Big Desert Sage-grouse Local Working Group

Sage-grouse Conservation Plan

Approved by Consensus, November 2009
Respectfully Submitted for Public Review

Comments requested by January 28, 2010

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Acronyms

ATV	All Terrain Vehicle
BLM	Bureau of Land Management
CDC	Center for Disease Control and Prevention
CSP	Conservation Security Program
CWMA	Cooperative Weed Management Area
DOE	Department Of Energy
EIS	Environmental Impact Statement
ESR	Emergency Stabilization and Restoration
EQUIP	Environmental Quality Incentive Program
FMDA	Fire, fuels and related vegetation Management Direction plan Amendment
FMP	Fire Management Plan
FMU	Fire Management Unit
FSA	Farm Service Agency
GBRI	Great Basin Restoration Initiative
GIS	Geographic Information System
IDA	Idaho Department of Agriculture
IDFG	Idaho Department of Fish and Game
IDL	Idaho Department of Lands
INL	Idaho National Laboratory
LWG	Local Working Group
ISAC	Idaho Sage-grouse Advisory Committee
NAGP	North American Grouse Partnership
NEPG	National Energy Policy Group
NRCS	Natural Resources Conservation Services
OHV	Off Highway Vehicle
OSC	Office of Species Conservation
PR	?
USDA	United States Department of Agriculture
USDC	United States District Courts
USDI	United States Department of Interior
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

USGS	United States Geological Survey
SGPA	Sage Grouse Planning Area
WAFWA	Western Association of Fish and Wildlife Agencies
WCS	Wildlife Conservation Society
WNV	West Nile Virus
WHIP	Wildlife Habitat Incentive Program
WS	Wildlife Services

Big Desert Sage-grouse Local Working Group Sage-grouse Conservation Plan

Citations from the July 2006 Idaho Sage-grouse Conservation Plan (ISAC 2006) have been included in this plan, but not verified.

The Big Desert Sage-Grouse Planning Area (Big Desert SGPA) includes portions of Bingham, Blaine, Bonneville, Butte, Minidoka, and Power counties as depicted in Figure 1.

I. INTRODUCTION

A. Conservation Goals and Objectives for the Big Desert Sage-grouse Planning Area

1. Purpose

Utilize a collaborative *effort that fosters and supports* management of sage grouse and sage grouse habitat within the Big Desert SGPA by fostering effective coordination between government agencies, tribes, non-government organizations, landowners, livestock operators, and interested individuals; and integrating national, regional, and local input and knowledge. This plan will provide information, guidance, and conservation tools for protecting and enhancing sage grouse populations and their habitats in the Big Desert SGPA in a manner that supports sage-grouse and a healthy diversity and abundance of wildlife species and human uses. This will be a "working document" so as local and regional conditions change and new information, technology and techniques become available, this plan may be refined to reflect these changes and information.

2. Conservation Objectives

Population Objectives

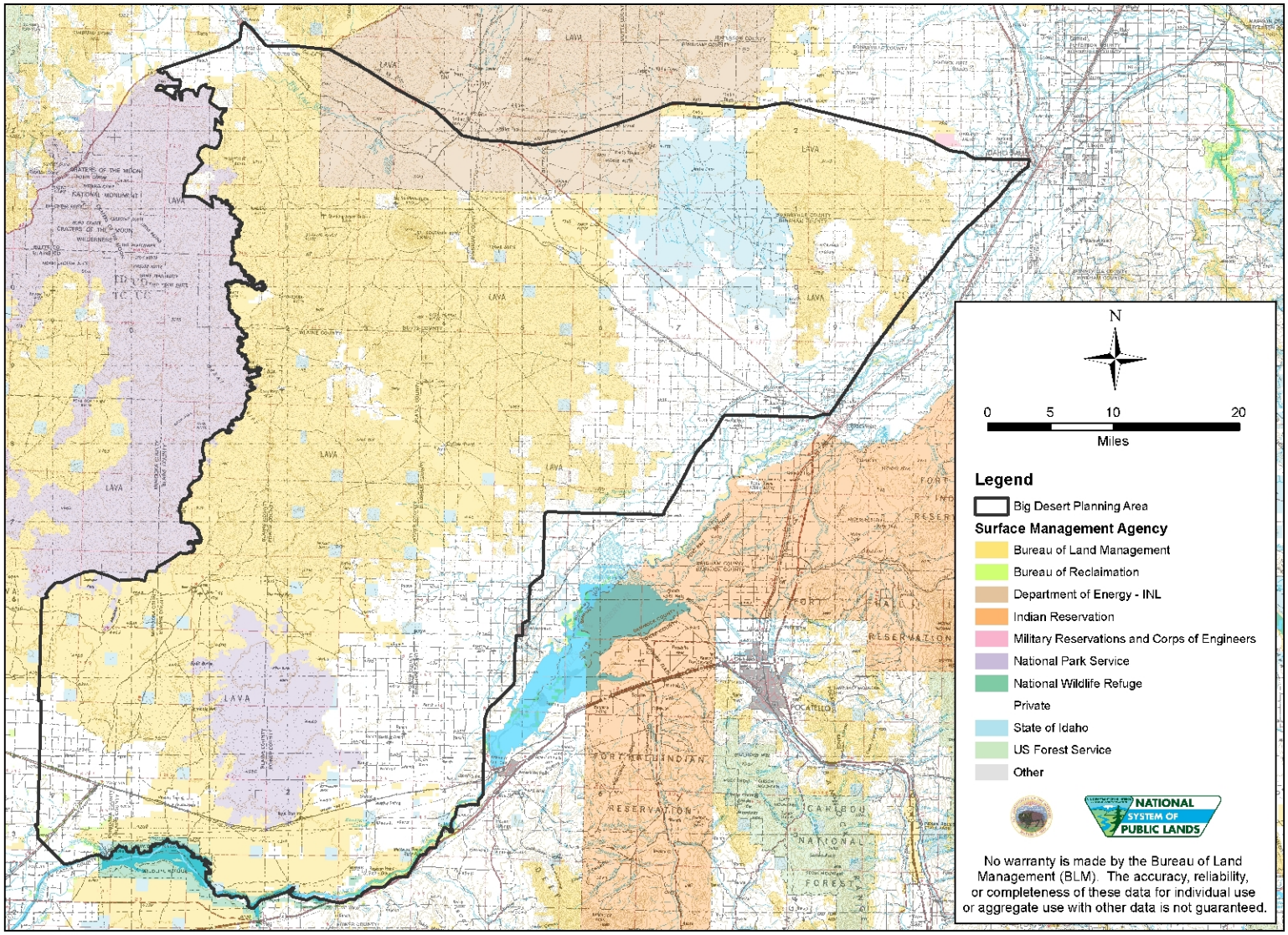
1. Maintain and, where feasible, increase current distributions and abundance of sage grouse within the Big Desert SGPA.
2. Reduce, eliminate, and mitigate the adverse impacts to sage grouse within or near breeding, brood-rearing, and winter habitat within the Big Desert SGPA.
3. Work collaboratively with government agencies, private landowners, and other entities to better understand the cumulative effects that land management decisions might have on sage grouse populations.

Habitat Objectives

5. Maintain, rehabilitate, and restore sage grouse habitats and the continuity of their habitats within the Big Desert SGPA.
6. Manage the sagebrush steppe ecosystems within the Big Desert SGPA for a diverse species composition of sagebrush, grasses, and forbs; and incorporate structural characteristics that promote rangeland health and sage grouse habitat requirements.
7. Work collaboratively with government agencies and other entities to better understand the cumulative effects that land management decisions might have on sage grouse habitat.

Figure 1

Big Desert Planning Area



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4. Coordinate with land management agencies and other entities to map and monitor sage grouse seasonal habitat, to identify and prioritize habitat rehabilitation and restoration projects, and document the effectiveness of projects and land management decisions.

B. Summary of Local Working Group Participation and Planning Process

Idaho Department of Fish and Game (IDFG) published the Idaho Sage-grouse Conservation Plan in July 2006. That plan directed that local working groups throughout the state develop local conservation plans addressing local conditions, threats, and opportunities. The efforts of the Big Desert Sage-grouse Local Working Group (Big Desert LWG) began when IDFG announced a meeting to be held in February 2007.

Aided by the services of a neutral facilitator, the Big Desert LWG met approximately once a month beginning in February 2007. The group's first task was to develop a Working Charter to guide its work and solicit participation from potentially interested individuals and organizations. A mailing list was built and has been used ever since to share the progress of the group. A copy of the mailing list is included as Appendix A.

The Big Desert LWG then developed a Working Charter to guide its efforts; it is included as Appendix B. As part of the process of developing that document, the group agreed to work by consensus, understanding that consensus building might be challenging and time-consuming.

The Big Desert LWG then began a process of learning about sage-grouse and sagebrush ecology and considering the risk factors to the bird and its habitat in the Big Desert Sage-grouse Planning Area. Experts were invited to provide informational presentations and members collected and reviewed available information on sage-grouse and the various factors that affect the bird's populations and habitat.

In August 2007, the group ranked the various threats faced by sage-grouse and habitat in the planning area into four categories:

High Risk to Sage-grouse and Habitat:

Annual grasslands

Big sagebrush recovery

Wildfire

Medium Risk:

Human disturbance

Infrastructure

Livestock Impacts

Lower ecological condition

Predation

Sport hunting

Three-tip sagebrush invasion

West Nile Virus

Low Risk:

Climate change

Insecticides

Sagebrush control

Seeded perennial grasslands

Very Low Risk:

Agricultural Expansion

Conifer Encroachment

Falconry

Isolated populations

Mines, landfills, and gravel pits

Prescribed fire

Urban/exurban development

In September 2007, the group began reviewing the menu of conservation measures presented in the July 2006 ISAC. Relevant and appropriate conservation measures were adopted and in some cases adapted to the Big Desert SGPA . Irrelevant and inappropriate conservation measures were not included. Sections titled "Threat Summary" and "Key Conservation Issues" were drafted for each threat category. As the Big Desert LWG moved forward with building its understanding of the threats and how they might be addressed through conservation measures, some of the threats identified in the August 2007 exercise were merged and/or renamed.

Following completion of conservation measures to address all threat categories, the Big Desert LWG then reviewed and approved all sections. Then the Big Desert LWG drafted the remaining sections.

On August 12, 2009, an Agency Review Draft of the group's draft Conservation Plan was sent to 58 elected officials and individuals representing relevant agencies with an invitation to comment by September 18, 2009. A total of six comment documents were submitted.

- Frank Fink - Natural Resources Conservation Service
- Ann Moser - Wildlife Biologist, Idaho Department of Fish and Game
- Karen Rice - BLM Idaho Falls District
- Mark Collinge - State Director, Idaho Wildlife Services
- Sandi Arena, US Fish and Wildlife Service
- Jesse Rawson - Wildlife Biologist, BLM Burley Field Office

The list of individuals who were invited to submit comments, all comments received in response to this opportunity, and the Big Desert LWG's responses to the comments that were submitted are included as Appendix C.

On (date), the Big Desert LWG will release a Public Review Draft for a 45-day public review and comment period.

Upon incorporation of comments submitted by the agencies and the public, the Big Desert LWG it is expected that the Final Big Desert Sage-grouse Conservation Plan will be submitted to IDFG.

The Big Desert LWG will then turn its attention to overseeing implementation of the Plan.

II. STATUS OF SAGE-GROUSE HABITAT AND POPULATION IN THE BIG DESERT SAGE-GROUSE PLANNING AREA

A. Population Overview

The Big Desert has been one of the strongholds for sage-grouse in Idaho. There are many local stories going back to the 1960's that state "the sky was black with sage chickens". The sage-grouse populations in the Big Desert SGPA have been monitored since 1964, when reliable lek data began to be collected. Since this time, sage-grouse populations within the planning area have been on a gradual decline. This decline has been attributed to numerous factors, most notably the loss of habitat from wildfire. The IDFG has been collecting sage-grouse data in the form of; lek routes, wing collection from harvested birds, and harvest data. All of this data is used in concert by wildlife managers to determine potential sage-grouse hunting season options. In addition to these data collection efforts, sage-grouse research has been conducted in the northern portion of the Big Desert from 1977 to 1999, and then again in 2003. This research was primarily conducted under J. W. Connelly and has resulted in numerous scientific publications. The Wildlife Conservation Society (WCS) collared a total of 21 sage-grouse with radio frequency collars for the purposes of estimating population demographic parameters (mortality, apparent nest success, brood rearing, etc.) and documenting habitat use throughout the year (currently 7 months data collected of the 1st year).

The IDFG has collected lek route data since the mid 1960's within the BDPA (Table 1). Lek routes within the Big Desert SGPA consist of the following routes; Big Desert #1, Big Desert #3, Big Desert #5, South Big Desert, Fingers Butte, Tractor Flat, and the RWMC/INL routes (Lek routes are explained in detail within the annual Upland PR reports issued by IDFG). Lek routes are conducted annually by IDFG personnel and experienced volunteers. Since the mid 1960's, lek routes have shown a decreasing trend (Figure 1). The Big Desert LWG has requested additional grant funding to conduct additional lek searches and counts in the southern portion of the Big Desert SGPA. This portion of the planning area does not have any established lek routes, and few leks have been identified within the area.

