect information to address the need for statistically valid range wide monitoring population and habitat trends, or to research effects of habitat fragmentation, etc. in key areas in Idaho. Such areas may include: (1) Areas of particular interest or concern to LWGs, (2) Habitats closely associated with one or more sage-grouse lek routes of interest, (3) Limiting seasonal habitats, or (4) Certain unique areas of particular local or regional importance.

Mapping and monitoring projects and infrastructure
The careful documentation of vegetation management and restoration projects, wildfires, infrastructure and other factors affecting sage-grouse habitat is vitally important. Specifically, this information will serve as the foundation for updates to the Idaho Sage-grouse Habitat Planning map, and for tracking progress toward the elimination, reduction or mitigation of threats locally and at broader scales.
Goals for maintaining up-to-date infrastructure maps include:
- Annual review of anticipated infrastructure projects
- Addition of these projects to current NMVPA infrastructure maps
- Discussion of potential threats posed by new infrastructure projects to sage-grouse
- Discussion of cumulative threats posed by all anticipated infrastructure projects, and other threats, to sage-grouse

4 Implementation strategy

The successful implementation of this Plan necessitates that certain important tasks and processes occur in a timely manner. Many sound, proactive activities, such as sage-grouse habitat restoration, wildfire suppression and rehabilitation, restrictive sage-grouse harvests, and control of invasive plant species are already in progress or will be planned on a site-specific basis. Many other important tasks are pending. The purpose of this chapter is to concisely summarize the latter and identify responsible parties and target deadlines.

Specific project proposals as developed locally, public education efforts, habitat/population assessment and monitoring efforts, research, and staff participation in the Local Working Group (LWG) will be routinely incorporated into agency annual budgets and work plans, as appropriate, and contingent on funding. Agencies, the LWG, and other cooperators are also expected to pursue partnership opportunities to leverage available funding to the greatest extent possible.

4.1 Ongoing LWG Tasks

4.1.1 LWG will meet at least quarterly:

January – complete annual report, provide recommendations to annual State Habitat Map update, review hunting season results and project reports

April – project identification and ranking (OSC, SGI, other)

July – evaluate annual lek survey results, provide recommendation for upcoming hunting season regulations

November – status reports, new reports on infrastructure, wildfire from past year, etc. review scheduled checklist of "ongoing" project status – send out to Group in advance etc.

4.1.2 Other Meetings and Activities:

Special LWG meetings may be convened for other specific purposes such as to provide timely comment on important projects occurring within the planning area that may affect sage-grouse, if mid-scale or fine-scale population triggers are met as outlined in Chapter 2 (Population Section), under the Fire/ Annual Grasslands threat (large fires and/or drought conditions) etc. Special LWG meetings would be organized by IDFG (if a member of the LWG wishes a special meeting be convened, contact the IDFG representative on the LWG).

4.1.2.1 Within five years, review the LWG Plan and update based on new or better information.

4.1.2.2 Provide an annual report of activities to the State Advisory Committee (SAC) by January 15 annually.

4.1.2.3 Develop habitat restoration, monitoring, and/or research projects annually to submit to SAC and Office of Species Conservation (OSC) or to other funding programs (i.e. Sage-grouse Initiative, Partners for Wildlife, etc.).

