CHALLIS SAGE-GROUSE CONSERVATION PLAN

FINAL

Developed by:
The Challis Sage-grouse Local Working Group

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Glossary of Terms

Arid:	Lacking moisture, especially having insufficient rainfall to support trees or woody plants (American Heritage 2005). An environment with a high precipitation deficit (Wikipedia 2007).
Habitat fragmentation:	A process of environmental change that describes the emergence of discontinuities (fragmentation) in an organism's preferred environment (habitat). habitat fragmentation can be considered to include six discrete processes: reduction in the total area of the habitat; increase in the amount of edge; decrease in the amount of interior habitat; isolation of one habitat from other areas of habitat; breaking up of one patch of habitat into several smaller patches; and decrease in the average size of each patch of habitat (Wikipedia 2007).
Hydric:	Relating to, characterized by, or requiring considerable moisture (American Heritage 2007).
Hydrophytic:	Plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (COE 1995).
Invasive:	An alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health (Presidential Executive Order 13112)
Lek:	A lek is a gathering of males of certain species of animal for the purposes of competitive mating display, held before and during the breeding season, day after day. The same group of males meet at a traditional place and take up the same individual positions on an arena, each occupying and defending a small territory or court. Intermittently or continuously, they spar individually with their neighbours or put on extravagant visual or aural displays (mating "dances" or gymnastics, plumage displays, vocal challenges, etc.) (Wikipedia 2007).
Multiple Indicator Monitoring:	A detailed long-term monitoring protocol using simple refinements of various existing protocols to measure stream and riparian vegetative attributes and, thus, provide useful data regarding the general condition and trend of stream channels and riparian vegetation regardless of the kind of activities or uses occurring on the site.

Mesic:	Of, characterized by, or adapted to a moderately moist habitat (American Heritage 2005). A type of habitat with a moderate or a well-balanced supply of moisture (Wikipedia 2007)
Proper Functioning Condition:	When adequate vegetation, landform, or large woody debris is present to: dissipate stream energy associated with high waterflow, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; support greater biodiversity (USDI 1998).
Seral stage (community):	An intermediate point of vegetation development of an area where an ecosystem is advancing towards its climax community A seral community is the name given to each group of plants within the succession (Wikipedia 2007).
Xeric:	Of, characterized by, or adapted to an extremely dry habitat (American Heritage 2005).

Citations

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Acronym List

BLM	Bureau of Land Management
Challis SGPA	Challis Sage-grouse Planning Area
Challis LWG	Challis Sage-grouse Local Working Group
CWMA	Cooperative Weed Management Area
IDFG	Idaho Department of Fish and Game
NRCS	Natural Resources Conservation Service
PFC	Properly Functioning Condition
USFS	United States Forest Service
WFSA	Wildland Fire Situation Analysis

CHALLIS SAGE-GROUSE LOCAL WORKING GROUP'S SAGE-GROUSE CONSERVATION PLAN

I. Introduction

The Idaho Department of Fish and Game (IDFG) published a Sage-grouse Management Plan in 1997 that called for the development of local working groups throughout the state to develop local management plans for increasing greater sage-grouse (sage-grouse) populations. Soon after the state plan was signed, the Upper Snake Sage-grouse Local Working Group was formed. This group incorporated the areas of Custer and Lemhi Counties that had sage-grouse populations into their discussion. In July 2002, during a meeting with the Challis Experimental Stewardship Program, the Upper Snake Sage-grouse Local Working Group discussed forming a local sage-grouse working group for the Challis area. Both private citizens and public agencies agreed that the Challis Sage-grouse Planning Area (Challis SGPA) was different enough from the Upper Snake Sage-grouse Planning Area to warrant a separate group to develop conservation measures that were appropriate to local conditions. The Challis Sage-grouse Local Working Group (Challis LWG) was formed with a first meeting in December 2002.

The Challis LWG has met approximately once a month from December 2002 through the present time. The group has strived to keep the appropriate government agencies, private individuals, and private groups involved in the process. The group began by discussing the risks to sage-grouse in the Challis SGPA and then proceeded to develop conservation measures to help alleviate those risks. As the plan development proceeded, the group has also focused on compiling existing data and collecting new data. The Challis LWG continues to facilitate on-the-ground projects designed to improve and protect sage-grouse habitat. The Challis SGPA is illustrated in Figure I.

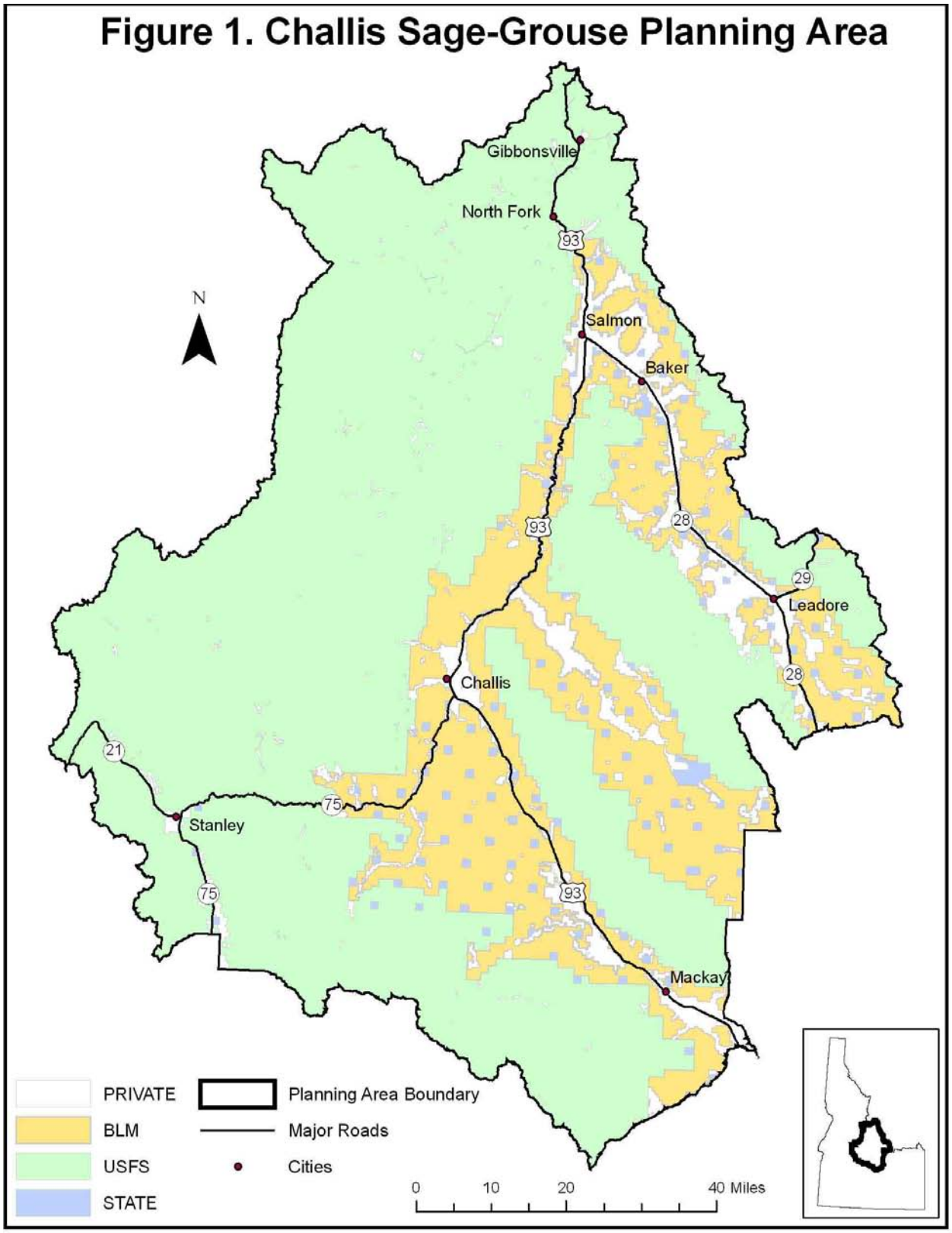
The purpose of the Challis LWG is to plan and oversee implementation of conservation measures that will result in a stable, healthy sage-grouse population within sustainable habitats. Management of sage-grouse populations and habitat (including historical) should occur in a socially, economically, and ecologically focused manner.

II. Vision Statement

The vision of the Challis LWG in the Challis SGPA is to:

- Maintain, and where possible, increase the sage-grouse population using adaptive management practices;
- Develop more local in-depth knowledge about sage-grouse and sagebrush ecosystems;
- Maintain, restore and enhance diverse, healthy, sagebrush communities using adaptive management practices;
- Identify important data gaps and utilize existing protocols for collecting relevant information regarding sage-grouse and sagebrush habitat for management purposes;
- Increase public involvement in the planning, management, and implementation process; and
- Increase cooperation between land and wildlife management agencies and private property owners.

Figure 1. Challis Sage-Grouse Planning Area



III. Challis Sage-grouse Planning Area Habitat Guidelines

These guidelines are based on local site knowledge and the Connelly et al. (2000) Guidelines to manage sage-grouse populations and their habitats (Appendix B).

Breeding habitats

Breeding areas, called leks, generally occur in open areas surrounded by sagebrush from mid-March through mid-May. Local examples include low sagebrush flats and ridge tops, landing strips, old lakebeds, unpaved roads, cropland, and burned areas. Sage-grouse males form leks opportunistically at sites within or adjacent to potential nesting habitat. Nesting habitat and leks should be managed to attain or support the following conditions (Connelly, et al. 2000):

	Height		Canopy cover (%)
	Centimeter	Inches	
Mesic site:			
Sagebrush	40-80	16-31	15-25
Grass-forb	>18	>7	≥25 (15% perennial grasses and 10% forbs)
Arid site:			
Sagebrush	30-80	12-31	15-25
Grass-forb	>18	>7	≥15

Habitats used by pre-laying hens are part of the breeding habitat. These areas should provide a diversity of forbs high in calcium, phosphorus, and protein. The ecological condition of these areas may greatly affect nest initiation rate, clutch size, and subsequent reproductive success.

Sage-grouse hens typically select nest sites under sagebrush, although other shrub species may be used. Nests occurring under sagebrush cover have higher nest success than other cover types. The mean height of sagebrush most commonly used by nesting grouse ranges from 30 to 80 cm (12-31 in) and nests tend to be under the tallest sagebrush within a stand. In general, sage-grouse nesting occurs under shrubs having larger canopies and more ground and lateral cover (spreading growth form rather than columnar).

Grass height and cover are important components of sage-grouse nest sites. Herbaceous cover associated with nest sites may provide scent, visual, and physical barriers to potential predators.

Early brood-rearing habitats

Early brood-rearing areas occur in upland sagebrush habitats relatively close to nest sites, but movements of individual broods may vary. The period of early brood-rearing is from mid-April to mid-June. These habitats may be relatively open (about 15% sagebrush canopy cover) stands of sagebrush with >15% canopy cover of grasses and forbs. Great plant species richness with abundant forbs and insects characterize brood areas. Insects, especially ants (*Hymenoptera*) and beetles (*Coleoptera*) are an important component of early brood-rearing habitat.

Early brood-rearing habitats should be managed to attain or support the following conditions which are the same for both mesic and arid sites (Connelly, et al. 2000):

	Height		Canopy Cover (%)
	Centimeter	Inches	
Sagebrush	40-80	16-31	10-25
Grass-forb	variable	variable	>15

Summer late brood-rearing habitats

As sagebrush habitats desiccate, sage-grouse usually move to more mesic sites which are higher in forb availability from June through August. Suitable habitat would be meadow or riparian areas dominated by mesic or hydric (also hydrophytic) plant species. The habitat should not have evidence of excessive erosion, though there may be some bare ground. The habitat suitability decreases as erosion increases or as xeric species invade the riparian/wetland zone. The presence of succulent, green forbs is essential. There should be sagebrush cover adjacent to the riparian/wetland zones to provide escape or protective cover. There are some upland sagebrush communities that provide late brood-rearing habitat due to elevation which helps to retain succulent, green forbs later into the summer. Wet meadows, springs, riparian zones and alfalfa fields are locally important. These mesic areas should be managed for Proper Functioning Condition (PFC) (BLM Technical Reference 1737-9).

Winter habitats

Movements to winter range are slow and meandering, and occur from late August to December. Wintering habitat is utilized from November through March. Feeding habits generally shift from forbs in early fall to sagebrush in winter. Characteristics of sage-grouse winter habitats are relatively similar throughout most of the species' range. During winter, sage-grouse feed almost exclusively on leaves of sagebrush in stands generally >15 % sagebrush cover. On winter ranges, areas with access to sagebrush above the snow (such as south slopes and wind blown ridges) are important. Winter habitats should be managed to sustain healthy sagebrush communities on a landscape scale, allowing sage-grouse access to sagebrush stands with canopy cover of 10–30% and heights of at least 25–35 cm (10-14 in) above snow cover.

IV. Status of Sage-grouse Population and Habitat

Background information related to sagebrush and sage-grouse ecology is readily available in the Conservation Plan for the Greater Sage-grouse in Idaho (Idaho Sage-grouse Advisory Committee 2006) and in the Conservation Assessment of greater sage-grouse and sagebrush habitats (Connelly, et al. 2004). Information from these documents is not repeated here. Following is a summary of locally specific information.

A. Population

The total year-round population of sage-grouse in the Challis SGPA has not been estimated. However, population trends on individual leks have been tracked since the early 1960's in the Challis SGPA. Population trends are determined by counting the number of males observed strutting on lek routes in the spring. Lek routes are one or more associated leks which the same males may use during a breeding season. Typically, the same leks are counted four times each spring and the highest count is reported. Established techniques are used to assure route count

consistency from one year to the next. (Refer to Section 5.2.1.1 of the Statewide Conservation Plan for general instructions for counting lek routes.)

Figure 2 illustrates the total number of male sage-grouse counted between 1986 and 2006 on population indexed routes within the Challis SGPA. More data related to the individual lek route counts in the Challis SGPA are presented in Appendix A.

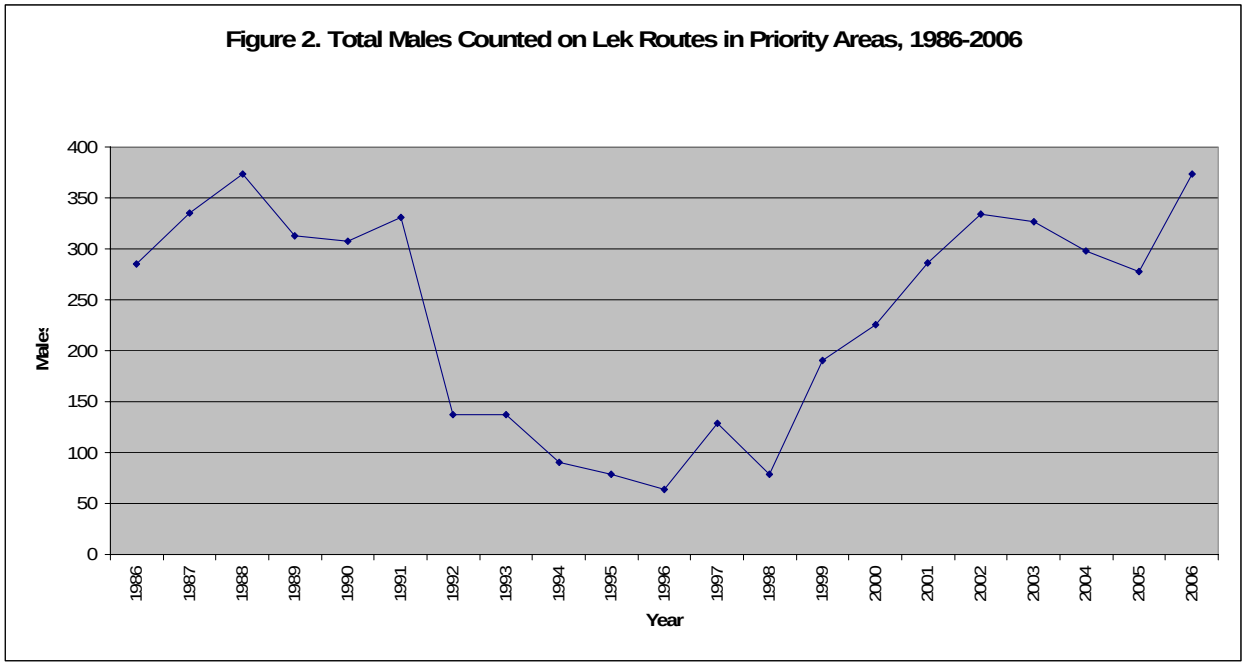
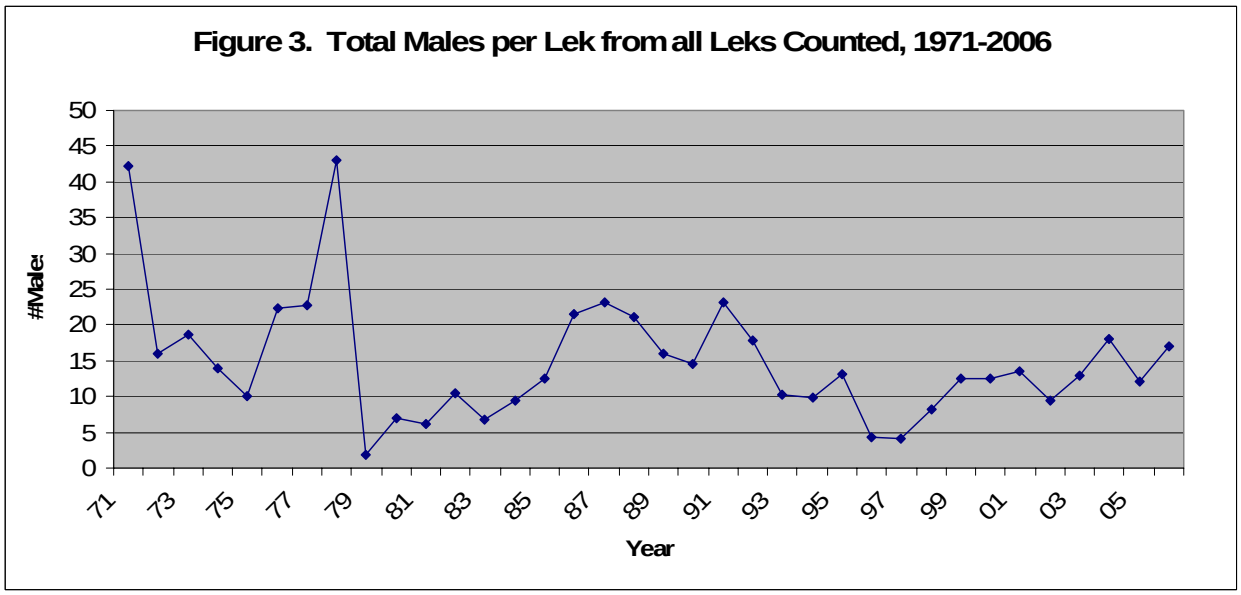


Figure 3 summarizes the average number of males counted on all leks 1971-2006.



More data related to the individual lek route counts in the Challis Sage-grouse Planning Area are presented in Appendix A.

A method that is used to track production trends analyzes data derived from sage-grouse wings deposited into barrels by hunters. Table 1 below presents various production trends based on wing data for sage-grouse in the Salmon Fish and Game region from 1979 through 2004.

Table 1. Greater sage-grouse production based on wing collections[1], Salmon Region, 1979- 2005

Year	Juveniles per 100 females	Juveniles per 100 adults	Percent unsuccessful females
1979	275	149	60
1980	188	102	66
1981	118	75	45
1982	157	113	57
1983	275	133	36
1984	228	134	52
1985	150	72	53
1986	247	159	45
1987	126	61	53
1988	143	72	
1989	177	98	
1990	175	116	
1991	168	100	69
1992	150	70	70
1993	149	100	56
1994	133	83	57
1995	78	40	
1996	320	155	47
1997	257	189	43
1998	520	347	60
1999	325	173	63
2000	149	100	51
2001	218	117	55
2002	229	114	67
2003	280	124	73
2004	190	121	81
2005	117	50	44
Average of the last ten years	261	149	58

[1] Data derived from small sample sizes (less than 100 per year)

Harvest data are available for various locations around the State from 1985 to the present. Table 2 below shows the estimated greater sage-grouse harvest for the Salmon Fish and Game Region from 1985 to 2004 based on check station and telephone survey.

Table 2. Estimated greater sage-grouse harvest, Salmon Region, 1985- 2005

Year	Check Station[a]				Telephone Survey[b]		
	Hunters	Birds harvested	Birds/ hunter	Hours/ bird	Hunters	Birds harvested	Birds/ hunter day
1985	180	228	1.3	6.5	667	976	0.8
1986	106	147	1.4	4.5	390	911	1.9
1987	117	265	2.3	3.0	625	2,852	2.0
1988	120	276	2.3	3.0	727	2,326	0.8
1989	125	192	1.5	3.6	560	974	0.8
1990	155	167	1.1	3.9	519	1,842	1.1
1991	91	153	1.7	4.1	760	2,122	0.8
1992	93	105	1.1	7.0	913	941	0.4
1993	84	48	0.6	13.1	1,670	2,620	0.6
1994	74	64	0.9	7.1	1,236	4,327	0.9
1995	79	25	0.3	23.9	1,117	2,132	0.4
1996	68	31	0.5	9.2			
1997	42	19	0.5	11.1			
1998	62	29	0.5	7.5			
1999	56	50	0.9	4.1			
2000	48	60	1.3	5.7	526	788	1.5
2001	41	29	0.7	7.8	440	571	1.3
2002	63	60	1.0	6.4	629	956	0.7
2003	52	50	1.0	7.9			
2004	25	20	0.8	5.4	364	459	0.6
2005	33	40	1.2	7.7	728	949	0.7
Average of the last ten years	49	39	0.8	7.3	537	745	1.0

[a] Howe and Sage Junction check stations.

[b] Telephone survey data at the Regional level were not collected from 1996-1999. Data from 2000-2003 includes all mountain-valley areas (zones 7A and 7B). Telephone survey data for 2003 is not available.

B. Habitat

Information about sage-grouse habitats in the Challis SGPA is not readily available. In particular, there is very little information about habitat condition. Consequently, efforts to compile information about sage-grouse habitat are on-going.

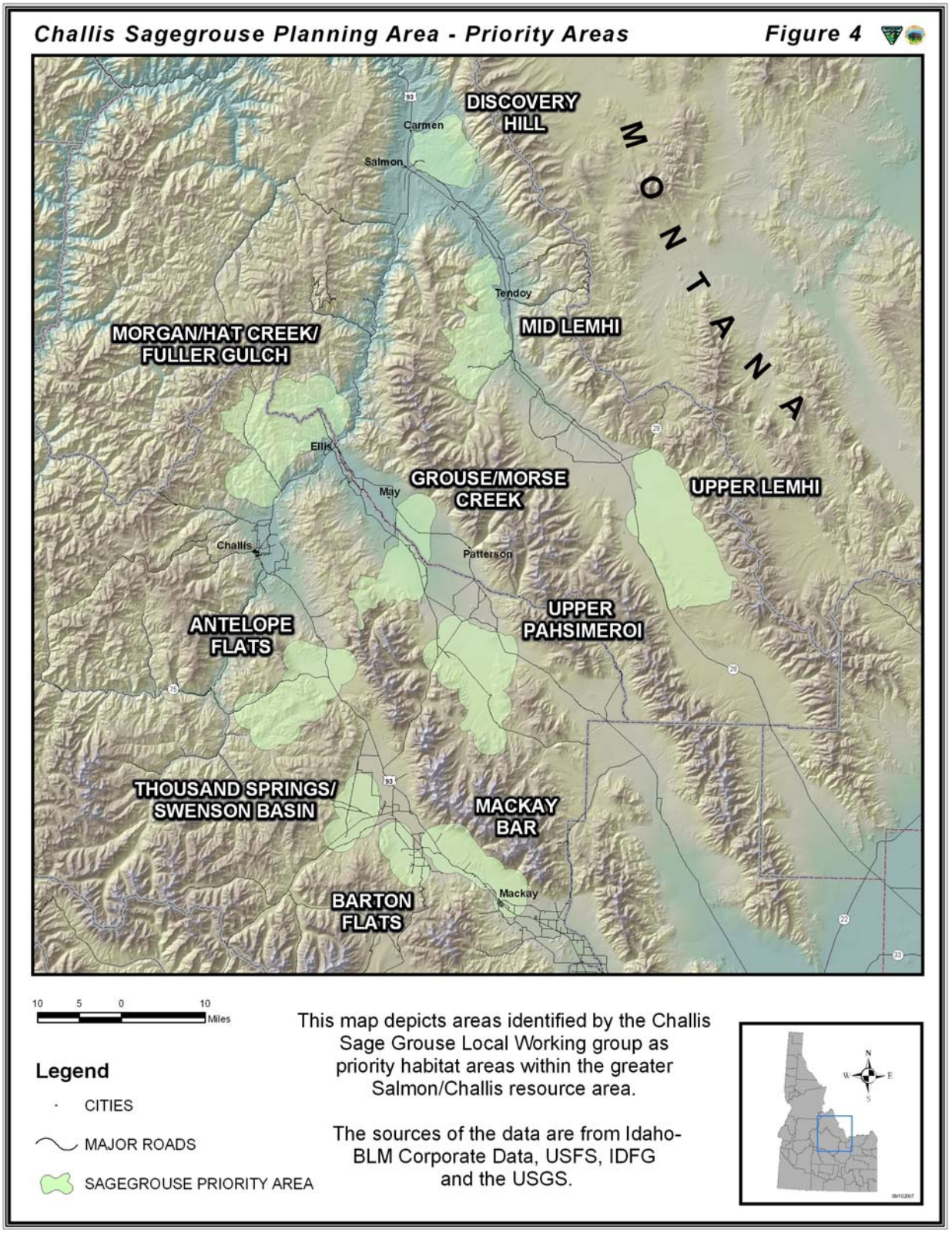
The Challis LWG used telemetry, lek data, observations, and Bureau of Land Management (BLM) Resource Management Plans to develop a map of priority habitat areas within the Challis SGPA (Figure 3). This map does not illustrate all habitat areas; rather, it depicts those areas that are deemed to be of highest priority for protection and restoration. This map will be revised on an as-needed basis to reflect new data.

The following 11 areas have been identified by the Challis LWG as "current" priority habitat areas for sage-grouse in the Challis SGPA, including leks:

- Upper Pahsimeroi Valley;
- Upper Lemhi Valley;
- Thousand Springs/Swensen Basin;
- Mackay Bar;
- Morgan/Hat Creek/Fuller Gulch;
- Discovery Hill;
- Grouse/Morse Creek;
- Antelope Flats;
- Barton Flats; and
- Mid-Lemhi.

The Challis Sage Grouse Local Working Group Data Compilation Report, dated October 2005, was prepared under a contract between the Challis LWG and Whitebark, Inc.

The Challis LWG has identified gaps in the data and intends to conduct additional efforts to support this Plan.


Challis Sagegrouse Planning Area - Priority Areas
Figure 4
DISCOVERY HILL
Carmen
Salmon
MONTANA
Tendoy
MID LEMHI
MORGAN/HAT CREEK/ FULLER GULCH
Ellis
May
GROUSE/MORSE CREEK
UPPER LEMHI
Challis
Patterson
UPPER PAHSIMEROI
ANTELOPE FLATS
THOUSAND SPRINGS/ SWENSON BASIN
MACKAY BAR
Mackay
BARTON FLATS
10 5 0 10 Miles
Legend
CITIES
MAJOR ROADS
SAGEGROUSE PRIORITY AREA
This map depicts areas identified by the Challis Sage Grouse Local Working group as priority habitat areas within the greater Salmon/Challis resource area.
The sources of the data are from Idaho-BLM Corporate Data, USFS, IDFG and the USGS.

V. Risks to Sage-grouse Populations and Habitats

At this time, the Challis LWG believes the following risks to sage-grouse populations and habitats exist in, and are specifically considered for the Challis SGPA. These risks are listed in approximate order of magnitude:

High risks:

- Habitat fragmentation;
- Invasive plant species (noxious weeds, cheatgrass and other undesirable non-native vegetation); and
- Inappropriate management strategies.

Medium risks:

- Improper livestock management;
- Fire; and
- Other natural causes.

Low risks:

- Excessive predation;
- Human disturbance;
- Health risks to sage-grouse populations;
- Overharvest; and
- Successional vegetation changes in brood-rearing habitat.

In some cases, a specific nesting or brood-rearing habitat area may be determined to be incapable of meeting sage-grouse habitat needs defined by the sage-grouse guidelines due to ecological site potential. Where site potential prevents attainment of suitable vegetative communities, the situation should be acknowledged.

VI. Recommended Conservation Measures to Address Risks to Sage-grouse Populations and Habitats

The following conservation measures are intended as recommendations to be considered and implemented to the extent possible, with the realization that other management concerns and priorities may exist in certain situations or locations.

A. Habitat Fragmentation – High Risk

1. Goal

The goal is to reduce risks of habitat fragmentation resulting from off-highway vehicles (OHV) use, land use conversion, and infrastructure development.

2. Risks

Risks to sage-grouse populations were identified for each of the four seasonal use areas, i.e., leks, nesting, brood-rearing, and winter habitat.

a. Lek Habitat Areas

Five specific risks associated with habitat fragmentation in the vicinity of lek areas were identified:

- Collisions with fences resulting from construction of fences within flight paths of leks or too close to leks;
- Loss of sagebrush cover resulting from OHV activities;
- Increased avian predation resulting from communications and power transmission lines, and structures, i.e., poles and towers being constructed too close to leks, thus providing predator perching sites;
- Direct loss of leks resulting from roads, mining, conversion to cultivated agriculture, urban expansion, and rangeland development; and
- Indirect loss of leks resulting from structures which cause abandonment of the lek, i.e., transmission lines, roads, fences, power poles, etc.

b. Nesting Habitat Areas

Three specific risks associated with habitat fragmentation in nesting habitat areas were identified:

- Indirect impacts to habitat value resulting from utility development, dump sites and transfer stations, and fences;
- Permanent or long-term loss of habitat resulting from agricultural conversion, roads, mining, urbanization, and wind farm development; and
- Loss of sagebrush cover resulting from OHV activities.

c, Brood-Rearing Habitat Areas

Three specific risks associated with habitat fragmentation in brood-rearing habitat were identified:

- Permanent habitat loss resulting from conversion to cultivated agriculture, mining, utility development, and urbanization;
- Damage to wetlands resulting from inappropriate OHV activities; and
- Damage to wetlands resulting from roads and other uses that affect hydrology.

d. Winter Habitat Areas

Three specific risks associated with habitat fragmentation in winter habitat were identified:

- Permanent habitat loss resulting from OHV activities, cultivated agriculture, utility development, mining, and urbanization;
- Mechanical treatments resulting in a sagebrush mix that is inconsistent with winter habitat needs; and
- Chemical treatments resulting in a sagebrush mix that is inconsistent with winter habitat needs.

3. Conservation Measures

The following conservation measures are designed to address the above risks related to habitat fragmentation.

To address risks associated with bird-fence collisions in lek areas:

1. All land managers[2] should increase the visibility of fences and other structures if these structures are documented to be hazardous to flying grouse (e.g., birds have been observed hittin or narrowly missing these structures or grouse remains have been found next to these structures);
2. All land managers should avoid construction of fences within 0.6 miles of active leks; and
3. All land managers should consider alternatives to fencing and alternative fence designs in active lek areas.