The IDFG also collects sage-grouse wing data from harvested birds within the Big Desert SGPA. Currently, IDFG collects hunter harvested bird wings from four wing barrel locations within the Big Desert SGPA. Wings are also collected through mail-in bird hunter surveys and sage-grouse check stations. All BDPA wings are combined and analyzed annually to determine sage-grouse production from that spring (Table 2). Sage-grouse wing collection has greatly decreased over the past 20 years (Table 2). The decrease in wing collection may be attributed to a decline in hunter participation (see Table 3). Sage-grouse production varies annually and in some cases sample sizes are inadequate to estimate accurately. If sage-grouse wing collection continues to decrease in the Big Desert SGPA, other alternatives for collecting sage-grouse production may need to be considered.

Sage-grouse harvest data is collected annually by IDFG within the Big Desert SGPA (Table 3). Harvest data is collected through hunter phone/mail surveys and check stations (Table 3). Sage-grouse harvest has had a decreasing trend over the 2 decades (Table 3). This decreasing trend in harvest is likely due to a decreasing trend in sage-grouse population (Table

1), and closure/more restrictive hunting seasons. Sage-grouse harvest data is currently unavailable at the BDPA level due to how it is collected. IDFG sage-grouse zones are not based upon sage-grouse planning areas. Therefore, harvest data from the IDFG-SE Region was used instead.

It is critical that IDFG continue to collect biological data on sage-grouse within the planning area to access population dynamics. This information enables managers to track population changes in response to the various threats identified by the Big Desert LWG.

Table 1. Average number of males per route, Big Desert SGPA, 1996-present.

Lek Route	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
RWMC/INL	15	26	58	117	70	89	148	135	98	179	132	73	105
Big Desert #1	54	54	79	107	149	126	148	141	114	151	110	141	60
Big Desert #3	71	67	62	20	38	53	67	98	84	107	153	126	110
Big Desert #5	22	19	19	15	58	62	68	146	124	146	188	180	79
South Big Desert	54	23	32	20	53	52	30	101	79	79	81	59	55
Fingers Butte			73	59	158	193	142	229	225	193	309	296	208
Average males per route	43.20	37.80	53.83	56.33	87.67	95.83	100.50	141.67	120.67	142.50	162.17	145.83	102.83

Table 2. Greater sage-grouse production based on wing collections, Big Desert SGPA[c], 1983-present.

Year	*n*	Juv:100 females[a]	Juv:100 adults[b]	Female Wings	Percent unsuccessful females[c]
1983	74	458	289	12	50
1984	124	268	202	31	52
1985	852	344	224	171	60
1986		302	190		49
1987		200	125		41
1988	818	108	77	331	
1989		230	149		
1990	378	267	164	88	6
1991		91	62		78
1992	127	84	57	55	84
1993	77	162	103	19	47
1994	307	291	198	60	80
1995	240	85	56	109	60
2002	96	431		16	62
2003	141	104	64	81	40
2004	34	317	127	18	83
2005	143	372	186	72	60
2006	155	244	131	77	75
2007	57	115	68	10	50

[a] Females = adults + yearlings

[b] Adults = adults + yearlings

[c] Big Desert harvest season closed from 1996-2001

Table 3. Estimated greater sage-grouse harvest, Southeast Region, 1986-present [c]

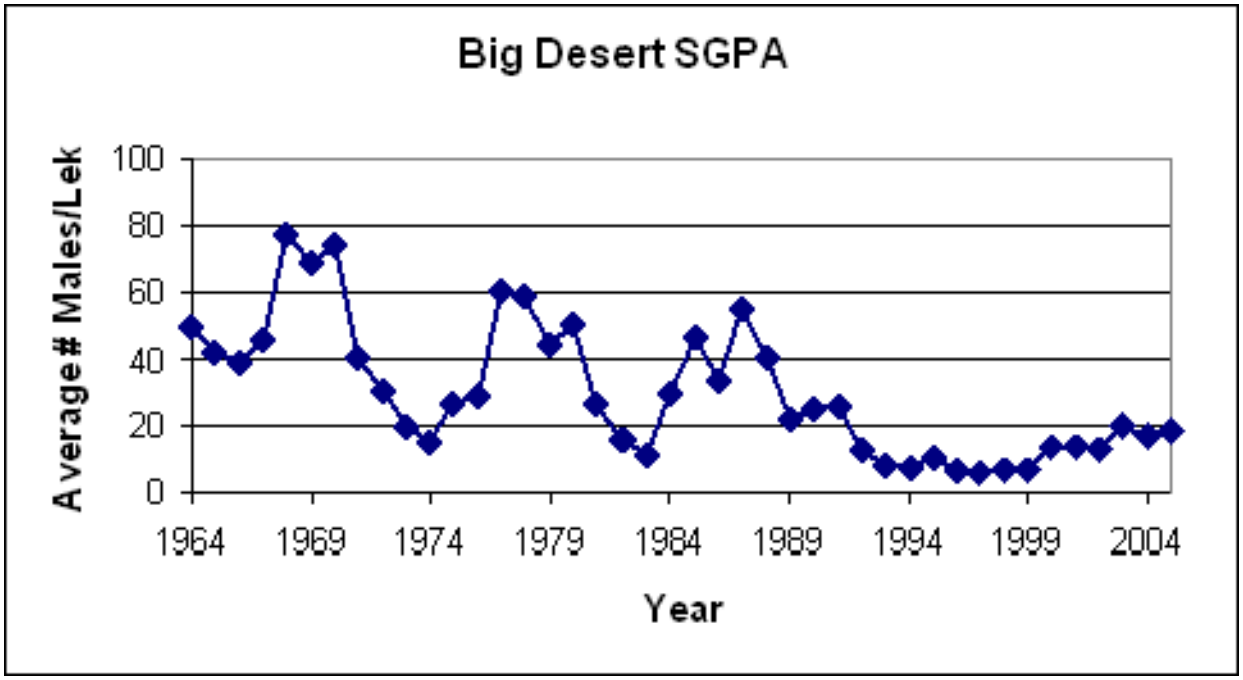
Year	Daily bag[a] & Possession	Season Length Days	Check station				Telephone survey[b]		
			Hunters	Birds	Birds per hunter	Hours per bird	Hunters	Birds	Birds per hunter day
1986	3 (2)	21	264	177	0.7	7.6	1,848	7,082	1.3
1987	3 (2)	21	341	450	1.3	3.4	2,002	6,076	1.3
1988	3 (2)	23	393	491	1.2	4.3	1,862	7,962	1.1
1989	3 (2)	23	402	283	0.7	7.1	1,922	4,118	0.7
1990	3(6)	30	344	498	1.4	3.2	2,073	6,004	0.8
1991	3(6)	30	314	153	0.5	9.7	2,063	3,743	0.6
1992	3(6)	30	168	52	0.3	15.1	2,242	5,077	0.6
1993	3(6)	30	112	13	0.1	40.7	3,123	4,332	0.4
1994	3(6)	30	167	109	0.6	7.6	2,528	4,401	0.5
1995	3(6)	30	122	35	0.3	15.5	1,462	2,559	0.5
2000	closed						743	669	0.4
2001	closed						551	489	0.3
2002	1	7	37	11	0.3	13.1	430	422	0.4
2003	1	7	31	23	0.7	3.6			
2004	1	7	35	10	0.3	7.0	342[c]	382	0.4
2005	1	7	59	42	0.7	3.3	429[c]	403	0.5
2006	1	7	83	61	0.7	3.9	305[c]	397	1.3
2007	1	7	84	13	0.2	10.6	342[c]	264	0.3
3-year average			75	39	0.5	6.0	359	355	0.7

[a] From 1986-1989, the bag limit for areas off the Big Desert were smaller (2) than for those on the Desert. From 1996-2001, the Big Desert was closed to harvest. The Curlew Grassland was closed to harvest in 2002.

[b] Telephone survey data at the regional level were not collected from 1996-1999. Telephone survey data for 2003 is not available.

[c] Used Zone 5 harvest data only, Southeast Region also includes portions of Zone 8, which is reported in statewide section and Upper Snake section.

Figure 2. Average Males per lek for Big Desert SGPA, 1964-2005



B. Habitat Conditions Overview

The Big Desert SPGA encompasses approximately 1,711,445 acres of land (Figure 1) on the Snake River plain of Eastern Idaho. The potential vegetative community is dominated by a Wyoming Big Sagebrush/bluebunch wheatgrass range site and is currently occupied range of the greater sage-grouse. The Bureau of Land Management (BLM) administers 53 percent of the planning area, the Department of Energy (DOE) administers 6 percent, Idaho Department of Lands (IDL) administers 6 percent, private land is 29 percent, and 5 percent is administered by the National Park Service. Approximately 70 percent of the Big Desert has been burned by wildfire since 1995. The impacted area has lost its large contiguous areas of sagebrush, leaving only patches of shrub, increasing fragmentation and cheatgrass invasion. Of the total burned, thirty percent is currently (2009) classified by BLM as key sage-grouse habitat (areas with intact sagebrush cover), 65 percent is dominated by perennial grassland, and approximately 5 percent is influenced by annual grassland. Key habitat is defined as areas of generally intact sagebrush that provide sage-grouse habitat during some portion of the year including winter, spring/summer, late brood-rearing, fall, transition sites from winter to spring, spring to summer, and summer/fall to winter.

The BLM has used several methods to evaluate and classify rangelands. In 1980, the Big Desert EIS determined range condition and ecological status by measuring the departure of the existing plant composition and production from the potential natural community (climax). Approximately 18 percent of the Big Desert SGPA was considered in good condition, 48 percent in fair condition, and 7 percent in poor condition. Another 27 percent had been seeded (non-native perennial), burned (wildfire or prescribed) or otherwise disturbed during the analysis. Since 1994, additional wildfires have impacted the Planning area increasing the areas impacted to as much as 70 percent. Much of recent fire impacts have occurred in areas designated in 1980 as being in fair condition or disturbed. Many of these areas have had recurring wildfire

since the mid-1990s, which threatens vegetative diversity and natural succession over much of the area.

In the late 1990s, the BLM started to look at other measures of rangeland health including other ecological considerations such as soil nutrient recycling, plant community structure, its composition and productivity, wildlife habitat, etc. BLM developed standardized methods for evaluating vegetative characteristics for sensitive species habitats. These methods follow Connelly et al. (2000b) Guidelines to Manage Sage-grouse Populations and their Habitats. Habitat indicators include predominate sagebrush species, average sagebrush height, sagebrush canopy, sagebrush age, predominate grass species, average grass height, grass canopy, forb canopy, patch size, and vegetative mosaic on the landscape. The ability of the big sagebrush sites to produce adequate herbaceous cover, stubble heights, and forb diversity during the May and early June nesting period are key to maintaining suitable sage-grouse breeding habitat.

Sage-grouse habitat has been evaluated utilizing Idaho BLM's Framework to assist in making sensitive habitat species assessments (USDI-BLM 2001) to comply with Standard 8 of Idaho's Standards for Rangeland Health. Breeding habitat has been evaluated at the allotment level using the following habitat indicators: (1) sagebrush canopy cover (15-25 %) (2) sagebrush height (30-80 cm) (3) sagebrush growth form (4) average grass and forb height (≥18 cm) (5) average perennial grass canopy cover (≥10 %) (6) average forb canopy cover (≥5 %) and (7) preferred forb abundance and diversity. Indicators that fall outside indicated ranges show less than suitable habitat. Other than loss of sagebrush cover, the most common factors reducing habitat quality for sage-grouse in the Big Desert SGPA are lower grass and forb heights, and reduced forb abundance and diversity. Other factors that lower habitat quality within the planning area are reduced composition of tall bunchgrasses relative to site potential. Most areas within the big desert have lower potential as late brood-rearing habitat. Upland area forbs dry out quickly and riparian areas are not present.

The Big Desert Sheep Allotment is the largest allotment located within the Big Desert with 223,950 total acres. A Rangeland Health Assessment was conducted in 1999. The four standards assessed were watersheds, native plant communities, seedings, and Standard 8, special status species. All standards were determined to be meeting standards. One factor (diversity) was rated down in both native plant and seedings standards due to lack of forbs. For Standard 8 (special status species) the areas where sagebrush was removed as a result of wildfire was found to be unsuitable as sage-grouse breeding habitat. That portion of the Twin Buttes Sheep Allotment within the Big Desert Planning area was meeting all rangeland health standards although the forb component was rated down.

Of the fifteen cattle allotments that make up the majority of the remainder of the Big Desert SGPA, three allotments, Smith, Cedar Butte, and Stageroad, were not meeting standards for native habitats or standards for sensitive species, and livestock were significant factors in not meeting. Within these allotments, grazing system changes were made on 21,000 acres to improve rangeland health conditions. Five allotments were not meeting standards but making significant progress toward meeting standards, and seven allotments were meeting standards. Approximately 5-10 percent of the planning area may be classified as potential restoration areas with respect to lack of understory (perennial grass and forb component).

Within the Burley Field Office of BLM, Rangeland Health assessments have been conducted on six of fourteen grazing allotments. Standard 8 (sensitive species habitat) was not being met on Minidoka, East Minidoka, and Schodde allotments due to the sagebrush limited areas from recent wildfires. Current livestock management practices were not significant factors in the standard not being met. Three allotments, Walcott, Lake Channel, and Sand were found to be

meeting Rangeland Health Standards including those for sensitive species. Rangeland Health Assessments have not been conducted on eight allotments, but wildfire impacts would likely make the majority of this area unsuitable for sage grouse and other sagebrush dependent species.

III. THREATS TO SAGE-GROUSE AND SAGE-GROUSE HABITAT IN THE SGPA

The threats identified in the statewide ISAC (2006) were ranked by the Big Desert LWG at its August 2007 meeting (see page 3). All threats were organized into four qualitative categories, high, medium, low, and very low. Threats are organized alphabetically within those four categories. The ranking has since been reconsidered and the Big Desert LWG agrees that it remains appropriate.