4.1.3 LWG Tasks Specific to Population and Habitat Monitoring as described in Chapter 2—Implementation Milestones

Task	Responsible Party	Frequency
5.2.1 IDFG and partners will complete annual population monitoring as outlined in Chapter 2 and 4.2	IDFG, BLM, FS, NPS, volunteers, etc.	Annual
5.2.2 LWG will annually review population data as presented by and IDFG representative	LWG	Annual (July meeting)
5.2.3 LWG will convene a special meeting if population assessment triggers occur (as detailed in Chapter 2). The LWG would discuss potential causes for population decline, whether current activities are sufficient or if the LWG needs to temporarily re-prioritize threats and conservation measures	LWG, IDFG	As needed
5.2.4 LWG will provide input (including spatial data) into the annual update of the Idaho Sage-grouse Habitat Planning Map	LWG, BLM	Annually by February 1
5.2.5 Approximately every five years, the LWG will review and revise as appropriate (based on new or improved information) the LWG seasonal habitat maps	LWG	5 year interval
5.2.6 Approximately every five years, the LWG will review and document progress towards habitat restoration within the Restoration Emphasis Areas (REA's) described in Chapter 2. LWG will also review REA boundaries and locations to determine if a re-prioritization of REA's is necessary	LWG	5 year interval
5.2.7 Approximately every five years, the LWG will reevaluate the infrastructure analysis (Chapter 2) and update the analysis as appropriate based on new infrastructure, removal of existing infrastructure, new information on spatial buffers, etc.	LWG	5 year interval
5.2.8 LWG will update the vegetation landcover map and dataset (Chapter 2) as better information becomes available	LWG	As new information becomes available
Task	**Responsible Party**	**Frequency**
5.2.9 Consider and encourage additional winter flights and/or telemetry studies to improve understanding of sage-grouse distribution and to refine and edit seasonal habitat mapping	LWG, IDFG	Ongoing

4.1.4 LWG Tasks Specific to Threats as described in Chapter 3—Conservation Measures Milestones

4.1.4.1 Infrastructure

Task	Responsible Party	Frequency/Timeline
5.3.1.1 LWG will keep informed of potential infrastructure project proposed within the planning area (or large projects proposed in adjacent LWG areas), evaluate potential effects of such projects on sage-grouse, and provide timely comments and recommendations on such projects to avoid or minimize effects to sage-grouse (conservation measures outlined in 3.3.6 of this document would be highlighted)	LWG	Ongoing
5.3.1.2 LWG will work cooperatively with partners and individuals to remove or minimize effects of existing infrastructure	LWG	Ongoing
5.3.1.3 LWG and agencies will work cooperatively with permittees and landowners to reduce effects of wire fences on sage-grouse. LWG will annually provide BLM and interested landowners with a list of fences that most likely cause negative effects to sage-grouse that should be considered for removal (if un-needed) or marked to improve visibility. Cost-share projects may be appropriate. BLM (and landowners through NRCS) will work to improve spatial data of existing fences.	LWG, BLM, NRCS, interested landowners	List provided annually by February 1. Improved mapping of fences would be ongoing.

4.1.4.2 Isolated Populations

Task	Responsible Party	Frequency/Timeline
5.3.2.1 LWG will work to avoid the creation of isolated populations of sage-grouse through conservation measures outlined within 3.4.1 of this document	LWG	Ongoing

4.1.4.3 Sport Hunting

Task	Responsible Party	Frequency/Timeline
5.3.3.1 Based on annual population monitoring results and guidelines within the State Plan (Table 4-14 on pages 4-122), the LWG will provide recommendations to IDFG on setting sage-grouse hunting seasons and bag limits.	LWG	Annual (July)
5.3.3.2 LWG will encourage IDFG to expand use of wing barrels in the planning area in order to obtain better juvenile production data	LWG	Ongoing?
5.3.3.3 IDFG and/or knowledgeable LWG members will analyze existing sage-grouse harvest data for the planning area annually	IDFG	Annual
5.3.3.4 LWG will encourage research on sage-grouse survival and causes of mortality within the planning area	LWG	Ongoing?

4.1.4.4 Predation

Task	Responsible Party	Frequency/Timeline
5.3.4.1 LWG will encourage research into the effects of predation on sage-grouse and other contributing factors (using guidelines outlined in 3.6 of this document) within the planning area. Conservation items listed in 3.6.1 would be followed if excessive predation is documented to be occurring.	LWG	Ongoing

4.1.4.5 Human Disturbance

Task	Responsible Party	Frequency/Timeline
5.3.5.1 In order for the LWG to better evaluate the effects of recreation on sage-grouse, better information on the spatial and temporal extent of recreation activities is needed. The LWG will attempt to collect information from land management agencies (recreation planners) on areas of high OHV use and potential expansion areas. This information would be overlaid with existing sage-grouse distribution and habitat layers to determine the potential extent of the issue. The same would be done for	LWG, BLM	Within five years?