To address risks in all habitats resulting from OHV activities:

1. The Challis LWG should review existing and proposed resource management plans/travel management plans and evaluate impacts to sage-grouse habitats;
2. The land management agencies[3] should develop travel management plans where they do not exist or revise existing plans that are inadequate;
3. All land managers should consider avoiding sage-grouse habitats when developing OHV timing and use restriction;
4. The Challis LWG should provide comments to the land management agencies whenever those agencies are developing OHV timing and use restrictions. In order to accomplish this conservation measure, the Challis LWG will request to be added to mailing lists for all travel planning documents;
5. The Challis LWG should notify the land management agencies that are responsible for enforcement of OHV activities and timing restrictions as to seasonal use areas for priority enforcement;
6. The Challis LWG, in cooperation with the land management agencies, Idaho Department of Parks and Recreation, and user groups, should educate the public about the impacts of OHV activities on sage-grouse habitats; and
7. The land management agencies should place education materials at visitor information centers throughout the Challis SGPA.

To address risks associated with excessive avian predation resulting from the placement of transmission lines and structures:

1. All land managers should consider the alternative of underground powerlines in the vicinity of sage-grouse habitats;
2. The land management agencies should consider sage-grouse habitats when siting new utility corridors and facilities; and
3. All land managers should identify areas with existing utility lines in sage-grouse habitats and work with utility companies to install anti-perching devices.

To address risks associated with landfills and transfer stations:

1. When siting new landfills and transfer stations, land management agencies and local governments (in consultation with IDFG) should consider alternatives that would avoid sage-grouse habitats where possible.

To address risks associated with communication sites in the vicinity of seasonal habitats:

1. Land management agencies should consolidate new communication site development in areas of existing communication sites.

To address risks associated with pressures to urbanize areas that serve as sage-grouse habitat:

[2] Throughout this document, the term land managers applies to all private landowners and public agencies with land management and oversight responsibilities, including IDFG.

[3] Throughout this document, the term land management agencies is meant to apply to all public agencies with land management and oversight responsibilities, including IDFG.

1. The Challis LWG should encourage securing conservation easements and development of incentives to maintain native rangelands;
2. The Challis LWG should encourage conservation easement purchases in the vicinity of critical habitats; and
3. The Challis LWG and IDFG should provide input during development of county land-use plans to encourage open space in sage-grouse habitats.

To address risks associated with permanent or long-term loss of habitat resulting from roads:

1. The land management agencies, in reviewing travel management plans, should consider consolidation of multiple roads leading to the same location (where users have developed new roads to avoid seasonal conditions) in seasonal habitats. In order to accomplish this conservation measure, all Challis LWG members are encouraged to participate in local land-use planning processes;
2. All land managers should minimize new road construction in nesting and winter habitats; and
3. All land managers should consider alterations to roads that are affecting wetland hydrology through maintenance, relocation, closure, culverts, and other measures.

To address risks associated with permanent or long-term loss of habitat resulting from mining:

1. The land management agencies should consult with biologists when reviewing notices and mine plans for new mines and gravel pits.

To address risks associated with permanent or long-term loss of habitat resulting from wind farms:

1. All land managers should avoid siting new wind farm developments in priority habitat areas on an ongoing basis.
2. The Challis LWG should review proposals and make recommendations for siting wind farm development

B. Invasive Plant Species – High Risk

1. Goal

The goal is to control, halt the spread of, and /or prevent establishment of invasive, non-native plant species in all sage-grouse habitat areas.

2. Risks

Five specific risks to sage-grouse habitats associated with invasives were identified:

- Loss of sagebrush cover associated with leks;
- Alterations to sagebrush communities that are inconsistent with nesting habitat requirements;
- Alterations to the sagebrush/forb component in brood-rearing habitat resulting from non-native annual plant invasion when sagebrush seedlings are absent;
- Alterations to the sagebrush/forb component in brood-rearing habitat resulting from non-native annual plant invasion when sagebrush seedlings are present; and
- Alterations to the sagebrush mix that is inconsistent with winter habitat needs.

3. Conservation Measures

The following conservation measures are designed to address the above risks related to invasives:

1. The Cooperative Weed Management Areas (CWMA), in cooperation with all land managers, should encourage the continuing inventory for invasives;
2. The Challis LWG and all land managers should continue to support the CWMA efforts to treat invasives;
3. The Challis LWG should prioritize areas for treatment in sage-grouse habitats where non-natives have invaded, and collaborate with the CWMA and land managers to implement restoration projects. These projects could include reseeding if appropriate;
4. All land managers should minimize new surface disturbances that create an opportunity for colonization of invasives and consider reseeding if appropriate;
5. The land management agencies should consider stipulations and reclamation requirements emphasizing the use of native species when authorizing new right-of-ways and mine plans;
6. The land management agencies should consider stipulations and reclamation requirements emphasizing the use of native species when updating existing right-of-ways; and
7. The land management agencies should require vehicle washing to remove invasive weeds at fire camps and other appropriate locations.

C. Inappropriate Management Strategies – High Risk

1. Goal

The goal is to reduce risks resulting from data gaps and a failure to address changing conditions.

2. Risks

Four specific risks to sage-grouse populations associated with inappropriate management strategies were identified:

- Inappropriate management strategies resulting from inadequate data on population status and trends;
- Inappropriate management strategies resulting from inadequate data on habitat condition and use;
- Inappropriate management strategies resulting from inadequate site specific knowledge, including site potential; and
- Inability of land management agencies to respond to current conditions and needs.

3. Conservation Measures

To address risks posed by inappropriate management strategies that result from inadequate data on population status and trends.

1. Whitebark, Inc. will compile and verify known data on population status and trend (*completed);*
2. The Challis LWG will coordinate with partners to acquire additional population data and enhance the understanding of population trends through telemetry studies, aerial lek searches, lek route counts, etc. Activities to date include the Pahsimeroi, Lemhi, and Ellis telemetry studies and lek identification work (aerial & ground); and
3. When data identify sustained population declines, Challis LWG should consider recommending changes in management strategies.

To address risks posed by inappropriate management strategies caused by inadequate data on habitat condition and use:

1. The land management agencies should propose adaptive habitat management strategies (see Section X) using tools such as fire, grazing, mechanical and chemical treatments to meet sage-grouse habitat objectives;
2. The BLM should continue sage-grouse habitat assessments on lands administered by the agency;
3. The Challis LWG will encourage the U.S. Forest Service (USFS) to adopt the same guidelines that are used by the BLM;
4. Whitebark, Inc. will compile and verify known data on habitat condition and use (*completed);*
5. The Challis LWG will coordinate with partners to acquire additional habitat condition and use data to determine seasonal use areas, assess degree of use, and evaluate the condition of those use areas; and
6. All land managers should take the lessons learned from areas where birds are thriving and apply them to areas where birds are limited.

To address risks posed by inappropriate management strategies resulting from inadequate site specific knowledge, including site potential:

1. All land managers should support the Natural Resources Conservation Service (NRCS) work on updating ecological site descriptions.

To address risks posed by the inability of land management agencies to respond to current conditions and needs:

1. All land management agencies should respond to changes in current conditions and needs to the extent as is fiscally and legally possible.

D. Improper Livestock Management – Medium Risk

1. Goal

The goal is to manage livestock grazing to benefit all sage-grouse habitats.

2. Risks

Seven potential risks to sage-grouse populations associated with improper livestock management were identified:

- Livestock grazing and bedding on leks during breeding season;
- Alterations to sagebrush and herbaceous cover that are inconsistent with nesting requirements;
- Nest trampling;
- Permanent/long-term loss of nesting habitat resulting from water developments, i.e., intensified disturbance around troughs;
- Damage to brood-rearing habitat in wetland areas resulting from livestock overgrazing, i.e., loss of vegetation and trampling of springs and meadows; and
- Alterations to sagebrush/forb component that are inconsistent with brood-rearing needs;
- Inadequate funding for rangeland infrastructure.

3. Conservation Measures

The following conservation measures are designed to address the above risks posed by improper livestock management in sage-grouse habitats:

1. To make significant progress towards achieving/maintaining riparian/wetland PFC or late seral conditions based upon Multiple Indicator Monitoring definitions in brood-rearing habitat

(if PFC assessment indicates an area is functioning at risk, or nonfunctional), all land managers should consider the following when conducting permit renewals:
   - Annual biological grazing plan (duration, intensity, season of use, timing control);
   - Permanent fencing;
   - Temporary fencing;
   - Piping of water to troughs (off-site water);
   - Supplement/mineral placement;
   - Herders/riders;
   - Target/monitor utilization levels to trigger livestock movement;
   - PFC re-assessment; and
   - Other creative ideas;
2. All land managers should manage grazing to achieve and maintain appropriate structure and appropriate sagebrush/forb communities to meet sage-grouse habitat needs. The following should be considered through annual authorizations and permit renewals:
   - Annual biological grazing plan (duration, intensity, season of use, timing control);
   - Permanent fencing;
   - Temporary fencing;
   - Piping of water to troughs (off-site water);
   - Supplement/mineral placement;
   - Herders/riders;
   - Target/monitor utilization levels to trigger livestock movement;
   - PFC assessment; and
   - Other creative ideas;
3. When considering livestock conversions (especially cattle to sheep) in sage-grouse habitats, all land managers should establish grazing management that would enhance forb diversity and vegetative cover;
4. Land management agencies should monitor grazing/bedding on active leks and advise livestock operators of active lek locations during annual authorization meetings;
5. Livestock operators should avoid placement of mineral/salt supplements on lek locations during strutting (March though May);
6. All land managers should place water troughs at least 0.6 miles from active leks where possible when existing water developments are replaced and new water developments are constructed;
7. All land managers should install and maintain bird ladders in troughs;
8. All land managers should maintain free-flowing characteristics of springs and wet meadows through the use of float valves or by returning water to a natural channel when existing water developments are replaced and new water developments are constructed;
9. All land managers should consider sage-grouse management objectives in the prioritization funding for rangeland infrastructure; and
10. All land managers should explore other funding mechanisms to increase overall funding levels for rangeland infrastructure.

E. Fire – Medium Risk

1. Goal

The goal is to minimize risks to all sage-grouse habitats resulting from prescribed fires and wildfires.

2. Risks

Four specific risks to sage-grouse habitats associated with wildfire, planned ignition (prescribed), and natural ignition fire events were identified:

- Loss of sagebrush cover associated with leks;
- Alterations to sagebrush that are inconsistent with nesting habitat requirements;
- Alterations to sagebrush/forbs that are inconsistent with brood-rearing habitat needs; and
- Alterations to sagebrush mix that is inconsistent with winter habitat needs.

3. Conservation Measures

The following conservation measures are designed to address the above risks to sage-grouse habitat related to fire.

1. The Challis LWG will map all known habitat use areas within the area of interest (*completed*);
2. The Challis LWG will prioritize and map priority areas for fire suppression (completed);
3. For all wildfires in sage-grouse habitat, land management agencies should assign resource advisors knowledgeable about sage-grouse to work with fire suppression personnel/teams on an as-needed basis.
4. The Challis LWG, in consultation with BLM and USFS fire ecologists and fuel specialists, will prioritize and map areas for maintenance and restoration of sage-grouse habitats (completed);
5. The land management agencies, in consultation with the relevant CWMA, IDFG and NRCS, will develop plans for avoidance of invasives by fall 2007. In addition, the land management agencies, in consultation with the Lemhi CWMA and NRCS, will develop plans for treatment of invasives following each fire event. This conservation measure will be implemented in two steps:
   - The Challis LWG will develop guidelines specific to sage-grouse for use in development of fire suppression and rehabilitation guidelines. These guidelines should be considered for fires that do not entail Wildland Fire Situation Analysis (WFSAs) as well;
   - The land management agencies will develop maps of known weed locations using data provided by the appropriate CWMA (by Spring of 2008; then following each fire event);
6. The land management agencies will conduct evaluations of sage-grouse habitats as soon as possible after each wildfire event to determine if reseeding (with sagebrush, bunch grasses, and native forbs, if possible) is necessary. The results of these evaluations will be incorporated into Burned Area Emergency Rehabilitation Plans and/or emergency Stabilization and Rehabilitation Plans, as appropriate; and
7. The Challis LWG, in cooperation with NRCS, will conduct educational outreach with private landowners before and after fire events regarding conservation measures related to fire.

F. Other Natural Causes – Medium Risk

1. Goal

The goal is to manage sage-grouse habitats to reduce the impacts resulting from natural disturbances.

2. Risks

Five specific risks associated with other natural causes were identified:

- Alterations to sagebrush communities caused by wild horse and wildlife grazing that are inconsistent with nesting and winter habitat requirements (form and canopy);
- Alterations to sagebrush communities caused by insects or disease that are inconsistent with nesting and winter habitat requirements;
- Nest trampling by wild horses or wildlife;
- Damage to brood-rearing habitat in wetlands resulting from overgrazing by wild horses, i.e., loss of vegetation, trampling of springs and meadows; and
- Alterations to all habitats from drought that are inconsistent with sage-grouse needs.

3. Conservation Measures

The following conservation measures are designed to address the above risks related to other natural causes.

1. The BLM Challis Field Office should follow herd management plans for wild horses and stay within appropriate management level;
2. The Challis LWG should discuss, with the land management agencies, the development of drought management plans to address risk factors in all sage-grouse habitats (this conservation measure should be started by December 2009);
3. All land managers should consider reseeding (with sagebrush, bunch grasses, and native forbs, if possible) and treatment of invasive species following major insect/disease infestations;
4. All land managers should evaluate sites where sagebrush form and canopy are inadequate so as to determine if wildlife utilization is the cause; and
5. If wildlife grazing is determined by land managers to be the cause of inadequate sagebrush form and cover, IDFG should consider modifications of herd objectives.

G. Excessive Predation – Low Risk

1. Goal

To reduce risks of excessive predation if a problem is documented.

2. Risks

Six specific risks to sage-grouse populations associated with excessive predation of sage-grouse were identified:

- Nest losses in excess of 60% to avian and mammalian predators;
- Excessive brood losses to avian predators;
- Excessive brood losses to terrestrial mammal predators;
- Excessive losses of adult birds to avian predators;
- Excessive losses of adult birds to terrestrial mammal predators; and
- Inappropriate management strategies resulting from inadequate predation data.

3. Conservation Measures

The following conservation measures are designed to address the above risks posed by predation.

1. If populations are static or declining over a period of three years, the Challis LWG, in cooperation with IDFG, should secure funding for studies, i.e., telemetry, to assess whether predation is additive; and

2. Whenever predation is documented to be excessive, IDFG should consider all relevant guidelines in the decision-making process related to possible predator management measures.

H. Human Disturbance – Low Risk

1. Goal

The goal is to reduce risks of human disturbance.

2. Risks

Three specific risks associated with human disturbance were identified:

- Dispersed recreational activities, i.e., OHV, camping, and hunting, overzealous observers, and untrained volunteers;
- Alterations to sagebrush and forbs that are inconsistent with habitat needs; and
- Loss of escape cover resulting from herbicide treatments.

3. Conservation Measures

The following conservation measures are designed to address the above risks posed by human disturbances in sage-grouse habitats.

1. The Challis LWG, in cooperation with IDFG and user groups, should educate the public and volunteers regarding potential impacts to leks and nesting habitats;
2. The land management agencies should work cooperatively with user groups and volunteers to educate the public and to enforce current OHV restrictions;
3. The land management agencies should strengthen management guidelines for OHV use with respect to sage-grouse habitats;
4. Whenever possible, the Challis LWG should encourage cooperative agreements between federal, state, county, and local law enforcement agencies to support enforcement of OHV regulations;
5. Whenever possible, the Challis LWG should participate in travel management planning processes;
6. All land managers should consider habitat needs prior to implementation of vegetation manipulation (including herbicide applications and mechanical treatment); and
7. The Challis LWG should educate county extension agents, NRCS, soil conservation districts, CWMA, and private landowners regarding habitat needs.

I. Health Risks to Sage-grouse Populations – Low Risk

1. Goal

The goal is to minimize health risks to sage-grouse populations.

2. Risks

Three additional, specific risks to sage-grouse populations were identified:

- Inadequate nutrition;
- Disease, i.e., West Nile Virus; and
- Toxicity related to pesticide use.

3. Conservation Measures

The following conservation measures are designed to address the above risks to sage-grouse populations.

1. All land managers should strive to maintain/improve meadows and riparian areas, without losing forbs;
2. Where necessary, all land managers should consider planting native and/or desired non-native forbs in range restoration and reclamation projects;
3. All land managers should apply management techniques, i.e., grazing systems, inter-seeding, and other mechanical treatments, etc., to achieve optimum forb and insect production;
4. IDFG should submit dead sage-grouse for testing for West Nile Virus within 24 hours of death;
5. All pesticide applicators should follow U.S. Environmental Protection Agency label instructions and restrictions; and
6. All land managers should consider alternatives to pesticides, i.e., biological controls or less toxic chemicals.

J. Overharvest – Low Risk

1. Goal

The goal is to prevent overharvest from legal hunting.

2. Risks

Six specific risks to sage-grouse populations associated with overharvest were identified:

- Human disturbance to leks resulting from hunting;
- Overharvest of a whole population;
- Overharvest of adult female sage-grouse;
- Overharvest of juvenile female sage-grouse;
- Site specific overharvest; and
- Inappropriate management strategies resulting from inadequate harvest data.

3. Conservation Measures

The following conservation measures are designed to address the above risks related to overharvest of sage-grouse populations.

1. As conditions warrant, the Challis LWG should consider all relevant guidelines and current information when making recommendations to the Idaho Fish and Game Commission for changes to hunting regulations;
2. The Challis LWG should recommend implementation of mandatory harvest reporting. The Idaho Department of Fish and Game Commission should establish ongoing mandatory harvest for enhanced population monitoring. Reports should include topographic features/land forms to identify where harvest occurs;
3. Once mandatory harvest reporting has been implemented, IDFG should use the enhanced harvest data to recommend hunting modifications, i.e., closures, limits, permits; and
4. If adverse population impacts are documented, the Challis LWG should recommend changes in falconry regulations to the Idaho Fish and Game Commission.

K. Successional Vegetation Changes in Brood-Rearing Habitat – Low Risk

1. Goal

The goal is to manage uplands, meadows, springs, and riparian zones with an emphasis on brood-rearing habitat requirements.

2. Risks

Two specific risks to brood-rearing habitat associated with meadows, springs and riparian zones were identified:

- Undesirable changes in plant composition, such as loss of forb diversity, through successional changes including overgrowth, stagnation, and conifer encroachment; and
- Sagebrush/forbs plant composition that is inconsistent with sage-grouse needs resulting from inadequate levels of forb diversity on big sagebrush sites.

3. Conservation Measures

The following conservation measures are designed to address the above risks associated with successional vegetation changes in brood-rearing habitat.

1. Whenever meadows, springs or riparian zones are excluded from livestock grazing, all land managers should monitor the forb and cover components. If either component declines, then all land managers should consider a vegetative manipulation that will reverse the decline;
2. Whenever conifers encroach into mesic habitats with a potential for sage-grouse use, all land managers should consider conifer treatment; and
3. Land managers should maintain a mosaic of sagebrush age classes to provide for multiple condition classes using mechanical, biological, chemical, or fire treatments on an on-going basis. In addition, land managers should ensure that the scale of the treatment maintains or creates critical habitat components.

VII. Public Education Measures

The Challis LWG will educate the public on sage-grouse conservation measures as they apply to desired actions. For example, the Challis LWG could develop an educational brochure, participate in CWMA functions, participate in county fairs and rancher schools, etc.

VIII. Implementation Plan

An Implementation Plan (summarizing the conservation measures in this Conservation Plan) is included as Appendix C. The Implementation Plan assigns each conservation measure to a responsible party and specifies when the conservation measure should be carried out.

A. Annual Meetings

Two time sensitive requirements are identified for inputs from the Challis LWG: submission of proposed projects for funding by the Office of Species Conservation (early summer), and completion of an annual report to the Idaho Sage-grouse Advisory Committee by December 31. It would be appropriate for the working group to meet collectively to discuss issues, accomplishments and recommendations at least a few weeks prior to the two time periods.

A full-day meeting in mid to late June with an agenda designed to address the following objectives:

- Discuss project proposals (solicit recommendations from all Challis LWG participants at least a month prior to meeting)
    - project location and timelines
    - costs
    - partners
    - group discussion and final ranking
- Receive agency reports that present new data, i.e., spring lek surveys, winter population observations, telemetry results, harvest information from previous season.

A full day meeting in early December with an agenda designed to address the following objectives:

- Receive reports as follows:
    - agency reports
        - review of new data, i.e., spring lek surveys, winter population observations, telemetry results, harvest information from previous season
        - what and where have agencies implemented recommendations in the Conservation Plan (for annual report)
        - review results of past, implemented projects (for annual report)
        - review wildland fire data, i.e., extent of fires, success of stabilization/restoration
        - current efforts in support of Conservation Plan, i.e., habitat assessments, greater sage-grouse population data collection
        - upcoming projects in support of Conservation Plan
        - recommendations from agencies for modifications to the Conservation Plan
    - landowner reports
        - efforts conducted in support of Conservation Plan
        - submission of population and/or habitat observations
        - recommendations for out-year planning
        - recommendations for modifications to Conservation Plan
    - other participant reports
        - efforts conducted in support of Conservation Plan

- recommendations for out-year planning
- recommendations for modifications to Conservation Plan

- Review implementation of the Challis Sage-grouse Conservation Plan
    - assess accomplishments in light of Conservation Plan direction; identify deficiencies
    - consider modifications to Conservation Plan.

- Discuss items for the annual report (per State Plan):
    - progress and success of project implementation
    - status of studies, research, or research proposals
    - discussion of new issues, project priorities, and problems and
    - actions or projects planned for the ensuing year and

- Affirm the membership of the Steering Committee and the Statewide Advisory Committee representative for the upcoming year.

It is assumed that the Challis LWG will continue to require the services of a neutral group process facilitator for the foreseeable future.

B. Mechanism for Calling Other Meetings

The Challis Local Working Group will have a Steering Committee – composed of representatives of the Idaho Department of Fish and Game, Forest Service, Bureau of Land Management along with a representative of the ranching community and a member of the general public – will determine when a meeting is necessary. Anyone who wants to suggest that a meeting of the Local Working Group be called can contact any member of the Steering Committee. The Steering Committee will decide, then make arrangements with the facilitator.

IX. Monitoring and Evaluation

The Statewide Plan (Idaho Sage-grouse Advisory Committee 2006; *in* 5.2.5.2) contains guidance for the Challis SGPA as follows:

- *Continue to monitor as many leks as possible in the Lemhi and Pahsimeroi drainages. Expand efforts in other areas throughout the planning area (Upper Big Lost, Challis, Morgan and Ellis Creek) through ground counts and aerial surveys.*
- *Multiple years of aerial surveys may need to be conducted to determine lek activity (especially in high snow years).*

The evaluation and monitoring of sage-grouse habitats and selected threats are crucial components in the implementation of the Challis LWG Plan. However, it is not expected that the Challis LWG members will perform the monitoring efforts. Rather, the Challis LWG expects that the various land management agencies responsible for implementing the conservation measures described in this Conservation Plan will conduct the monitoring and evaluation in accordance with agency protocols, and provide annual reports of related activities to the Challis LWG.

For example, the second conservation measure listed under “habitat fragmentation” states that “All land managers should avoid construction of fences within 0.6 miles of active leks.” During the year, each land management agency would know what fences have been constructed, and will report to the Challis LWG on the number and location of new fences. In this way, a record of new fencing can be maintained.

If future lek counts show a sudden increase or decrease in sage-grouse numbers, the overall monitoring record could be examined to determine which conservation measures may need to be applied to ascertain the cause of the change. Specific monitoring protocols then could be developed based on current conditions.

This approach should result in efficient monitoring of sage-grouse populations and habitats without imposing an unrealistic monitoring workload for each conservation measure.

X. Adaptive Management

Webster’s Dictionary defines “adaptive” and “management” as follows:

Adaptive – the ability to adjust to environmental conditions

Management – judicious use of means to accomplish an end

Therefore, Adaptive Management is the ability to adjust to environmental conditions so as to accomplish an objective (in this case improved or stable greater sage-grouse habitats/populations) through the use of sound science based activity planning. Adaptive Management is a five step process that includes: Assessment; Development of Objectives; Activity Design and Implementation; Monitoring; and Modification.

- *Assessment* involves evaluating the current conditions, and in the case of “less than desired” conditions, determining the cause.
- *Objectives* are developed for an area based on the current conditions, site potential, and greater sage-grouse needs.
- *Activity design and implementation* is based, in part, on conservation measures that will result in attaining the desired objectives.
- *Monitoring* is conducted to determine if the activity is being implemented as designed and to determine if the observed results will be effective in reaching the stated objectives.
- *Modification* of objectives and/or activity design may be necessary if the “effectiveness” monitoring shows insufficient progress towards meeting the objective(s). Otherwise, the current activity design and objectives likely would remain in place through the next assessment period. Any changes in strategy are the result of “adaptive management.”

Figure 5 summarizes the adaptive management process.

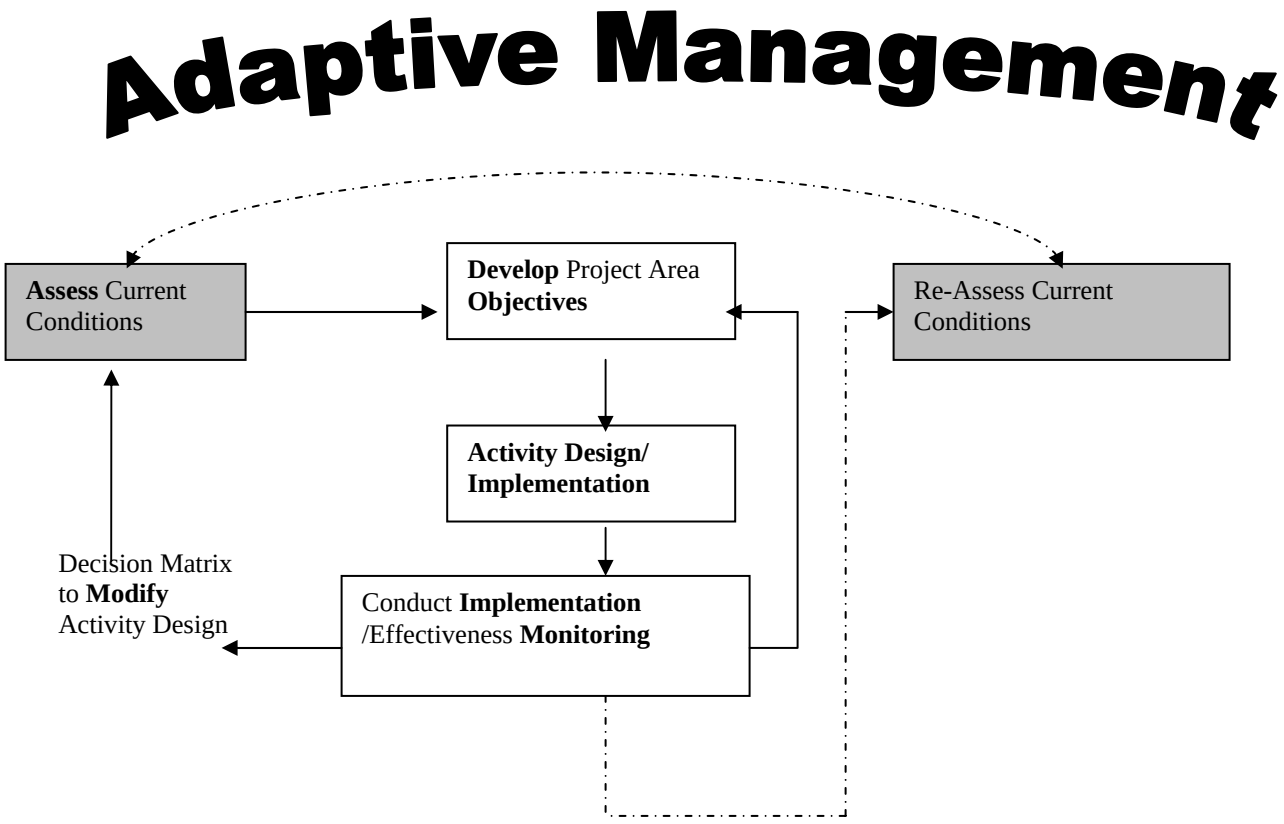


Figure 5. Adaptive Management Process

Figure 6 illustrates a decision matrix that supports the adaptive management process. In accordance with the Conservation Plan for the Greater Sage-grouse in Idaho, the adaptive management process would document the action, responsible party, and the outcomes.

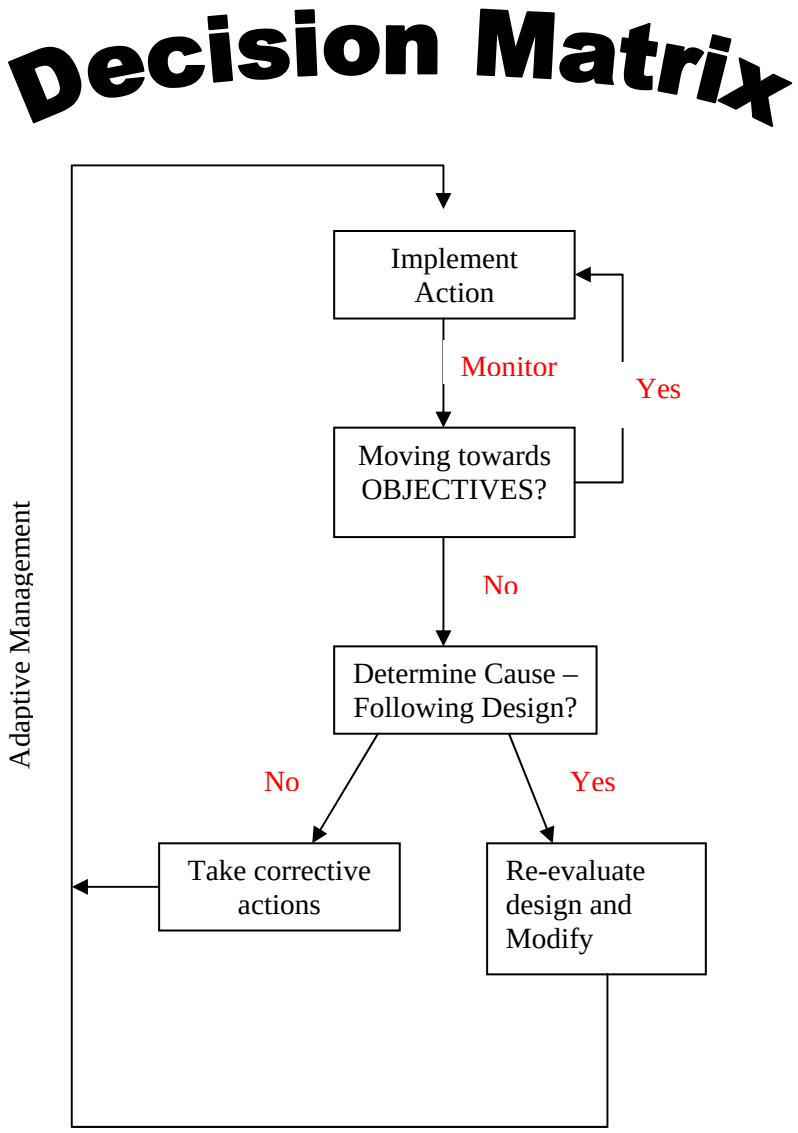


Figure 6. Decision Matrix to Support Adaptive Management

XI. Accomplishments

On an annual basis, the Local Working Group will prepare an Annual Report in accordance with the Statewide Sage-grouse Conservation Plan, including a list of accomplishments.