IV. CONSERVATION MEASURES TO ADDRESS LOCAL THREATS

The Big Desert SGPA includes areas classified as sagebrush steppe as well as adjacent cultivated agricultural lands - which are not currently considered critical habitat areas because they provide food and cover for sage-grouse under certain conditions. Conservation projects in these cultivated areas may benefit sage-grouse populations. The Big Desert LWG does not intend that many conservation measures included in this Plan are appropriate for cultivated land. In addition, the Big Desert LWG has no authority to mandate implementation of any conservation measures. The Big Desert LWG understands its role in helping to educate the public, including private land-owners, on the needs of sage-grouse and best practices that will benefit (or minimize harm to) the species.

A. Annual Grasslands

1. Threat Summary

The proliferation of invasive annual plant species, particularly cheatgrass (*Bromus tectorum*), in portions of Idaho (Wisdom et al. 2000b), poses a significant threat to sage-grouse and sage-grouse habitat. Throughout Idaho, the spread of invasive annual grasses has been most extensive in the Wyoming big sagebrush cover type (Crawford et al. 2004). This sagebrush species is the historic dominant vegetative cover of the Big Desert planning area which presently is not in agricultural production or lava flows. Large wildfires in recent years have increased the annual grassland threat in the planning area. Also see the wildfire section of this plan for a discussion of that continuing threat and related conservation measures.

Risk of invasion of cheatgrass increases below elevations of 5,000 ft (Crawford et al. 2004). These lower areas are generally considered to be “warmer” soils which are found in the southern portion of the planning area. Elevation throughout the area varies from 4400 feet to 5900 feet, not factoring in the higher elevations on the 3 largest buttes (Big Southern, Middle, and East Buttes). However, regardless of elevation, exotic annual grasses should be monitored closely. The competitive influence exerted by invasive annuals enables them to dominate vast areas for many years (Monsen et al. 2004).

2. Key Conservation Issues

Spatial Extent of Annual Grasslands and Degraded Habitat Quality: In general, invasive annual grasses can proliferate and out-compete native grasses, forbs, and shrubs for nutrients and water, resulting in less diverse plant communities in terms of species composition and structure. This simplified plant community structure and altered species composition (e.g., fewer shrubs or native perennial grasses and forbs, more weedy species) can degrade habitat quality and quantity by reducing the availability of desirable plant species needed by sage-grouse for cover or food

The restoration of these lands to a point where they are again suitable for sage-grouse requires a long-term commitment of funding and personnel resources. Several research projects underway in conjunction with the Great Basin Restoration Initiative will contribute to the understanding of how to effectively restore diverse, functional rangelands. Projects include the Great Basin Native Plant Selection and Increase Project, Coordinated Intermountain Restoration Project, Integrating Weed Control and Restoration for Great Basin Rangelands Project, and A Regional Experiment to Evaluate Effects of Fire and Fire Surrogate Treatments in the Sagebrush Biome.

Altered Fuels and Fire Regimes: Cheatgrass can alter fire regimes by increasing fine-fuel loads and greatly shortening fire-return intervals, hindering perennial grasses, sagebrush, or other shrubs from establishing or setting seed (Laycock 1991). Dominance of sites may result in stable, resistant vegetation states with thresholds (for recovery or restoration) that are difficult to cross (Laycock 1991). Recovery or restoration of these areas typically requires concerted management intervention.

3. Conservation Measures

Spatial Extent of Annual Grasslands and Degraded Habitat Quality: To address issues associated with the spatial extent of annual grasslands on the landscape and degraded habitat quality including rangeland health, the Big Desert LWG recommends implementation of the following conservation measures throughout the sage-grouse planning area:

1. LWGs, land management agencies, IDFG and other partners should work closely together to identify and prioritize annual grassland areas for restoration. Work cooperatively to identify options, schedules and funding opportunities for specific projects. Information identified through implementation of Conservation Measure #1 should be updated annually. In general, the priority for implementation of specific sage-grouse habitat restoration projects in annual grasslands should be given first to (1) sites adjacent to or surrounded by sage-grouse stronghold habitats, then (2) sites outside stronghold habitats but adjacent to or within approximately two miles of key habitat, and last (3) sites beyond two miles of key habitat. The intent here is to focus restoration outward from existing, intact habitat.
2. As funding and logistics permit, restore annual grasslands to a species composition characterized by perennial grasses, forbs and shrubs. Emphasize the use of native plant species recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions. Multiple treatments may be required. See Monsen et al. (2004), Dalzell (2004), and the Seeded Perennial Grasslands section of this Plan for helpful suggestions on restoration techniques. Lambert (2005) also provides descriptions, recommended seeding rates, and other useful information for nearly 250 species of native and nonnative grasses, forbs and shrubs.
3. The eradication or control of invasive weeds posing a risk to sage-grouse habitats should also be aggressively pursued using a variety of chemical, mechanical, biological (including

grazing), or other means as appropriate. All seeding project designs should include measures for invasive weed control and monitoring for at least 3 years following implementation.

4. Seed utilized in sage-grouse habitat restoration seedings, burned area rehabilitation projects, and hazardous fuels/wildland urban interface projects will be tested and certified as weed-free, based on prevailing agency policy and protocol. Private landowners are encouraged to utilize only certified seed as well.
5. To discourage the spread of invasive annuals and invasive weeds, require the use (for stock animals) of certified weed-free forage by permitted users (outfitters, guides, livestock operators) and by casual users (e.g., recreation trail riders, hunters) utilizing horses, goats, or llamas on public or state lands.
6. On private lands, consider enrolling in incentive or other programs to improve or enhance sage-grouse/sagebrush habitats. Current Natural Resources Conservation Service (NRCS) programs that may provide some opportunities for economic offset of certain conservation measures include the Conservation Security Program (CSP), the Wildlife Habitat Incentive Program (WHIP), and the Environmental Quality Incentive Program (EQIP). Funding may also be available for certain private lands projects through BLM's hazardous fuels program or through IDFG, Fish and Wildlife Service's Partners for Fish and Wildlife Program, and OSC. Landowners are encouraged to discuss the various opportunities available with their local NRCS, IDFG, USFWS, or BLM office. Support for Idaho projects may also be available through the North American Grouse Partnership's (NAGP) Grouse Habitat Restoration Fund. Other possible funding sources include the Cooperative Sagebrush Initiative and the Conservation Reserve Enhancement Programs as additional possible funding sources, as well as other possible funding sources that have yet to be identified.
7. In designing rehabilitation and restoration projects, utilize the best available science relative to seeding technology and plant materials. Use of NRCS's "VegSpec" website may be helpful. VegSpec is a web-based decision support system that assists land managers in the planning and design of vegetation establishment practices. VegSpec utilizes soil, plant, and climate data to select plant species that are site-specifically adapted, suitable for the selected practice, and appropriate for the purposes and objectives for which the planting is intended. (See http://plants.usda.gov).

Altered Fuels and Fire Regimes: To address issues associated with altered fuels and fire regimes, the Big Desert LWG recommends implementation of the following conservation measures throughout the sage-grouse planning area:

8. Design vegetation treatments in areas of high fire frequency to facilitate firefighter safety; reduce the risk of extreme fire behavior; reduce the risk and rate of fire spread to stronghold, key, and restoration habitats; reduce fire frequencies; and shorten the fire season. Actions may include: fire-resistant or "green-strip" seedings, mowing vegetation along roadsides, grazing strategies, or other related measures.
9. Where rangelands are dominated by annuals (such as cheatgrass), or border farmlands or railroad rights-of-way, convert cheatgrass areas to perennials, or establish buffers of perennial species to reduce the risk of fire spread from railroad or agriculture-related activities (e.g. sparks from trains, field burns, burn barrels), where appropriate and feasible. However, to retain their effectiveness greenstrips must be monitored as well as maintained, such as through grazing, so fuel loads do not build up over time (Younkin-Kury 2004).

10. To discourage the spread of invasive annuals and invasive weed seed, require the washing of fire vehicles (including undercarriage) prior to deployments and prior to demobilization from wildfire incidents.
11. Ensure annual grass restoration priority areas are incorporated into Fire Management Plans, updated annually, as priority fuels treatment and Emergency Stabilization and Restoration (ESR) project areas.

B. Sagebrush Management

1. Threat Summary

This section of the Big Desert Conservation Plan is based on Section 4.3.7 "Prescribed Fire" *(ISAC 2006)*. Treatment methods other than prescribed fire are discussed in that section of ISAC (2006), and the following discussion of prescribed fire and related conservation measures also encompasses other "sagebrush control" activities, such as mechanical and chemical treatments. The choice was made to combine these discussions because: (1) certain issues related to the effects of prescribed fire and other sagebrush control techniques may be similar, such as habitat reduction and risk of invasive plant species, and (2) management objectives may be similar. Combining the discussions; however, is not intended to imply that the risk of mechanical sagebrush control is the same as that of prescribed fire.

Prescribed fire can be used to control annual grasses, reduce sagebrush density for a variety of reasons (including reduction of fuel loads to prevent large wildfires), facilitate growth of grasses and forbs, and control juniper and pinyon expansion into sagebrush habitats (Connelly et al. 2004). Thus, it can be viewed as both a threat (due to loss of sagebrush) or an effective tool in reducing excessive sagebrush cover and/or density, and in increasing herbaceous productivity on rangelands.

It may be an appropriate and necessary site preparation technique in the restoration of poor quality habitat. For example, in cases where the removal of cheatgrass thatch is needed prior to chemical treatments and seeding; or in specific circumstances where the temporary removal of sagebrush cover (excluding winter range) is needed to facilitate drill-seeding during restoration operations. See the Annual Grasslands section of the Big Desert Conservation Plan for additional discussion of cheatgrass related threats and conservation measures.

Prescribed fire is a potential tool for maintaining forage reserves that provide alternative livestock foraging areas during restoration efforts elsewhere. It may also be used in maintaining certain grass seedings that were done previously, to help offset grazing impacts to native rangelands or riparian areas.

However, prescribed burning of sagebrush habitats also involves risk. Prescribed fires can escape under certain conditions, affecting areas beyond the planned treatment area. The recovery of burns in drier sites can be very slow, and the limited viability of sagebrush seed limits regeneration if post-burn weather conditions are unfavorable (Connelly et al. 2004).

After a nine-year study in the Big Desert, Connelly et al. (1994, 2000a) reported that prescribed burning of Wyoming big sagebrush during a drought period resulted in a large decline of a sage-grouse breeding population. However, the character and scale of the burn mosaic, fire severity, spring precipitation and other factors may influence the recovery of sagebrush canopy cover to levels suitable for nesting habitat. For additional discussion of the effects of fire on sagebrush and/or sage-grouse, see the Wildfire threat section.

Other techniques are also often used to manage vegetation, such as mowing, brushbeating, chaining, harrowing, and herbicide application.

Big sagebrush recovery: Attempts to re-establish big sagebrush on the Big Desert following recent wildfires have been slow and less successful than desired. The Big Desert area lies on the north eastern edge of the Great Basin biome. The Great Basin biome is more susceptible to cheatgrass invasion following wildlife and, consequently, much more difficult to recover big sagebrush than areas with higher precipitation.

Table 4-3 of ISAC *(*2006*)* indicates that 536,531 acres (63%) of sage-grouse habitat on the Big Desert area burned between 1990 and 2003. Additional acreage (both new acreage and re-burned acreage) has burned since 2003. None of the big sagebrush cover on these burned areas has recovered to levels to support successful sage-grouse nesting and wintering habitat.

Connelly et al. (2004) discuss aspects of wildfire rehabilitation and restoration in considerable detail. Given the magnitude and frequency of wildfires and the potential for loss of sagebrush and expansion on invasive plants in southern Idaho, restoration activities and burned area rehabilitation will continue to play a critical role in sage-grouse conservation (Monsen et al. 2004. See http://www.fs.fed.us/rm/pubs/rmrs_gtr136_3.html) provide a comprehensive and up-to-date source of information relative to restoration of western rangelands. See also Lambert 2005 for descriptions, recommended seeding rates, and other useful information for nearly 250 species of native and non-native grasses, forbs and shrubs).

BLM Public Land Statistics indicate that between1997-2004,over $31 million was expended on Idaho Emergency Fire Rehabilitation and Stabilization projects alone, inclusive of revegetation, fencing, weed control, monitoring and related efforts. While burned area rehabilitation is essentially a reactive approach, occurring after wildfires, the protection, strategic planning and restoration of areas prior to wildfire is also critical, and of even greater priority. Several important strategic processes have been recently initiated or completed to that end. These include:

- BLM's Great Basin Restoration Initiative (GBRI), introduced in 1999, provides a strategy for prioritizing, protecting and restoring western landscapes. Several GBRI projects underway, that will improve our understanding and capability for rangeland restoration include: Great Basin Native Plant Selection and Increase Project; Coordinated Intermountain Restoration Project; Integrating Weed Control and Restoration for Great Basin Rangeland; and A Regional Experiment to Evaluate Effects of Fire and Fire Surrogate Treatments in the Sagebrush Biome.
- Federal agencies (BLM, USFS) recently completed Fire Management Plan (FMP) revisions in accordance with National Fire Plan direction. Each plan contains suppression objectives to keep wildfires to a minimum size with consideration of sage-grouse habitat, including restoration areas. Specific suppression objectives have been established by the Fire Management Unit. FMPs also identify areas for fire hazard reduction, which will reduce the duration of the fire season and enable suppression forces to more easily contain and minimize the size of fires.
- In 2008, Idaho BLM signed a "Fire, Fuels, and Related Vegetation Management Direction Plan Amendment (FMDA)". This document amended the land use plans in Shoshone, Burley, Pocatello, and Idaho Falls, which overlap with the Big Desert planning area. These land use plans now recognize that the sagebrush steppe ecosystem and its associated wildlife species, including sage-grouse, are at risk from increased wildfire and other disturbances. Emphasis will be placed on maintaining existing high quality sagebrush steppe habitat and increasing the quantity of resilient sagebrush steppe acreage through post-fire rehabilitation and proactive restoration.