potential overlap of snowmobiling and sage-grouse wintering areas.		
5.3.5.2 LWG will work with BLM, permittees, and landowners to map out where human activities associated with livestock management may disturb sage-grouse leks and nesting. LWG will work collaboratively with agencies and permittees to reduce disturbance from such activities.	LWG, BLM	Map within one year??
5.3.5.3 LWG will provide input on proposed new or renewal of special use permits, recreation projects, travel management or other projects on public lands where such activities may disturb sage-grouse during critical periods (convene a special meeting if necessary). Conservation measures described in 3.7.1 of this document would be the basis for such comments.	LWG	Ongoing
5.3.5.4 LWG will work collaboratively with BLM and SUWS Program to reduce potential disturbance effects of SUWS activities on sage-grouse. LWG and BLM will analyze existing information related to spatial and temporal overlap of SUWS activities with known leks and nesting habitat. LWG and BLM will provide this data to SUWS and work with them to reduce negative disturbance (recommendations for timing and location of SUWS activities in relation to sage-grouse critical time periods and locations).	LWG, BLM	Within one year??

4.1.4.6 Agriculture

Task	**Responsible Party**	**Frequency/Timeline**
5.3.6.1 LWG and partners will work to prevent long term loss of sage-grouse habitat from plowing burning, or spraying in the planning area through educational efforts with private landowners, permittees, and agencies	LWG	Ongoing
5.3.6.2 LWG will provide comments and recommendations on proposed prescribed fire or mechanical/chemical brush management projects on federal lands (or federally funded projects on private lands) that may affect sage-grouse (convene a special meeting if necessary). Conservation measures described in 3.8.1 of this document would be the basis for such comments.	LWG	Ongoing

Agencies (BLM, FS, and NRCS) would be responsible for alerting the LWG of any such planned projects.		
5.3.6.3 LWG will encourage research into the extent which mortality to sage-grouse (particularly young juveniles) from haying activities is occurring in the planning area and the extent which this affects annual recruitment. LWG and partners will also investigate (and encourage) potential techniques to avoid mortality and/or subsidy programs to delay haying activities until young grouse can fly and escape annual haying activities.	LWG	Within five years? Specific proposal?
5.3.6.4 LWG will encourage research into the extent which insecticide use in the planning area is affecting sage-grouse	LWG	Within five years??
5.3.6.5 LWGs, Cooperative Extension agents, NRCS, IDFG, NAGP and other partners should collaborate to inform farmers of concerns with insecticide use and to develop collaborative solutions to reduce adverse impacts to sage-grouse.	LWG	Within five years? Specific proposal?
Task	**Responsible Party**	**Frequency/Timeline**
5.3.6.6 LWG, land management agencies, landowners, IDFG, IDA, and APHIS-PPQ should collaborate closely to ensure annual grasshopper/Mormon cricket control efforts focus on key problem areas, better delineate treatment avoidance areas, determine the treatment of least risk to sage-grouse, and monitor results	LWG	Ongoing Specific proposal?

4.1.4.7 Wildfire/Annual Grasslands

Task	**Responsible Party**	**Frequency/Timeline**
5.3.7.1 LWG, BLM, and FS develop improved mapping of annual grasslands and use that in conjunction with sage-grouse population and habitat maps to develop annual grassland restoration priority areas throughout the NMVPA	LWG, BLM, and FS	?
5.3.7.2 LWG will encourage development of fire breaks in areas dominated by annual grasslands and the recovery of these areas through sagebrush recovery in interior portions of areas dominated by annual grasslands	LWG, BLM	?
5.3.7.3 LWG will encourage research into effective and sustainable methods of cheatgrass control and removal	LWG	Within five years? Specific proposal?

5.3.7.4 LWG will encourage BLM to convert existing exotic annuals to perennial grasses in road or railroad rights-of-way areas where possible and to seed (with perennial species) new road cuts or where road or railway right-of-way maintenance activities expose soil to potential exotic annual grass spread	LWG	Within five years?? Specific proposal?