XII. Literature Citations

Burton, T.A., E.R. Cowley, and S. J. Smith 2007. Monitoring Stream Channels and Riparian Vegetation – Multiple Indicators. Bureau of Land Management, Idaho Technical Bulletin 2007-1. BLM/ID/GI-07/001.

Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to manage sage-grouse populations and their habitats. Wildlife Society Bulletin 28:967-985.

Connelly, J.W., S.T. Knick, M.A. Schroeder, and S.J. Stiver. 2004. Conservation assessment of greater sage-grouse and sagebrush habitats. Western Association of Fish and Wildlife Agencies. Cheyenne, Wyoming. Unpublished report.

Idaho Sage-grouse Advisory Committee. 2006. Conservation Plan for the Greater Sage-grouse in Idaho.

U.S. Department of the Interior, Bureau of Land Management. 1999. Challis Resource Area Record of Decision (ROD) and Resource Management Plan (RMP). Challis Resource Area, BLM.

Whitebark, Inc. Challis Sage Grouse Local Working Group Data Compilation Report, 2005.

Appendix A. Detailed Information about Sage-grouse Populations in the Challis SGPA

General information related to sage-grouse populations is presented in the Challis LWG's Sage-grouse Conservation Plan. This appendix provides additional, more detailed information about sage-grouse populations in the Challis SGPA.

Figure A-1 illustrates the total number of leks counted in the Challis SGPA from 1962 to 2006.

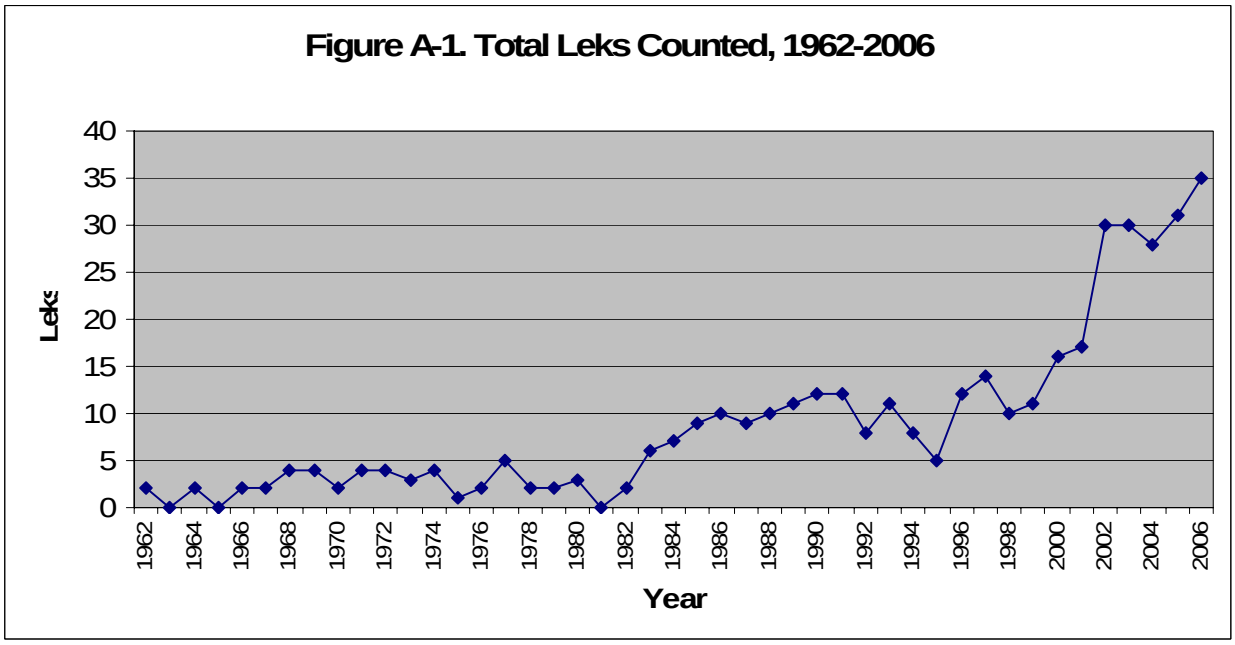
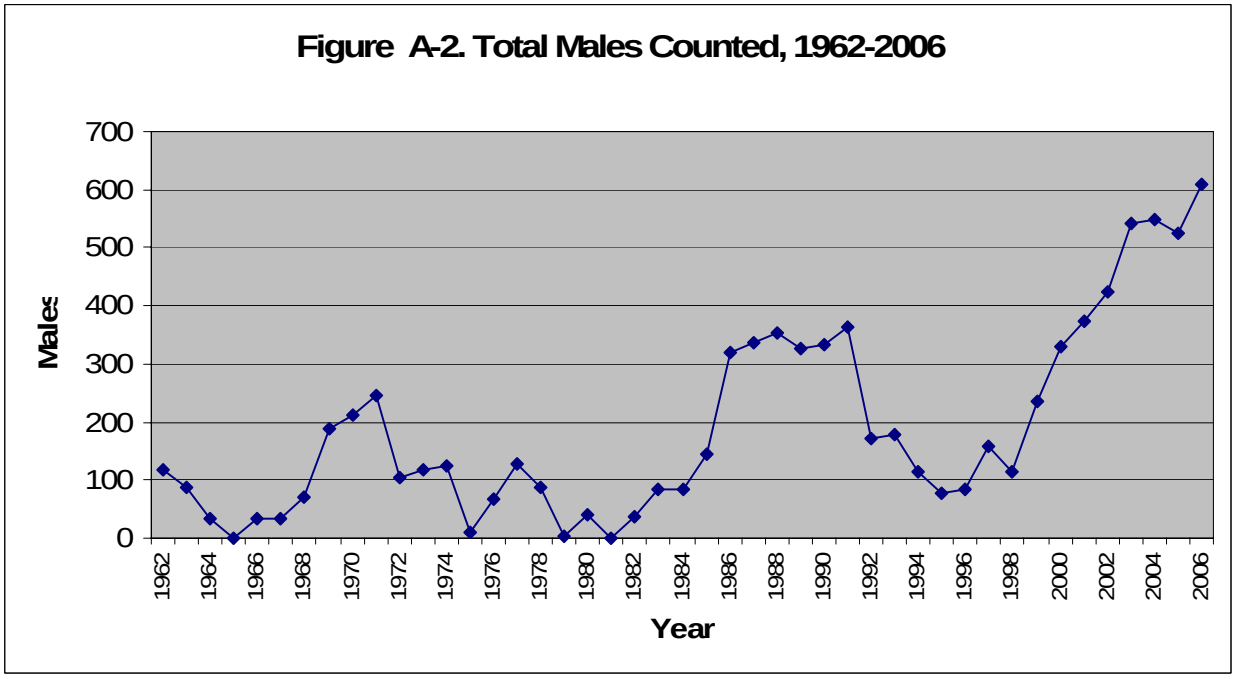


Figure A-2 illustrates the number of male birds counted on those leks from 1962 to 2006.



Specific leks have been identified for use in tracking (or indexing) population trends in the Challis SGPA. Figure A-3 illustrates the number of leks counted for the index since 1962.

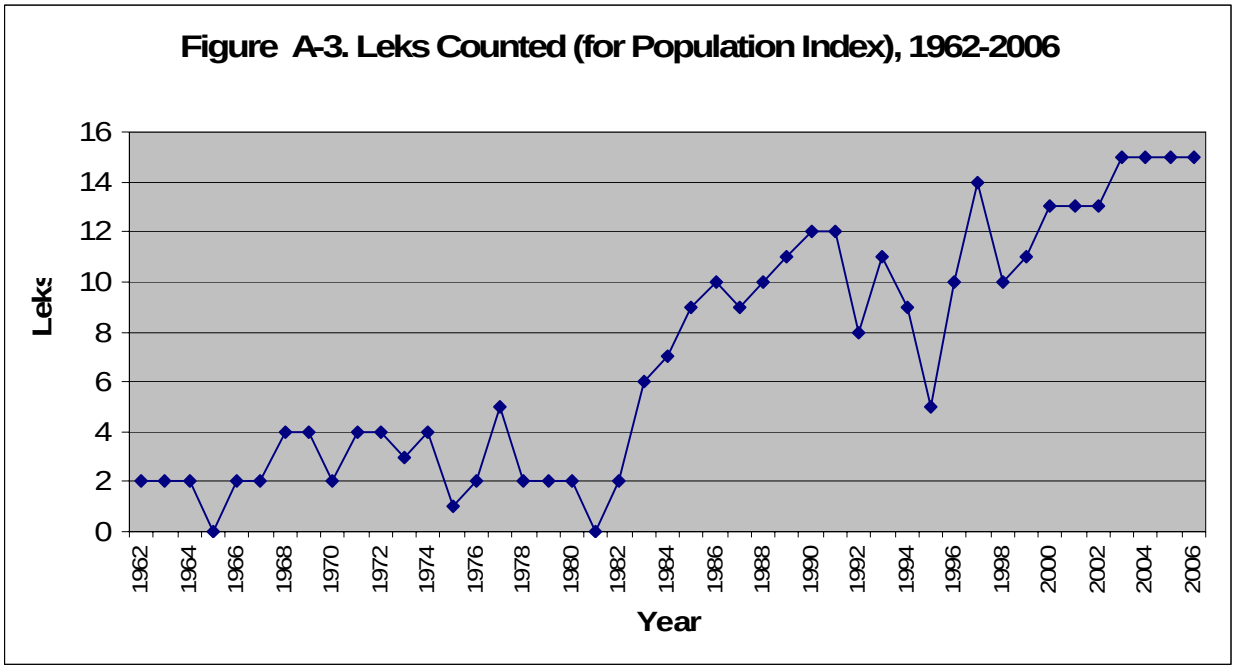
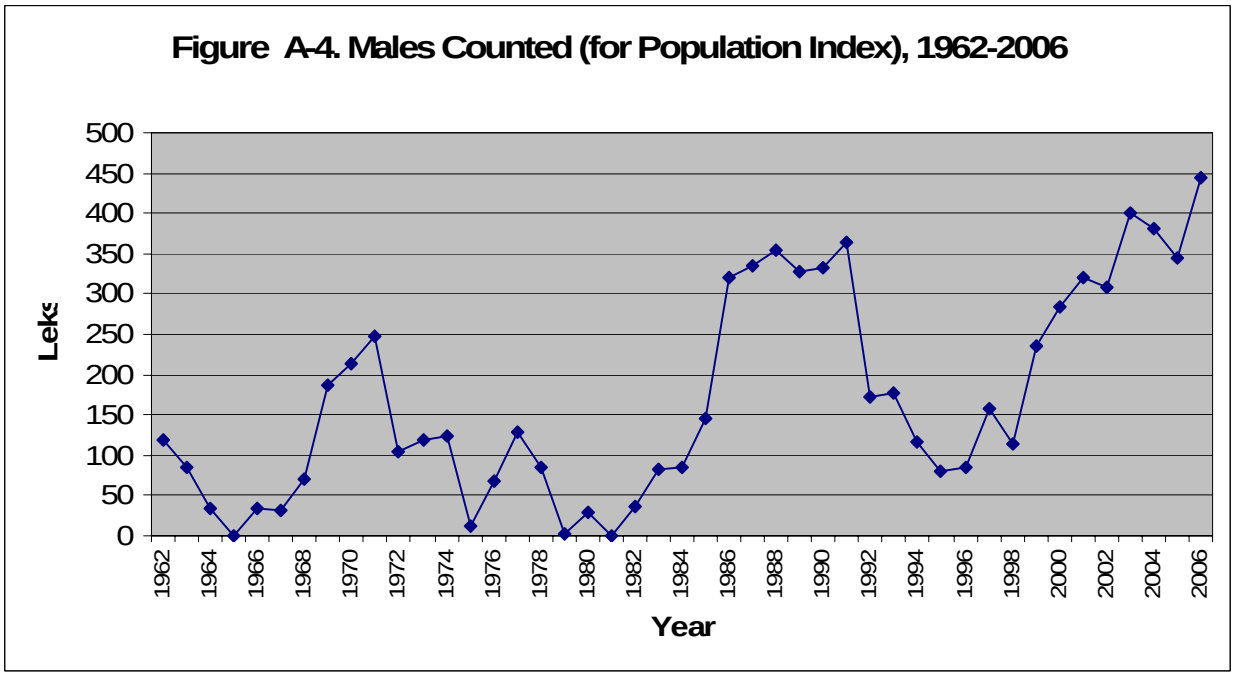


Figure A-4 illustrates the number of male birds counted on the index leks since 1962.



Figures A-5 through A-9 illustrate the total numbers of male sage-grouse counted on six lek routes in areas that have been identified as “high priority” by the Challis LWG, including the Leadore East, Lower Lemhi, Pahsimeroi, Upper Lemhi, and Upper Pahsimeroi lek routes.

Figure A-5 illustrates the total number of male sage-grouse counted on the Leadore East lek route from 1962 through 2006 (note that the route was not counted all years).

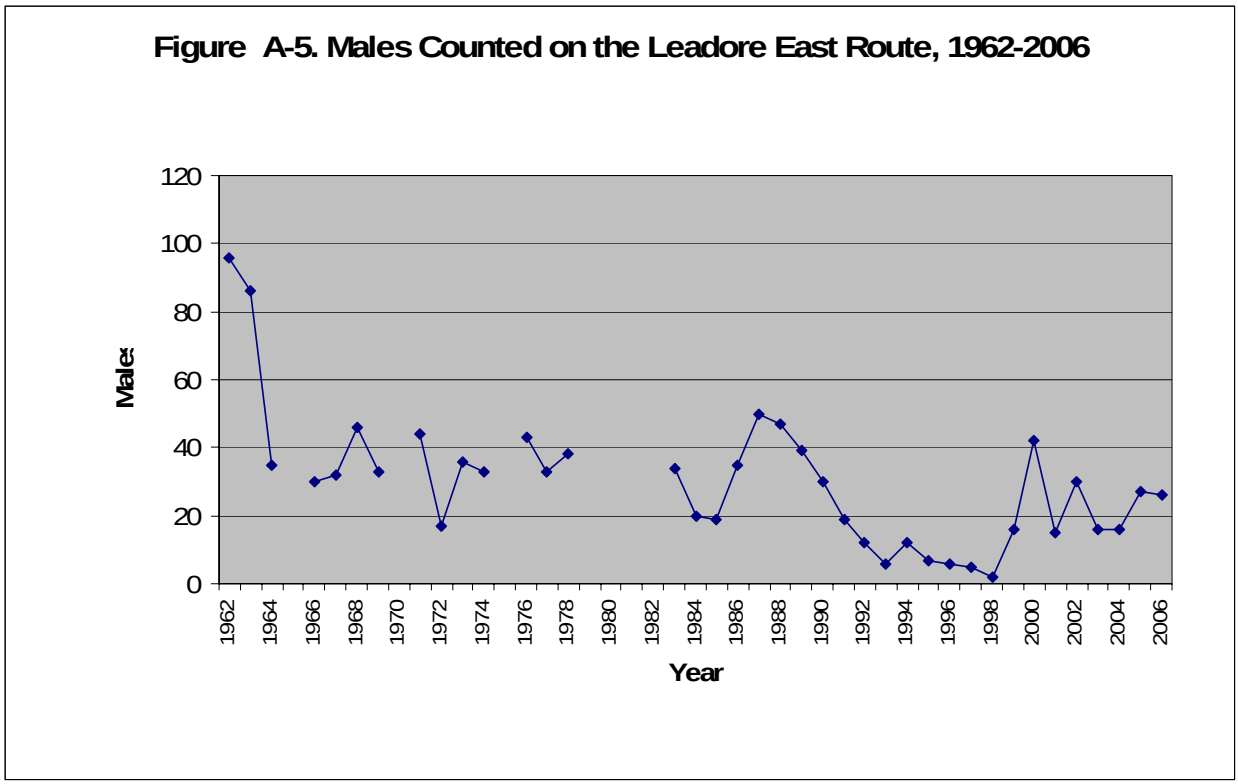


Figure A-6 illustrates the total number of male sage-grouse counted on the Lower Lemhi lek route from 1968 through 2006 (note that the route was not counted all years).

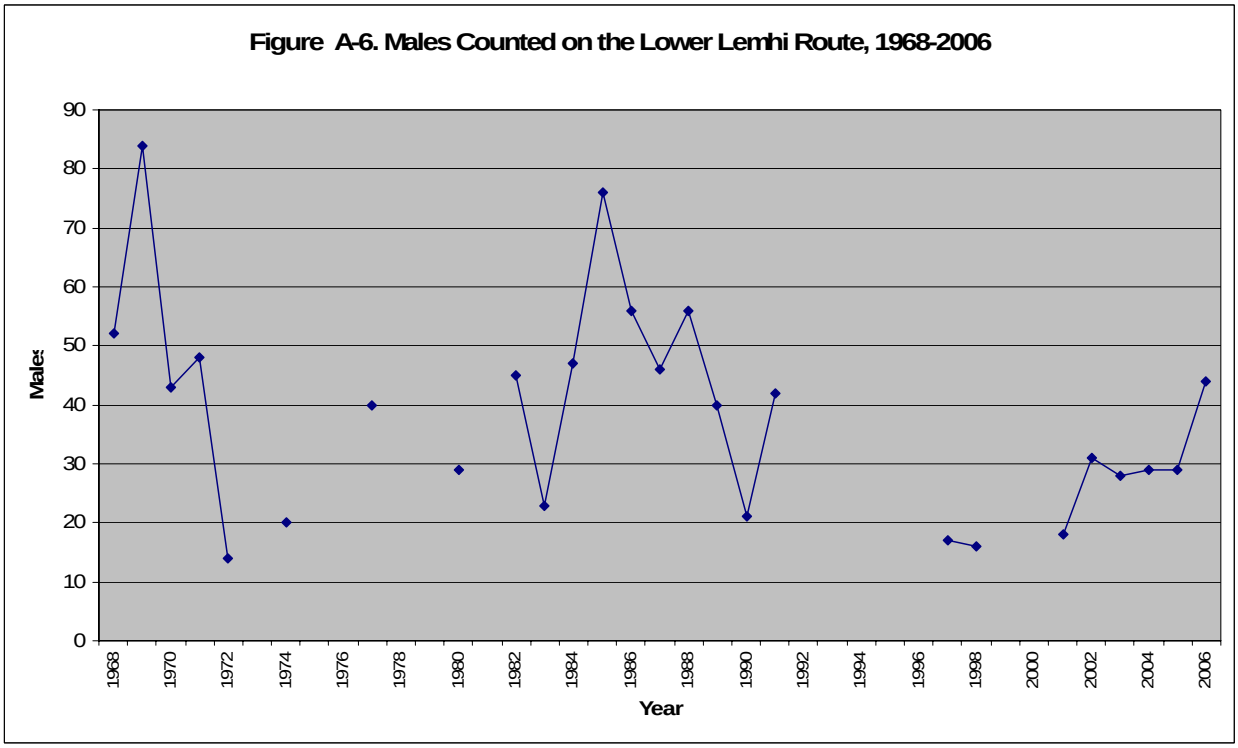


Figure A-7 illustrates the total number of male sage-grouse counted on the Pahsimeroi East lek route from 1977 through 2006 (note that the route was not counted all years).

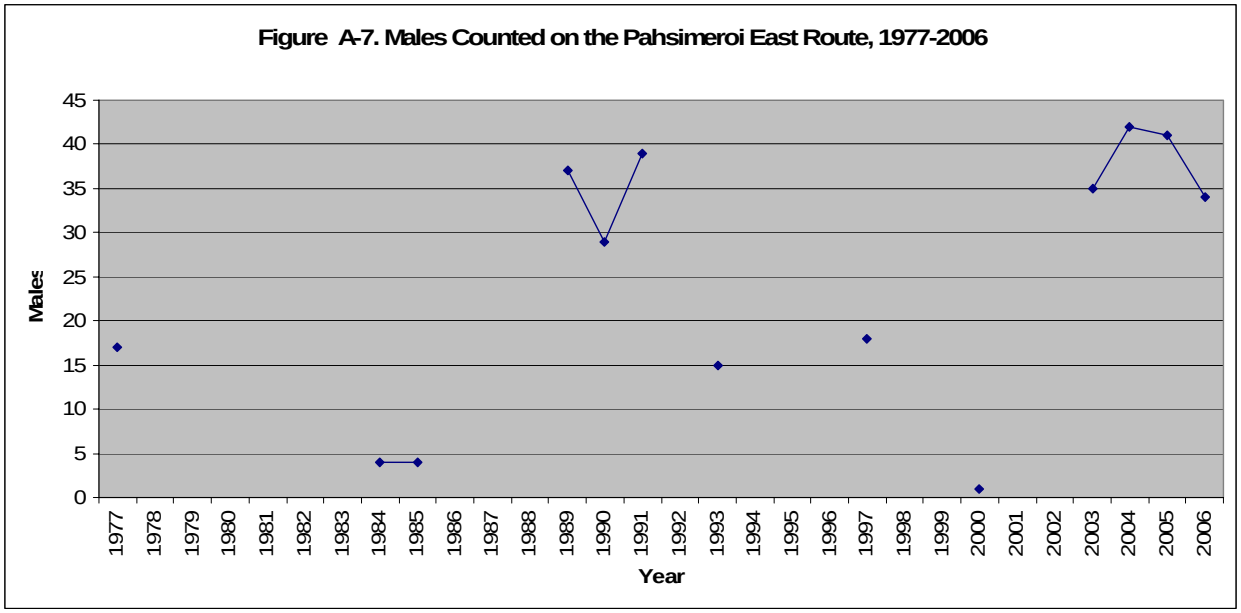


Figure A-8 illustrates the total number of male sage-grouse counted on the Upper Lemhi lek route from 1986 through 2006.

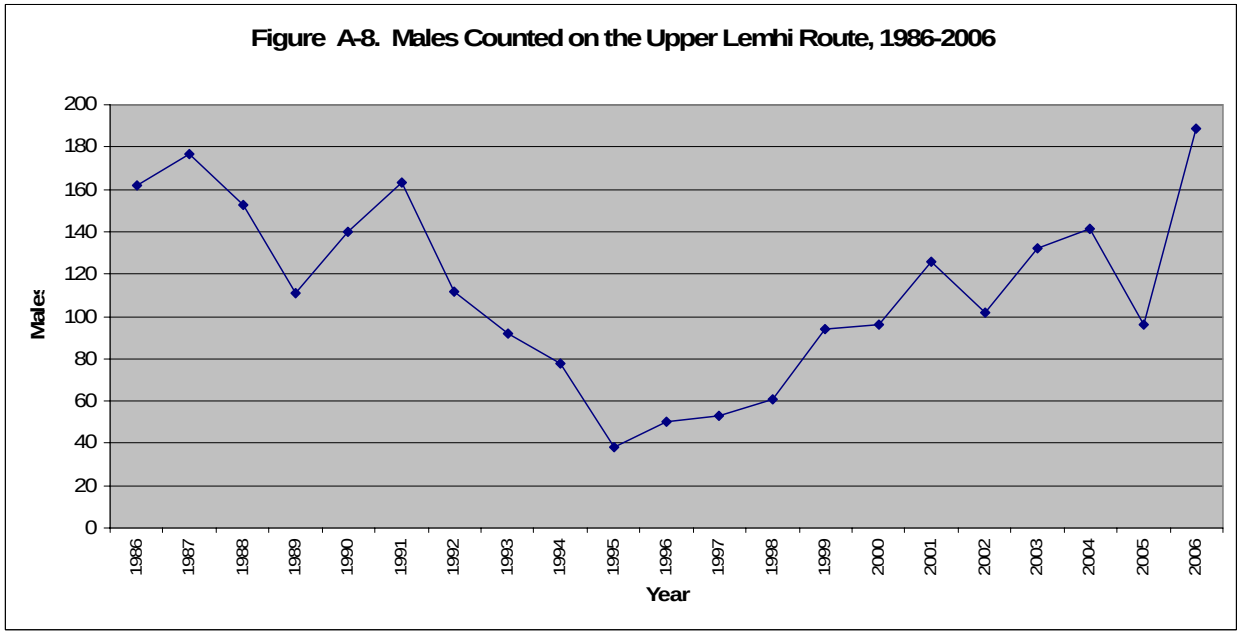
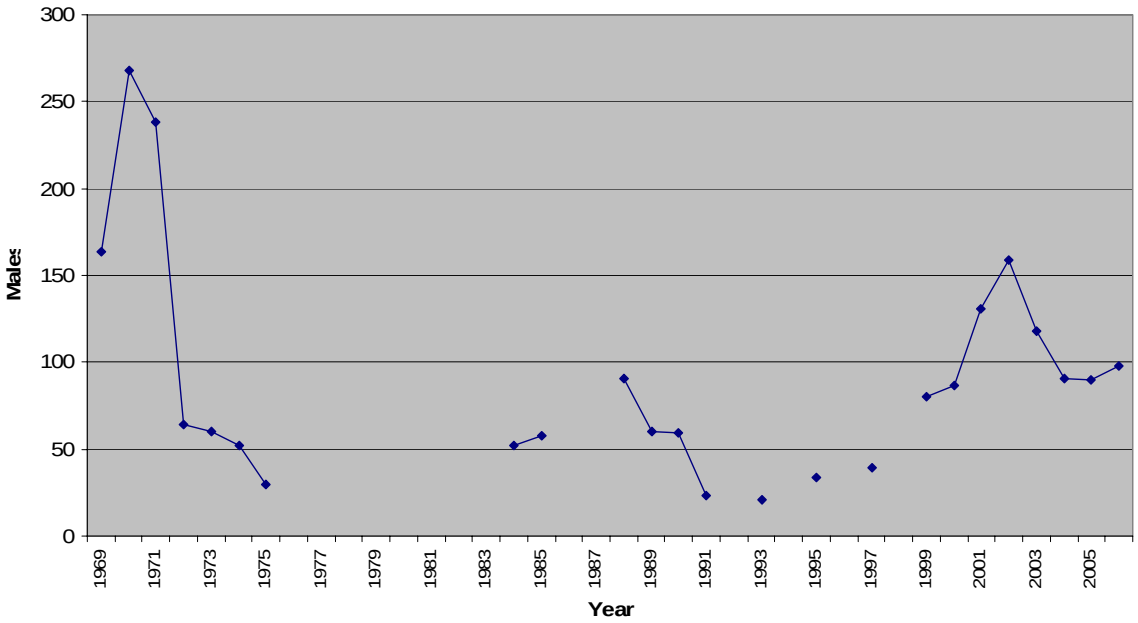


Figure A-9 illustrates the total number of male sage-grouse counted on the Upper Pahsimeroi lek route from 1969 through 2006 (note that the route was not counted all years).

Figure A-9. Males Counted on the Upper Pahsimeroi Route, 1969-2006



Appendix B. Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to manage sage-grouse populations and their habitats. Wildlife Society Bulletin 28:967-985.

Guidelines to manage sage grouse populations and their habitats

John W. Connelly, Michael A. Schroeder, Alan R. Sands, and Clait E. Braun

Abstract The status of sage grouse populations and habitats has been a concern to sportsmen and biologists for >80 years. Despite management and research efforts that date to the 1930s, breeding populations of this species have declined throughout much of its range. In May 1999, the western sage grouse (*C. urophasianus phaios*) in Washington was petitioned for listing under the Endangered Species Act because of population and habitat declines (C. Warren, United States Fish and Wildlife Service, personal communication). Sage grouse populations are allied closely with sagebrush (*Artemisia* spp.). Despite the well-known importance of this habitat to sage grouse and other sagebrush obligates, the quality and quantity of sagebrush habitats have declined for at least the last 50 years. Braun et al. (1977) provided guidelines for maintenance of sage grouse habitats. Since publication of those guidelines, much more information has been obtained on sage grouse. Because of continued concern about sage grouse and their habitats and a significant amount of new information, the Western States Sage and Columbian Sharp-tailed Grouse Technical Committee, under the direction of the Western Association of Fish and Wildlife Agencies, requested a revision and expansion of the guidelines originally published by Braun et al. (1977). This paper summarizes the current knowledge of the ecology of sage grouse and, based on this information, provides guidelines to manage sage grouse populations and their habitats.

Key words *Artemisia, Centrocercus urophasianus,* guidelines, habitat, management, populations, sage grouse, sagebrush

The status of sage grouse populations and habitats has been a concern to sportsmen and biologists for >80 years (Hornaday 1916, Patterson 1952, Autenrieth 1981). Despite management and research efforts that date to the 1930s (Girard 1937), breeding populations of this species have declined by at least 17–47% throughout much of its range (Connelly and Braun 1997). In May 1999, the western sage grouse (*C. urophasianus phaios*) in Washington was petitioned for listing under the Endangered Species Act because of population and habitat declines (C. Warren, United States Fish and Wildlife Service, personal communication).

Sage grouse populations are allied closely with sagebrush (*Artemisia* spp.) habitats (Patterson 1952, Braun et al. 1977, Braun 1987). The dependence of sage grouse on sagebrush for winter habitat has been well documented (Eng and Schladweiler 1972, Beck 1975, Beck 1977, Robertson 1991). Similarly, the relationship between sagebrush

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Sage grouse on a nest with good shrub and herbaceous cover. The nest was successful.

habitats and sage grouse nest success has been described thoroughly (Klebenow 1969, Wallestad and Pyrah 1974, Wakkinen 1990, Connelly et al. 1991, Gregg et al. 1994). Despite the well-known importance of this habitat to sage grouse and other sagebrush obligates (Braun et al. 1976, Saab and Rich 1997), the quality and quantity of sagebrush habitats have declined for at least the last 50 years (Braun et al. 1976, Braun 1987, Swenson et al. 1987, Connelly and Braun 1997).

Braun et al. (1977) provided guidelines for maintenance of sage grouse habitats. Since publication of those guidelines, much more information has been obtained on relative size of sagebrush habitats used by these grouse (Connelly 1982, Connelly et al. 1988, Wakkinen et al. 1992), seasonal use of sagebrush habitats (Benson et al. 1991, Connelly et al. 1991), effects of insecticides on sage grouse (Blus et al. 1989), importance of herbaceous cover in breeding habitat (Wakkinen 1990, Connelly et al. 1991, Gregg 1991, Barnett and Crawford 1994, Drut et al. 1994*a*, Gregg et al. 1994), and effects of fire on their habitat (Hulet 1983; Benson et al. 1991; Robertson 1991; Fischer 1994; Fischer et al. 1996*a*, 1997; Pyle and Crawford 1996; Connelly et al. 2000*b*). Because of continued concern about sage grouse and their habitats and a significant amount of new information, the Western States Sage and Columbian Sharp-tailed Grouse Technical Committee, under the direction of the Western Association of Fish and Wildlife Agencies, requested a revision and expansion of the guidelines originally published by Braun et al. (1977). This paper summarizes the current knowledge of the ecology of sage grouse and, based on this information, provides guidelines to manage sage grouse populations and their habitats.