- A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment (10-Year Comprehensive Strategy) was created under the National Fire Plan (August 2000) as a response to severe wildland fires and their impacts. The 10-Year Comprehensive Strategy lists four goals with goal three to Restore Fire-Adapted Ecosystems by rehabilitation, restoration, monitoring, using best available science and information. This includes preventing invasive species and restoring healthy, diverse and resilient ecological systems to minimize uncharacteristic severe wildfires.

2. Key Conservation Issues

Sagebrush control activities can pose a risk to sage-grouse if projects are planned without the appropriate consideration for fine-, mid-, and broad-scale habitat conditions on the landscape and cumulative effects over time:

Reduction of already limited or fragmented habitat: While prescribed burns and other sagebrush management treatments have potentially beneficial outcomes, there is some risk that in certain situations, prescribed burn projects might adversely affect breeding or winter habitat. For example, Connelly et al. (2004) suggested that the recovery of sagebrush canopy cover to pre-burn levels may require 20-years or longer in some areas, and expressed concerns that short-term benefits such as increased forb production may not balance the loss of sagebrush canopy required during the nesting or winter seasons. Crawford et al. (2004) suggested that prescribed burning of sagebrush should not be used if sagebrush cover is a limiting factor for sage-grouse in the area. In all cases, vegetation management projects should be carefully planned in consideration of the surrounding landscape, and with an understanding of which seasonal sage-grouse habitats may be limited locally or in poor ecological health.

Expansion of exotic plant species: Sagebrush treatments can pose a risk to sage-grouse if applied in areas prone to proliferation of exotic annuals (e.g. cheatgrass). In such cases, provision must be made for the control of the invasive plant species and for the establishment of desirable perennial herbaceous species (Connelly et al. 2000b).

Since much of the Big Desert has burned in wildfire in recent years, and since Wyoming big sagebrush is the subspecies which is most common throughout the area, the use of prescribed fire over the next few years will probably be limited.

Idaho BLM signed in 2008 a “Fire, Fuels, and Related Vegetation Management Direction Plan Amendment” (FMDA), This document recognizes that recent increases (natural occurrences and intensities) in wildland fire and the large number of acres recently burned in sagebrush steppe in the planning area has affected the natural environment of the public lands. This impacts the conservation of sage-grouse and/or other wildlife species and indirectly affects public land users. As a result, new treatment acreage specifically for sagebrush control in the planning area is expected to be low, but there will probably be an increased emphasis on restoration of disturbed perennial grasslands and invasive annual grasslands through the use of all treatment methods (prescribed fire, mechanical, chemical, etc.). Note – does this section belong under this heading?

Risk of escaped prescribed fire: Escaped prescribed fires pose a risk to adjoining seasonal habitats in suitable condition (meeting seasonal habitat criteria), and therefore may compound concerns about habitat availability.

3. Conservation Measures

Reduction of Already Limited or Fragmented Habitat. Inadequate planning and implementation of prescribed burns, or other sagebrush treatment projects, may adversely

impact sage-grouse seasonal habitats and/or sage-grouse populations. To reduce the potential threats posed by inadequate planning and implementation of sage-brush control projects, the following conservation measures are appropriate:

1. Sage-grouse seasonal habitats should be mapped for the Big Desert SGPA by December 2009 and updated annually. This map should depict land ownership information as well.
2. Once seasonal habitats have been mapped, ensure that proposed project areas have been evaluated on the ground in the context of the appropriate seasonal habitat characteristics.
3. Avoid the use of prescribed fire, and other sagebrush reduction projects, in habitats that currently meet or are trending toward meeting breeding or winter habitat characteristics or in areas where sagebrush is limiting on the landscape.
4. If the analysis shows that a vegetation treatment may still be advisable, design habitat manipulation projects to achieve the desired objectives, considering the following:

   Where prescribed burning, or other treatments, in sage-grouse habitats may be warranted (e.g., sagebrush cover exceeds desired breeding or winter habitat characteristics; understory does not meet seasonal habitat characteristics and restoration is desired; there is a need to restore ecological processes; or a proposed treatment site is in an exotic seeding being managed for overall sage-grouse benefits on the surrounding landscape):

   - Project design should be done with interdisciplinary input, and in cooperation with IDFG.
   - Ensure that any proposed sagebrush treatment acreage is conservative in the context of surrounding seasonal habitats and landscape.
   - Where appropriate, ensure that treatments are configured in a manner that promotes use by sage-grouse (see Connelly et al. 2000b) for additional discussion).
   - Leave adequate untreated sagebrush areas for loafing/hiding cover near leks for sage-grouse.
5. Evaluate and monitor prescribed burns, and other treatments, as soon as possible after treatment and periodically thereafter to determine whether the project was successful and is meeting or trending toward desired objectives.
6. IDF&G should establish and maintain a database of information about sagebrush control projects to document conditions before and after each project. Willing landowners will be able to submit projects on private ground for inclusion in this database.

Expansion of Exotic Plant Species and Threetip Sagebrush. Inadequate planning, implementation and follow-up of prescribed burns or other sagebrush treatments may result in the expansion of cheatgrass or other invasive plant species. To reduce the potential threats posed by expansion of exotic plant species, the following conservation measures are appropriate:

7. Avoid the use of prescribed fire or other sagebrush treatments in habitats prone to the expansion or invasion of cheatgrass or other invasives unless adequate measures are taken to control the invasives and ensure subsequent dominance by desirable perennial species. In many if not most cases, this will likely require chemical treatments and reseeding.
8. Consider application of chemical control measures to keep Three-tip sagebrush from increasing.
9. Follow chemical control with planting of sagebrush seedings as soon as possible.

Risk of Escaped Prescribed Fire. Escaped prescribed fires can threaten surrounding habitats. To reduce the potential threat posed by escaped prescribed fire, the following conservation measures are appropriate:

10. Prescribed fires must be planned, executed and monitored in a manner that provides for adequate control and provision for contingency resources.
11. Ensure burn plans address the importance of preventing escaped fires when prescription fires are planned in the vicinity of stronghold and key habitat.

C. Wildfire

1. Threat Summary

Wildfire poses a substantial threat to sage-grouse habitat. This is especially true in eastern Idaho where summers are hot and dry – creating ideal burning conditions. Depending on weather, fuel conditions and other factors, wildfires potentially can quickly affect hundreds of thousands of acres of habitat in a single season. Up until 2007, the Big Desert SGPA had seen more acres affected by wildfire over the last twelve years than any other sage-grouse planning area in Idaho. Consequently, proactive fire management and reduction of wildfire risk must be a priority for this plan.

Three-tipped sagebrush dominance: Of particular concern for of the Big Desert SPGA is the dominance of three-tip sagebrush following wildfire. In many areas of the Big Desert three-tip sagebrush is a natural component of the sagebrush steppe. However, in some of these areas three-tip sagebrush becomes the dominant sagebrush species after wildfire, and in some instances following prescribed fire. Threetip sagebrush re-sprouts following wildfire, and appears to be better adapted to the shortened fire intervals associated with the invasion of cheatgrass than the big sagebrushes. Once threetip sagebrush becomes the dominant sagebrush species it becomes extremely difficult to manage because it frequently re-sprouts following fire and herbicide treatments.

Lowe (2006) found sage-grouse preferred nesting under big sagebrush relative to threetip sagebrush and sage-grouse nesting under big sagebrush had a 60-90% success rate versus a 31.3% nest success rate under three-tip sagebrush. Therefore, it is important to manage for big sagebrush in sage-grouse nesting habitat.

Methods for the effective management of three-tip sagebrush within a big sagebrush community following wildfire are lacking. Lowe (2006) suggested re-establishing big sagebrush as quickly as possible following wildfire may be one way to reduce threetip sagebrush dominance; however, he provided no data or literature citations to support this suggestion. This places an urgent need to re-establish big sagebrush as quickly as possible after wildfire within the Big Desert sage-grouse planning area for sage-grouse nesting habitat.

2. Key Conservation Issues

Altered Fuels and Fire Regimes: Historical fire-return intervals vary depending on the species and subspecies of sagebrush and site factors such as elevation and annual precipitation. Fire regimes (historical frequency and severity of fire) have changed across portions of the sagebrush biome. Of particular concern for this planning area is the fact that Wyoming big sagebrush (*Artemisia tridentata* var. *wyomingensis*) is the historical vegetative cover, and these ecological sites are where wildfires throughout Idaho have become much more frequent, due to the expansion of cheatgrass, a flammable and invasive annual grass.

Reduction or Modification of Habitat: Wildfire can pose a substantial threat to sage-grouse and sage-grouse habitat in Idaho in several ways. Frequent and/or large-scale wildfires can remove substantial portions of remaining nesting, brood, or winter habitat in the course of hours or days, rendering vast areas unsuitable or marginal for sage-grouse for many years. Fire can also fragment existing habitats further by removing or reducing sagebrush cover or by impairing the progress of expensive sagebrush-steppe restoration efforts.

Wildfires that have occurred since 1996 in the Big Desert have affected substantial acreages of sagebrush rangelands. Some of the major fires have been: Cox' Well (1996 – 236,000 acres), Mule Butte and Cedar Butte (1999 – over 250,000 acres), Coffee Point and Flat Top (2000 – 130,000 acres), and the 2006 Crystal wildfire (220,000 acres) which reburned much of the acreage which had burned since 1996. All of these fires have started from lightning.

Human-caused Ignitions: Although over half the wildfires in the Big Desert planning area between 1994 and 2003 were lightning caused (USDI-BLM 2003), human-related activities are still a concern in overall fire management. Trash burning, field burning, land clearing and related practices are examples; and the use of agricultural equipment has particularly played a role in fire starts in the Big Desert (12%). Accordingly, it may be appropriate to more aggressively target wildfire prevention, education, and enforcement efforts.

Restoration and Burned Area Rehabilitation: Given the magnitude and frequency of wildfires and the potential for loss of sagebrush and expansion of invasive plants in the Big Desert, restoration activities and burned area rehabilitation will continue to play a critical role in sage-grouse conservation. The recent three volume publication "Restoring Western Ranges and Wildlands" provides a comprehensive and up-to-date source of information in this regard. http://www.fs.fed.us/rm/pubs/rmrs_gtr136.html)

Federal agencies (BLM, USFS) recently completed Fire Management Plan (FMP) revisions in accordance with National Fire Plan direction. Each plan contains suppression objectives to keep wildfires to a minimum size with consideration of sage-grouse habitat, including restoration areas. FMPs also identify areas for fire hazard reduction projects, which will reduce the duration of the fire season and enable suppression forces to more easily contain and minimize the size of fires.

In 2008, Idaho BLM signed the FMDA, which amended land use plans that cover the Big Desert planning area. These land use plans now recognize that the sagebrush steppe ecosystem and its associated wildlife species, including sage-grouse, are at risk from increased wildfire and other disturbances. Emphasis will be placed on maintaining existing high quality sagebrush steppe habitat and increasing the quantity of resilient sagebrush steppe acreage through post-fire rehabilitation and proactive restoration.

3. Conservation Measures

Altered Fuels and Fire Regimes. In recognition that the Big Desert SGPA includes areas that are dominated by cheatgrass - which have higher frequency of wildfire and minimal habitat value - the Big Desert LWG agreed that the following conservation measures are appropriate:

1. Identify and prioritize annual grasslands most conducive for restoration to perennial species. Coordinate closely with USGS Snake River Field Station, GBRI, Universities, local partners, BLM emergency stabilization and rehabilitation planning processes, and IDFG, as appropriate.
2. Since it is impossible to restore large annual grasslands all at once due to cost and logistics, consider an incremental or "buffer" approach, (i.e., green stripping) to protect existing intact habitat. That is, where large annual grasslands border key or other important areas such as

recent restoration projects, create “buffers” by progressively converting broad bands of the adjacent annual grasslands to perennial species. As perennial grasses, forbs, and sagebrush become established, expand the buffers outward. This practice, over time, can reduce fire risk by conversion of high fire hazard annuals to lower hazard perennial fuels . Where funding and logistical factors permit, larger-scale conversions, rather than the buffer approach, may be more appropriate.

Reduction or Modification of Habitat. Wildfires can reduce or fragment already limited habitat, including recent restoration project areas, and can facilitate the proliferation of invasive plants. The Big Desert LWG agreed that the following conservation measures are appropriate:

3. In the event that multiple ignitions occur in a local suppression unit area, suppression priorities are to protect human life and property. In situations where human safety or property will not be compromised or threatened, employ fire suppression tactics that protect sagebrush ecosystems by minimizing the average size of unplanned fires, maintaining productive sage-grouse habitat, and maintaining sagebrush cover. In the event of multiple fire starts in sagebrush ecosystems, suppression priority will be as outlined by specific Fire Management Unit (FMU) based on the following general guidelines:

   Priority 1- Stronghold habitats (subset of key habitat on the Idaho Sage-grouse Habitat Planning Map).