Task	Responsible Party	Frequency/Timeline
5.3.7.6 LWG will encourage BLM to convert existing exotic annuals to perennial grasses in road or railroad rights-of-way areas where possible and to seed (with perennial species) new road cuts or where road or railway right-of-way maintenance activities expose soil to potential exotic annual grass spread	LWG	Within five years?? Specific proposal?
5.3.7.7 LWG encourage the BLM and IDL to employ fire suppression tools (such as fire breaks, green strips, and road improvement and development) that have minimal negative impacts on sage-grouse or other wildlife species	LWG	?
5.3.7.8 When large (>50,000 acre) fires occur within sage-grouse habitat, convene a meeting of the NMV LWG to discuss potential ramifications of the fire and develop recommendations for rehabilitation and other responses.	LWG	As needed
5.3.7.9 LWG will encourage BLM to convert existing exotic annuals to perennial grasses in road or railroad rights-of-way areas where possible and to seed (with perennial species) new road cuts or where road or railway right-of-way maintenance activities expose soil to potential exotic annual grass spread	LWG	Within five years?? Specific proposal?
5.3.7.10 Monitor drought conditions, and when counties declare official drought, convene a meeting of the NMV LWG to discuss potential ramifications and develop actions to minimize negative effects to sage-grouse	LWG	As needed
5.3.7.5 Develop a map quantifying fire risk in relation to sage grouse populations, seasonal habitat, and potential habitat improvement projects.	LWG, BLM, IDFG	Within five years?

4.1.4.8 Seeded Perennial Grasslands

Task	Responsible Party	Frequency/Timeline
5.3.8.1 LWG will encourage BLM to restore sagebrush into perennial grasslands where sagebrush recovery is lacking (<10% canopy closure). LWG will also encourage BLM to investigate	LWG, BLM	Check Davis Mountain Fire area in 2011

whether or not sagebrush within the Davis Mountain Fire area (1990's) has (on average) reached >10% canopy closure such that it can be updated to key habitat on the State Habitat Planning Map.		

4.1.4.9 Urban/ Rural Development

Task	Responsible Party	Frequency/Timeline
5.3.9.1 LWG will provide county planning and zoning administrators/commissions with maps of sage-grouse habitat, leks, and important seasonal habitats to incorporate into planning and zoning efforts within the counties in the planning area	LWG	Within one year?
5.3.9.2 LWG will keep informed of important county planning and zoning efforts and proposed development within sage-grouse habitat. LWG will provide comments/ recommendations to eliminate or minimize effects from zoning or proposed development that may affect sage-grouse. Conservation measures within 3.11.1 of this document would guide LWG comments.	LWG	Ongoing
5.3.9.3 BLM should not dispose of land parcels in key sage-grouse habitat or at minimum should exchange for parcels of equal habitat quality. BLM should give the highest priority to conservation buyers when disposing of parcels located in key sage-grouse habitat	LWG	Ongoing

4.1.4.10 Livestock Management

Task	Responsible Party	Frequency/Timeline
5.3.10.1 LWG with assistance from BLM and IDFG will develop a map of where grazing allotments with active grazing occurring during the critical nesting period (April 1 to June 15) overlap with mapped nesting habitat (or where trailing of sheep across such areas occurs). This would highlight what public land allotments (or trail routes) are of concern for disturbing lekking, nesting and/or reducing nesting cover.	LWG, BLM, IDFG	Within one year?
5.3.10.2 LWG will provide the map from 5.3.10.1 and comments to BLM, FS, or IDL on those allotments where temporal and spatial overlap of grazing occurs with sage-grouse nesting. Conservation measures listed in 3.12.1 would guide these	LWG	Within five years or as allotments are reauthorized through NEPA