Population biology

Seasonal movements and home range

Sage grouse display a variety of annual migratory patterns (Beck 1975, Wallestad 1975, Hulet 1983, Berry and Eng 1985, Connelly et al. 1988, Wakkinen 1990, Fischer 1994). Populations may have: 1) distinct winter, breeding, and summer areas; 2) distinct summer areas and integrated winter and breeding areas; 3) distinct winter areas and integrated breeding and summer areas; or 4) well-integrated seasonal habitats (nonmigratory populations). Seasonal movements between distinct seasonal ranges may exceed 75 km (Dalke et al. 1963, Connelly et al. 1988), which complicates attempts to define populations. Thus, Connelly et al. (1988) suggested that sage grouse populations be defined on a temporal and geographic basis. Because of differences in seasonal movements among populations (Dalke et al. 1963, Wallestad 1975, Connelly et al. 1988, Wakkinen 1990), 3 types of sage grouse populations can

Sage grouse on a nest with poor shrub and herbaceous cover. This nest was unsuccessful. Photo by Jena Hickey.

Sage grouse on winter range. Note the relatively sparse cover; without snow, the canopy cover of sagebrush in this area exceeds 20%.

be defined: 1) nonmigratory, grouse do not make long-distance movements (i.e., >10 km one way) between or among seasonal ranges; 2) one-stage migratory, grouse move between 2 distinct seasonal ranges; and 3) 2-stage migratory, grouse move among 3 distinct seasonal ranges. Within a given geographic area, especially summer range, there may be birds that belong to more than one of these types of populations.

On an annual basis, migratory sage grouse populations may occupy areas that exceed 2,700 km^2 (Hulet 1983, Leonard et al. 2000). During winter, Robertson (1991) reported that migratory sage grouse in southeastern Idaho made mean daily movements of 752 m and occupied an area ≥140 km^2. For a nonmigratory population in Montana, Wallestad (1975) reported that winter home range size ranged from 11 to 31 km^2. During summer, migratory sage grouse in Idaho occupied home ranges of 3 to 7 km^2 (Connelly and Markham 1983, Gates 1983).

Despite large annual movements, sage grouse have high fidelity to seasonal ranges (Keister and Willis 1986, Fischer et al. 1993). Females return to the same area to nest each year (Fischer et al. 1993) and may nest within 200 m of their previous year's nest (Gates 1983, Lyon 2000).

Survival

Wallestad (1975) reported that annual survival rates for yearling and adult female sage grouse were 35 and 40%, respectively, for poncho-tagged birds. However, Zablan (1993) reported that survival rates for banded yearling and adult females in Colorado were similar and averaged 55%; survival rates for yearling and adult males differed, averaging 52 and 38%, respectively. In Idaho, annual survival of male sage grouse ranged from 46 to 54% and female survival from 68 to 85% (Connelly et al. 1994). Lower survival rates for males may be related to physiological demands because of sexual dimorphism and greater predation rates (Swenson 1986).

Reproduction

Bergerud (1988) suggested that most female tetraonids nest as yearlings. Although essentially all female sage grouse nested in Washington (Schroeder 1997), Connelly et al. (1993) reported that in Idaho up to 45% of yearling and 22% of adult female sage grouse do not nest each year. Gregg (1991) indicated that, of 119 females monitored through the breeding season in eastern Oregon, 26 (22%) did not nest. However, Coggins (1998) reported a 99% nest initiation rate for 3 years for the same population in Oregon. The differences may be related to improved range condition that resulted in better nutritional status of pre-laying hens (Barnett and Crawford 1994).

Estimates of sage grouse nest success throughout the species' range vary from 12 to 86% (Trueblood 1954, Gregg 1991, Schroeder et al. 1999). Nest success also may vary on an annual basis (Schroeder 1997, Sveum et al. 1998*a*). Wallestad and Pyrah (1974) observed greater nest success by adults than yearlings. However, significant differences in nest success between age groups have not been reported in other studies (Connelly et al. 1993, Schroeder 1997).

Clutch size of sage grouse is extremely variable and relatively low compared to other species of gamebirds (Edminster 1954, Schroeder 1997). Average clutch size for first nests varies from 6.0 to

Sage grouse nest. Photo by Jena Hickey.

9.5 throughout the species' range (Sveum 1995, Schroeder 1997). Greatest and least average clutch sizes have been reported in Washington (Sveum 1995, Schroeder 1997).

Renesting by sage grouse varies regionally from <20% (Patterson 1952, Eng 1963, Hulet 1983, Connelly et al. 1993) to >80% (Schroeder 1997). Despite regional variation, differences in renesting rates due to age have not been documented (Connelly et al. 1993, Schroeder 1997). Because of variation in nest initiation, success, and renesting rates, the proportion of females successfully hatching a brood varies between 15 and 70% (Wallestad and Pyrah 1974, Gregg et al. 1994). Despite this variation, sage grouse generally have low reproductive rates and high annual survival compared to most gallinaceous species (Zablan 1993, Connelly et al. 1994, Connelly and Braun 1997, Schroeder 1997, Schroeder et al. 1999).

Little information has been published on mortality of juvenile sage grouse or the level of production necessary to maintain a stable population. Among western states, long-term ratios have varied from 1.40 to 2.96 juveniles/hen in the fall; since 1985 these ratios have ranged from 1.21 to 2.19 (Connelly and Braun 1997). Available data suggest that a ratio ≥2.25 juveniles/hen in the fall should result in stable to increasing sage grouse populations (Connelly and Braun 1997, Edelmann et al. 1998).

Habitat requirements

Breeding habitats

Leks, or breeding display sites, typically occur in open areas surrounded by sagebrush (Patterson 1952, Gill 1965); these sites include, but are not limited to, landing strips, old lakebeds, low sagebrush flats and ridge tops, roads, cropland, and burned areas (Connelly et al. 1981, Gates 1985). Sage grouse males appear to form leks opportunistically at sites within or adjacent to potential nesting habitat. Although the lek may be an approximate center of annual ranges for nonmigratory populations (Eng and Schladweiler 1972, Wallestad and Pyrah 1974, Wallestad and Schladweiler 1974), this may not be the case for migratory populations (Connelly et al. 1988, Wakkinen et al. 1992). Average distances between nests and nearest leks vary from 1.1 to 6.2 km, but distance from lek of female capture to nest may be >20 km (Autenrieth 1981, Wakkinen et al. 1992, Fischer 1994, Hanf et al. 1994, Lyon 2000). Nests are placed independent of lek location (Bradbury et al. 1989, Wakkinen et al. 1992).

Habitats used by pre-laying hens also are part of the breeding habitat. These areas should provide a diversity of forbs high in calcium, phosphorus, and protein; the condition of these areas may greatly affect nest initiation rate, clutch size, and subsequent reproductive success (Barnett and Crawford 1994, Coggins 1998).

Most sage grouse nests occur under sagebrush (Patterson 1952, Gill 1965, Gray 1967, Wallestad and Pyrah 1974), but sage grouse will nest under other plant species (Klebenow 1969, Connelly et al. 1991, Gregg 1991, Sveum et al. 1998*a*). However, grouse nesting under sagebrush experience greater nest success (53%) than those nesting under other plant species (22%, Connelly et al. 1991).

Table 1. Habitat characteristics associated with sage grouse nest sites.

	Sagebrush		Grass		
State	Height[a](cm)	Coverage (%)[b]	Height(cm)	Coverage(%)[c]	Reference
Colo.	52				Petersen 1980
Id.		15		4	Klebenow 1969
Id.	58–79	23–38			Autenrieth 1981
Id.	71	22	18	3–10	Wakkinen 1990
Id.			19–23	7–9	Connelly et al. 1991
Id.	61		22	30	Fischer 1994
Id.		15–32	15–30		Klott et al. 1993
Id.	69	19	34	15	Apa 1998
Mont.	40	27			Wallestad 1975
Oreg.	80	20			Keister and Willis 1986
Oreg.		24	14	9–32	Gregg 1991
Wash.		20		51	Schroeder 1995
Wash.		19		32	Sveum et al. 1998*a*
Wyo.	36				Patterson 1952
Wyo.	29	24	15	9	Heath et al. 1997
Wyo.	31	25	18	5	Holloran 1999
Wyo.	33	26	21	11	Lyon 2000

[a] Mean height of nest bush.
[b] Mean canopy coverage of the sagebrush surrounding the nest.
[c] Some coverage estimates may include both grasses and forbs.

Mean height of sagebrush most commonly used by nesting grouse ranges from 29 to 80 cm (Table 1), and nests tend to be under the tallest sagebrush within a stand (Keister and Willis 1986, Wakkinen 1990, Apa 1998). In general, sage grouse nests are placed under shrubs having larger canopies and more ground and lateral cover as well as in stands with more shrub canopy cover than at random sites (Wakkinen 1990, Fischer 1994, Heath et al. 1997, Sveum et al. 1998*a*, Holloran 1999). Sagebrush cover near the nest site was greater around successful nests than unsuccessful nests in Montana (Wallestad and Pyrah 1974) and Oregon (Gregg 1991). Wallestad and Pyrah (1974) also indicated that successful nests were in sagebrush stands with greater average canopy coverage (27%) than those of unsuccessful nests (20%). Gregg (1991) reported that sage grouse nest success varied by cover type. The greatest nest success occurred in a mountain big sagebrush (*A. t. tridentata vaseyana*) cover type where shrubs 40–80 cm in height had greater canopy cover at the site of successful nests than at unsuccessful nests (Gregg 1991). These observations were consistent with the results of an artificial nest study showing greater coverage of medium-height shrubs improved success of artificial nests (DeLong 1993, DeLong et al. 1995).

Grass height and cover also are important components of sage grouse nest sites (Table 1). Grass associated with nest sites and with the stand of vegetation containing the nest was taller and denser than grass at random sites (Wakkinen 1990, Gregg 1991, Sveum et al. 1998*a*). Grass height at nests under non-sagebrush plants was greater ($P < 0.01$) than that associated with nests under sagebrush, further suggesting that grass height is an important habitat component for nesting sage grouse (Connelly et al. 1991). Moreover, in Oregon, grass cover was greater at successful nests than at unsuccessful nests (Gregg 1991). Grass >18 cm in height occurring in stands of sagebrush 40–80 cm tall resulted in lesser nest predation rates than in stands with lesser grass heights (Gregg et al. 1994). Herbaceous cover associated with nest sites may provide scent, visual, and physical barriers to potential predators (DeLong et al. 1995).

Early brood-rearing areas occur in upland sagebrush habitats relatively close to nest sites, but movements of individual broods may vary (Connelly 1982, Gates 1983). Within 2 days of hatching, one brood moved 3.1 km (Gates 1983). Early brood-rearing habitats may be relatively open

Radiotelemetry and a pointing dog are used to capture sage grouse chicks for a research project in southeastern Idaho.

(about 14% canopy cover) stands of sagebrush (Martin 1970, Wallestad 1971) with ≥15% canopy cover of grasses and forbs (Sveum et al. 1998*b,* Lyon 2000). Great plant species richness with abundant forbs and insects characterize brood areas (Dunn and Braun 1986, Klott and Lindzey 1990, Drut et al. 1994*a*, Apa 1998). In Oregon, diets of sage grouse chicks included 34 genera of forbs and 41 families of invertebrates (Drut et al. 1994*b*). Insects, especially ants (Hymenoptera) and beetles (Coleoptera), are an important component of early brood-rearing habitat (Drut et al. 1994*b*, Fischer et al. 1996*a*). Ants and beetles occurred more frequently ($P = 0.02$) at brood-activity centers compared to nonbrood sites (Fischer et al. 1996*a*).

Summer–late brood-rearing habitats

As sagebrush habitats desiccate, grouse usually move to more mesic sites during June and July (Gill 1965, Klebenow 1969, Savage 1969, Connelly and Markham 1983, Gates 1983, Connelly et al. 1988, Fischer et al. 1996*b*). Sage grouse broods occupy a variety of habitats during summer, including sagebrush (Martin 1970), relatively small burned areas within sagebrush (Pyle and Crawford 1996), wet meadows (Savage 1969), farmland, and other irrigated areas adjacent to sagebrush habitats (Connelly and Markham 1983, Gates 1983, Connelly et al. 1988). Apa (1998) reported that sites used by grouse broods had twice as much forb cover as independent sites.

Fall habitats

Sage grouse use a variety of habitats during fall. Patterson (1952) reported that grouse move from summer to winter range in October, but during

mild weather in late fall, some birds may still use summer range. Similarly, Connelly and Markham (1983) observed that most sage grouse had abandoned summering areas by the first week of October. Fall movements to winter range are slow and meandering and occur from late August to December (Connelly et al. 1988). Wallestad (1975) documented a shift in feeding habits from September, when grouse were consuming a large amount of forbs, to December, when birds were feeding only on sagebrush.

Winter habitats

Characteristics of sage grouse winter habitats are relatively similar throughout most of the species' range (Table 2). Eng and Schladweiler (1972) and Wallestad (1975) indicated that most observations of radiomarked sage grouse during winter in Montana occurred in sagebrush habitats with >20% canopy cover. However, Robertson (1991) indicated that sage grouse used sagebrush habitats that had average canopy coverage of 15% and average height of 46 cm during 3 winters in southeastern Idaho. In Idaho, sage grouse selected areas with greater canopy cover of Wyoming big sagebrush (*A. t. wyomingensis*) in stands containing taller shrubs when compared to random sites (Robertson 1991).

Table 2. Characteristics of sagebrush at sage grouse winter-use sites.

	Canopy		
State	Coverage[a] (%)	Height[a] (cm)	Reference
Colo.		24–36[bd]	Beck 1977
Colo.		20–30[cd]	Beck 1977
Colo.	43[b]	34[b]	Schoenberg 1982
Colo.	37[c]	26[c]	Schoenberg 1982
Colo.	30–38[de]	41–54[de]	Hupp 1987
Id.	38[e]	56[e]	Autenrieth 1981
Id.	26[b]	29[b]	Connelly 1982
Id.	25[c]	26[c]	Connelly 1982
Id.	15	46	Robertson 1991
Mont.	27	25	Eng and Schladweiler 1972
Mont.	>20		Wallestad 1975
Oreg.	12–17[d]		Hanf et al. 1994

[a] Mean canopy coverage or height of sagebrush above snow.
[b] Males
[c] Females
[d] Ranges are given when data were provided for more than one year or area.
[e] No snow present when measurements were made or total height of plant was measured.

In Colorado, sage grouse may be restricted to <10% of the sagebrush habitat because of variation in topography and snow depth (Beck 1977, Hupp and Braun 1989). Such restricted areas of use may not occur throughout the species' range because in southeastern Idaho, severe winter weather did not result in the grouse population greatly reducing its seasonal range (Robertson 1991).

During winter, sage grouse feed almost exclusively on leaves of sagebrush (Patterson 1952, Wallestad et al. 1975). Although big sagebrush dominates the diet in most portions of the range (Patterson 1952; Wallested et al. 1975; Remington and Braun 1985; Welch et al. 1988, 1991), low sagebrush (*A. arbuscula*), black sagebrush (*A. nova,* Dalke et al. 1963, Beck 1977), fringed sagebrush (*A. frigida*, Wallestad et al. 1975), and silver sagebrush (*A. cana*, Aldridge 1998) are consumed in many areas depending on availability. Sage grouse in some areas apparently prefer Wyoming big sagebrush (Remington and Braun 1985, Myers 1992) and in other areas mountain big sagebrush (Welch et al. 1988, 1991). Some of the differences in selection may be due to preferences for greater levels of protein and the amount of volatile oils (Remington and Braun 1985, Welch et al. 1988).

Effects of habitat alteration

Range management treatments

Breeding habitat. Until the early 1980s, herbicide treatment (primarily with 2,4-D) was the most common method to reduce sagebrush on large tracts of rangeland (Braun 1987). Klebenow (1970) reported cessation of nesting in newly sprayed areas with < 5% live sagebrush canopy cover. Nesting also was nearly nonexistent in older sprayed areas containing about 5% live sagebrush cover (Klebenow 1970). In virtually all documented cases, herbicide application to blocks of sagebrush rangeland resulted in major declines in sage grouse breeding populations (Enyeart 1956, Higby 1969, Peterson 1970, Wallestad 1975). Effects of this treatment on sage grouse populations seemed more severe if the treated area was subsequently seeded to crested wheatgrass (*Agropyron cristatum*, Enyeart 1956).

Using fire to reduce sagebrush has become more common since most uses of 2,4-D on public lands were prohibited (Braun 1987). Klebenow (1972) and Sime (1991) suggested that fire may benefit sage grouse populations. Neither Gates (1983),

Martin (1990), nor Bensen et al. (1991) reported adverse effects of fire on breeding populations of sage grouse. In contrast, following a 9-year study, Connelly et al. (1994, 2000*b*) indicated that prescribed burning of Wyoming big sagebrush during a drought period resulted in a large decline (>80%) of a sage grouse breeding population in southeastern Idaho. Additionally, Hulet (1983) documented loss of leks from fire and Nelle et al. (2000) reported that burning mountain big sagebrush stands had long-term negative impacts on sage grouse nesting and brood-rearing habitats. Canopy cover in mountain big sagebrush did not provide appropriate nesting habitat 14 years after burning (Nelle et al. 2000). The impact of fire on sage grouse populations using habitats dominated by silver sagebrush (which may resprout following fire) is unknown.

Cheatgrass (*Bromus tectrorum*) will often occupy sites following disturbance, especially burning (Valentine 1989). Repeated burning or burning in late summer favors cheatgrass invasion and may be a major cause of the expansion of this species (Vallentine 1989). The ultimate result may be a loss of the sage grouse population because of long-term conversion of sagebrush habitat to rangeland dominated by an annual exotic grass. However, this situation largely appears confined to the western portion of the species' range and does not commonly occur in Wyoming (J. Lawson, Wyoming Department of Game and Fish, personal communication).

Mechanical methods of sagebrush control have often been applied to smaller areas than those treated by herbicides or fire, especially to convert rangeland to cropland. However, adverse effects of this type of treatment on sage grouse breeding populations also have been documented. In Montana, Swenson et al. (1987) indicated that the number of breeding males declined by 73% after 16% of their study area was plowed.

Brood-rearing habitats. Martin (1970) reported that sage grouse seldom used areas treated with herbicides to remove sagebrush in southwestern Montana. In Colorado, Rogers (1964) indicated that an entire population of sage grouse appeared to emigrate from an area that was subjected to several years of herbicide application to remove sagebrush. Similarly, Klebenow (1970) reported that herbicide spraying reduced the brood-carrying capacity of an area in southeastern Idaho. However, application of herbicides in early spring to reduce sagebrush cover may enhance some brood-rearing habitats by increasing the amount of herbaceous plants used for food (Autenrieth 1981).

Fire may improve sage grouse brood-rearing habitat (Klebenow 1972, Gates 1983, Sime 1991), but until recently, experimental evidence was not available to support or refute these contentions (Braun 1987). Pyle and Crawford (1996) suggested that fire may enhance brood-rearing habitat in montane settings but cautioned that its usefulness requires further investigation. A 9-year study of the effects of fire on sage grouse did not support that prescribed fire, conducted during late summer in a Wyoming big sagebrush habitat, improved brood-rearing habitat for sage grouse (Connelly et al. 1994, Fischer et al. 1996*a*). Prescribed burning of sage grouse habitat did not increase amount of forbs in burned areas compared to unburned areas (Fischer et al. 1996*a*, Nelle et al. 2000) and resulted in decreased insect populations in the treated area compared to the unburned area. Thus, fire may negatively affect sage grouse brood-rearing habitat rather than improve it in Wyoming big sagebrush habitats (Connelly and Braun 1997), but its effect on grouse habitats in mountain big sagebrush communities requires further investigation (Pyle and Crawford 1996, Nelle et al. 2000).

Sage grouse often use agricultural areas for brood-rearing habitat (Patterson 1952, Wallestad 1975, Gates 1983, Connelly et al. 1988, Blus et al. 1989). Grouse use of these areas may result in mortality because of exposure to insecticides. Blus et al. (1989) reported die-offs of sage grouse that were exposed to methamidiphos used in potato fields and dimethoate used in alfalfa fields. Dimethoate is used commonly for alfalfa, and 20 of 31 radiomarked grouse (65%) died following direct exposure to this insecticide (Blus et al. 1989).

Winter habitat. Reduction in sage grouse use of an area treated by herbicide was proportional to the severity (i.e., amount of damage to sagebrush) of the treatment (Pyrah 1972). In sage grouse winter range, strip partial kill, block partial kill, and total kill of sagebrush were increasingly detrimental to sage grouse in Montana (Pyrah 1972) and Wyoming (Higby 1969).

In Idaho, Robertson (1991) reported that a 2,000-ha prescribed burn that removed 57% of the sagebrush cover in sage grouse winter habitat minimally impacted the sage grouse population. Although sage grouse use of the burned area declined following the fire, grouse adapted to this disturbance by moving 1 to 10 km outside of the burn to areas

with greater sagebrush cover (Robertson 1991) than was available in the burned area.

Land use

Mining–energy development. Effects of mining, oil, and gas developments on sage grouse populations are not well known (Braun 1998). These activities negatively impact grouse habitat and populations over the short term (Braun 1998), but research suggests some recovery of populations following initial development and subsequent reclamation of the affected sites (Eng et al. 1979, Tate et al. 1979, Braun 1986). In Colorado, sage grouse were displaced by oil development and coal-mining activities, but numbers returned to pre-disturbance levels once the activities ceased (Braun 1987, Remington and Braun 1991). At least 6 leks in Alberta were disturbed by energy development and 4 were abandoned (Aldridge 1998). In Wyoming, female sage grouse captured on leks disturbed by natural gas development had lower nest-initiation rates, longer movements to nest sites, and different nesting habitats than hens captured on undisturbed leks (Lyon 2000). Sage grouse may repopulate an area following energy development but may not attain population levels that occurred prior to development (Braun 1998). Thus, short-term and long-term habitat loss appears to result from energy development and mining (Braun 1998).

Grazing. Domestic livestock have grazed over most areas used by sage grouse and this use is generally repetitive with annual or biennial grazing periods of varying timing and length (Braun 1998). Grazing patterns and use of habitats are often dependent on weather conditions (Valentine 1990). Historic and scientific evidence indicates that livestock grazing did not increase the distribution of sagebrush (Peterson 1995) but markedly reduced the herbaceous understory over relatively large areas and increased sagebrush density in some areas (Vale 1975, Tisdale and Hironaka 1981). Within the intermountain region, some vegetation changes from livestock grazing likely occurred because sagebrush steppe in this area did not evolve with intensive grazing by wild herbivores, as did the grassland prairies of central North America (Mack and Thompson 1982). Grazing by wild ungulates may reduce sagebrush cover (McArthur et al. 1988, Peterson 1995), and livestock grazing may result in high trampling mortality of sagebrush seedlings (Owens and Norton 1992). In Wyoming big sagebrush habitats, resting areas from livestock grazing may improve understory production as well as decrease sagebrush cover (Wambolt and Payne 1986).

There is little direct experimental evidence linking grazing practices to sage grouse population levels (Braun 1987, Connelly and Braun 1997). However, grass height and cover affect sage grouse nest site selection and success (Wakkinen 1990, Gregg 1991, Gregg et al. 1994, Delong et al. 1995, Sveum et al. 1998*a*). Thus, indirect evidence suggests grazing by livestock or wild herbivores that significantly reduces the herbaceous understory in breeding habitat may have negative impacts on sage grouse populations (Braun 1987, Dobkin 1995).

Miscellaneous activities. Construction of roads, powerlines, fences, reservoirs, ranches, farms, and housing developments has resulted in sage grouse habitat loss and fragmentation (Braun 1998). Between 1962 and 1997, >51,000 km of fence were constructed on land administered by the Bureau of Land Management in states supporting sage grouse populations (T. D. Rich, United States Bureau of Land Management, personal communication). Structures such as powerlines and fences pose hazards to sage grouse because they provide additional perch sites for raptors and because sage grouse may be injured or killed when they fly into these structures (Call and Maser 1985).

Weather

Prolonged drought during the 1930s and mid-1980s to early 1990s coincided with declining sage grouse populations throughout much of the species' range (Patterson 1952, Fischer 1994, Hanf et al. 1994). Drought may affect sage grouse populations by reducing herbaceous cover at nests and the quantity and quality of food available for hens and chicks during spring (Hanf et al. 1994, Fischer et al. 1996*a*).

Spring weather may influence sage grouse production. Relatively wet springs may result in increased production (Wallestad 1975, Autenrieth 1981). However, heavy rainfall during egg-laying or unseasonably cold temperatures with precipitation during hatching may decrease production (Wallestad 1975).

There is no evidence that severe winter weather affects sage grouse populations unless sagebrush cover has been greatly reduced or eliminated (Wallestad 1975, Beck 1977, Robertson 1991).

Predation

Over the last 25 years, numerous studies have used radiotelemetry to address sage grouse survival and nest success (Wallestad 1975; Hulet 1983; Gregg 1991; Robertson 1991; Connelly et al. 1993, 1994; Gregg et al. 1994; Schroeder 1997). Only Gregg (1991) and Gregg et al. (1994) indicated that predation was limiting sage grouse numbers, and their research suggested that low nest success from predation was related to poor nesting habitat. Most reported nest-success rates are >40%, suggesting that nest predation is not a widespread problem. Similarly, high survival rates of adult (Connelly et al. 1993, Zablan 1993) and older (>10 weeks of age) juvenile sage grouse indicate that population declines are not generally related to high levels of predation. Thus, except for an early study in Oregon (Batterson and Morse 1948), predation has not been identified as a major limiting factor for sage grouse (Connelly and Braun 1997).

Constructing ranches, farms, and housing developments has resulted in the addition of nonnative predators to sage grouse habitats, including dogs, cats, and red foxes (*Vulpes vulpes*; J. W. Connelly, Idaho Department of Fish and Game, unpublished data; B. L. Welch, United States Forest Service, personal communication) and may be responsible for increases in abundance of the common raven (*Corvus corax*, Sauer et al. 1997). Relatively high raven populations may decrease sage grouse nest success (Batterson and Morse 1948, Autenrieth 1981), but rigorous field studies using radiotelemetry do not support this hypothesis. Current work in Strawberry Valley, Utah, suggests that red foxes are taking a relatively high proportion of the population (Flinders 1999). This may become a greater problem if red foxes become well established throughout sage grouse breeding habitat.

Recommended guidelines

Sage grouse populations occupy relatively large areas on a year-round basis (Berry and Eng 1985, Connelly et al. 1988, Wakkinen 1990, Leonard et al. 2000), invariably involving a mix of ownership and jurisdictions. Thus, state and federal natural resource agencies and private landowners must coordinate efforts over at least an entire seasonal range to successfully implement these guidelines. Based on current knowledge of sage grouse population and habitat trends, these guidelines have been developed to help agencies and landowners effectively assess and manage populations, protect and manage remaining habitats, and restore damaged habitat. Because of gaps in our knowledge and regional variation in habitat characteristics (Tisdale and Hironaka 1981), the judgment of local biologists and quantitative data from population and habitat monitoring are necessary to implement the guidelines correctly. Further, we urge agencies to use an adaptive management approach (Macnab 1983, Gratson et al. 1993), using monitoring and evaluation to assess the success of implementing these guidelines to manage sage grouse populations.

Activities responsible for the loss or degradation of sagebrush habitats also may be used to restore these habitats. These activities include prescribed fire, grazing, herbicides, and mechanical treatments. Decisions on land treatments using these tools should be based on quantitative knowledge of vegetative conditions over an entire population's seasonal range. Generally, the treatment selected should be that which is least disruptive to the vegetation community and has the most rapid recovery time. This selection should not be based solely on economic cost.

Definitions

For the purpose of these guidelines, we define an occupied lek as a traditional display area in or adjacent to sagebrush-dominated habitats that has been attended by ≥2 male sage grouse in ≥2 of the previous 5 years. We define a breeding population as a group of birds associated with 1 or more occupied leks in the same geographic area separated from other leks by >20 km. This definition is somewhat arbitrary but generally based on maximum distances females move to nest.

Population management

1) Before making management decisions, agencies should cooperate to first identify lek locations and determine whether a population is migratory or nonmigratory. In the case of migratory populations, migration routes and seasonal habitats must be identified to allow for meaningful and correct management decisions.

2) Breeding populations should be assessed by either lek counts (census number of males attending leks) or lek surveys (classify known leks as active or inactive) each year (Autenrieth et al. 1982). Depending on number of counts each spring (Jenni and Hartzler 1978, Emmons and Braun

1984) and weather conditions when the counts were made, lek counts may not provide an accurate assessment of sage grouse populations (Beck and Braun 1980) and the data should be viewed with caution. Despite these shortcomings, lek counts provide the best index to breeding population levels and many long-term data sets are available for trend analysis (Connelly and Braun 1997).

3) Production or recruitment should be monitored by brood counts or wing surveys (Autenrieth et al. 1982). Brood counts are labor-intensive and usually result in inadequate sample size. Where adequate samples of wings can be obtained, we recommend using wing surveys to obtain estimates of sage grouse nesting success and juvenile:adult hen (including yearlings) ratios.

4) Routine population monitoring should be used to assess trends and identify problems for all hunted and nonhunted populations. Check stations, wing collections, and questionnaires can be used to obtain harvest information. Breeding population and production data (above) can be used to monitor nonhunted populations.

5) The genetic variation of relatively small, isolated populations should be documented to better understand threats to these populations and implement appropriate management actions (Young 1994, Oyler-McCance et al. 1999).

6) Hunting seasons for sage grouse should be based on careful assessments of population size and trends. Harvest should not be based on the observations of Allen (1954:43), who stated, "Our populations of small animals operate under a 1-year plan of decimation and replacement; and Nature habitually maintains a wide margin of overproduction. She kills off a huge surplus of animals whether we take our harvest or not." To the contrary, sage grouse tend to have relatively long lives with low annual turnover (Zablan 1993, Connelly et al. 1994) and a low reproductive rate (Gregg 1991, Connelly et al. 1993). Consequently, hunting may be additive to other causes of mortality for sage grouse (Johnson and Braun 1999, Connelly et al. 2000*a*). However, most populations appear able to sustain hunting if managed carefully (Connelly et al. 2000*a*).

7) If populations occur over relatively large geographic areas and are stable to increasing, seasons and bag limits can be relatively liberal (2- to 4-bird daily bag limit and a 2- to 5-week season) for hunting seasons allowing firearms (Braun and Beck 1985).

8) If populations are declining (for 3 or more consecutive years) or trends are unknown, seasons and bag limits should be generally conservative (1- or 2-bird daily bag limit and a 1-to 4-week season) for hunting seasons allowing firearms, or suspended (for all types of hunting, including falconry and Native American subsistence hunting) because of this species' population characteristics (Braun 1998, Connelly et al. 2000*a*).

9) Where populations are hunted, harvest rates should be 10% or less of the estimated fall population to minimize negative effects on the subsequent year's breeding population (Connelly et al. 2000*a*).

10) Populations should not be hunted where ≤300 birds comprise the breeding population (i.e., ≤100 males are counted on leks [C. E. Braun, Colorado Division of Wildlife, unpublished report]).