   - Wyoming big sagebrush sites (in general, lower elevations).
   - Basin big sagebrush sites
   - Other habitats (e.g. early sagebrush, low sagebrush sites).

   Priority 2 - Key habitat.

   - Wyoming big sagebrush sites (in general, lower elevations).
   - Basin sagebrush sites
   - Other habitats

   Priority 3 - Restoration habitat.

   - Areas with established or recovering sagebrush.
   - Areas with minimal or no sagebrush cover
   - Areas dominated by Three-tip sagebrush

   Priority 4 - Juniper or annual grasslands where delaying initial attack does not threaten priorities 1-3 above.

4. BLM and Idaho Department of Lands line officers will ensure that a knowledgeable field level Resource Advisor is available for any “extended attack” fire (>300 acres in size) within or threatening sage-grouse habitats, including stronghold, key, and potential/existing restoration areas. Availability by phone or “on-call” is appropriate in some circumstances, such as during times of low fire danger. During times of high or extreme fire danger, red flag, or other similar conditions, resource advisors should be field-ready on short notice.

5. In all sage-grouse habitats (key, stronghold, potential restoration areas), suppress fires and hotspots in unburned areas including interior islands, patches, or strips of sagebrush if doing so will not compromise fire crew safety, poses little risk of escape, and to the extent that resources allow (limited water supplies, etc.). Do not square-up or burn-out islands or interior patches of sagebrush. Such areas may provide important remnant habitats post-fire,

are useful in assessing pre-burn vegetation conditions, and serve as a source of on-site sagebrush seed, facilitating the post-fire reestablishment of sagebrush.

6. Encourage Incident Commanders, Division Supervisors and/or other fire operations personnel to make use of private landowners, permittees, and other available local resources as can be done safely and appropriately. Private individuals and/or equipment contractors who have been certified through fire training and other processes can be ordered and assigned to the incident to be used on agency managed lands. As the incident unfolds, fire operations personnel can discuss with certified as well as non-certified private landowners what actions can be taken concerning their private lands to aid in overall suppression and control efforts. These actions might include: having landowners safely create fire lines at tactical locations on private land through the use of dozers, tractors, disks, harrows or other equipment. Suppression forces should be made aware of water sources which may be available.
7. When fires threaten or occur within sage-grouse stronghold habitats, deploy the appropriate pre-identified management response as soon as possible to minimize loss of habitat to fire and to reduce the scale of subsequent ESR efforts. Depending on the nature of the fire, appropriate tools may include heavy or medium engines, dozers, hand crews, single engine aerial tankers, large tankers, or others. In general, the intent of this conservation measure is to encourage fire management officers, dispatch shift supervisors, and incident commanders to be proactive, to the extent feasible, in deploying suppression resources in order to minimize habitat loss. Fire crew safety will be the first priority.
8. Burn-out/backfiring operations should be conducted in a manner that minimizes the loss of sagebrush, while still providing for public and fire crew safety.
9. Use post-fire After Action Reviews and/or evaluations on fires that are large enough and/or intense enough to have adversely affected sage-grouse habitat. The intent of the review is to facilitate making improvements or adjustments in priorities, tactics or resource availability in preparation for potential fires. During multiple or sequential large-scale fire events this measure may need to be deferred. The urgency of the review depends on when the fire occurred in the fire season, how typical or significant it was, and if there are clearly opportunities to learn important lessons. These reviews should include resources advisors.

To supported planning for strategic wildfire suppression planning:

10. Ensure Fire Management Plans (FMPs), updated annually, re-assess priorities and incorporate the conservation measures outlined in this plan, particularly identifying the appropriate management response in Fire Management Units (FMUs) where stronghold and key habitat exist. The FMPs should include grazing association and permittee fire suppression resources.
11. In FMP's, annually update the Idaho Sage-grouse Habitat Planning Map. Update Fire Management Plans and Fire Management Unit databases as needed to incorporate new sage-grouse habitat related information and wildfire suppression priorities in sage-grouse or restoration habitats.
12. In areas of limited water availability and/or remote locations, coordinate with LWGs and appropriate agency personnel to explore creative options for the establishment of fill hydrants along existing pipelines, new emergency water storage tanks or other similar facilities, or upgrading/modification of existing wells or pipelines. Locate such water access facilities near suitable access roads. Mark locations of such sites on maps for fire crews, resource advisors, and dispatchers. Wildlife water guzzlers can also be designed in concert

with such projects in sage-grouse habitats where water is limited. Whenever possible water troughs and tanks will remain filled during and after the grazing season.

13. Where feasible, consider staging initial attack resources in high fire incident areas to ensure quicker initial attack response times in remote areas.
14. At the wildland-urban interface bordering rangelands, employ pre-suppression tactics, public education and vegetation treatments to minimize or reduce the risk of the escape of human-caused fire into sage-grouse key or restoration habitat.
15. Strategically place pre-treated strips/areas (e.g., roto-mowing 100 to 300 foot wide strips along existing roads, green-stripping, herbicide application, intensively managed grazed strips, etc.) to provide fuel breaks as an aid to controlling wildfire and reducing the block size damaged by wildfire. The ability to implement these practices will depend upon the availability of annual funding, therefore, areas to be treated should be prioritized by the LWG according to proximity to key/critical sage-grouse habitats.
16. Strategically place pre-treated strips/areas (e.g., mowing, green-stripping, herbicide application, strictly managed grazed strips, etc.) to aid in controlling wildfire should wildfire occur near critical habitats.
17. Identify strategic roads for maintenance to allow for more rapid fire suppression response.
18. Availability of private resources (equipment, water supplies, etc.) can be discussed in yearly grazing permittee meetings and listed in agency records for the use of assigned resource advisors and other personnel as fires occur later in the year.

To support firefighter training:

19. Provide annual training for rangeland fire personnel (including appropriate rural fire department personnel and landowners/permittees), public affairs staff, resource advisors, and others, as appropriate, to include awareness of issues and potential impacts of suppression activities in sage-grouse habitats and other resource issues of management concern.

Human-caused Ignitions. In recognition that over half of wildfires in Idaho are human-caused, the Big Desert LWG agreed that the following conservation measures are appropriate. To support public outreach and education:

20. Increase public awareness of fire danger by installing and maintaining additional fire danger signs along main access roads.
21. Increase public outreach, information, and education related to sagebrush ecosystems, fire risk mitigation, fire ecology and related issues. Examples include. media interviews and articles, presentations to schools and civic organizations, brochures or similar efforts.
22. Via media opportunities increase public awareness and understanding of fire-related risk during times of high to extreme fire danger and red flag conditions.
23. Work closely with railroad companies to minimize wildfire ignitions, improve suppression response, where needed, and to manage fuels/invasives within railroad rights-of-way.

To support enforcement of restrictions or closures and related measures:

24. Increase local enforcement of existing fire restrictions or closures in accordance with the High Fire Danger Closure and Restriction Plan.
25. Promote practices that discourage or limit firelines (e.g., dozer lines or other trails created by equipment) from being converted to 2-track roads or OHV/ATV trails.

Restoration and Burned Area Rehabilitation. Following wildfire, burned areas should be assessed for the possibility of natural regeneration. Deliberate seeding of some areas is essential to ensure that needed habitat components are restored. The Big Desert LWG agreed that the following conservation measures are appropriate:

26. Assess pre-burn vegetation via mapping, fuels/vegetation surveys or allotment monitoring records to determine plant species composition and diversity. Consider/evaluate fire severity. Acquire satellite or aerial imagery of the burn, where available and feasible, to help estimate the extent of burned and unburned areas, including islands.
27. In the absence of information for areas directly affected by the burn, evaluate unburned islands and the areas adjacent to the burn to help predict plant species composition and diversity within the burned area.
28. Estimate from the findings of 1 and 2 and a site potential analysis if rehabilitation is necessary to achieve the habitat goals for the area. When necessary, rehabilitate the areas using the proper sagebrush species.
29. Use fire rehabilitation funds to address concerns about the expansion of three-tip sagebrush into big sagebrush communities. Consider chemical, mechanical, and biological methods to ensure re-establishment of big sagebrush.
30. Ensure that sage-grouse habitat considerations are incorporated into restoration and burned area rehabilitation plans, particularly in or near stronghold, key and isolated habitats.
31. Emphasize the use of native plant materials to the greatest extent possible, and as appropriate for site conditions. Seeds should be certified weed free.
32. Use proper site-preparation techniques (e.g., seedbed preparation, control of invasives, weed-control), seeding techniques, and seed mixes in designing restoration and burned area rehabilitation plans. For example, the restoration of annual grasslands may require preparatory chemical treatments and/or an exotic/native seed mix. Perennial grasslands (existing seedings or native) may require seeding or planting of sagebrush.
33. When planting or reseeding sagebrush, favor the sagebrush species, subspecies, that are appropriate for the ecological site. Source identified seed is preferable. To maximize the likelihood of establishment, consider multiple approaches, such as aerial seeding, ground broadcast seeding with harrow or roller, and planting of seedlings in strategic patches or strips. Avoid seeding sagebrush or other shrubs near road margins if the road and road margin might otherwise serve as a fuel break in the event of future fires.
34. When using exotic perennial grasses and forbs in restoration use species whose growth form, forage value, and phenology that would meet objectives.
35. Provide for invasive weed control in burned area rehabilitation projects.

D. Human Disturbances

1. Threat Summary

Human disturbance encompasses several distinct issues and is somewhat related to the infrastructure and urban/exurban threats addressed in other sections of this Big Desert plan.

Off-highway vehicle (OHV) use has increased dramatically in recent years, and there is considerable concern about the potential for disturbance to sage-grouse on leks or other important seasonal habitats, ground disturbance, spread of invasive plants, and increased fire risk.

Military training activities, while they may be necessary in the interest of national defense are, nonetheless, a potential source of disturbance.

Project construction and maintenance activities near leks are also matters of concern, and encompass a host of activities associated with other potential threats such as infrastructure, mines and gravel pits. Human activities associated with management of cattle or sheep on or near occupied leks may also cause disturbances under some circumstances.

Finally, wildlife viewing and photography, while an important aspect of public education and non-consumptive use, can result in disturbance to lekking birds. In general, when humans approach occupied leks, grouse often flush and may or may not return the same day (Call 1979).

2. *Key Conservation Issues*

Off-highway vehicle (OHV) disturbance: Off-road vehicles, including four wheel drive and all-terrain vehicles (ATV) and motorcycles can potentially disturb sage-grouse activity at leks and threaten other important seasonal habitats (nesting, brood-rearing, fall/winter). Examples of specific impacts include: increased human presence, noise, ground disturbance, spread of weed seeds, direct damage to sagebrush plants and other vegetation, and risk of human-caused wildfire.

Due to low elk numbers (compared to other areas of the state) within the Big Desert SGPA OHVs have not been used extensively to search cross-country for shed antlers in the spring. But recent wildfires have “opened up” the desert and an increasing number of people may be engaging in this activity, thus creating adverse impacts to sage-grouse or sage-grouse habitat. Motorcycle and mountain biking does not pose an extensive problem due to the remoteness of the bulk of the planning area.

Military training: Many military exercises are destructive by their nature. Direct impacts result from maneuvers by tracked and wheeled vehicles and from fires originating from ordnance impacts (Connelly et al. 2004). Vehicle disturbance facilitates the spread of exotic plants, increases potential for soil erosion and potentially reduces ecosystem productivity and stability (Belcher and Wilson 1989, Shaw and Diersing 1990, Watts 1998 cited in Connelly et al. 2004).

Although these actions are not taking place at present in the Big Desert planning area, they have occurred in the past and could reoccur in the future on lands of the Idaho National Laboratory.

Project and maintenance activity near leks: Construction and maintenance activities associated with rangeland improvements, vegetation manipulation projects, roads, gas/oil pipelines, utilities and communication structures (see also Infrastructure threat section), and other similar activities near occupied leks during the breeding season have the potential to disturb sage-grouse. The significance of the threat is a function of proximity, timing, and duration of the activity. The current level of disturbance and impacts of these factors on Idaho sage-grouse populations are unknown, but in many cases, can likely be reduced or minimized.

Suggested buffers vary.

Human activity associated with management of livestock: Human activities associated with livestock management (e.g., fence construction, sheep camps, etc.), near sage-grouse leks have the potential to disturb lek activity or hens nesting in the vicinity of leks (see also the Infrastructure and Livestock Impacts threat sections of this plan).

Wildlife viewing/photography at leks: The viewing and photography of sage grouse at leks is an interest pursued by a relatively small, but in all likelihood, growing number of enthusiasts.

Instances of photographers camping on leks have been noted, as has the presence of temporary blinds. Such activities disturb breeding sage-grouse. Viewing from automobiles does not appear to disrupt courtship activity, but grouse flush when people leave cars to get a closer look (Stinson et al. 2004).

3. Conservation Measures

OHV Disturbance. Recreational OHV activity can disturb sage-grouse, adversely impact vegetation and soils, and increase fire risk. To reduce the potential for threats posed by OHV use, the following conservation measures are appropriate:

1. Limit recreational OHV use to existing designated roads and trails to eliminate or minimize disturbance to sage-grouse and reduce the risk of wildfire and other habitat disturbances associated with cross-country travel. Consider a "closed unless posted open" approach where appropriate.
2. Discourage the creation of new roads and trails in sage-grouse breeding or winter habitat. Re-route existing trails and route new trails in a manner that minimizes disturbance.
3. Where existing roads or recreational OHV trails are near occupied leks, apply use-restrictions where needed and appropriate, to minimize nonessential recreational OHV activity between 6:00 PM to 9:00 AM. In general this guideline should be applied from approximately March 15 through May 1 in lower elevation habitats and March 25 through May 15 in higher elevation habitats, where OHV or vehicular disturbance is a problem.
4. Work collaboratively with recreational OHV user groups to increase awareness of the potential adverse impacts of OHVs on sage-grouse and other wildlife and to develop solutions to reduce conflict.