comments. In general, LWG would recommend adjusting timing of grazing until after the nesting period to reduce effect of grazing on sage-grouse nesting.		
5.3.10.3 BLM or IDL should place signs or provide maps of occupied leks to sheep permittees who trail/graze sheep in the vicinity of active leks during the breeding period. Require that sheep bands avoid active lek areas and/or not cross those areas during the early morning or bed them there overnight. LWG will provide comments on this issue during Resource management Plan (RMP) updates.	LWG, BLM, IDL	Within five years or as allotments are reauthorized through NEPA
5.3.10.4 LWG will provide comments to BLM, FS, or IDL on those allotments occurring in documented sage-grouse brood-rearing habitat, encouraging light utilization and maintenance of healthy riparian areas and an abundance of forbs and insects (for grouse broods). Conservation measures listed in 3.12.1 would guide these comments.	LWG	Within five years or as allotments are reauthorized through NEPA
5.3.10.5 LWG will encourage private landowners to not "aftermath" graze (or only lightly graze) alfalfa fields after haying where sage-grouse use has been documented to occur in their fields (retain some stubble height of alfalfa so that grouse continue to use through the fall and are not excluded). LWG may consider working with NRCS to develop a BMP practice related to aftermath grazing of alfalfa field where sage-grouse use is documented.	LWG, NRCS	Within five years?
5.3.10.6 If a county within the planning area has an official "disaster" declared due to drought, the LWG would convene a meeting to determine if the following recommendation should be given to public grazing managers: In sage-grouse nesting and brood-rearing habitats, adjust livestock use (season, utilization, stocking, intensity, and/or duration) during drought to minimize the additional stress placed on herbaceous species. This is anticipated to reduce impacts on perennial herbaceous cover, plant species diversity, and plant vigor. (these activities may need to be continued in the year following drought as well)	LWG	If drought occurs
5.3.10.7 Placement of salt/mineral supplements, new fences, and water developments within sage-grouse habitat would consider impacts to sage-grouse and avoid or minimize those effects as outlined 3.12.1 of this document. LWG would make comments on new proposed fences and water developments during NEPA	BLM, FS, IDL, NRCS, LWG	Ongoing

analysis (for federal public lands) if impacts to sage-grouse are likely. Existing fences that potentially impact sage-grouse would be mapped and altered as per infrastructure implementation measure 5.3.1.3.		

5 Adaptive management

The utility of this Plan in achieving its stated objectives is largely contingent on the implementation of the various conservation measures in the appropriate place and time, and their subsequent effectiveness. While measures may be implemented with the best of intentions, the success of certain measures is not guaranteed. For example, a restoration seeding may fail, or prove only marginally successful, due to unforeseen influences such as drought, wildfire, rangeland grasshopper outbreaks, or human error. Moreover, some conservation measures may involve habitat restoration actions that will take well over a decade to accomplish.

Given the multitude of temporal and spatial variables, in many cases, determining the specific effects of individual conservation actions on sage-grouse populations will be very difficult. However, over time the knowledge gained by trying to assess the effectiveness of various actions will contribute new knowledge about sage-grouse populations and about the utility of conservation actions. Adaptive management is a method for examining alternative strategies for meeting measurable biological goals and objectives, and then, if necessary, adjusting future conservation management actions according to what is learned. As knowledge about
Idaho sage-grouse populations increases, and as a better understanding of the effectiveness of various conservation measures (at both local and regional scales) is gained, it will be possible and desirable to review the effectiveness of various actions and adapt those responses where it is deemed appropriate.

The degree to which conservation measures (or strategies) meet their stated objectives can only be determined by monitoring. It is thus the intent of this Plan to ensure that:
(1) the implementation of conservation measures be documented by the appropriate agency or landowner, (2) the success or effectiveness of conservation measures be monitored periodically using the most appropriate method, and (3) information exchange occurs between parties to the Plan to facilitate the learning from our various management actions. Suggested processes and mechanisms for documentation and information transfer necessary to implement adaptive management are identified in

Table 5-6 Process and documentation necessary to implement adaptive management
Action Responsible Party Method of Documentation

Action	Responsible Party	Method of Documentation
Implementation of conservation measure	Agency project team leader or landowner	1. Project Completion Report in project file, with "as-built" illustrations, details as appropriate; upward reporting of spatial and tabular data; include in annual LWG report to the SAC.
Measure effectiveness of conservation measure	Agency project team leader or landowner	1. Standardized protocol (e.g., vegetation transect); photographs; narrative write-up. Results placed in permanent project file. Results incorporated into annual LWG report to SAC.
Information transfer	Agency specialists, landowners, LWGs, Research Biologists, and Ecologists	1. Annual reports to the SAC and coordination with SAC TAT. 2. Presentations at professional meetings (e.g., Idaho Chapter Wildlife Society, Society for Range Management, etc.) 3. Publication in peer-reviewed scientific publications or other appropriate venues.

6 Appendices (as necessary)