11) Spring hunting of sage grouse on leks should be discouraged or, if unavoidable, confined to males only during the early portion of the breeding season. Spring hunting is considered an important tradition for some Native American tribes. However, in Idaho, 80% of the leks hunted during spring in the early 1990s (n=5) had become inactive by 1994 (Connelly et al. 1994).

12) Viewing sage grouse on leks (and censusing leks) should be conducted so that disturbance to birds is minimized or preferably eliminated (Call and Maser 1986). Agencies should generally not provide all lek locations to individuals simply interested in viewing birds. Instead, 1 to 3 lek locations should be identified as public viewing leks, and if demand is great enough, agencies should consider erecting 2–3 seasonal blinds at these leks for public use. Camping in the center of or on active leks should be vigorously discouraged.

13) Discourage establishment of red fox and other nonnative predator populations in sage grouse habitats.

14) For small, isolated populations and declining populations, assess the impact of predation on survival and production. Predator control programs are expensive and often ineffective. In some cases, these programs may provide temporary help while habitat is recovering. Predator management programs also could be considered in areas where seasonal habitats are in good condition but their extent has been reduced greatly. However, predator management should be implemented only if the available data (e.g., nest success <25%, annual survival of adult hens <45%) support the action.

General habitat management

The following guidelines pertain to all seasonal habitats used by sage grouse:

1) Monitor habitat conditions and propose treatments only if warranted by range condition (i.e., the area no longer supports habitat conditions described in the following guidelines under habitat protection). Do not base land treatments on schedules, targets, or quotas.

2) Use appropriate vegetation treatment techniques (e.g., mechanical methods, fire) to remove junipers and other conifers that have invaded sage grouse habitat (Commons et al. 1999). Whenever possible, use vegetation control techniques that are least disruptive to the stand of sagebrush, if this stand meets the needs of sage grouse (Table 3).

Table 3. Characteristics of sagebrush rangeland needed for productive sage grouse habitat.

	Breeding		Brood-rearing		Winter[e]	
	Height (cm)	Canopy (%)	Height (cm)	Canopy (%)	Height (cm)	Canopy (%)
Mesic sites[a]						
Sagebrush	40–80	15–25	40–80	10–25	25–35	10–30
Grass–forb	>18[c]	≥25[d]	variable	>15	N/A	N/A
Arid sites[a]						
Sagebrush	30–80	15–25	40–80	10–25	25–35	10–30
Grass/forb	>18[c]	≥15	variable	>15	N/A	N/A
Area[b]	>80		>40		>80	

[a] Mesic and arid sites should be defined on a local basis; annual precipitation, herbaceous understory, and soils should be considered (Tisdale and Hironaka 1981, Hironaka et al. 1983).

[b] Percentage of seasonal habitat needed with indicated conditions.

[c] Measured as "droop height"; the highest naturally growing portion of the plant.

[d] Coverage should exceed 15% for perennial grasses and 10% for forbs; values should be substantially greater if most sagebrush has a growth form that provides little lateral cover (Schroeder 1995)

[e] Values for height and canopy coverage are for shrubs exposed above snow.1

3) Increase the visibility of fences and other structures occurring within 1 km of seasonal ranges by flagging or similar means if these structures appear hazardous to flying grouse (e.g., birds have been observed hitting or narrowly missing these structures or grouse remains have been found next to these structures).

4) Avoid building powerlines and other tall structures that provide perch sites for raptors within 3 km of seasonal habitats. If these structures must be built, or presently exist, the lines should be buried or poles modified to prevent their use as raptor perch sites.

Breeding habitat management

For migratory and nonmigratory populations, lek attendance, nesting, and early brood rearing occur in breeding habitats. These habitats are sagebrush-dominated rangelands with a healthy herbaceous understory and are critical for survival of sage grouse populations. Mechanical disturbance, prescribed fire, and herbicides can be used to restore sage grouse habitats to those conditions identified as appropriate in the following sections on habitat protection. Local biologists and range ecologists should select the appropriate technique on a case-by-case basis. Generally, fire should not be used in breeding habitats dominated by Wyoming big sagebrush if these areas support sage grouse. Fire can be difficult to control and tends to burn the best remaining nesting and early brood-rearing habitats (i.e., those areas with the best remaining understory), while leaving areas with poor understory. Further, we recommend against using fire in habitats dominated by xeric mountain big sagebrush (*A. t. xericensis*) because annual grasses commonly invade these habitats and much of the original habitat has been altered by fire (Bunting et al. 1987).

Although mining and energy development are common activities throughout the range of sage grouse, quantitative data on the long-term effects of these activities on sage grouse are limited. However, some negative impacts have been documented (Braun 1998, Lyon 2000). Thus, these activities should be discouraged in breeding habitats, but when they are unavoidable, restoration efforts should follow procedures outlined in these guidelines.

Habitat protection

1) Manage breeding habitats to support 15–25% canopy cover of sagebrush, perennial herbaceous cover averaging ≥18 cm in height with ≥15% canopy cover for grasses and ≥10% for forbs and a diversity of forbs (Barnett and Crawford 1994, Drut et al. 1994*a*, Apa 1998) during spring (Table 3). Habitats meeting these conditions should have a high priority for wildfire suppression and should

not be considered for sagebrush control programs. Sagebrush and herbaceous cover should provide overhead and lateral concealment from predators. If average sagebrush height is >75 cm, herbaceous cover may need to be substantially greater than 18 cm to provide this protection. There is much variability among sagebrush-dominated habitats (Tisdale and Hironaka 1981, Hironaka et al. 1983), and some Wyoming sagebrush and low sagebrush breeding habitats may not support 25% herbaceous cover. In these areas, total herbaceous cover should be ≥15 % (Table 3). Further, the herbaceous height requirement may not be possible in habitats dominated by grasses that are relatively short when mature. In all of these cases, local biologists and range ecologists should develop height and cover requirements that are reasonable and ecologically defensible. Leks tend to be relatively open, thus cover on leks should not meet these requirements.

2) For nonmigratory grouse occupying habitats that are distributed uniformly (i.e., habitats have the characteristics described in guideline 1 and are generally distributed around the leks), protect (i.e., do not manipulate) sagebrush and herbaceous understory within 3.2 km of all occupied leks. For nonmigratory populations, consider leks the center of year-round activity and use them as focal points for management efforts (Braun et al. 1977).

3) For nonmigratory populations where sagebrush is not distributed uniformly (i.e., habitats have the characteristics described in guideline 1 but distributed irregularly with respect to leks), protect suitable habitats for ≤5 km from all occupied leks. Use radiotelemetry, repeated surveys for grouse use, or habitat mapping to identify nesting and early brood-rearing habitats.

4) For migratory populations, identify and protect breeding habitats within 18 km of leks in a manner similar to that described for nonmigratory sage grouse. For migratory sage grouse, leks generally are associated with nesting habitats but migratory birds may move >18 km from leks to nest sites. Thus, protection of habitat within 3.2 km of leks may not protect most of the important nesting areas (Wakkinen et al. 1992, Lyon 2000).

5) In areas of large-scale habitat loss (≥40% of original breeding habitat), protect all remaining habitats from additional loss or degradation. If remaining habitats are degraded, follow guidelines for habitat restoration listed below.

6) During drought periods (≥2 consecutive years), reduce stocking rates or change management practices for livestock, wild horses, and wild ungulates if cover requirements during the nesting and brood-rearing periods are not met. Grazing pressure from domestic livestock and wild ungulates should be managed in a manner that at all times addresses the possibility of drought.

Sage grouse just leaving a nest in good-condition breeding habitat in southwestern Idaho. Note the height of grass and herbaceous cover.

7) Suppress wildfires in all breeding habitats. In the event of multiple fires, land management agencies should have all breeding habitats identified and prioritized for suppression, giving the greatest priority to those that have become fragmented or reduced by >40% in the last 30 years.

8) Adjust timing of energy exploration, development, and construction activity to minimize disturbance of sage grouse breeding activities. Energy-related facilities should be located >3.2 km from active leks whenever possible. Human activities within view of or <0.5 km from leks should be minimized during the early morning and late evening when birds are near or on leks.

Habitat restoration

1) Before initiating vegetation treatments, quantitatively evaluate the area proposed for treatment to ensure that it does not have sagebrush and herbaceous cover suitable for breeding habitat (Table 3). Treatments should not be undertaken within sage grouse habitats until the limiting vegetation factor(s) has been identified, the proposed treatment is known to provide the desired vegetation response, and land-use activities can be managed after treatment to ensure that vegetation objectives are met.

2) Restore degraded rangelands to a condition that again provides suitable breeding habitat for sage grouse by including sagebrush, native forbs

(especially legumes), and native grasses in reseeding efforts (Apa 1998). If native forbs and grasses are unavailable, use species that are functional equivalents and provide habitat characteristics similar to those of native species.

3) Where the sagebrush overstory is intact but the understory has been degraded severely and quality of nesting habitat has declined (Table 3), use appropriate techniques (e.g., brush beating in strips or patches and interseed with native grasses and forbs) that retain some sagebrush but open shrub canopy to encourage forb and grass growth.

4) Do not use fire in sage grouse habitats prone to invasion by cheatgrass and other invasive weed species unless adequate measures are included in restoration plans to replace the cheatgrass understory with perennial species using approved reseeding strategies. These strategies could include, but are not limited to, use of pre-emergent herbicides (e.g., Oust®, Plateau®) to retard cheatgrass germination until perennial herbaceous species become established.

5) When restoring habitats dominated by Wyoming big sagebrush, regardless of the techniques used (e.g., prescribed fire, herbicides), do not treat >20% of the breeding habitat (including areas burned by wildfire) within a 30-year period (Bunting et al. 1987). The 30-year period represents the approximate recovery time for a stand of Wyoming big sagebrush. Additional treatments should be deferred until the previously treated area again provides suitable breeding habitat (Table 3). In some cases, this may take <30 years and in other cases >30 years. If 2,4-D or similar herbicides are used, they should be applied in strips such that their effect on forbs is minimized. Because fire generally burns the best remaining sage grouse habitats (i.e., those with the best understory) and leaves areas with sparse understory, use fire for habitat restoration only when it can be convincingly demonstrated to be in the best interest of sage grouse.

Nest habitat is measured in Owyhee County, southwestern Idaho.

This breeding habitat is in poor condition because of a lack of understory.

6) When restoring habitats dominated by mountain big sagebrush, regardless of the techniques used (e.g., fire, herbicides), treat ≤20% of the breeding habitat (including areas burned by wildfire) within a 20-year period (Bunting et al. 1987). The 20-year period represents the approximate recovery time for a stand of mountain big sagebrush. Additional treatments should be deferred until the previously treated area again provides suitable breeding habitat (Table 3). In some cases, this may take <20 years and in other cases >20 years. If 2,4-D or similar herbicides are used, they should be applied in strips such that their effect on forbs is minimized.

7) All wildfires and prescribed burns should be evaluated as soon as possible to determine whether reseeding is necessary to achieve habitat management objectives. If needed, reseed with sagebrush, native bunchgrasses, and forbs whenever possible.

8) Until research unequivocally demonstrates that using tebuthiuron and similar-acting herbicides to control sagebrush has no long-lasting negative impacts on sage grouse habitat, use these herbicides only on an experimental basis and over a sufficiently small area that any long-term negative impacts are negligible. Because these herbicides have the potential of reducing but not eliminating sagebrush cover within grouse breeding habitats, thus stimulating herbaceous development, their use as sage grouse habitat management tools should be examined closely.

John Crawford explains Oregon's sage grouse research program to field-trip attendees during a meeting of the Western States Sage and Columbian sharp-tailed Grouse Technical Committee.

Summer–late brood-rearing habitat management

Sage grouse may use a variety of habitats, including meadows, farmland, dry lakebeds, sagebrush, and riparian zones from late June to early November (Patterson 1952, Wallestad 1975, Connelly 1982, Hanf et al. 1994). Generally, these habitats are characterized by relatively moist conditions and many succulent forbs in or adjacent to sagebrush cover.

Habitat protection

1) Avoid land-use practices that reduce soil moisture effectiveness, increase erosion, cause invasion of exotic plants, and reduce abundance and diversity of forbs.

2) Avoid removing sagebrush within 300 m of sage grouse foraging areas along riparian zones, meadows, lakebeds, and farmland, unless such removal is necessary to achieve habitat management objectives (e.g., meadow restoration, treatment of conifer encroachment).

3) Discourage use of very toxic organophosphorus and carbamate insecticides in sage grouse brood-rearing habitats. Sage grouse using agricultural areas may be adversely affected by pesticide applications (Blus et al. 1989). Less toxic agrichemicals or biological control may provide suitable alternatives in these areas.

4) Avoid developing springs for livestock water, but if water from a spring will be used in a pipeline or trough, design the project to maintain free water and wet meadows at the spring. Capturing water from springs using pipelines and troughs may adversely affect wet meadows used by grouse for foraging.

Habitat restoration

1) Use brush beating or other mechanical treatments in strips 4–8 m wide in areas with relatively high shrub-canopy cover (≥35% total shrub cover) to improve late brood-rearing habitats. Brush beating can be used to effectively create different age classes of sagebrush in large areas with little age diversity.

2) If brush beating is impractical, use fire or herbicides to create a mosaic of openings in mountain big sagebrush and mixed-shrub communities used as late brood-rearing habitats where total shrub cover is ≥35%. Generally, 10–20% canopy cover of sagebrush and ≤25% total shrub cover will provide adequate habitat for sage grouse during summer.

3) Construct water developments for sage grouse only in or adjacent to known summer-use areas and provide escape ramps suitable for all avian species and other small animals. Water developments and "guzzlers" may improve sage grouse summer habitats (Autenrieth et al. 1982, Hanf et al. 1994). However, sage grouse used these developments infrequently in southeastern Idaho because most were constructed in sage grouse winter and breeding habitat rather than summer range (Connelly and Doughty 1989).

4) Whenever possible, modify developed springs and other water sources to restore natural free-flowing water and wet meadow habitats.

Winter habitat management

Sagebrush is the essential component of winter habitat. Sage grouse select winter-use sites based on snow depth and topography, and snowfall can affect the amount and height of sagebrush available to grouse (Connelly 1982, Hupp and Braun 1989, Robertson 1991). Thus, on a landscape scale, sage grouse winter habitats should allow grouse access to sagebrush under all snow conditions (Table 3).

Habitat protection

1) Maintain sagebrush communities on a landscape scale, allowing sage grouse access to sagebrush stands with canopy cover of 10–30% and heights of at least 25–35 cm regardless of snow cover. These areas should be high priority for wildfire suppression and sagebrush control should be avoided.

2) Protect patches of sagebrush within burned areas from disturbance and manipulation. These areas may provide the only winter habitat for sage grouse and their loss could result in the extirpation of the grouse population. They also are important

seed sources for sagebrush re-establishment in the burned areas. During fire-suppression activities do not remove or burn any remaining patches of sagebrush within the fire perimeter.

3) In areas of large-scale habitat loss (≥40% of original winter habitat), protect all remaining sagebrush habitats.

Habitat restoration

1) Reseed former winter range with the appropriate subspecies of sagebrush and herbaceous species unless the species are recolonizing the area in a density that would allow recovery (Table 3) within 15 years.

2) Discourage prescribed burns >50 ha, and do not burn >20% of an area used by sage grouse during winter within any 20–30-year interval (depending on estimated recovery time for the sagebrush habitat).

Conservation strategies

We recommend that each state and province develop and implement conservation plans for sage grouse. These plans should use local working groups comprised of representatives of all interested agencies, organizations, and individuals to identify and solve regional issues (Anonymous 1997). Within the context of these plans, natural resource agencies should cooperate to document the amount and condition of sagebrush rangeland remaining in the state or province. Local and regional plans should summarize common problems to conserve sage grouse and general conditions (Table 3) needed to maintain healthy sage grouse populations. Local differences in conditions that affect sage grouse populations may occur and should be considered in conservation plans. Natural resource agencies should identify remaining breeding and winter ranges in Wyoming big sagebrush habitats and establish these areas as high priority for wildfire suppression. Prescribed burning in habitats that are in good ecological condition should be avoided. Protection and restoration of sage grouse habitats also will likely benefit many other sagebrush obligate species (Saab and Rich 1997) and enhance efforts to conserve and restore sagebrush steppe.

Although translocating sage grouse to historical range has been done on numerous occasions, few attempts have been successful (Musil et al. 1993, Reese and Connelly 1997). Thus, we agree with Reese and Connelly (1997) that translocation efforts should be viewed as only experimental at this time and not as a viable management strategy.

More information is needed on characteristics of healthy sagebrush ecosystems and the relationship of grazing to sage grouse production. Field experiments should be implemented to evaluate the relationship of grazing pressure (i.e., disturbance and removal of herbaceous cover) to sage grouse nest success and juvenile survival (Connelly and Braun 1997). The overall quality of existing sage grouse habitat will become increasingly important as quantity of these habitats decrease. Sage grouse populations appear relatively secure in some portions of their range and at risk in other portions. However, populations that have thus far survived extensive habitat loss may still face extinction because of a time lag between habitat loss and ultimate population collapse (Cowlishaw 1999).

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Appendix C. Implementation Plan for Conservation Measures in the Challis Sage-grouse Conservation Plan			
Specific Risk	**Responsible Party**	**Conservation Measure**	**When**
Habitat Fragmentation			
Collisions with fencing	All land managers	Increase the visibility of fences and other structures if these structures are documented to be hazardous to flying grouse (e.g., birds have been observed hitting or narrowly missing these structures or grouse remains have been found next to these structures)	As needed and on an ongoing basis
	All land managers	Avoid construction of fences within 0.6 miles of active leks	As needed and on an ongoing basis
	All land managers	Consider alternatives to fencing and alternative fence designs in active lek areas	As needed and on an ongoing basis
Off-highway vehicle (OHV) use in all habitats	Challis LWG	Review existing and proposed resource management plans/travel management plans and evaluate impacts to sage-grouse habitats	As needed and on an ongoing basis
	Land management agencies	Develop travel management plans where they do not exist or revise existing plans that are inadequate	As needed and on an ongoing basis
	All land managers	Consider avoiding sage-grouse habitats when developing OHV timing and use restriction	As needed and on an ongoing basis
	Challis LWG	Provide comments to the land management agencies whenever those agencies are developing OHV timing and use restrictions. The Challis LWG will request to be added to mailing lists for all travel planning documents	As needed and on an ongoing basis
	Challis LWG	Notify land management agencies that are responsible for enforcement of OHV use and timing restrictions as to seasonal use areas for priority enforcement	As needed and on an ongoing basis
	Challis LWG in cooperation with the land management agencies, IDFG, Idaho Department of Parks & Recreation, and user groups	Educate the public about the impacts of OHV activities on sage-grouse habitats	As needed and on an ongoing basis
	Land management agencies and IDFG	Place education materials at visitor information centers throughout the Challis LWG area	On an on-going basis

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Specific Risk	**Responsible Party**	**Conservation Measure**	**When**
Excessive avian predation resulting from placement of transmission lines & structures	All land managers	Consider the alternative of underground powerlines in the vicinity of sage-grouse habitats	As needed and on an on-going basis
	Land management agencies	Consider sage-grouse habitats when siting new utility corridors and facilities	As needed and on an on-going basis
	All land managers	Identify areas with existing utility lines in sage-grouse habitats and work with utility companies to install anti-perching devices	As needed and on an on-going basis
Risks associated with landfills and transfer stations	Land management agencies and local governments (in consultation with IDFG)	Consider alternatives that would avoid sage-grouse habitats when siting new landfills and transfer stations, where possible	As needed and on an on-going basis
Risks associated with communication sites in the vicinity of seasonal habitats	Land management agencies	Consolidate new communication site development in areas of existing communication sites	As needed and on an on-going basis
Risks of urbanization in sage-grouse habitat	Challis LWG	Encourage securing conservation easements and development of incentives to maintain native rangelands	As needed and on an on-going basis
	Challis LWG	Encourage conservation easement purchases in the vicinity of critical habitats	As needed and on an on-going basis
	Challis LWG and IDFG	Provide input during development of county land-use plans to encourage open space in sage-grouse habitats	As necessary and appropriate
Loss of habitat resulting from roads	Land management agencies	Consider consolidation of multiple roads leading to the same location (where users have developed new roads to avoid seasonal conditions) in seasonal habitats in reviewing travel management plans. All Challis LWG members are encouraged to participate in local land use planning processes	As needed
	All land managers	Minimize new road construction in nesting and winter habitats	On an on-going basis
	All land managers	Consider alterations to roads that are affecting wetland hydrology through maintenance, relocation, closure, culverts, and other measures	As needed and on an on-going basis

Appendix C. Implementation Plan for Conservation Measures in the Challis Sage-grouse Conservation Plan			
Specific Risk	**Responsible Party**	**Conservation Measure**	**When**
Loss of habitat resulting from mining	Land management agencies	Consult with biologists when reviewing notices and mine plans for new mines and gravel pits	As needed and on an on-going basis
Loss of habitat resulting from wind farms	All land managers	Avoid siting new wind farm developments in priority habitat areas	As needed and on an on-going basis
	Challis LWG	Review proposals and make recommendations for siting wind farm developments	As needed and on an on-going basis
Invasives			
Risks to habitats related to invasive vegetation	Cooperative Weed Management Areas (CWMA), in cooperation with all land managers	Encourage the continuing inventory for invasive	On an ongoing basis
	Challis LWG, all land managers	Continue to support the CWMA ongoing efforts to treat invasives	On an ongoing basis
	Challis LWG	Prioritize areas for treatment in sage-grouse habitats where non-natives have invaded and collaborate with the CWMA and all land managers to implement restoration projects. These projects could include reseeding if appropriate	On an ongoing basis
	All land managers	Minimize new surface disturbances that create an opportunity for colonization of invasives and consider reseeding if appropriate	On an ongoing basis
	Land management agencies	Consider stipulations and reclamation requirements emphasizing the use of native species when authorizing new right-of-ways and mine plans	As needed
	Land management agencies	Consider stipulations and reclamation requirements emphasizing the use of native species when updating existing right-of-ways	As needed
	Land management agencies	Require vehicle washing to remove invasive weeds at fire camps and other appropriate locations	On an ongoing basis

Appendix C. Implementation Plan for Conservation Measures in the Challis Sage-grouse Conservation Plan			
Specific Risk	**Responsible Party**	**Conservation Measure**	**When**
Risks associated with inappropriate management strategies			
Inadequate data on population status and trends	Whitebark, Inc.	Compile and verify known data on population status and trend	Completed
	Challis LWG	Coordinate with partners to acquire additional population data and enhance the understanding of population trends through telemetry studies, aerial lek searches, lek route counts, etc.	On an ongoing basis. Activities to date include the Pahsimeroi, Lemhi, and Ellis telemetry studies and lek identification work (aerial & ground).
	Challis LWG	Consider recommending changes in management strategies	When data identify sustained population changes
Inadequate data on habitat condition and use	Land management agencies	Propose adaptive habitat management strategies (using tools such as fire, grazing, mechanical and chemical treatments) to meet sage-grouse habitat objectives	On an ongoing basis
	BLM	Continue sage-grouse habitat assessments on lands administered by the agency	On an ongoing basis
	Challis LWG	Encourage the U.S. Forest Service (USFS) to adopt the same guidelines that are used by the BLM	On an ongoing basis
	Whitebark, Inc.	Compile and verify known data on habitat condition and use	Completed
	Challis LWG	Coordinate with partners to acquire additional habitat condition and use data to determine seasonal use areas, assess degree of use, and evaluate the condition of those use areas	On an ongoing basis
	All land managers	Take the lessons learned from areas where birds are thriving and apply them to areas where birds are limited	On an ongoing basis
Inadequate site specific knowledge, including site potential	All land managers	Support the Natural Resources Conservation Service (NRCS) work on updating ecological site descriptions.	
Inability of land management agencies to respond to current conditions and needs	Land management agencies	Respond to changes in current conditions and needs to the extent as is fiscally and legally possible	As needed and on an ongoing basis

Appendix C. Implementation Plan for Conservation Measures in the Challis Sage-grouse Conservation Plan			
Specific Risk	**Responsible Party**	**Conservation Measure**	**When**
Improper Livestock Management			
Risks posed by improper livestock management	All land managers	To make significant progress towards achieving/maintaining proper functioning condition (PFC) or late seral conditions based upon Multiple Indicator Monitoring definitions of riparian/wetland areas in brood-rearing habitat (if PFC assessment indicates an area is functioning at risk or nonfunctional), consider the following: • Annual biological grazing plan (duration, intensity, season of use, timing control) • Permanent fencing • Temporary fencing • Piping of water to troughs (off-site water) • Supplement/mineral placement • Herders/riders • Target/monitor utilization levels to trigger livestock movement • PFC re-assessment • Other creative ideas	On an ongoing basis through annual authorizations and permit renewals
	All land managers	Manage grazing to achieve and maintain appropriate structure and appropriate sagebrush/forb communities to meet habitat needs. The following should be considered: • Annual biological grazing plan (duration, intensity, season of use, timing control) • Permanent fencing • Temporary fencing • Piping of water to troughs (off-site water) • Supplement/mineral placement • Herders/riders • Target/monitor utilization levels to trigger livestock movement • PFC assessment • Other creative ideas.	On an ongoing basis through annual authorizations and permit renewals

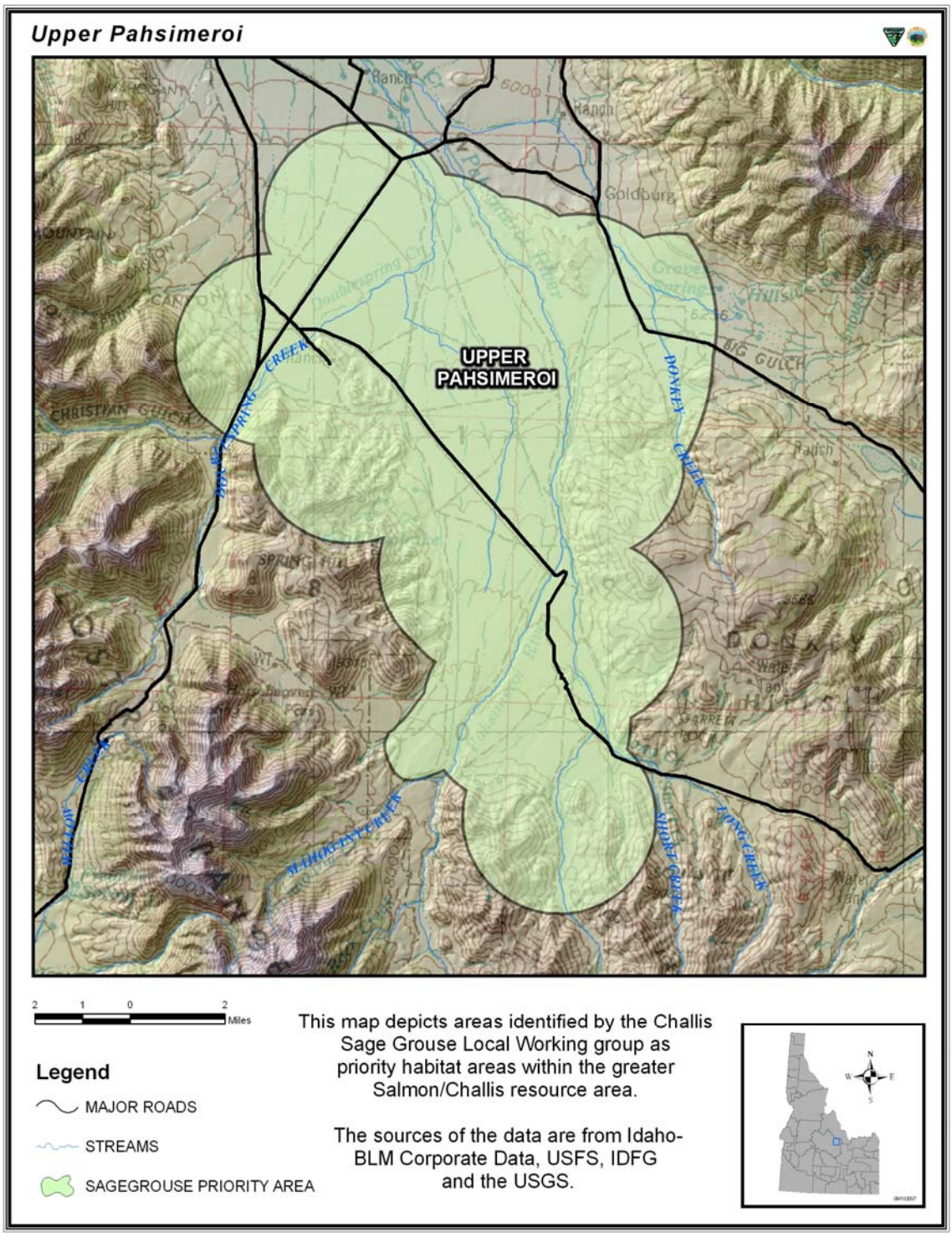
Appendix C. Implementation Plan for Conservation Measures in the Challis Sage-grouse Conservation Plan			
Specific Risk	**Responsible Party**	**Conservation Measure**	**When**
	All land managers	Establish grazing management that would enhance forb diversity and vegetative cover when considering cattle to sheep conversions in sage-grouse habitats.	As needed
	Land management agencies	Monitor grazing/bedding on active leks and advise livestock operators of active lek locations	On an on-going basis
	Livestock operators	Avoid placement of mineral/salt supplements on lek locations during strutting	March though May
	All land managers	Place water troughs at least 0.6 miles from active leks where possible when existing water developments are replaced and new water developments are constructed	As needed
	All land managers	Install and maintain bird ladders in troughs	On an on-going basis
	All land managers	Maintain free-flowing characteristics of springs and wet meadows through the use of float valves or by returning water back to a natural channel when existing water developments are replaced and new water developments are constructed.	As needed
	All land managers	Prioritize funding for rangeland infrastructure to address sage-grouse management objectives	On an ongoing basis
	All land managers	Explore other funding mechanisms to increase overall funding levels for rangeland infrastructure	On an ongoing basis
Fire			
Risks to sage-grouse habitat related to fire	Challis LWG	Map all known sage-grouse habitat use areas within the area of interest.	Completed
	Challis LWG	Prioritize and map priority areas for fire suppression.	Completed
	Land management agencies	For all wildfires in sage-grouse habitat, land management agencies should assign resource advisors knowledgeable about sage-grouse to work with fire suppression personnel/teams	On an as-needed basis
	Challis LWG in consultation with BLM and USFS fire ecologists and fuel specialists	Prioritize and map areas for maintenance (including fuels treatment) and restoration of sage-grouse habitats.	Completed