Military Training. Military training activities can disrupt sage-grouse, lead to fires and habitat fragmentation, increase invasives and human disturbance. To reduce the potential for threats posed by military training, the following conservation measure is appropriate:

5. Foster further communication and collaboration between the military, land management agencies and landowners via the Idaho Sage-grouse Advisory Committee and Big Desert LWGs. Utilize such partnerships to more effectively plan resource management and protection activities on a landscape basis.

Projects and Maintenance Activity Near Leks. Human disturbance can cause disruption of breeding or nesting sage-grouse. To reduce the potential for threats posed by projects, the following conservation measure is appropriate:

6. Human activities such as fence and pipeline maintenance or construction, facility maintenance, utility maintenance, or any project or related work at or near (1 km or 0.6 miles) occupied leks that results in or will likely result in disturbance to lekking birds should be avoided from approximately 6:00 PM to 9:00 AM. In general this guideline should be applied from approximately March 15 through May 1 in lower elevation habitats and March 25 through May 15 in higher elevation habitats.

Human Activity Associated with Management of Livestock. Human activities associated with livestock management near sage-grouse leks has the potential to disturb lek activity or hens nesting in the vicinity of leks. To reduce the potential for threats to sage-grouse caused by livestock operations, please see the Livestock Impacts section of this plan.

Wildlife Appreciation, Viewing, and Photography at Leks. Careless or imprudent activities associated with viewing of sage-grouse at leks can lead to disturbance of breeding sage-

grouse. To reduce the potential for threats posed by wildlife appreciation, viewing, and photography, the following conservation measures are appropriate:

7. Wildlife viewing and appreciation should be promoted; however, the viewing of sage-grouse on leks should be conducted so that disturbance to birds is minimized or eliminated. Use of blinds for photography at leks should be limited to the latter part of the lekking season, outside of peak breeding activity, as determined locally.
8. Where photography or viewing activities appear to be increasing in extent, or if they appear to be problematic in certain areas, consider designating 1-3 lek locations for public viewing. Other alternatives might include establishing one or more seasonal blinds for public use, utilize agency staff or trained volunteers to guide viewers to selected leks during designated times, and limit close-up viewing/photography of selected leks to the latter portion of the breeding season after most breeding has occurred.
9. Camping on occupied leks should not be allowed, to eliminate sustained disturbance.
10. Improve the dissemination of information to elementary and high school students, hunters, resource user-groups, and others to increase their understanding of sage-grouse and sagebrush steppe conservation issues.
11. Monitoring of leks should be done in a manner that minimizes disturbance to sage-grouse.

E. Infrastructure Development

1. Threat Summary

Infrastructure development, while essential for society, can nonetheless result in essentially irretrievable losses of sage-grouse habitat or fragmentation of habitat, foster the spread of invasives, facilitate predation, increase risk of mortality, increase human-disturbance or access, or influence behavior of sage-grouse. The significance of these threats is difficult to quantify and is likely to depend on site-specific influences. Four priority infrastructure features that currently affect or potentially affect sage-grouse and sage-grouse habitat in the Big Desert SGPA are addressed in greater detail below. Linear features include utility lines and roads. Nonlinear features of interest include wireless communications towers, and wind energy facilities. Additional factors not evaluated in this plan that may be of future concern to sage-grouse conservation in Idaho, depending on locality, include activities such as airport development or expansion; development of coal-fired power plants, geothermal or nuclear energy resources; or construction of similar facilities. As project proposals arise, the Big Desert LWG should actively engage in opportunities to provide comment and recommendations for avoiding or mitigating impacts to sage-grouse and other resource values.

2. Key Conservation Issues

Linear Infrastructure

The following discussion of linear infrastructure features includes a summary of conservation issues associated with utility lines, roads, active railroads, and oil and gas pipelines. Where linear infrastructure features have been quantified in the discussions that follow, the term “buffer” refers to the area potentially influenced by the presence of these features on the landscape, based on assumptions of noise, predator foraging distances, and the likelihood of invasive plant establishment. The buffers used vary by infrastructure type, and are based on a similar buffer analysis presented in Connelly et al. (2004). While buffering provides a means to quantify these features, it must be recognized that actual impacts by the various infrastructure features on sage-grouse will likely vary from area to area depending on many different factors.

Utility lines: Structures associated with utility corridors provide perches and nesting substrates for raptors and ravens (Knight and Kawashima 1993, Steenhof et al. 1993). Such structures may result in an increased concentration of raptors and ravens along utility corridors, which may pose a threat to sage-grouse by increasing their risk to avian predation and pose a collision hazard (Braun 1998). Sage-grouse may also avoid utility lines and other tall structures, though published data are limited. For example, Braun (1998) noted that use of habitat by sage-grouse increases as the distance from power lines increase up to 600 meters. Therefore, fragmenting the habitat and reducing their security in a linear strip > 1 km in width. Braun (1998) also suggests that impacts by power lines can be reduced by eliminating raptor perch sites. In Nevada, Lammers and Collopy (2007) reported that perch deterrents did not prevent perching by raptors. Rather, it reduced their perch duration relative to other perching substrates. Ultimately, raptors over came the perch deterrents and continued to take advantage of the height of the towers where no other perches of similar height existed. In addition, associated corridors, access roads, and associated rights-of-way, may also fragment habitat, facilitate the spread of invasive plant species (Gelbard and Belnap 2003) and aid in the movement of predators (Connelly et al. 2004).

Opportunities exist for reducing or mitigating these potential impacts. Best Management Practices are currently under development that will emphasize site-specific solutions (B. Dumas, Idaho Power Co., pers. comm. in ISAC 2006). In general, some impacts related to transmission lines can be reduced or minimized by managing roads, rehabilitating disturbed areas, controlling invasive weeds, and timing construction or maintenance activities to minimize disturbance.

Roads: To date, all improved and unimproved roads within the Big Desert SGPA have not been inventoried. However, the major paved roads within the SGPA include U.S. 26 which bisects the planning area and U.S. 20/26, U.S. 20, Interstate 15, and State Highway 39 which delineate the planning area. In addition, there are several hundred miles of county and unimproved roads within the planning area.

In general, traffic associated with major roads can lead to mortality of sage-grouse due to collisions. Habitat changes or noise associated with roads and traffic can modify animal behavior. Roads can also fragment landscapes, facilitate the spread of invasive weeds, and lead to increased use by humans. The incidence of human-caused fires is also closely related to the proximity of roads (Connelly et al. 2004). Similarly, Wisdom et al. (2000a) noted that roads within the Columbia Basin influence the ecology of the terrestrial and aquatic ecosystems through direct habitat loss, fragmentation and the associated impacts by humans as a result of increased access. While roads pose a potential threat, they also can facilitate access for fire suppression activities, provide access for habitat and population monitoring, and for implementation of restoration projects.

Spatial analysis of major roads (Figure 4-4 in ISAC 2006) in Idaho indicate there are approximately 977.6 miles of major paved roads (Interstate, U.S., state) intersecting Idaho SGPAs (USDI-BLM 2004a). Applying a 10 km (6.2 mile) buffer along each side of these roads to account for an influence from predation and noise disturbance (Connelly et al. 2004), the total buffer area influenced by major paved roads within SGPAs is 6,890,485 acres. While the degree of threat to sage-grouse in terms of road mileage or road density is presently uncertain, the documentation of existing conditions may be useful as a baseline for future analyses.

While major paved roads are of primary interest, other roads (e.g., paved or graveled county roads, BLM, USFS, private, other) can also pose a risk to sage-grouse or sage-grouse habitat through factors such as increased human access, Off-Highway Vehicle (OHV) use, spread of invasive species, and increased wildfire risk and collisions. Vehicle-related mortalities of juvenile sage-grouse presumably foraging for milky forbs (e.g., Tragopogon, Lactuca) or other

species along the Red Road, Jacoby Road, and the A2 Yale-Kilgore Road in the Upper Snake SGPA have been noted (M. Commons-Kemner, IDFG and R. Mickelsen USFS, pers. comm. in ISAC 2006). Some effort has been made by IDFG to reduce vehicular strikes along certain roads in the spring by mowing sagebrush nearby in an effort to encourage males to display off of the road itself (R. Mickelsen USFS pers. comm. in ISAC 2006).

Railroads: Railways are largely attributed with the initial spread of cheatgrass in the intermountain region (Young and Sparks 2002). Wildfires sparked by trains can lead to loss of sagebrush habitats and promote the further spread of cheatgrass. Active railroads intersect portions of seven of the 13 SGPAs in Idaho (Table 4-7 and Figure 4-5 in ISAC 2006). While this threat factor collectively impacts a relatively small proportion of SGPAs in terms of mileage and buffer acreage, impacts can be important locally. For example, from 1980-2003, railroads accounted for 14% and 10% of wildfire ignitions in the East and West Magic Valley SGPAs, respectively (USDI-BLM 2004b). Rapid fire suppression and provision for perennial species along railroad corridors are important factors in managing this threat.

Oil/gas pipelines: Pipelines intersect minor portions of seven SGPAs (Table 4-8 and Figure 4-6 in ISAC 2006). Surface disturbances and roads associated with pipelines pose a potential threat to sage-grouse or sage-grouse habitat, as they can facilitate predator movements, foster invasion by weedy plant species, and fragment habitat locally. The re-vegetation of lands disturbed by pipeline construction activities using the appropriate perennial species is crucial to minimize the likelihood of establishment by invasive plants. Periodic weed control is also warranted. Pipeline construction and maintenance activities in proximity to important seasonal habitats may disturb sage-grouse, particularly in the vicinity of leks. Managing the timing of such activities can help to reduce or eliminate disturbances.

Nonlinear Infrastructure

Two nonlinear infrastructure features evaluated in this Plan include wireless communications (i.e. cellular) towers and structures associated with wind energy development. While these features occupy points or relatively small areas on the landscape, their presence has the potential to disrupt behavior survival or sage-grouse habitat-use. Associated access roads, ground disturbance and increased human presence may also be of concern.

Wireless communication towers: As with power lines, wireless communications towers provide unnatural vertical structure on the shrub-steppe landscape and provide potential perch or nest sites for raptors and ravens. To date, the current number and distribution of wireless communication tower in and around the SGPA have not been inventoried; however, statewide their distribution is relatively extensive, with most occurring along Interstate or other highway corridors outside of SGPAs (USDI-BLM 2004c; Figure 4-8 in ISAC 2006). Wireless towers nonetheless occur within each SGPA:

Wind energy development: The National Energy Policy established in 2001 encouraged the development of renewable energy sources (NEPG 2001). Federal lands in the western United States have significant potential to produce energy from wind (Connelly et al. 2004).

To date, no wind energy-related structures occur within the Big Desert SGPA. However, wind turbines have been erected and are operable in the adjacent East Idaho Uplands SGPA. Therefore, it is likely that the Big Desert SGPA could be identified for potential wind energy development in the future.

The effects of wind energy development and associated ancillary facilities (i.e. access roads, utility corridors, transmission corridors) on sage-grouse populations are largely unknown, though a number of direct and indirect impacts have been identified. The Final BLM Programmatic Wind Energy Development EIS (USDI-BLM 2005) discusses a number of

construction activities that may adversely affect wildlife (sage-grouse). These include: (1) habitat reduction, alteration or fragmentation, (2) introduction of invasive vegetation (3) injury or mortality of wildlife, (4) decrease in water quality from erosion and runoff, (5) fugitive dust, (6) noise, (7) exposure to contaminants, and (8) interference with behavioral activities. Manville (2004) suggested, "Given the continuing uncertainties about structural impacts on prairie grouse, especially the lack of data regarding impacts from wind facilities, and the clearly declining trends in prairie grouse populations, we urge a precautionary approach by industry and recommend a 5-mile buffer [around active leks] where feasible."

Most research that has been conducted on bird collision mortality has occurred in Europe and the United States. Direct mortality due to collisions with turbines and towers is variable and ranges from zero collisions/turbine/year to as high as 30 collisions/turbine/year depending upon the experimental design, layout design of the wind farm, characteristics of turbines, weather conditions, landscape topography, and the number and type of birds species using the area, etc (Kuvlesky et al. 2007). Similarly, Smallwood (2007) concluded that existing mortality estimates at wind farms is highly imprecise and potentially biased low based on the methodology and experimental design. Nonetheless, Erickson et al. (2005) reported that bird collision fatalities, in migratory routes and corridors, with wind turbines and their associated structures is a valid concern

Structures can also provide potential perches and nesting substrates for raptors and ravens (Steenhof et al. 1993). Tall structures and noise associated with wind energy development may also disrupt communication between lekking birds (Manes et al. 2002). It is possible that low frequency noise and/or shadow flicker associated with turbine blades, as described in USDI-BLM (2005), could affect sage-grouse behaviorally, especially if in proximity to leks though further information is not available.