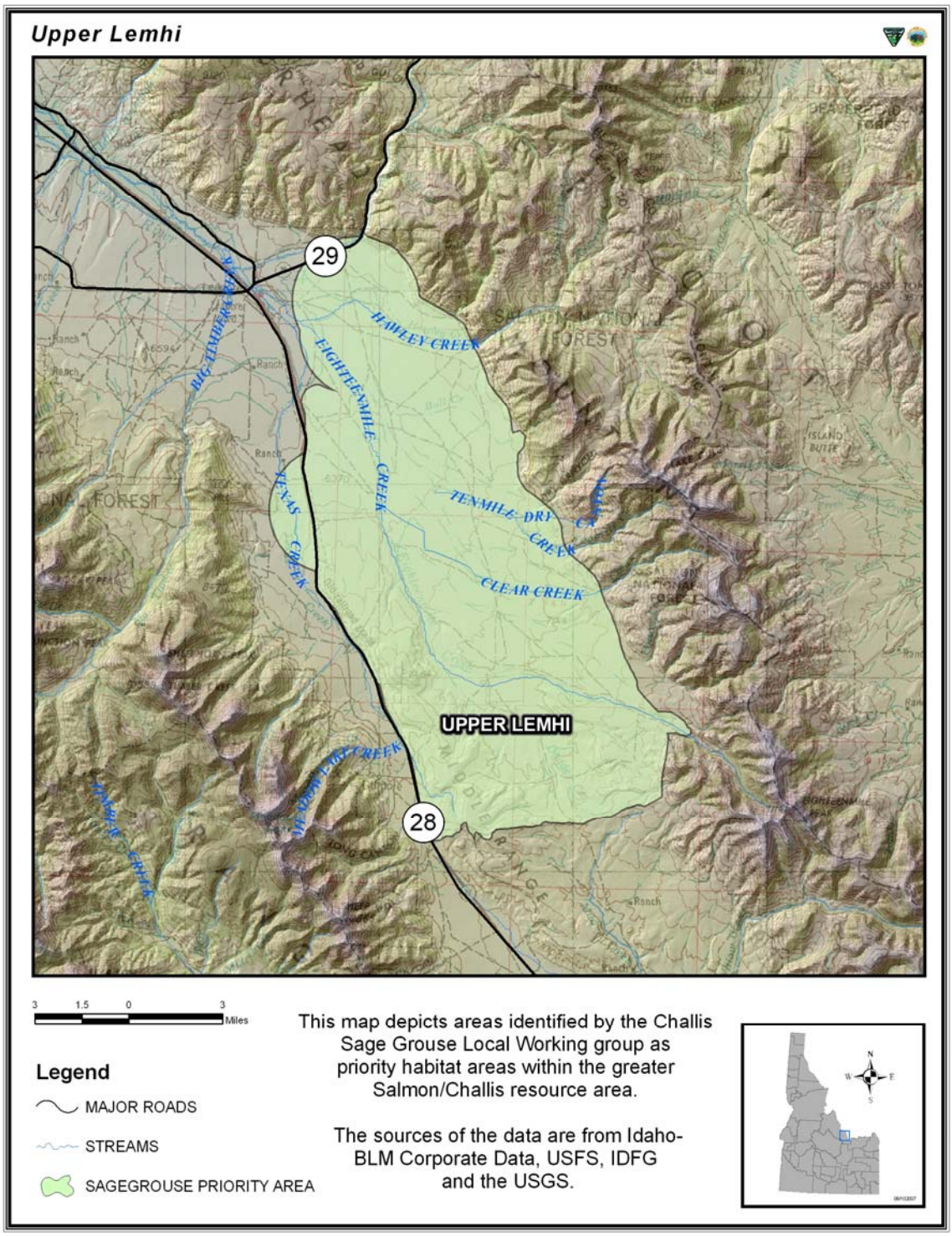
Appendix C. Implementation Plan for Conservation Measures in the Challis Sage-grouse Conservation Plan			
Specific Risk	**Responsible Party**	**Conservation Measure**	**When**
	Land management agencies, in consultation with the appropriate CWMA, IDFG and the NRCS	Develop plans for avoidance and treatment of invasives following each fire event. This conservation measure will be implemented in two steps: • The Challis LWG will develop guidelines specific to sage-grouse for use in development of fire suppression and rehabilitation guidelines. • The land management agencies will develop maps of known weed locations using data provided by the appropriate CWMA.	By spring of 2008 ; then, following each fire event
	Land management agencies	Conduct evaluations of sage-grouse habitats as soon as possible after each fire event to determine if reseeding (with sagebrush, bunch grasses, and native forbs, if possible) is necessary. The results of these evaluations will be incorporated into Burned Area Emergency Rehabilitation Plans (BAER) and/or Emergency Stabilization and Rehabilitation (ESR) Plans, as appropriate.	During development of BAER and ESR plans
	Challis LWG in cooperation with NRCS	Conduct educational outreach with private landowners before and after fire events regarding conservation measures related to fire	On an ongoing basis
Risks associated with other natural causes			
Risks to sage-grouse habitat resulting from other natural causes	BLM Challis Field Office	Follow herd management plans for wild horses and stay within appropriate management levels	On an ongoing basis
	Challis LWG	Discuss, with the land management agencies, the development of drought management plans to address risk factors in all sage-grouse habitats	Begin by December of 2009
	All land managers	Consider reseeding (with sagebrush, bunch grasses, and native forbs, if possible) and treatment of invasive species following major insect/disease infestations	As needed
	All land managers	Evaluate sites where sagebrush form and canopy are inadequate so as to determine if wildlife utilization is the cause	On an ongoing basis
	IDFG	Consider modifications of herd objectives if wildlife grazing is determined by land managers to be the cause of inadequate sagebrush form and cover	As needed

Appendix C. Implementation Plan for Conservation Measures in the Challis Sage-grouse Conservation Plan			
Specific Risk	**Responsible Party**	**Conservation Measure**	**When**
Excessive Predation			
Risks to sage-grouse populations associated with excessive predation	Challis LWG, in cooperation with IDFG	Secure funding for studies, i.e., telemetry, to assess predation problems	If populations are static or declining over a period of three years
	IDFG	Consider all relevant guidelines in the decision-making process related to predator management measures	Whenever predation is documented to be excessive
Human Disturbance			
Risks to habitat associated with human disturbance	Challis LWG in cooperation with IDFG and user groups	Educate the public and volunteers regarding potential impacts to leks and nesting areas	On an ongoing basis
	Land management agencies	Work cooperatively with user groups and volunteers to educate the public and to enforce current OHV restrictions	On an ongoing basis
	Land management agencies	Strengthen management guidelines for OHV use with respect to sage-grouse habitats	On an ongoing basis
	Challis LWG	Encourage cooperative agreements between federal, state, county, and local law enforcement agencies to support enforcement of OHV regulations	Whenever possible
	Challis LWG	Participate in travel management planning processes	Whenever possible
	Land management agencies	Consider sage-grouse habitat needs prior to implementation of vegetation manipulation (including herbicide applications and mechanical treatment)	As needed
	Challis LWG	Educate county extension agents, NRCS, soil conservation districts, CWMA, and private landowners regarding sage-grouse habitat needs	On an ongoing basis

Appendix C. Implementation Plan for Conservation Measures in the Challis Sage-grouse Conservation Plan			
Specific Risk	**Responsible Party**	**Conservation Measure**	**When**
Health Risks to Sage-grouse Populations			
Risks to sage-grouse populations associated with inadequate nutrition, disease, and toxicity related to pesticide use	All land managers	Maintain/improve meadows and riparian areas, without losing forbs, where feasible	On an ongoing basis
	All land managers	Consider planting native and/or desired non-native forbs in range restoration and reclamation projects	As needed and where necessary
	All land managers	Apply management techniques, i.e., grazing systems, inter-seeding, and other mechanical treatments, etc., to achieve optimum forb and insect production	As needed
	IDFG	Submit dead sage-grouse for testing for West Nile Virus	Within 24 hours of death
	All pesticide applicators	Follow U.S. Environmental Protection Agency label instructions and restrictions	On an ongoing basis
	All land managers	Consider alternatives to pesticides, i.e., biological controls or less toxic chemicals	On an ongoing basis
Overharvest			
Risks to sage-grouse populations associated with overharvest	Challis LWG	Consider all relevant guidelines and current information when making recommendations to the Idaho Fish and Game Commission for changes in hunting regulations	As conditions warrant
	Challis LWG	Recommend implementation of mandatory harvest reporting to the Idaho Fish and Game Commission to enhance population monitoring. Reports should include topographic features/land forms to identify where harvest occurs	On an ongoing basis
	IDFG	Use the enhanced harvest data to recommend hunting modifications, i.e., closures, limits, permits)	Once mandatory harvest reporting has been implemented
	Challis LWG	Recommend changes in falconry regulations to Idaho Fish and Game Commission	If adverse population impacts are documented

Appendix C. Implementation Plan for Conservation Measures in the Challis Sage-grouse Conservation Plan			
Specific Risk	**Responsible Party**	**Conservation Measure**	**When**
Successional Vegetation Changes in Brood-Rearing Habitat			
Risks associated with inadequate brood-rearing habitat/meadows	All land managers	Monitor the forb and cover components whenever meadows, springs or riparian zones are excluded from livestock grazing. If either component declines, then vegetative manipulation should be considered to reverse the decline	On an on-going basis
	All land managers	Consider conifer treatment whenever conifers encroach into mesic habitats	On an on-going basis
	All land managers	Maintain a mosaic of sagebrush age classes to provide for multiple condition classes using mechanical, biological, chemical, or fire treatments. In addition, land managers should ensure that the scale of the treatment maintains or creates critical habitat components	On an on-going basis
Public Education Measures			
Inadequate public knowledge of sage-grouse	Challis LWG	Educate the public on sage-grouse conservation measures as they apply to desired actions. For example, the Challis LWG could develop an educational brochure, participate in CWMA functions, participate in county fairs and rancher schools, etc.	On an ongoing basis


Upper Pahsimeroi
UPPER PAHSIMEROI
Goldburg
Ranch
CHRISTIAN GUICH
BIG GUICH
PONEY CREEK
SPRING HILL
WARREN
SHORT CREEK
LONG CREEK
2 1 0 2
Miles
Legend
MAJOR ROADS
STREAMS
SAGEGROUSE PRIORITY AREA
This map depicts areas identified by the Challis Sage Grouse Local Working group as priority habitat areas within the greater Salmon/Challis resource area.
The sources of the data are from Idaho-BLM Corporate Data, USFS, IDFG and the USGS.


Upper Lemhi
29
28
HAWLEY CREEK
EIGHTEENMILE CREEK
TENMILE DRY CREEK
CLEAR CREEK
TEXAS CREEK
BIG TIMBER CREEK
UPPER LEMHI
3 1.5 0 3 Miles
Legend
MAJOR ROADS
STREAMS
SAGEGROUSE PRIORITY AREA
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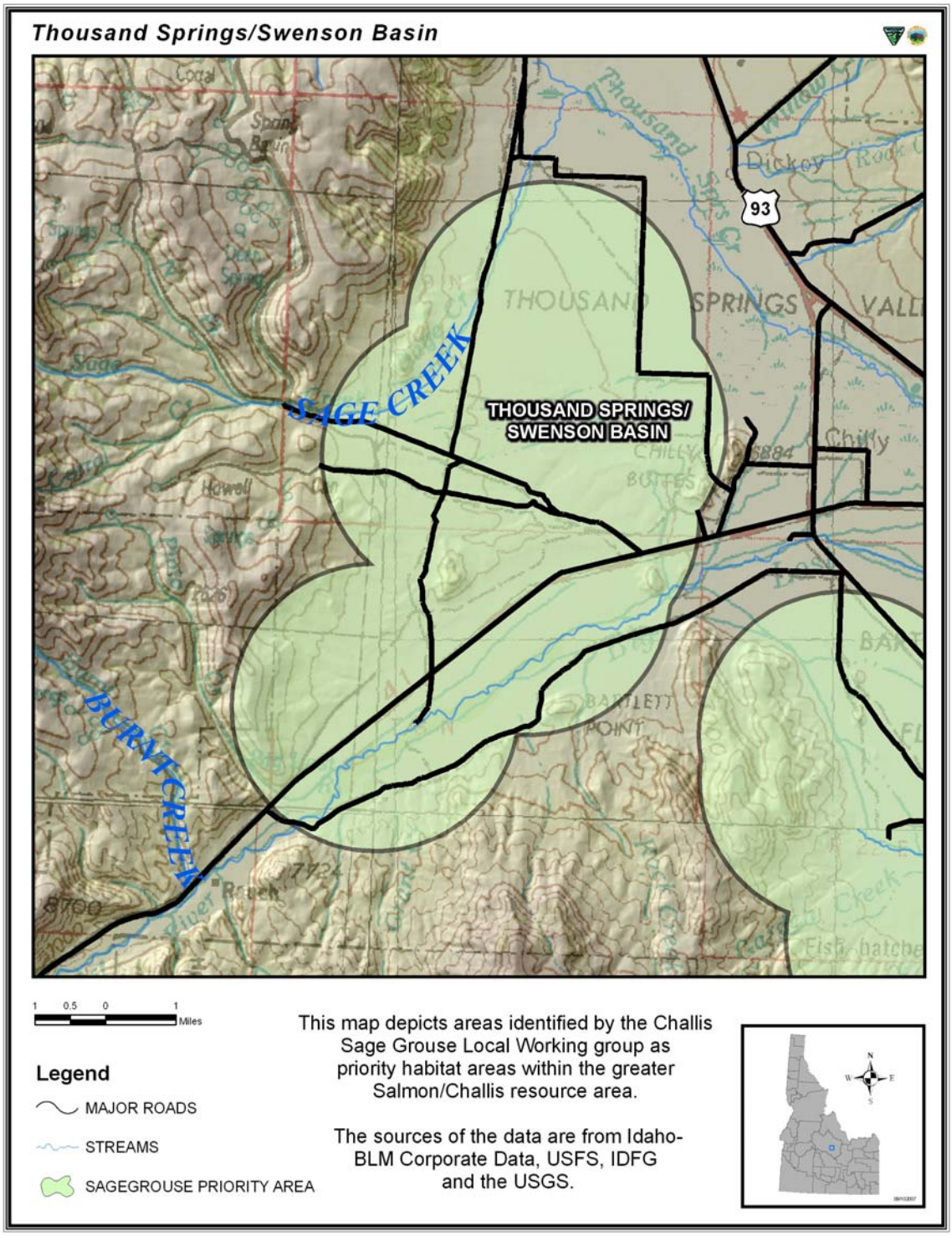
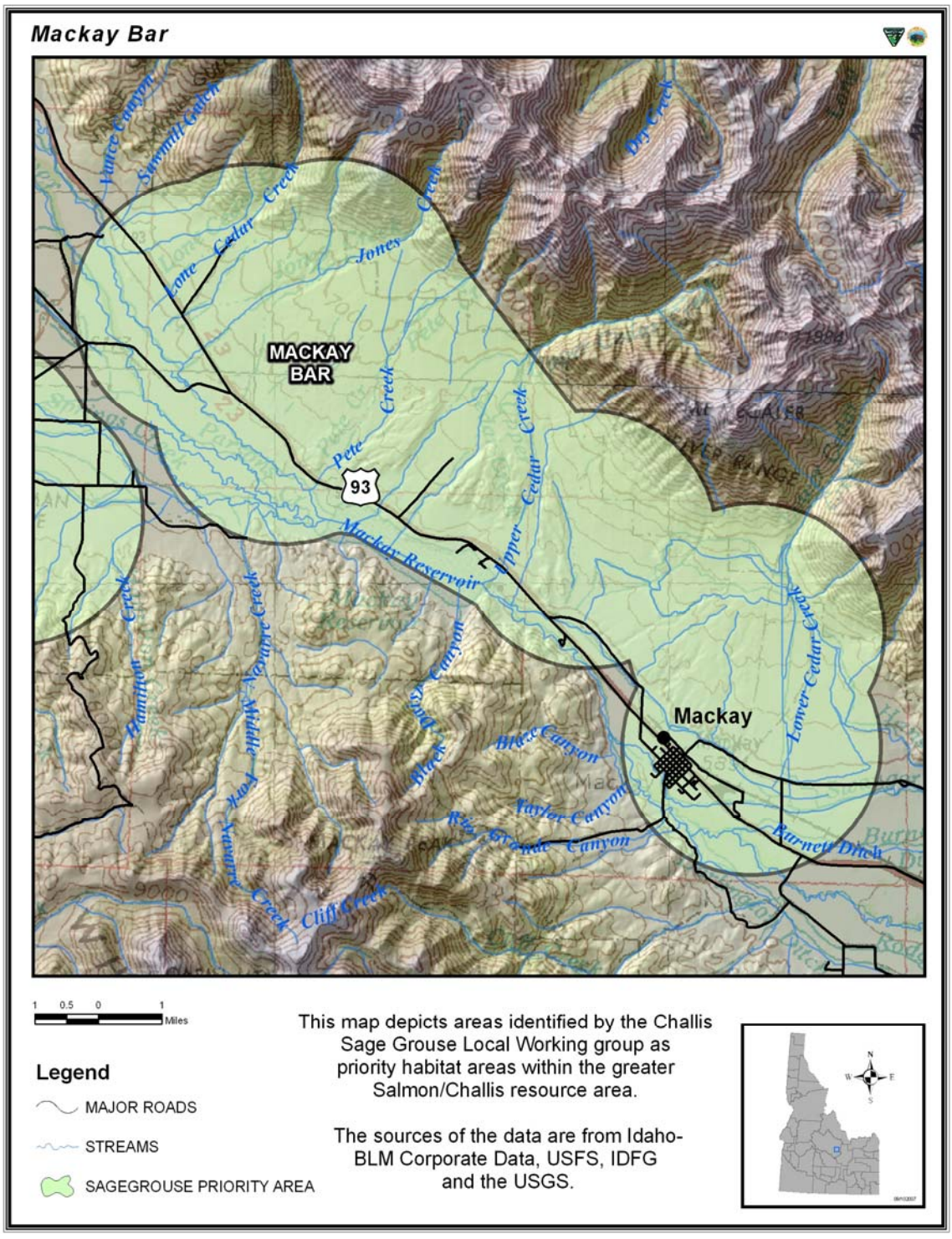
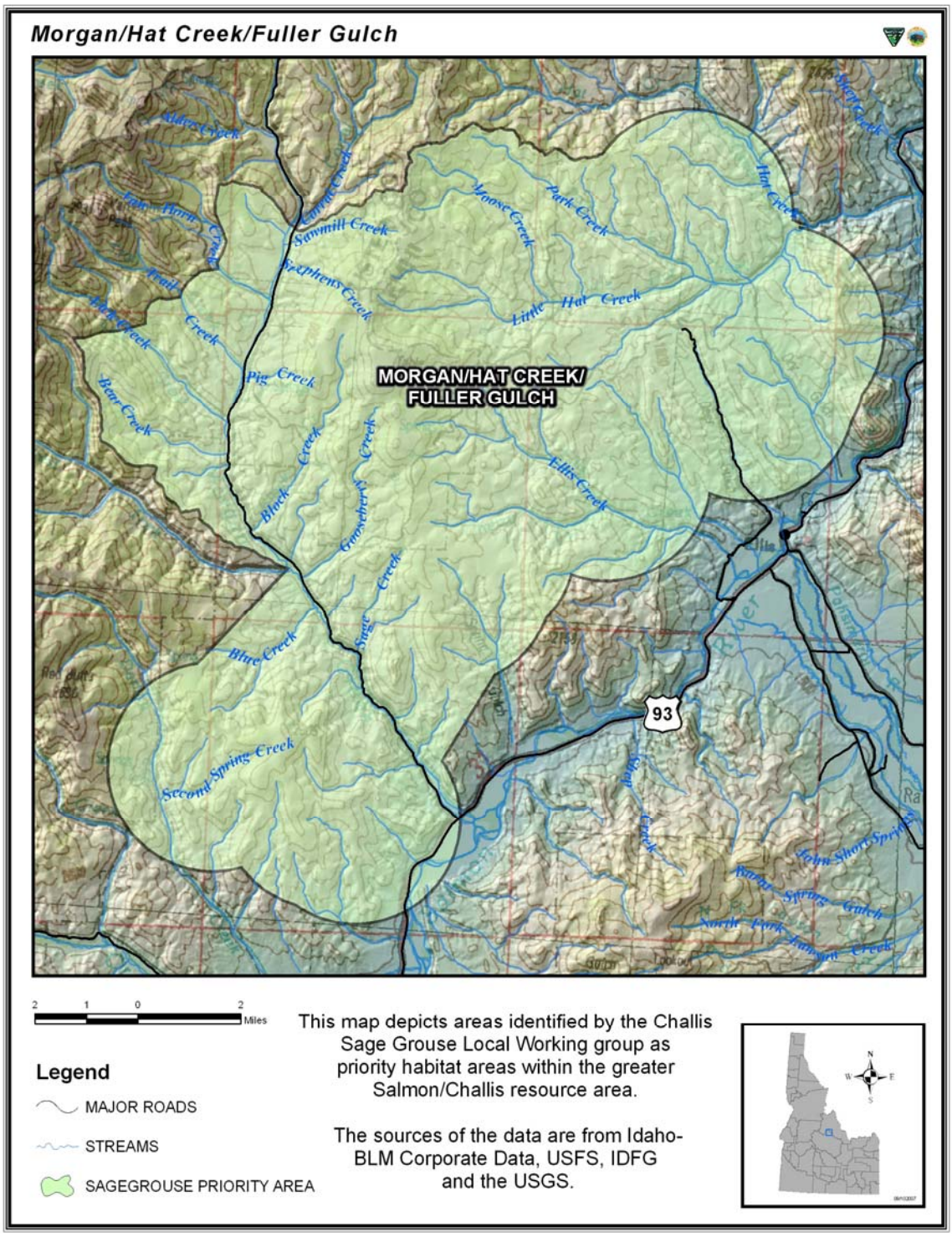
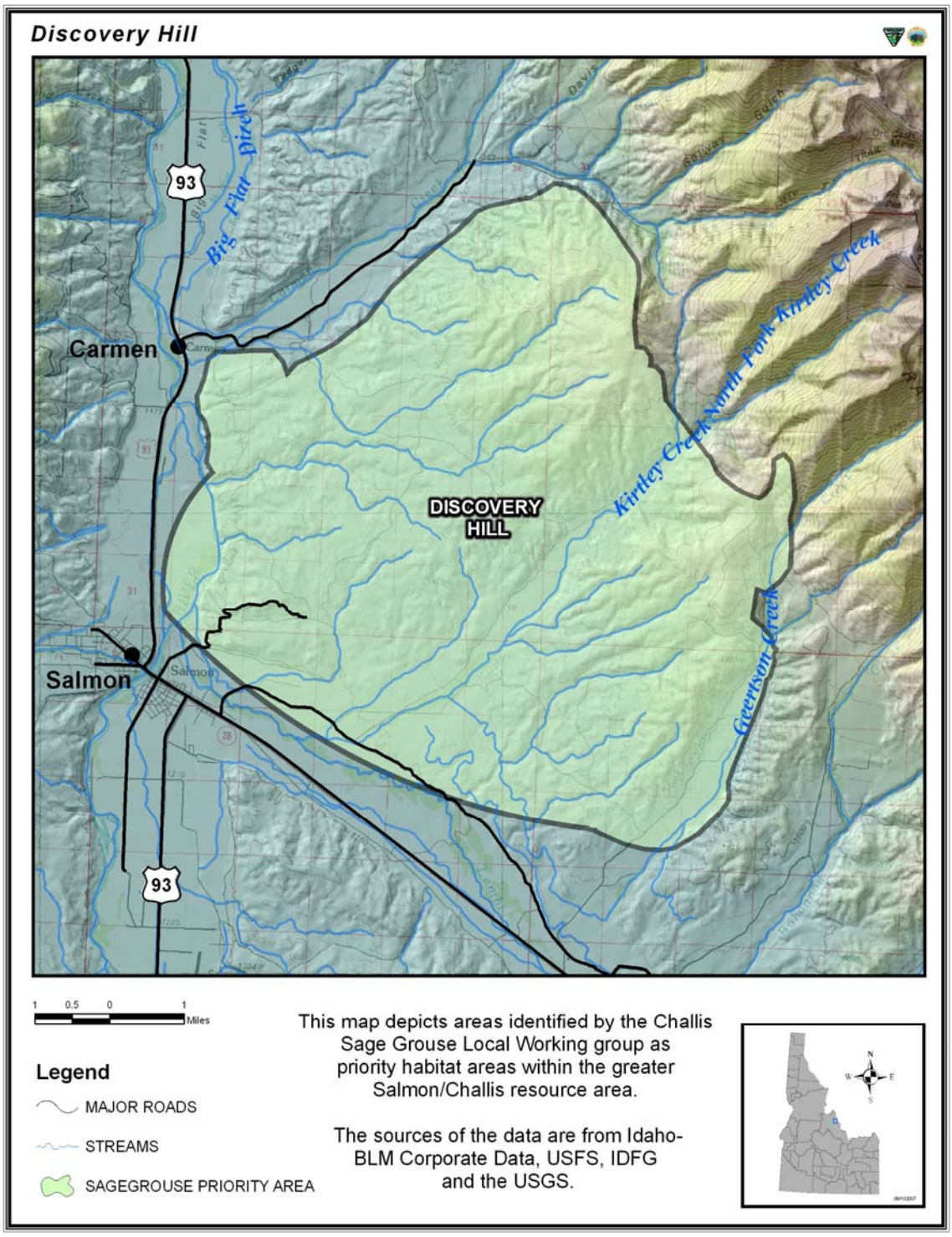
The sources of the data are from Idaho-BLM Corporate Data, USFS, IDFG and the USGS.

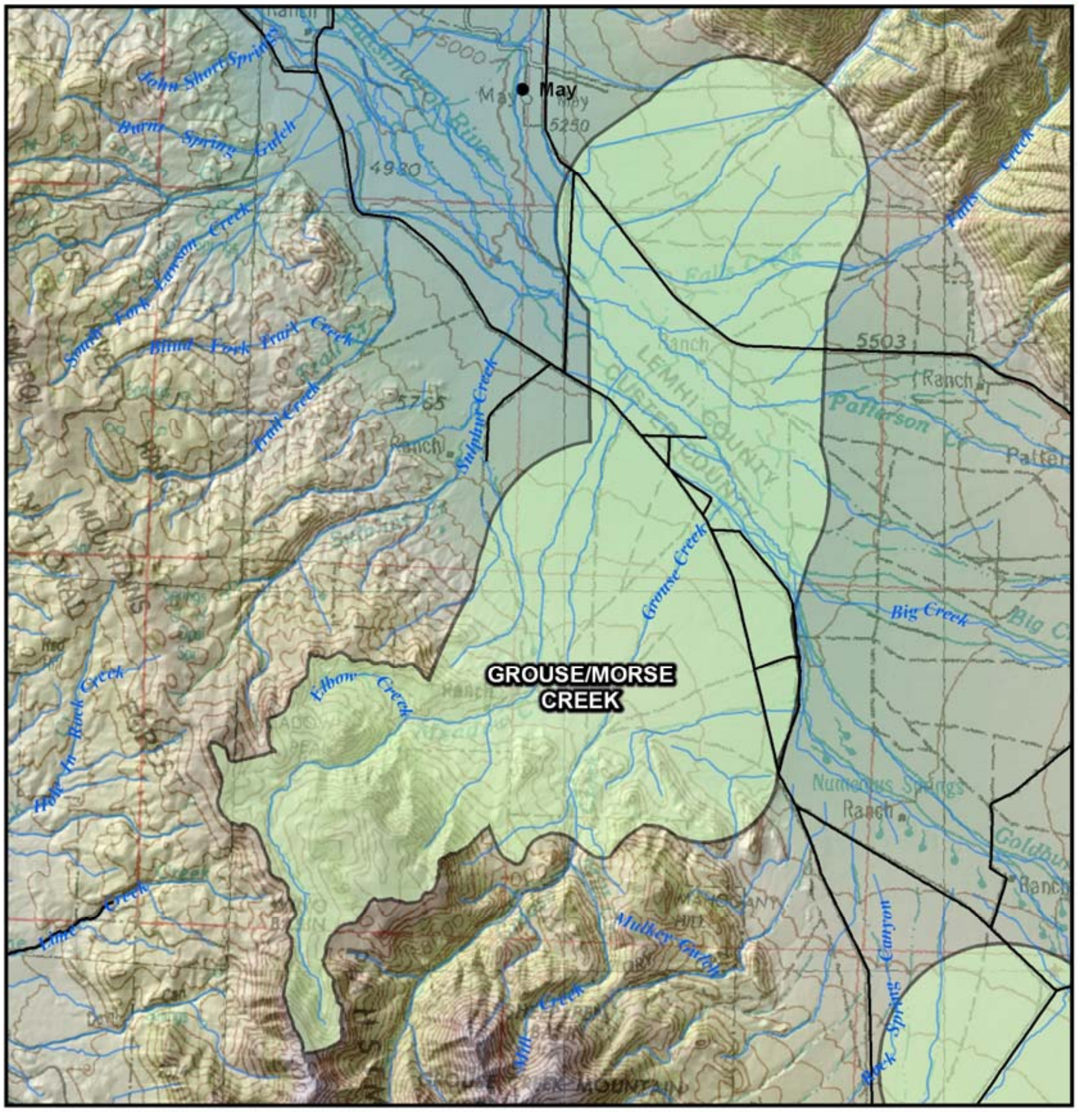

Thousand Springs/Swenson Basin
SAGE CREEK
THOUSAND SPRINGS/
SWENSON BASIN
BURYT CREEK
93
THOUSAND SPRINGS
Dickey
Chilly
BUTTES
BARTLETT
POINT
1 0.5 0 1
Miles
Legend
MAJOR ROADS
STREAMS
SAGEGROUSE PRIORITY AREA
This map depicts areas identified by the Challis Sage Grouse Local Working group as priority habitat areas within the greater Salmon/Challis resource area.
The sources of the data are from Idaho-BLM Corporate Data, USFS, IDFG and the USGS.


Mackay Bar
MACKAY BAR
93
Mackay
Mackay Reservoir
Lone Cedar Creek
Jones Creek
Pete Creek
Upper Cedar Creek
Lower Cedar Creek
Dry Creek
Summit Gulch
Lance Canyon
Hamilton Creek
Narrows Creek
Middle Fork Narrows Creek
Cliff Creek
Black Canyon
Taylor Canyon
Rio Grande Canyon
Burnett Ditch
1 0.5 0 1
Miles
Legend
MAJOR ROADS
STREAMS
SAGEGROUSE PRIORITY AREA
This map depicts areas identified by the Challis Sage Grouse Local Working group as priority habitat areas within the greater Salmon/Challis resource area.
The sources of the data are from Idaho-BLM Corporate Data, USFS, IDFG and the USGS.


Morgan/Hat Creek/Fuller Gulch
MORGAN/HAT CREEK/
FULLER GULCH
Moose Creek
Park Creek
Hat Creek
Sawmill Creek
Stephens Creek
Little Hat Creek
Pig Creek
Bear Creek
Black Creek
Ellis Creek
Sage Creek
Blue Creek
Second Spring Creek
93
2 1 0 2
Miles
Legend
MAJOR ROADS
STREAMS
SAGEGROUSE PRIORITY AREA
This map depicts areas identified by the Challis Sage Grouse Local Working group as priority habitat areas within the greater Salmon/Challis resource area.
The sources of the data are from Idaho-BLM Corporate Data, USFS, IDFG and the USGS.


Discovery Hill
93
Big Flat Ditch
Carmen
DISCOVERY HILL
Kirtley Creek-North Fork Kirtley Creek
Geertson Creek
Salmon
93
1 0.5 0 1
Miles
Legend
MAJOR ROADS
STREAMS
SAGEGROUSE PRIORITY AREA
This map depicts areas identified by the Challis Sage Grouse Local Working group as priority habitat areas within the greater Salmon/Challis resource area.
The sources of the data are from Idaho-BLM Corporate Data, USFS, IDFG and the USGS.

Grouse/Morse Creek



2 1 0 2 Miles

Legend

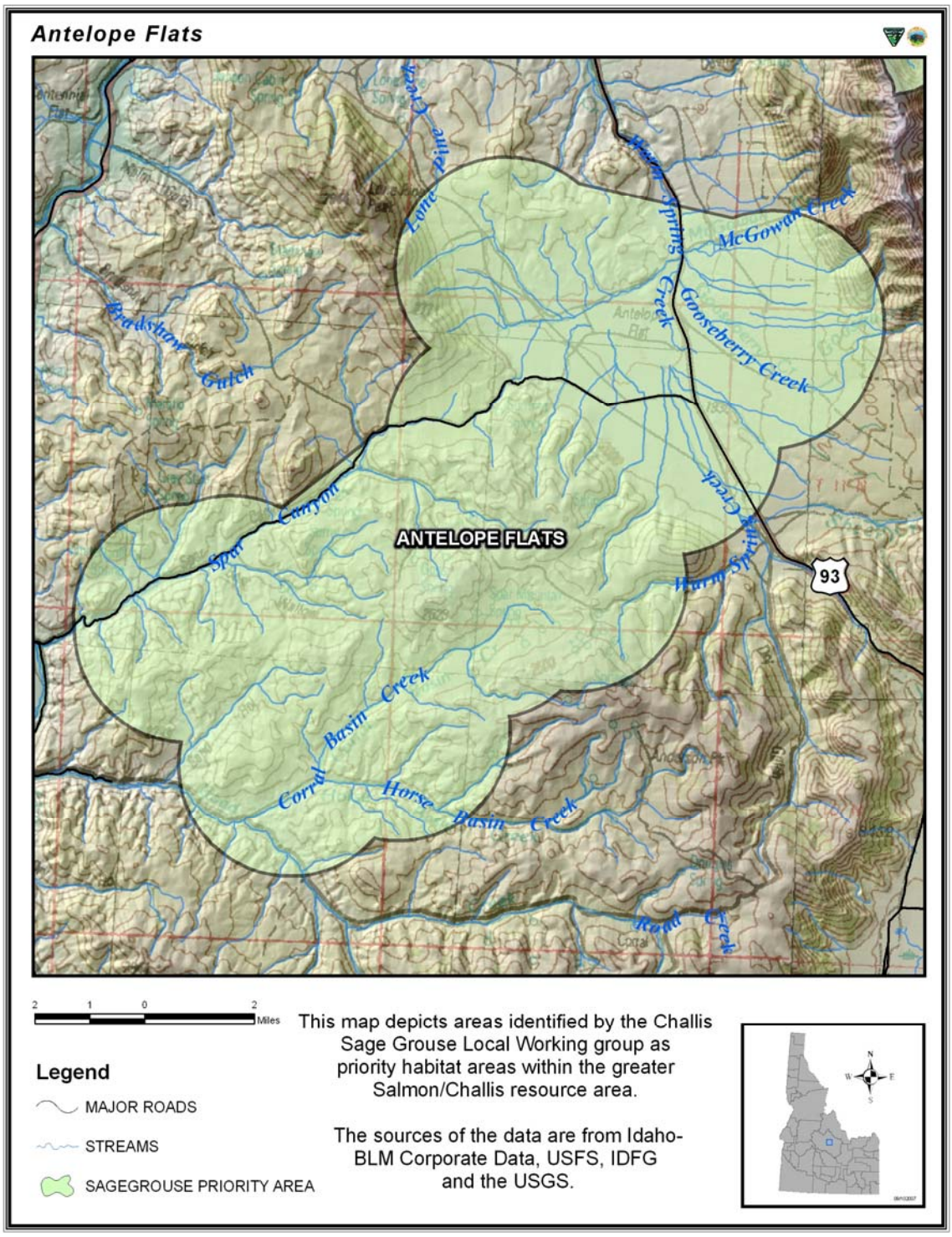
MAJOR ROADS

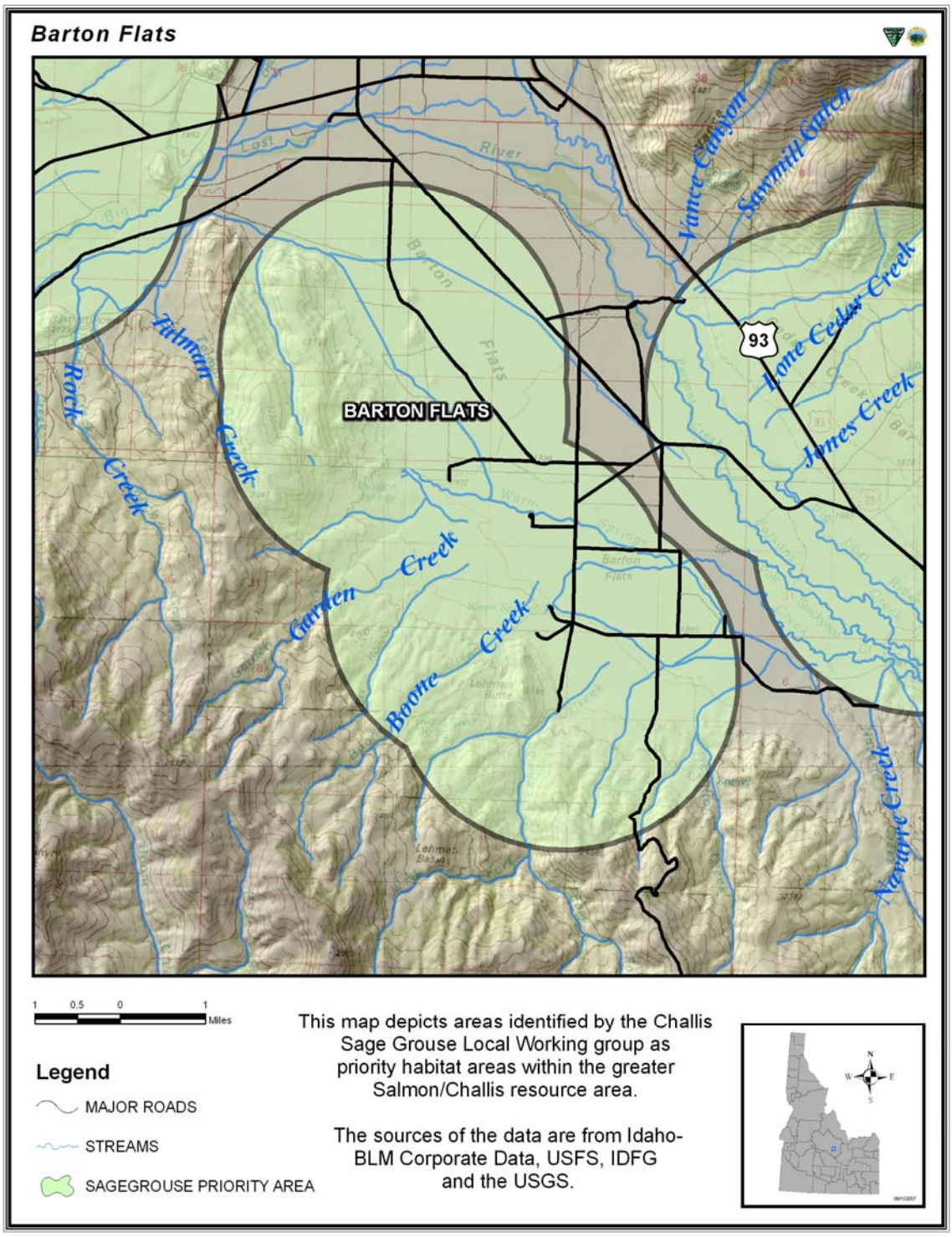
STREAMS

SAGEGROUSE PRIORITY AREA

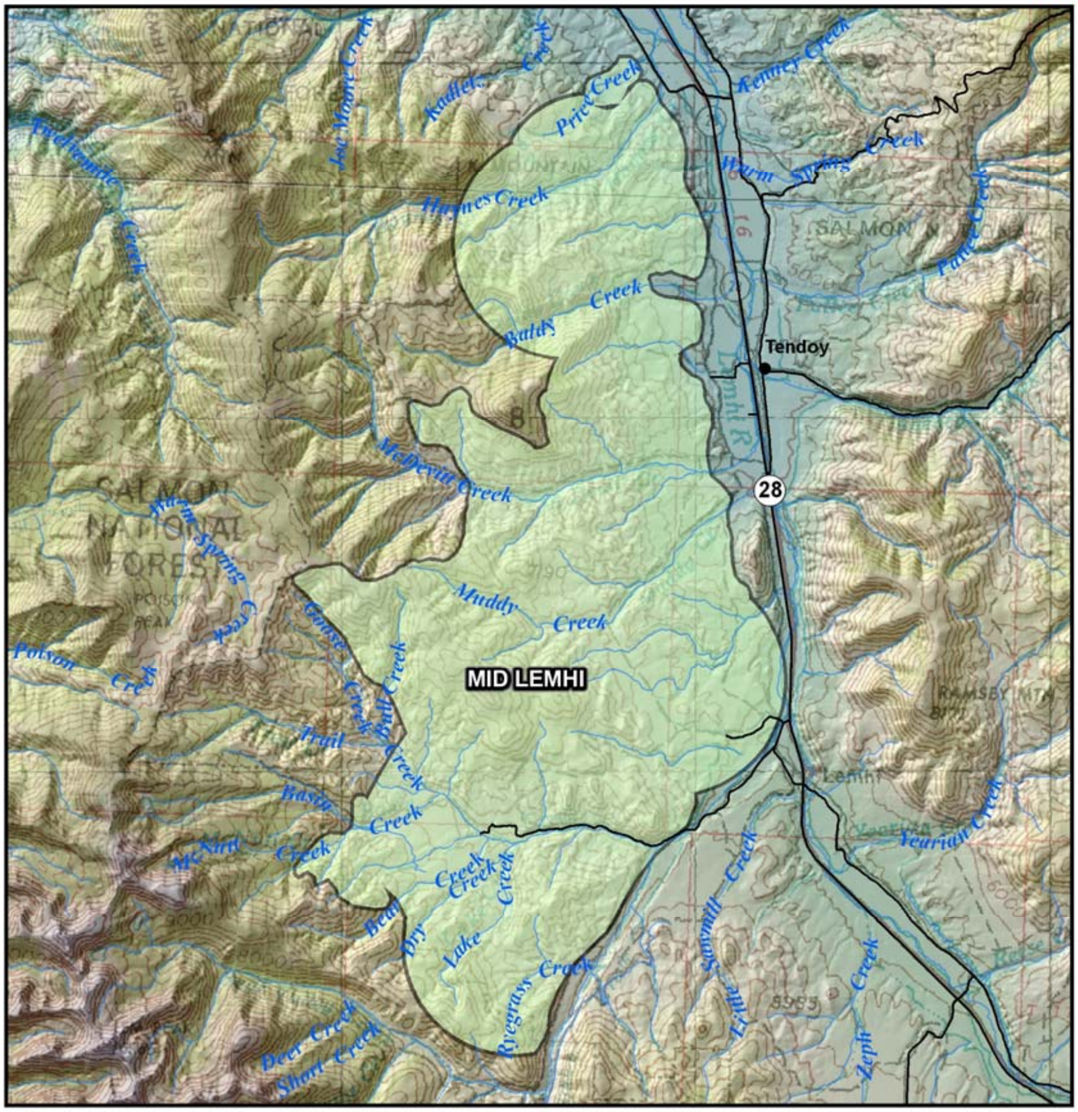
This map depicts areas identified by the Challis Sage Grouse Local Working group as priority habitat areas within the greater Salmon/Challis resource area.

The sources of the data are from Idaho-BLM Corporate Data, USFS, IDFG and the USGS.


Antelope Flats
Lone Pine Creek
Warm Springs Creek
McGowan Creek
Gooseberry Creek
Bradshaw Gulch
Spar Canyon
ANTELOPE FLATS
Warm Springs Creek
93
Basin Creek
Corral
Horse Basin Creek
Road Creek
2 1 0 2 Miles
Legend
MAJOR ROADS
STREAMS
SAGEGROUSE PRIORITY AREA
This map depicts areas identified by the Challis Sage Grouse Local Working group as priority habitat areas within the greater Salmon/Challis resource area.
The sources of the data are from Idaho-BLM Corporate Data, USFS, IDFG and the USGS.


Barton Flats
BARTON FLATS
93
Vance Canyon
Sawmill Gulch
Lone Cedar Creek
Jones Creek
Tahman Creek
Rock Creek
Garden Creek
Boone Creek
Navarre Creek
Barton Flats
Lehman Basin
1 0.5 0 1
Miles
Legend
MAJOR ROADS
STREAMS
SAGEGROUSE PRIORITY AREA
This map depicts areas identified by the Challis Sage Grouse Local Working group as priority habitat areas within the greater Salmon/Challis resource area.
The sources of the data are from Idaho-BLM Corporate Data, USFS, IDFG and the USGS.

Mid Lemhi



2 1 0 2 Miles

Legend

MAJOR ROADS

STREAMS

SAGEGROUSE PRIORITY AREA

This map depicts areas identified by the Challis Sage Grouse Local Working group as priority habitat areas within the greater Salmon/Challis resource area.

The sources of the data are from Idaho-BLM Corporate Data, USFS, IDFG and the USGS.

CHALLIS SAGE-GROUSE CONSERVATION PLAN

Figure 1: Sage-grouse on lek in the Lower Lemhi

2009 Amendment

Developed by:
The Challis Sage-grouse Local Working Group

CHALLIS SAGE-GROUSE LOCAL WORKING GROUP'S SAGE-GROUSE CONSERVATION PLAN: 2009 AMENDMENT

I. Introduction

This Amendment is a yearly update to the Challis Sage-grouse Conservation Plan originally adopted in 2007. The Challis Sage-grouse Local Working Group (Challis LWG) continues to meet and discuss sage-grouse issues in the area. This Amendment includes an updated Planning Area map and description, as well as an additional map depicting sage-grouse habitat within the planning area. The annual report of the Local Working Group is also incorporated.

The Introduction in the current plan refers to Figure 1, a map of the Challis Sage-Grouse Planning Area (Challis SGPA). That map will be replaced with Figure 2 from this Amendment. The new planning area is described as:

- The portion of Lemhi County that lies outside of Idaho Department of Fish and Game (IDFG)'s Units 51 and 58;
- The portion of Custer County that lies outside of IDFG Management Unit 51; and
- The portion of Butte County that lies within IDFG Management Unit 50.

The Challis LWG agreed to these changes after discussions with the adjoining Upper Snake Sage-grouse Local Working Group (Upper Snake LWG) and the fact that both groups were claiming the same area. Representatives from both groups met and discussed the boundary and how it related to agency boundaries, Idaho Department of Fish and Game Reporting Zones, sage-grouse populations, vegetation types, demographics, and the status of the implementation of the plans to date. After a lengthy discussion it was decided that the Challis LWG would extend its boundary in the Big Lost drainage south to cover the entire drainage (IDFG Management Unit 50) to United States Highway 20/26. The Challis LWG would also move the boundary in the Little Lost to the north to allow the entire drainage (IDFG Management Unit 51) to be covered by the Upper Snake LWG.

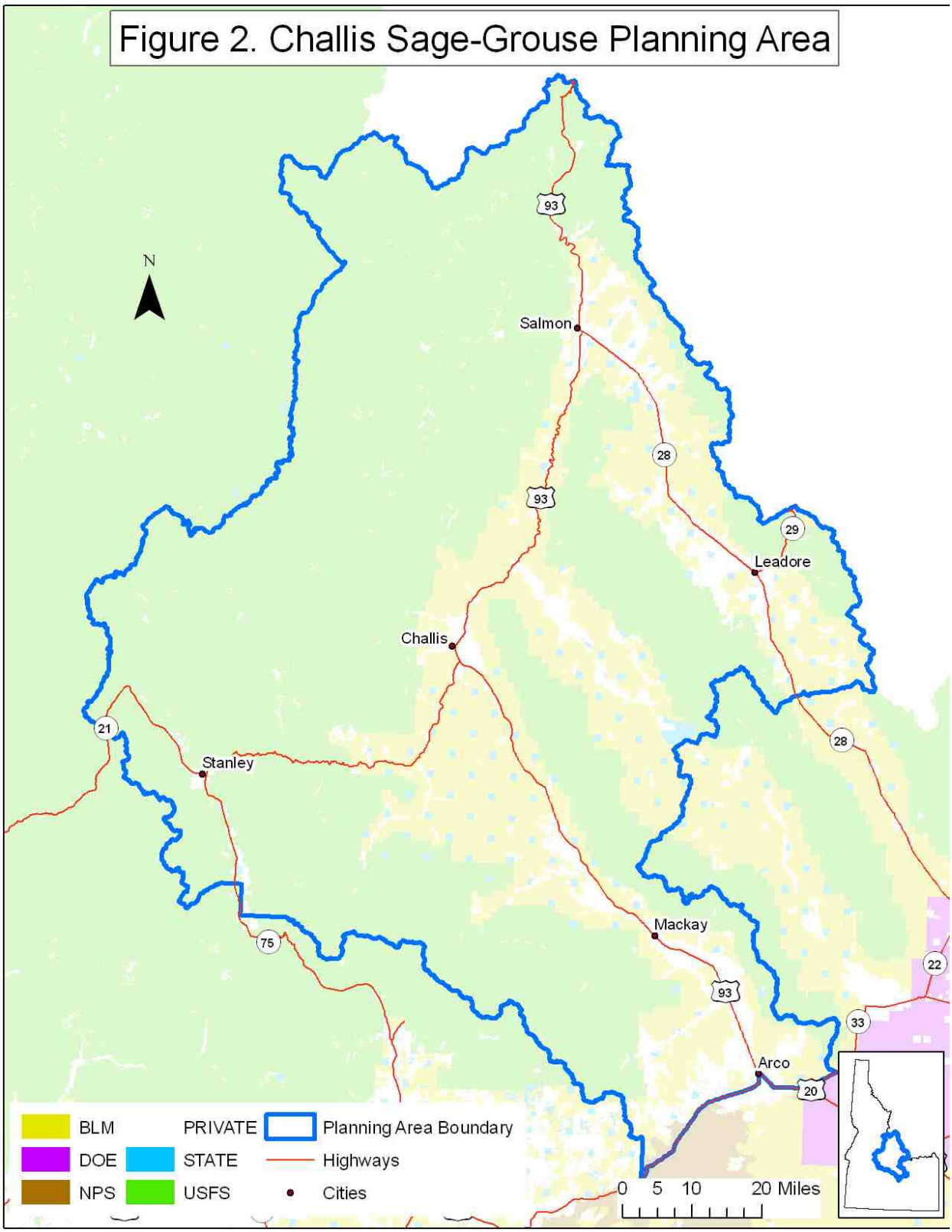


Figure 2. Challis Sage-Grouse Planning Area
N
Salmon
Challis
Leadore
Stanley
Mackay
Arco
93
28
29
21
75
22
33
20
BLM
DOE
NPS
PRIVATE
STATE
USFS
Planning Area Boundary
Highways
Cities
0 5 10 20 Miles

II. Vision Statement

Part of our vision, as described in the Conservation Plan is to increase the cooperation between land and wildlife management agencies and private property owners. Table 1 shows the attendance at Challis LWG and Idaho Sage-grouse Advisory Committee (Idaho SAC) meetings in 2008 as reported to the Idaho SAC. In addition to these meetings there have been multiple small working meeting for mapping habitat and other work that have been attended by multiple individuals.

Table 1: Challis Sage-grouse Local Working Group (2008)

Meeting Attendees	# Meetings Attended	Representation	Miles Traveled
Dave Ellis	1 LWG + 2 SAC	South Carmen Grazing Association	1030
Vince Guyer	2 LWG + 1 SAC	Bureau of Land Management	280
Rod Evans	1	Idaho Farm Bureau	10
Laura Hanson	1	Idaho Department of Fish and Game	120
Craig Nemeth	2	Bureau of Land Management	130
Greg Painter	2	Idaho Department of Fish and Game	130
Jennifer Purvine	1	Forest Service	10
Peggy Redick	2 LWG + 1 SAC	Bureau of Land Management	700
Charles Schwartz	1	Idaho Falconers Association	225
Michael Steck	2	US Forest Service	130
Tanya Thrift	1	Bureau of Land Management	10

III. Challis Sate-grouse Planning Area Habitat Guidelines

At this time, the Challis LWG has not suggested any changes to this section of the plan.

IV. Status of Sage-grouse Population and Habitat

A. Population

Information regarding local population as reported to the Idaho SAC is included in Table 2.

Table 2: Sage-grouse Population Monitoring (2008)

# of leks surveyed by air	# of individual leks ground surveyed	# of lek routes	# of leks in these routes	'08 Avg # males/ lek on routes	Males/lek previous 5 years				
					'07	'06	'05	'04	'03
0	46	11	23	15	23	23	20	21	22

'08 # Wings collected	'08 Chicks :Hen	Chicks:Hen previous 5 years					'08 Estimated harvest	Estimated harvest previous 5 years				
		'07	'06	'05	'04	'03		'07	'06	'05	'04	'03
160	1.0	1.12	1.88	1.17	1.9	2.8	NA	495	1813	949	459	NA

Sage-grouse Radio-telemetry Monitoring			
# of grouse with radio-collars in 2008	25	Purpose of monitoring	Hen and juvenile distribution and habitat use study

B. Habitat

This Section of the Conservation Plan describes the habitat in the Challis SGPA. At the state level in Idaho there is a sage-grouse habitat map that is updated on a yearly basis. The 2004 version of the map is depicted in the Conservation Plan for Greater Sage-grouse in Idaho (Figure 3-5; pg 3-17). The maps portray four different type of habitat:

Cover type definitions include (From the Statewide Plan 3-13):

- ***Key Sage-grouse Habitat*:** Areas of generally intact sagebrush that provide sage-grouse habitat during some portion of the year.

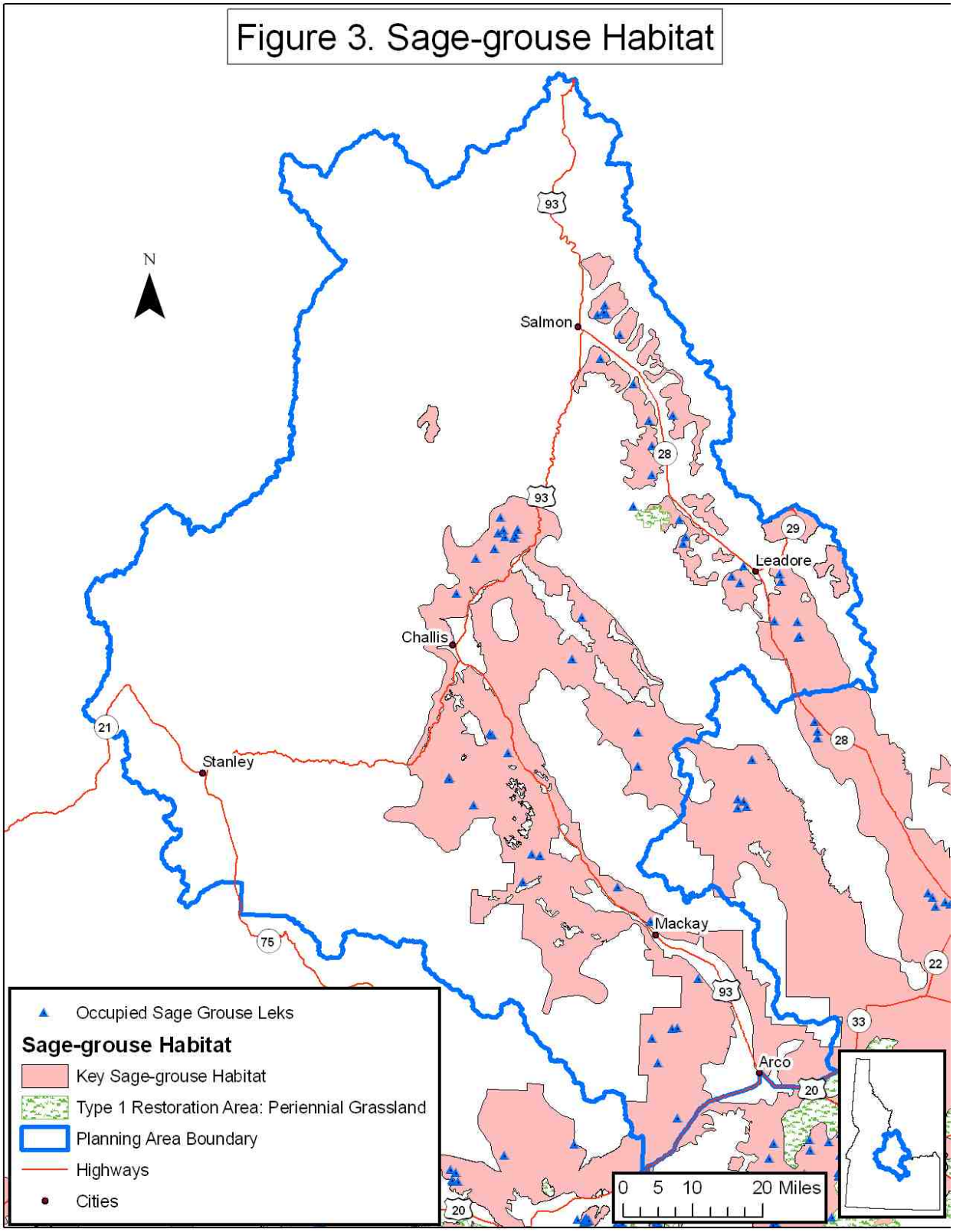
- ***Potential Restoration Areas*:**
  - Type I. Perennial Grassland: Sagebrush-limited areas characterized by perennial grass species composition and/or structure that should provide suitable potential nesting habitat in the future, once sufficient sagebrush cover is re-established (at least 10% canopy cover). Includes areas characterized by native and/or introduced perennial bunchgrasses.

  - Type II. Annual Grassland: Areas dominated or strongly influenced by invasive annuals such as cheatgrass (*Bromus tectorum*) or medusahead rye (*Taeniatherum caput-medusae*) or similar species. Areas with sagebrush may be present, but, in general, understories are not suitable for sagegrouse. Reclassify as Perennial Grassland once restoration seedings are determined to be successful.

  - Type III. Conifer Encroachment: Areas where junipers (*Juniperus* spp.) and/or other conifer species are encroaching into sage-grouse habitat areas.

The sage-grouse habitat within the Challis SGPA is classified as key sage-grouse habitat for the majority of the area. There is one area of approximately 5.600 acres which is classified as perennial grassland (Type I). This area was burned by a human caused wildfire in 2003 and is now vegetated with native grasses and forbs, but the sage brush canopy covers is still below 10%. We would like to add a map showing the sage-grouse habitat in the planning area, updated for 2009 with this amendment. Figure 3 shows the updated habitat map as agreed to by the Challis LWG.

Figure 3. Sage-grouse Habitat



Currently the Challis LWG is completing seasonal habitat mapping and will include that in a 2010 Amendment to the plan. Table 3 shows the habitat information reported to the State SAC for 2008.

Table 3: Sage-grouse Habitat (2008)				
Number Acres Wildfire on **Private** Land	Number Acres Wildfire on **BLM** Land	Number Acres Wildfire on **USFS** Land	Number Acres Wildfire on **State** Land	Number of Acres Wildfire on **Other** Land (DOE, Tribes, etc.)
0	0	0	0	0

V. Risks to Sage-grouse Populations and Habitats

At this time, the Challis LWG has not suggested any changes to this section of the plan.

VI. Recommended Conservation Measures to Address Risks to Sage-grouse

At this time, the Challis LWG has not suggested any changes to this section of the plan.

VII. Public Education Measures

At this time, the Challis LWG has not suggested any changes to this section of the plan.

VIII. Implementation Plan

An Implementation Plan (summarizing the conservation measures in this Conservation Plan) is included as Appendix C. The Implementation Plan assigns each conservation measure to a responsible party and specifies when the conservation measure should be carried out.

A. Annual Meetings

At this time, the Challis LWG has not suggested any changes to this section of the plan.

B. Mechanism for Calling Other Meetings

At this time, the Challis LWG has not suggested any changes to this section of the plan.

IX. Monitoring and Evaluation

At this time, the Challis LWG has not suggested any changes to this section of the plan.

X. Adaptive Management

At this time, the Challis LWG has not suggested any changes to this section of the plan.

XI. Accomplishments

At this time, the Challis LWG has not suggested any changes to this section of the plan.

XII. Literature Citations

At this time, the Challis LWG has not suggested any changes to this section of the plan.

Appendix A

At this time, the Challis LWG has not updated the figures in this appendix.

Appendix B

At this time, the Challis LWG has not suggested any changes to this section of the plan.

Appendix C

At this time, the implementation plan is in effect. Projects being completed, as reported to the State SAC are shown in Table 4 and Table 5.

Appendix D

At this time, the Challis LWG has not suggested any changes to this section of the plan.

Table 4: OSC-funded Projects in the Challis Sage-grouse Planning Area (Ongoing)													
Project Name	**OSC Grant Number**	**Type of Project***	**Grant Proposed**		**Grant Funded**		**In-Kind Match**		**Project Implementation**		**Total Spent to Date ($)**	**Amount left over ($)**	**Status**
			Amount ($)	**Date**	**Amount ($)**	**Date**	**Amount ($)**	**Source**	**Start Date**	**End Date**			
Cottonwood Fence	2007-11	Fencing	$6,324	6/07	$6,324	8/08	$23,871	BLM/ permittee	4/09	10/09	$0	NA	The fence was not built last year. It is on the priority list of this summer.
Leadville Seeding	2007-12	Seeding	$25,000	6/07	$25,000	Approved but not yet received	$144,000	BLM	7/09	12/09	$0	NA	The planning is continuing. Funding is in place to complete the project in the fall of '09.
South Baldy Riparian Exclosure	2008-6	Exclosure	$5,200	7/08	$5,200	Approved but not yet received	$9,120	BLM/ permittee	4/09	12/09	$0	NA	Exclosure to be built this summer.
Magpie/ Larkspur	2007-10	Exclosure	$16,545	6/07	$16,545	2008	$33,549	BLM	9/2008	11/2008	$50,104	0	Exclosures are completed.

Table 5: Other Sage-grouse Projects not Funded by OSC in the Challis Sage-grouse Planning Area (Ongoing)							
Project Name	**Type of Project***	**Brief Description**	**Funding Mechanism**	**Acres Affected**	**Land Ownership(s)**	**Start Date**	**End Date**
Pahsimeroi Sage-grouse Habitat monitoring	SG habitat use	Identify important SG habitats	IDFG, (OSC purchased collars in 2007)	30,000+	BLM, FS, Private	1-1-08	12-31-08

CHALLIS SAGE-GROUSE CONSERVATION PLAN

Figure 1: Sage-grouse on lek in the Lower Lemhi

2010 Amendment

Developed by:
The Challis Sage-grouse Local Working Group

CHALLIS SAGE-GROUSE LOCAL WORKING GROUP'S SAGE-GROUSE CONSERVATION PLAN: 2010 AMENDMENT

I. Introduction

This Amendment is a yearly update to the Challis Sage-grouse Conservation Plan originally adopted in 2007. The information presented in this amendment was largely completed during 2009. The Challis Sage-grouse Local Working Group (Challis LWG) continues to meet and discuss sage-grouse issues in the area. This Amendment includes an update of the sage-grouse habitat map for the area, and seasonal habitat mapping for the LWG area. The annual report to the State Advisory Council from the Local Working Group is also incorporated.