3. Conservation Measures

To reduce the potential for adverse effects on breeding sage-grouse associated with human disturbance (including construction and maintenance activities), the following conservation measure is appropriate:

1. Inspections, maintenance work, and related human activities at or near (1 km or 0.6 miles) occupied leks that results in, or will likely result in, disturbance to lekking birds should be avoided from approximately 6:00 PM to 9:00 AM. Utility companies should work closely with IDFG, land management agencies and landowners in scheduling such activities to minimize disturbance. In general, this guideline should be applied from approximately March 15 to May 1, in lower elevations; and March 25 to May 15, in higher elevations.

Improper placement of utility lines, wireless towers or related structures can disrupt sage-grouse behavior, increase mortality due to collisions, lead to increased avian predation, or spread of invasive vegetation. The Big Desert LWG agreed that the following conservation measures are appropriate:

2. Use of guy-wires on towers should be avoided.
3. Where existing utility lines, including smaller power distribution lines, telephone lines, or wireless communication towers are known to be causing adverse impacts locally, or where such impacts are likely, LWGs and/or land-management agencies should work closely with power companies and related entities in assessing problem areas and developing creative solutions.
4. New above ground major power transmission lines should be sited in a manner that avoids sage-grouse habitat to the extent possible, or they should be buried. If it is impossible to

avoid impacts to sage-grouse or habitat, then the permitting agency (in cooperation with the Big Desert LWG) should require appropriate mitigation measures.

5. New, smaller power distribution lines, or similar structures (e.g., telephone lines, communications towers) should be buried (as appropriate) or sited as far as possible, preferably at least 3.2 km (~2 miles) from occupied leks and other important sage-grouse seasonal habitats (Connelly et al. 2000b), as determined locally.

6. The placement of raptor perch deterrents on power poles and other structures, such as telephone poles, should be considered on a site-specific basis in areas where population impacts from raptors or ravens is likely or is a documented problem. Areas that may be of particular concern include fragmented habitats with high raptor and/or raven activity. See "Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006" (APLIC 2006).

7. Utility companies should ensure access roads, rights-of-ways and disturbed areas associated with their facilities are managed in a manner that restores disturbed areas to perennial vegetative cover, and controls the spread of invasive weeds and invasive plant species. Coordinate with land-management agencies and others in selecting the most appropriate plant species. Consider the use of fire-resistant species in high fire-frequency/ cheatgrass areas. Encourage companies to participate in Coordinated Weed Management Areas. LWGs may be of assistance in helping to identify particular problem areas.

8. Developers will mitigate impacts at off-site locations to offset unavoidable alteration and losses of sage-grouse habitat. Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.

9. Where wind energy development within sage-grouse habitat is unavoidable, developers will monitor sage-grouse populations and habitat (a) for at least 3 years before project construction; (b) during construction, and (c) for at least 3 years after construction is completed and implementation has begun, to complement the existing knowledge of impacts and to help in the design of future conservation measures. Industry proponents should work closely with IDFG, land-management agencies, private landowners and LWGs, in designing the appropriate monitoring strategy.

Roads. To reduce the potential for adverse direct and indirect effects on sage-grouse and habitat including: collisions with vehicles; human disturbance and vehicular noise; habitat loss and fragmentation; increased risk of fire, and invasives, the following conservation measures are appropriate:

10. Ensure that new public trails, roads, and highways avoid or skirt areas of key or stronghold habitat (including restoration areas intended to become key/stronghold in the future) to the extent feasible.

11. The Big Desert LWG will identify specific roads or road sections where sage-grouse mortality has been documented. Work collaboratively with the appropriate agency(ies) to develop measures to reduce the risk of road-related mortalities of sage-grouse. Consider speed limits, brush control, signing, and public education.

12. The land management agencies will reduce the risk of vehicle or human-caused wildfires, and spread of invasives, by planting perennial vegetation (e.g. green-strips) paralleling road rights-of-way. This measure is applicable to existing as well as new paved or gravel roads in sage-grouse habitat. The need for the green-strips should be evaluated on a case-by-

case basis depending on fire risk, vehicle activity, vegetation type, importance of the area, or other factors. Avoid the use of species palatable to sage-grouse.

13. Manage existing roads and trails to minimize disturbance to occupied leks or other important seasonal habitats. Employ seasonal closures, permanent closures, rerouting of existing roads/trails or other measures, as deemed locally appropriate. Administrative access may be granted on a case-by-case basis by the land management agency. (See Conservation Measure #5 under Livestock Impacts for further information.)

Railroads. Certain invasives (e.g., cheatgrass) increase the likelihood of wildfire ignitions from trains. To reduce the potential for establishment and spread of invasive plants in disturbed areas along railroads, the following conservation measures are appropriate:

14. The agencies will work with the railroad companies and private landowners, as appropriate, to reduce or control invasive plants along railroad rights-of way.

15. The agencies will work closely with the railroad companies and private landowners, as appropriate, to manage fuels along railroad rights-of-way to reduce fire risk. Where cheatgrass or other vegetation presents a high-fire risk, the agencies will replace with suitable perennial species.

Gas and Oil Pipelines. To reduce the potential for fragmentation of habitat and the spread of invasive plants associate with new gas and oil pipelines, the following conservation measures are appropriate:

16. Locate new oil or gas pipelines and related facilities as far as possible (preferably at least 3.2 kilometers/2 miles) from occupied leks or place along existing corridors to the extent possible. The Big Desert LWG and the land management agencies will work closely with gas/oil companies and related entities in identifying potential problem areas and creative solutions.

17. The agencies will work closely with oil/gas and private landowners, as appropriate, to reduce or control invasive plants along pipeline rights-of-way and access roads. This will include ensuring that disturbed areas are seeded to an appropriate perennial seed mix.

Wind Energy Development. To reduce the potential for direct and indirect adverse impacts to sage-grouse and sage-grouse habitat resulting from wind energy development, the following conservation measures are appropriate:

18. When siting new wind energy developments, the Big Desert LWG will work with developers to help them:

    - Avoid placing turbines and related infrastructure in breeding or winter habitat. If turbines must be sited within breeding habitat, avoid placing turbines within five miles of occupied leks where feasible.
    - Avoid locating turbines and related infrastructure in known sage-grouse movement corridors, migration pathways or in areas where sage-grouse are highly concentrated (e.g., wintering areas).
    - Avoid fragmenting large, contiguous tracts of sage-grouse habitat. Where practical, focus wind energy development on lands already altered or cultivated and away from areas of intact and healthy native habitats. If this is not practical, select fragmented or degraded habitats for development, rather than relatively intact areas.
    - Minimize roads, fences, or other infrastructure.

- Use tubular supports with pointed tops rather than lattice supports to minimize bird (raptor, raven) perching and nesting opportunities.
- Avoid placing external ladders and platforms on tubular towers to minimize perching and nesting by raptors and ravens.
- To reduce the risk of collisions, avoid the use of guy wires for turbine or meteorological tower supports. All existing guy wires should be marked with recommended bird deterrent devices.
- Where feasible, place electric power lines underground or on the surface as insulated, shielded wire to avoid electrocution (and collisions) of birds.

F. Livestock Impacts

1. Threat Summary

Throughout the West, there is little information directly linking livestock management practices to sage-grouse population levels (Braun 1987, Connelly and Braun 1997, Mosley 2001), but it is recognized that poor livestock grazing practices have negatively impacted some sage-grouse habitat and proper management can have neutral to positive effects on sage-grouse populations and habitat. Although an increase in annuals may be occurring in some areas, this is more closely related to frequent wildfire occurrence rather than livestock grazing.

Connelly et al. (2004) suggested the impacts of livestock are spread unevenly across the landscape in space and time and may positively or negatively affect the structure and composition of sage-grouse habitat. In general, livestock management practices that promote the sustainability of desired native perennial grasses and forbs should maintain or minimally impact sage-grouse habitat. Miller and Eddleman (2001) summarized the inherent complexities of developing grazing management plans that are compatible with sage-grouse:

> *Grazing management practices, which maintain the integrity of sagebrush communities, can have positive, neutral or negative impacts on sage-grouse habitat. Season, duration, distribution, intensity of use, and class of livestock (e.g. cattle, sheep, etc.) will determine the effects of grazing on sage-grouse food and cover. Plant composition and structure at the community and landscape levels will also affect potential interactions between livestock and sage-grouse. Spatial and temporal heterogeneity of the landscape will affect abundance and grazing distribution. Topography, size and shape of pastures, and distribution of salt and water will also influence grazing distribution. All of these factors must be considered when developing grazing management plans sensitive to sage-grouse habitat requirements.*

Due to the difficulty of restoring desirable vegetative conditions, the importance of maintaining currently good sage-grouse habitat is especially vital. For this reason, a primary management objective for the Big Desert Planning Area is to maintain the condition and geographical range of currently suitable sage-grouse habitat and sagebrush communities. As stated above in relation to wildfire, much of the sagebrush component of the Big Desert has been “lost”, at least for the time being (until sites are repopulated with individual sagebrush plants). Grazing in the Big Desert can be seen as a management tool to reduce plant biomass (fuel buildup) and, thus, help to prevent large wildfires in the future. Grazing can be considered as a natural, highly mobile, non-chemical and economical land management tool for sage-grouse habitat improvement, fire fuel reduction and invasive weed control.

The Big Desert provides essential spring, summer, and fall grazing to many sheep and cattle operations. The BDLWG recognizes the economical, ecological and cultural value of continued

livestock grazing on the Big Desert. Operations that are managed in a sustainable and responsible manner are compatible with achieving sage-grouse population and habitat goals." (Some members of the Big Desert LWG felt this might fit better elsewhere in the document.)

As a general approach, healthy, functioning rangelands provide most, if not all, of the habitat components comprising suitable sage-grouse habitat relative to site potential. Therefore, the primary focus for conservation and improvement of sage-grouse habitat is consistent with long-term grazing management programs that support ecological conditions or trends toward healthy rangelands. Livestock management practices are not stand-alone actions but are considered in combinations that best represent a complete and effective program that fully considers key sage-grouse conservation needs.

2. Key Conservation Issues

The many variables associated with livestock related impacts to sage-grouse populations and habitat are complex and often interrelated. Historically, livestock over-stocking on some rangelands in the West altered the composition and productivity of some sagebrush and vegetative communities. However, implementation of improved grazing management practices including control of the timing, intensity, duration and frequency of grazing use, as well as the sequence of these treatments over time, have improved vegetative conditions on many rangelands. Livestock numbers have declined in the Big Desert SGPA over the last few decades. The following summary presents some of the key livestock related conservation issues that affect sage-grouse populations and sage-grouse habitat in the Big Desert.

Livestock management and rangeland health: Rangeland health is defined as "the degree to which the integrity of the soil and ecological processes of rangeland ecosystems are maintained" (National Research Council, 1994). In general, healthy rangelands can also provide a basic foundation for productive sage-grouse habitat. Rangelands in an unhealthy or declining condition due to improper livestock management (and possibly a combination of additional factors) may have lost, or are at risk of losing, key habitat components such as desirable perennial bunchgrasses and forbs.

The Upper Snake Field Office of the BLM, which has management responsibility for public lands within the Big Desert, and the Idaho Department of Lands, which administers grazing on the State endowment lands within the planning area, evaluate rangeland health on each grazing allotment and make necessary livestock management adjustments so that rangeland health objectives are achieved. Private landowners are also being encouraged, as part of the Big Desert LWG effort, to be aware of and address rangeland health issues.

Livestock management and herbaceous plant canopy cover: Grass height and cover have been identified as two important components of sage-grouse nest sites (Connelly et al. 2000b). Specifically in the Big Desert, Wakkinen (1990) reported taller grasses occurred near nests compared to random locations. Such herbaceous cover may provide scent, visual, and physical barriers to potential predators (DeLong et al. 1995). The degree of impact that livestock grazing has on herbaceous cover, in the context of sage-grouse nesting habitat conditions, is dependant on timing, intensity of use, vegetation composition, and other factors.

Livestock management and leks: The practice of bedding and herding domestic sheep on or near occupied leks may disturb mating rituals, although at this time the amount of disturbance has not been quantified in Idaho. The presence of sheep bands on or near leks can also hinder population monitoring efforts during lek count surveys. However, it has been observed that sage-grouse may return to leks during the mating season following the interruption or disturbance by livestock.

Livestock management and late brood-rearing habitat: Connelly et al. (2004) provide an extensive literature review on this topic. In general, forb diversity and cover are shown to be extremely important for sage-grouse. In Idaho, Apa (1998) found sites used by sage-grouse broods had twice as much forb cover as did independent sites. Broods in Idaho typically move up in elevation, following the gradient of food availability (Klebenow 1969). However, sage-grouse in the Big Desert may only move towards the closest farm fields to seek out broadleaf plants and more moisture. Even so, managing livestock to maintain forb cover (considering site potential) remains an objective of overall rangeland health while also providing desirable brood-rearing habitat for sage-grouse.

Since late brood habitats are generally characterized by relatively moist conditions with succulent forbs (Connelly et al. 2000b), there is little opportunity for this situation within native range of the Big Desert. This might only be found on private irrigated lands which may or may not be grazed.

Livestock management during periods of drought: Drought reduces vegetation productivity and water availability causing both short and potentially long-term impacts to nesting, early, and late brood habitat. During drought, forage production may be reduced by more than 50% compared to the annual average (Holechek et al. 2004). Therefore, the impacts of livestock grazing on upland herbaceous cover may be greater than usual due to already reduced vegetative productivity. Improper management of livestock during drought may also hinder post-drought recovery of upland perennial plants since root reserves may be limited. Post-drought management is also important to facilitate recovery of drought-stressed plants. Livestock can be used as a tool to improve sage-grouse habitat and, therefore, it is important to consider the consequences to producers when making management decisions during drought.