The Introduction in the current plan refers to Figure 1, a map of the Challis Sage-Grouse Planning Area (Challis SGPA). That map was replaced in the 2009 amendment with changes that were made after discussions with the adjoining Upper Snake Sage-grouse Local Working Group (Upper Snake LWG). In 2009, it came to the attention of the Challis LWG that there was also an overlap with the North Magic Valley Sage-grouse Local Working Group. The overlap is at the southern most boundary of the Challis LWG area. The Challis LWG will continue to work with the North Magic Valley Sage-grouse Local Working Group to determine where the boundary should be.

II. Vision Statement

Part of our vision, as described in the Conservation Plan is to increase the cooperation between land and wildlife management agencies and private property owners. In 2009, a total of 22 different people participated over the course of the year in different meetings for the Challis LWG. Eight different meeting were held to map seasonal habitat, discuss boundaries, and for the annual meetings described in the plan.

Table 1 shows the attendance at Challis LWG, (including mapping meetings, and Idaho Sage-grouse Advisory Committee (Idaho SAC) meetings in 2009 as reported to the Idaho SAC.

Table 1: Challis Sage-grouse Local Working Group (2009)

Meeting Attendees	# Meetings Attended	Representation	Miles Traveled
Scott Bergen	1	Wildlife Conservation Society	440
Claire Casey	1	Idaho Conservation League	10
Gregg Dawson	1	Idaho Department of Agriculture	216
Karen Dunlap	1	US Forest Service	92
Dave Ellis	3 LWG	South Carmen Grazing Association	372
	4 SAC		1069
Mike Foster	2	Forest Service	328
Vince Guyer	6 LWG	Bureau of Land Management	374
	1 SAC		500
Cindy Haggas	3	US Forest Service	138

Table 1: Challis Sage-grouse Local Working Group (2009)			
Meeting Attendees	**# Meetings Attended**	**Representation**	**Miles Traveled**
Trisha Miller	2	Bureau of Land Management	20
Craig Nemeth	3	Bureau of Land Management	138
Greg Painter	4	Idaho Department of Fish and Game	148
Kyra Povirk	2	Bureau of Land Management	128
Jennifer Purvine	1	Forest Service	10
Peggy Redick	6	Bureau of Land Management	378
Dave Rosenkranz	1	Bureau of Land Management	108
Alan Sands	1	The Nature Conservancy	560
Michael Steck	3	Forest Service	140
Ron Troy	1	The Nature Conservancy	118
Diane Weaver	1	US Forest Service	118
James Whittaker	1	Rancher	92
Laura Wolf	6	Idaho Department of Fish and Game	278
Bart Zweitzig	6	Bureau of Land Management	374

III. Challis Sate-grouse Planning Area Habitat Guidelines

At this time, the Challis LWG has not suggested any changes to this section of the plan.

IV. Status of Sage-grouse Population and Habitat

A. Population

Information regarding local population as reported to the Idaho SAC is included in Table 2. Changes were made from previous years to take into account the boundary changes agreed to in 2009.

Table 2: Sage-grouse Population Monitoring (2009)												
# of leks surveyed by air	# of individual leks ground surveyed			# of lek routes	# of leks in these routes	'09 Avg # males/ lek on routes	Males/lek previous 5 years					
							'08	'07	'06	'05	'04	
0	53			13	37	15	14	22	25	20	18	
'09 # Wings collected	'09 Chicks: Hen	Chicks:Hen previous 5 years					'09 Estimated harvest	Estimated harvest previous 5 years				
		'08	'07	'06	'05	'04		'08	'07	'06	'05	'04
62	1.88	1.0	1.12	1.88	1.17	1.9	NA	487	495	1813	949	459

Sage-grouse Radio-telemetry Monitoring			
# of grouse with radio-collars in 2009	27	Purpose of monitoring	Hen production and habitat use study

B. Habitat

This Section of the Conservation Plan describes the habitat in the Challis SGPA. At the state level in Idaho there is a sage-grouse habitat map that is updated on a yearly basis. The Challis LWG updated the sage-grouse habitat map after seasonal maps were prepared to include areas that had been previously missed. None of the acres that had previously been mapped were removed. Most of the sage-grouse habitat within the Challis SGPA is still classified as key sage-grouse habitat. There is one area of approximately 5.600 acres which is still classified as perennial grassland (Type I). This area was burned by a human caused wildfire in 2003 and is now vegetated with native grasses and forbs, but the sage brush canopy cover is still below 10%. Figure 2 shows the updated sage-grouse habitat map for the planning area as agreed to by the Challis LWG.

In 2009, the Challis LWG mapped seasonal habitats for sage-grouse. Using observation data, local knowledge and vegetation the group mapped nesting, wintering, and summer habitat. Figure 3 shows nesting habitat, Figure 4 wintering habitat, and Figure 5 summering habitat. Most of the Local Working Group area was mapped, but the Big Lost River Sub-basin was not completed and is a goal of the group for 2010.

After completing the seasonal habitat mapping the Challis LWG adjusted the boundaries of some of the Sage-grouse Priority Areas based on the new information. The number and general location of the Priority Areas did not change, but the boundaries were adjusted as depicted in Figure 6. Figure 6 replaces Figure 4 from the original plan.

Figure 2: Sage-Grouse Habitat

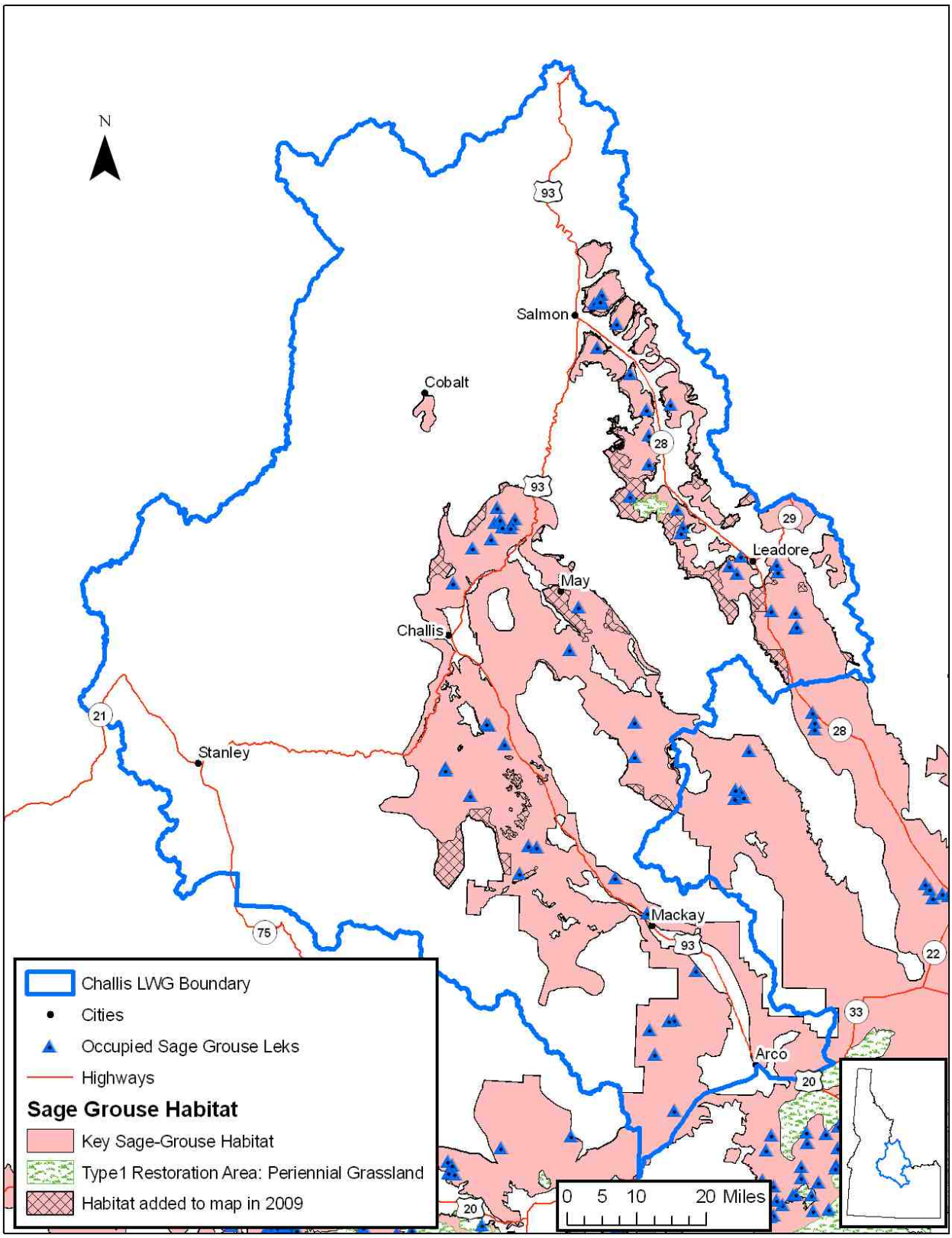


Figure 3: Nesting Habitat

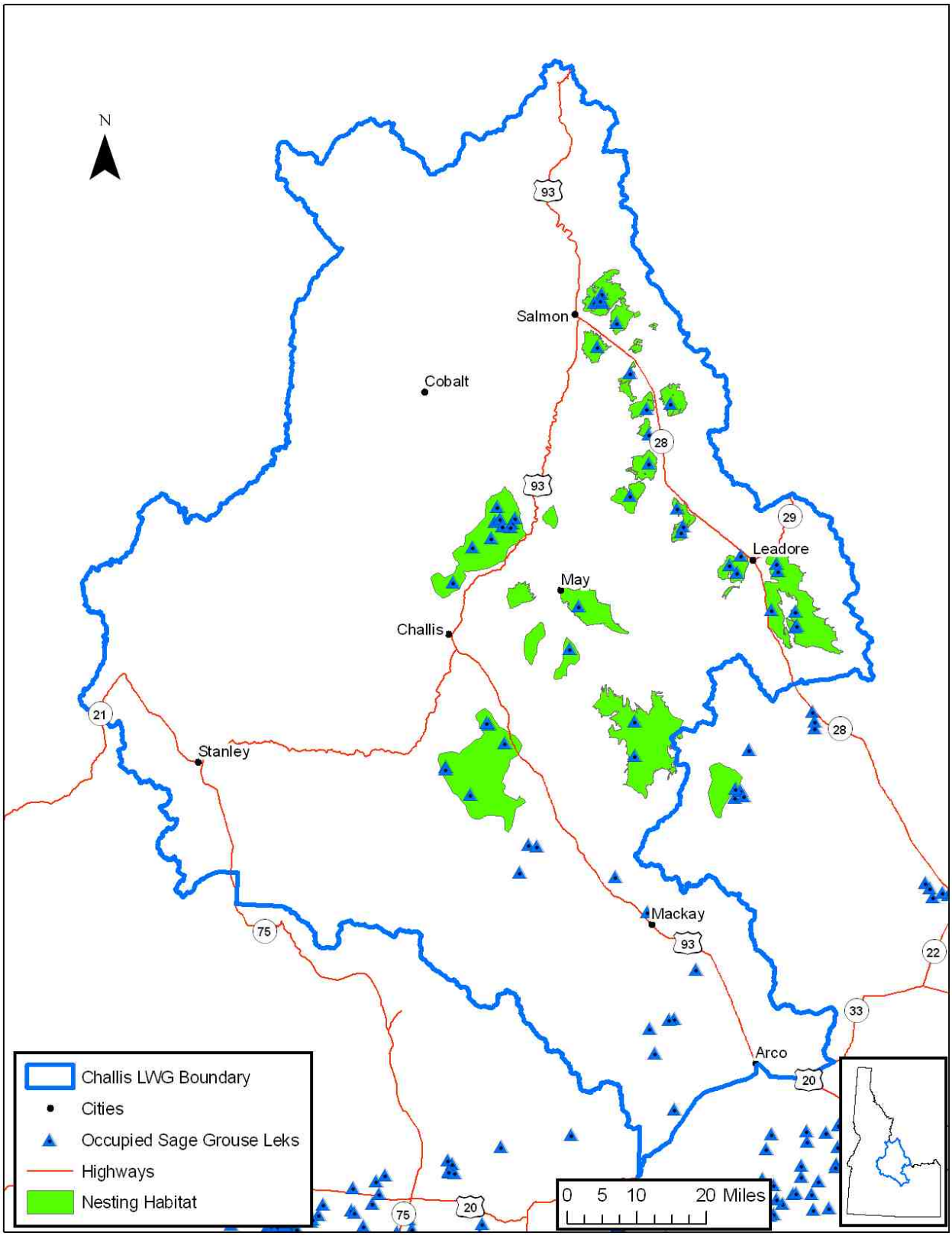


Figure 4: Wintering Habitat

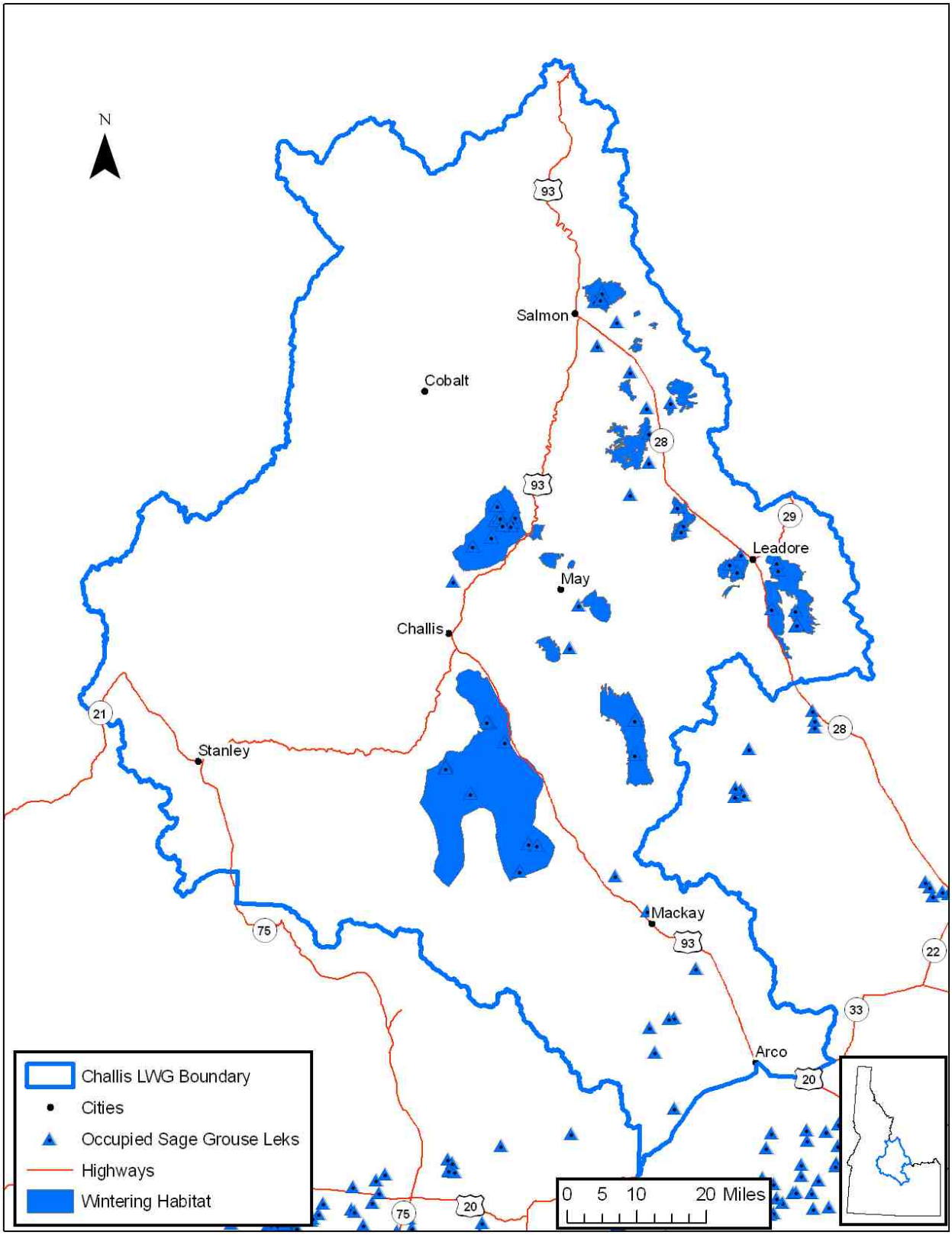


Figure 5: Summer Habitat

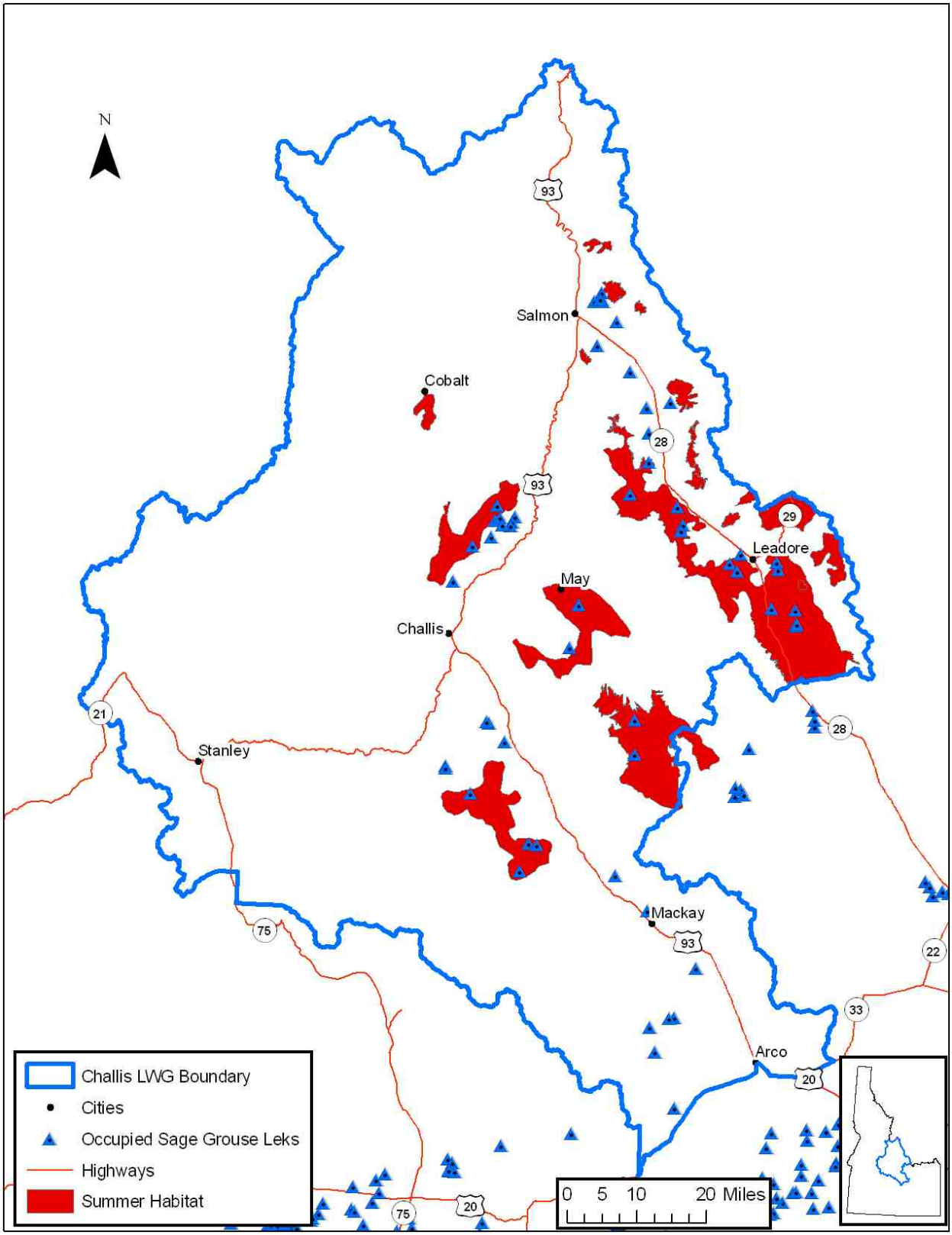


Figure 6: Priority Areas

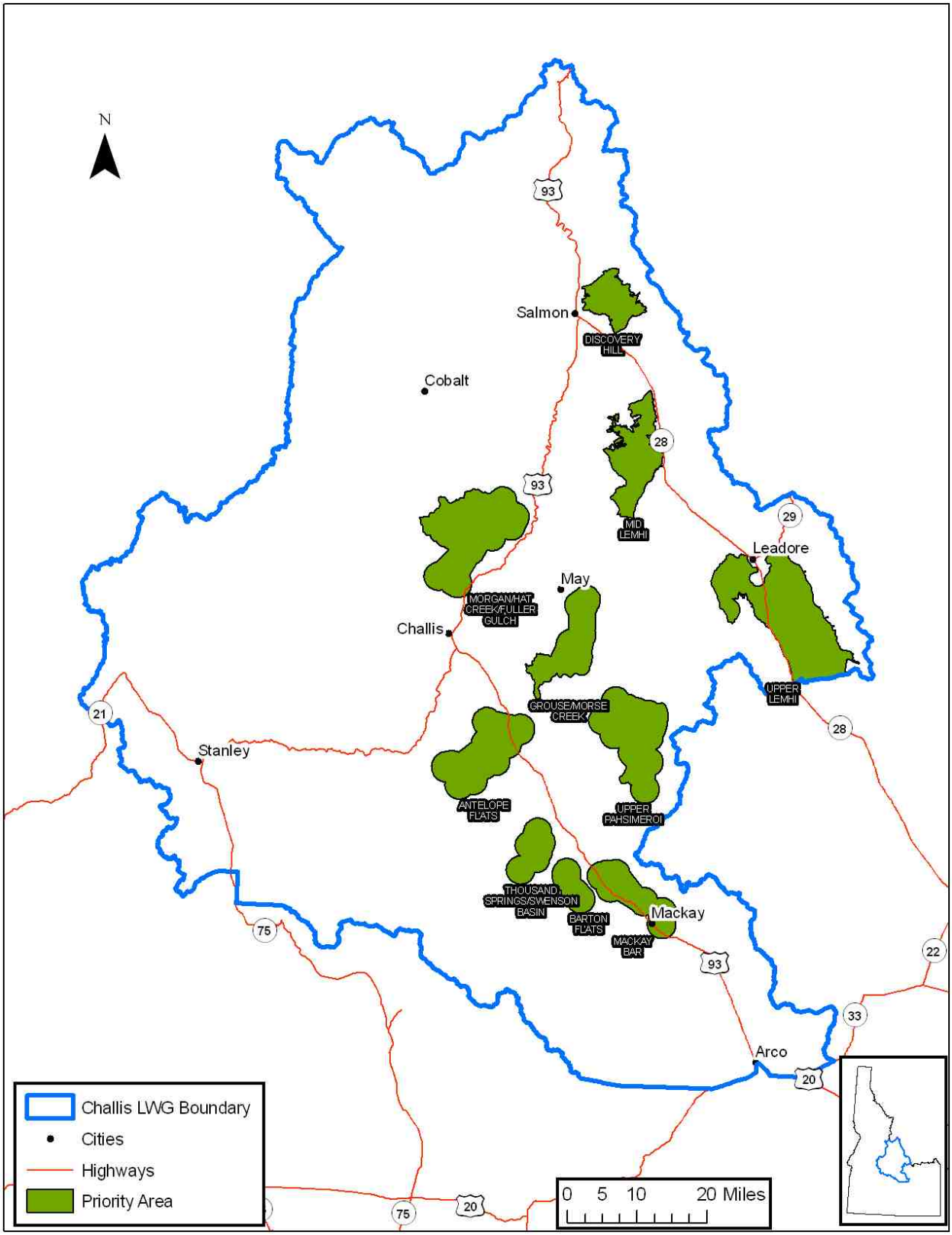


Table 3 shows the habitat information reported to the State SAC for 2009.

Table 3: Sage-grouse Habitat (2009)				
Number Acres Wildfire on **Private** Land	Number Acres Wildfire on **BLM** Land	Number Acres Wildfire on **USFS** Land	Number Acres Wildfire on **State** Land	Number of Acres Wildfire on **Other** Land (DOE, Tribes, etc.)
0	0	0	0	0

V. Risks to Sage-grouse Populations and Habitats

At this time, the Challis LWG has not suggested any changes to this section of the plan.

VI. Recommended Conservation Measures to Address Risks to Sage-grouse

At this time, the Challis LWG has not suggested any changes to this section of the plan.

VII. Public Education Measures

At this time, the Challis LWG has not suggested any changes to this section of the plan.

VIII. Implementation Plan

The Challis SGLWG continues to implement the plan and work together to increase local knowledge of the sage-grouse and to protect important sage-grouse habitat. Conservation measures are being considered by the Forest Service, Bureau of Land Management, and IDFG when making management decisions. In addition the following progress has been made toward implementing conservation measures:

The Forest Service has been conducting a lek search in the Salmon-Cobalt Ranger District.

The Local Working Group used telemetry, observation data and local knowledge to map seasonal habitats for sage grouse, using that data they revised the maps of sage-grouse habitat priority areas in the Conservation Plan and the Statewide habitat map for the Challis area, see maps above.

Bureau of Land Management Challis Field Office implemented the Challis Travel Management Plan road closures within sage grouse priority areas in October of 2009 when the final travel maps were distributed. Road signage, closure, and rehabilitation are ongoing and expected to be finished in 2010.

The Salmon-Challis National Forest completed a motorized vehicle use plan (ie, travel plan) which identifies travel routes by vehicle type and season of use, and restricts cross-country motorized travel on lands administered by the Forest. This decision will benefit sage grouse.

The Challis and Upper Snake Local Working Groups resolved questions about the boundary between the two planning areas. The Challis Local Working Group amended the map depicting their boundary in the Conservation Plan.

The Local Working Group produced a 2009 Amendment to their Conservation Plan and made that amendment available to the public on the Internet at: http://fishandgame.idaho.gov/cms/hunt/grouse/conserve_plan/challis/09Amend.pdf.

Specific projects completed in the Local Working Group area are described in Appendix C.

A. Annual Meetings
At this time, the Challis LWG has not suggested any changes to this section of the plan.

B. Mechanism for Calling Other Meetings
At this time, the Challis LWG has not suggested any changes to this section of the plan.

IX. Monitoring and Evaluation
At this time, the Challis LWG has not suggested any changes to this section of the plan.

X. Adaptive Management
At this time, the Challis LWG has not suggested any changes to this section of the plan.

XI. Accomplishments
At this time, the Challis LWG has not suggested any changes to this section of the plan.

XII. Literature Citations
At this time, the Challis LWG has not suggested any changes to this section of the plan.

Appendix A
At this time, the Challis LWG has not updated the figures in this appendix.

Appendix B
At this time, the Challis LWG has not suggested any changes to this section of the plan.

Appendix C
At this time, the implementation plan is in effect. Projects being completed, as reported to the State SAC are shown in Table 4 and Table 5.

Table 4: OSC-funded Projects in the Challis Sage-grouse Planning Area

Project Name	OSC Grant Number	Type of Project*	Grant Proposed		Grant Funded		In-Kind Match		Project Implementation		Total Spent to Date ($)	Amount left over ($)	Status
			Amount ($)	Date	Amount ($)	Date	Amount ($)	Source	Start Date	End Date			
Cottonwood Fence	2007-11	Fencing	$6,324	6/07	$6,324	8/08	$10,594	BLM/ permittee	4/09	10/10	$$12,200	NA	Materials have been delivered. Building this spring
Leadville Seeding	2007-12	Seeding	$25,000	6/07	$13,000	12/09	$144,000	BLM/ permittee	7/09	12/10	$0	NA	The equipment and seed are ordered. Goal is to implement in Spring or Fall 2010
South Baldy Riparian Exclosure	2008-6	Exclosure	$5,200	7/08	$5,200	3/09	$21,562	BLM/ permittee	4/09	12/10	$13,590	NA	Materials have been delivered, building this spring

Table 5: Other Sage-grouse Projects not Funded by OSC in the Challis Sage-grouse Planning Area

Project Name	Type of Project*	Brief Description	Funding Mechanism	Acres Affected	Land Ownership(s)	Start Date	End Date
Baldy Basin Allotment	Grazing management changes	Changed grazing which will improve sage-grouse habitat	BLM/permittee	2,200	BLM	3/1/09	2/28/19
Butte County Weed treatments	Noxious weed treatment within Butte County (Big Lost River drainage)	Treatment for spotted knapweed, leafy spurge, and Canada thistle		121 acres spotted knapweed, 762 acres leafy spurge, and 202 acres Canada thistle	133.5 acres BLM, 99.5 acres FS, and 852 acres private		
Challis Field Office Weed Treatments	Chemical and mechanical treatments	Spot treatments	Fuels Program	200ac	BLM	6/1/09	9/30/09
Challis Field Office Weed Treatments	Chemical and mechanical treatments	Spot treatments	HLIN	100ac	BLM	6/1/09	9/30/09
Challis Travel Management Plan	Road closures in priority areas	Redundant roads closed and rehabilitated to lessen disturbances in priority areas	Federal Stimulus	467,910acres affected by 84 miles of road closure	BLM	Implemented October, 2009	Ongoing
Condon Springs area	Habitat improvement	Range planting, extensive weed management (chemical), and altered grazing management to improve vegetation and habitat. Significant improvement to wet meadows with short duration grazing management and weed management (chemical).	NRCS/Private	280	Private	March 2009	Continuing
Leadville Exclosure	Exclosure	Excludes grazing from an upland site.	BLM	25	BLM	6/1/09	10/1/09
Lemhi County Cooperative Weed Management Area	Noxious weed treatments	Treatment of leafy spurge, spotted knapweed, etc.	Lemhi County, USFS, BLM, State of Idaho, etc.	272,742 acres affected, within that 90,373 acres were inventoried, 2,193 acres were treated using biological treatments, 2030 bio-control agents were released, and 300 chemical acres were completed.	BLM, USFS, private, State	5/1/2009	10/1/2009
Moyer Basin (Panther Creek drainage) Sage-grouse Trapping.	SG habitat use/migration	Determine seasonal use of Moyer Basin and origin of grouse	IDFG/USFS	5,944	FS	3/1/09	Ongoing
Pahsimeroi River Area	Habitat improvement	Range planting	NRCS/private	74	Private	June 2009	September 2009
Pahsimeroi Sage-grouse Habitat monitoring	SG habitat use	Identify important SG habitats	IDFG, (OSC purchased collars in 2007)	30,000+	BLM, FS, Private	1-1-09	12-31-09
Ryegrass Exclosure This project was funded by OSC in 2004 (2004-10).	Exclosure modification	Existing exclosure was expanded to include a larger mesic area for the benefit of sage-grouse.	Forest Service	5	Forest Service	6/1/09	6/15/09
Salmon-Challis National Forest motorized vehicle use plan		Travel Plan identifies travel routes by vehicle type and season of use, and restricts cross-country motorized travel on lands administered by the Forest which will benefit sage-grouse					

Appendix D

At this time, the Challis LWG has not suggested any changes to this section of the plan.