Placement of salt and mineral supplements: Supplements and salt are regularly used to improve livestock distribution. The placement of salt and supplements may negatively or positively affect sage-grouse habitat by either altering habitat or by decreasing excessive brush cover. In most instances, if the site is repeatedly used in subsequent years, desirable grass and forb cover is reduced.

Placement of fences and other livestock related structures: Sage-grouse are adapted to landscapes with few vertical obstructions or features but, rangewide, currently inhabit areas with many miles of fence (Connelly et al. 2004). Fences are found throughout much of the Big Desert SGPA. Connelly et al. (2004) noted that they can influence predator movements or facilitate the spread of exotic plants.

Although it may be of most concern when grouse are disturbed by humans or chased by predators, fences can pose a hazard to sage-grouse through injury or death as a result of collisions with wires. Fences in proximity to occupied leks or other important habitats or that bisect movement corridors (e.g., low areas or passes used during migratory movements) may be of particular concern. Fences, corrals, wells, etc. can also provide perch sites for raptors.

While these features may pose some potential threat, they are often useful in the development and implementation of grazing management programs intended to achieve overall improvement of sage-grouse habitats. Since the impact of individual fences has not been quantified, grazing managers and private landowners should consider new fences or facilities on a site-specific basis relative to sage-grouse.

Design and placement of water developments: Water developments and the distribution of water sources substantially influence the movements and distribution of livestock in arid western habitats (Valentine 1947, Freilich et al. 2003). Consequently, water developments, depending on their placement and design, can increase or decrease the impact of livestock on sage-grouse

habitat. Water developments pose a potential threat if troughs or tanks are not equipped with wildlife access and escape ramps to prevent sage-grouse from drowning.

Although little to no opportunity exists in the Big Desert, spring developments can disrupt or diminish the free flow of water if not designed properly, adversely affecting wet meadows or other moist areas used by foraging grouse (Connelly et al. 2000b). Diminished water flows may also reduce available surface water for drinking, though the importance of this issue has been questioned since succulent vegetation may provide sufficient moisture.

Water developments in sage-grouse habitat should be carefully analyzed and designed to accommodate the needs of grouse, as well as to facilitate sound grazing management.

Livestock management during rehabilitation and restoration efforts: Since large areas of the Big Desert have experienced repeated wildfire in recent years, the planning area is one of the main areas in the state to receive previous rehabilitation treatments. In relation to actual restoration needs, however, the area does not have the large vegetative component of cheatgrass that a few other planning areas have. Still, areas exist where restoration would improve site productivity and benefit sage-grouse. It may also be desirable to diversify certain existing exotic perennial grass seedings (e.g., crested wheatgrass) by increasing the shrub, forb or native perennial grass component.

There are currently insufficient alternative forage reserves which have been identified in the Big Desert to support livestock needs during natural recovery of untreated areas, or during rehabilitation and restoration establishment/rest periods for treated sites. Therefore, palatable forage reserves, economic incentives, or similar measures to help livestock operations remain viable while areas are rested from grazing use will be necessary. These measures would facilitate resource objectives such as providing rest to improve herbaceous cover in certain nesting or brood-rearing areas.

Another result of establishment of forage reserves, even if on a rotating of areas basis, would be to reduce fuel loads where forage is being under-utilized. This would help to reduce the frequency of wildfire and cause sagebrush to reestablish sooner onsite.

Given the magnitude and frequency of wildfires and the potential for loss of sagebrush and expansion of invasive plants in the Big Desert, restoration activities and burned area rehabilitation will continue to play a critical role in sage-grouse conservation. The recent three volume publication "Restoring Western Ranges and Wildlands" (http://www.fs.fed.us/rm/pubs/rmrs_gtr136.html) provides a comprehensive and up-to-date source of information in this regard.

Without the development of forage reserves, economic incentives or other prospects, site restoration will proceed slowly, and livestock operations and sage-grouse will continue to remain at risk of wildfires and their associated after-effects.

3. Conservation Measures

Livestock management and rangeland health. Some livestock management practices impair rangeland health. To reduce the potential for impairment of rangeland health that could result from livestock management practices, the following conservation measures are appropriate:

1. Use established scientifically based agency protocols and procedures for evaluating rangeland health and sage-grouse habitats.
2. Continue and/or establish specific habitat objectives and implement effective grazing management practices and/or vegetative manipulation to achieve those objectives and maintain or improve vegetation conditions or trends.

3. The Big Desert LWG will help secure funding sources to provide private landowners with incentives when and where appropriate to achieve sage-grouse objectives.

Livestock management and herbaceous plant canopy cover. In some cases, livestock grazing may reduce the availability of suitable nesting or early brood rearing habitat. To reduce the potential for reductions in the availability of suitable nesting or early brood-rearing habitat, the following conservation measures are appropriate:

4. Taking into account site potential, if fine-scale habitat assessments or monitoring indicates that current livestock grazing practices are limiting sage-grouse nesting habitat quality and/or quantity and/or reproductive success by limiting herbaceous understory characteristics, design and implement grazing management systems that maintain or enhance herbaceous understory cover, height, and species diversity that occurs during the spring nesting season. Grazing systems must be consistent with ecological site characteristics and potential and must be developed in cooperation with livestock operators. The primary objective is to provide desirable perennial grass and perennial forb cover during the spring nesting season (approximately April 1-June 15 in much of Idaho, see Chapter 5 in ISAC 2006 for additional discussion).

   Design management programs to minimize grazing effects on the cover and height of primary forage species in occupied habitat during the nesting season. Work with permitees in reaching viable alternatives to improve breeding habitat where appropriate.

   The following is a list of management actions or strategies that may be considered and employed singly or in combination, where appropriate, in the development an implementation of grazing management programs.

   A. Employ grazing management systems (e.g., herding, rest rotation, deferred rotation, etc.) that ensure adequate nesting habitat within the breeding landscape.

   B. When use pattern mapping or monitoring shows opportunity to adjust grazing use distribution to benefit occupied sage-grouse breeding habitat, include as appropriate herding, salting and water source management (e.g., turning troughs/pipelines on/off, extending pipelines/moving troughs) in grazing management programs.

   C. When available and feasible, utilize exotic perennial grass seedings and/or annual grasslands to avoid breeding season use of occupied sage-grouse habitat.

   D. Use NRCS incentive programs as related to private lands and sage-grouse/sagebrush habitats. Current programs that may provide some opportunities for economic offset of certain conservation measures include the CSP, WHIP, and EQIP programs. Landowners are encouraged to discuss the various opportunities available with their local NRCS district conservationist.

   E. Work with ranchers to determine when and where it is feasible to identify and/or develop strategically located forage reserves (e.g., seedings, grass banks, etc.) to shift early season livestock-use. (Note: the establishment of such forage reserves may be particularly relevant in areas that have minimal or no potential for sage-grouse habitat restoration.)

   F. Work with ranchers, to determine if appropriate to consider excluding livestock from islands (10 acres or less) of important sage-grouse nesting areas through fencing/herding. LWG will seek funding for this measure.

G. In areas where spring growth is inadequate to meet sage-grouse nesting requirements, gain cooperation from permittees to maintain residual herbaceous vegetation at the end of the grazing season to contribute to nesting and brood-rearing habitat during the coming nesting season. When altering grazing seasons, duration and utilization, work with ranchers to find viable temporary alternatives if the modification causes financial hardship.

H. Identify alternative grazing areas for livestock operators.

I. Consider adjustments to livestock utilization if the area is lacking or deficient in herbaceous cover immediately prior to and during the nesting season.

Livestock management and leks. Bedding of sheep bands on or near leks can disturb breeding grouse and interfere with lek/population monitoring. To reduce the potential for negative impacts associated with bedding of sheep bands on or near leks, the following conservation measures are appropriate:

5. All land management agencies, in conjunction with IDF&G, inform livestock operators of lek locations and encourage operators to avoid leks during breeding season (mid-March through mid-to-late-May) when trailing, bedding, salting, or watering livestock. If marking sites is appropriate, careful consideration should be made in determining what kind of site marker will be used.

Livestock management and late brood-rearing habitat. Livestock grazing may reduce the availability of suitable late brood-rearing habitat. To reduce the potential for reductions in the availability of suitable late brood-rearing habitat resulting from livestock grazing, the following conservation measures are appropriate:

6. Manage allotments using grazing management techniques that promote and maintain a diversity of desirable annual and perennial forbs. Suggestions include:

   A. When feasible, alternate or rotate areas for spring turnout.

   B. Promote light, once-over use of vegetation, as opposed to repeated use during the same season by the same band or successive bands of sheep.

   C. Ensure that permittees, are informed of management and movement requirements, such as related to the avoidance of recent burns, burned area rehabilitation seedings or other restoration sites and that they manage their livestock with those requirements in mind.

   D. Encourage open (loose) herding of sheep as opposed to tightly bunched sheep.

Livestock management during periods of drought. Drought conditions can intensify the effects of livestock grazing on upland and riparian vegetation. To reduce the potential for negative impacts, the following conservation measures are appropriate:

7. In sage-grouse nesting and brood-rearing habitats, adjust livestock use (utilization, stocking, intensity, and/or duration) during drought to minimize the additional stress placed on herbaceous species. This is anticipated to reduce impacts on perennial herbaceous cover, plant species diversity, and plant vigor. When considering reducing utilization, stocking rates or duration, work closely with permittees to provide viable forage alternatives.

Placement of salt and mineral supplements. The placement of salt and mineral supplements can affect sage-grouse habitat quality. To reduce the potential for negative impacts associated with salt/mineral supplements, the following conservation measures are appropriate:

8. When using salt or mineral supplements: a) place them in existing disturbed sites, areas with reduced or excessive sagebrush cover, seedings, or cheatgrass sites (for example) to reduce impacts to sage-grouse breeding habitat, b) where feasible, use salts or mineral supplements to improve management of livestock for the benefit of sage-grouse habitat.

Placement of fences and other structures. The placement of fences or other structures near important seasonal habitats can increase the risk of collision mortalities or may facilitate predation by eagles, hawks and ravens. To reduce the potential for negative impacts associated with fencing, the following conservation measures are appropriate:

9. Biologists, in cooperation with LWGs and willing landowners, are encouraged to use existing knowledge, allotment/pasture maps and lek distribution maps, to determine which fences may pose the greatest risk for collision mortality.

10. If significant sage-grouse mortality is documented, implement appropriate actions in key sections to mitigate impacts. Such actions might include marking with permanent flagging or other suitable means.

11. Placement of new fences and structures should include consideration of their impact on sage-grouse. In general, avoid constructing new fences within 1 km (0.6 mi) of occupied leks (adopted from Connelly et al. 2000b). Where feasible, place new, taller structures such as corrals, loading facilities, water storage tanks, windmills etc., as far as possible from occupied leks to reduce opportunities for perching raptors. Careful consideration, based on local conditions, should also be given to the placement of new fences or structures near other important seasonal habitats (winter-use areas, movement corridors etc.) in order to reduce potential impacts.

Design and placement of water developments. Water developments can: result in mortality of sage-grouse due to drowning; affect the flow of springs/wet meadows; foster the spread of invasive plants; or encourage grazing or disturbance of previously unused or lightly used breeding or early brood habitat. To reduce the potential for negative impacts associated with water developments, the following conservation measures are appropriate:

12. New spring developments in sage-grouse habitat should be designed to maintain or enhance the free-flowing characteristics of springs and wet meadows by the use of float valves on troughs or other features where feasible. Retrofit existing water developments during normal maintenance activities.

13. Ensure that new and existing livestock troughs and open water storage tanks are fitted with ramps to facilitate the use of and escape from troughs by sage-grouse and other wildlife. Do not use floating boards or similar objects, as these are too unstable and are ineffective. See Wildlife Watering and Escape Ramps on Livestock Water Developments (Sherrets 1989) for suggestions for ramp designs.

14. When placing new water developments in sage-grouse breeding habitat, choose sites and designs that will provide the greatest enhancement for sage-grouse and sage-grouse habitat and help secure funding to do so.

15. Avoid placing water developments into higher quality native breeding/early brood habitats that have not had significant prior grazing use.

Management of livestock during rehabilitation and restoration efforts. The practicality of extensive rangeland rehabilitation and restoration efforts is influenced by adequate plant establishment time (rest) before grazing resumes. To reduce the potential for negative impacts of grazing during restoration/rehabilitation efforts, the following conservation measures are appropriate:

16. Identify and when feasible, establish strategically located forage reserves focusing on areas unsuitable for sage-grouse habitat restoration, or lower priority habitat restoration areas. These reserves (such as seedings) would serve to provide livestock operators with temporary alternative forage opportunities during the resting of recently seeded restoration or fire rehabilitation areas and could serve as additional fuel breaks depending on location and configuration. Work with ranchers to determine the site feasibility and palatability of seedings considered for forage reserves.
17. Given that many factors (i.e., climate, seed viability) can determine the duration of grazing rest of rehabilitation/restoration sites, land managers and permittees will evaluate each site prior to grazing turnout.
18. The Big Desert LWG and land management agencies will identify and utilize economic incentive programs to assist private landowners in implementation of appropriate sage-grouse habitat conservation actions on private lands.

G. Predation

1. Threat Summary

No predators are known to be dependent on sage-grouse as a primary food source (Connelly et al. 2004). Sage-grouse predators include the golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*B. swainsoni*), common raven (*Corvus corax*), weasel (*Mustela spp*.), coyote (*Canis latrans*), and red fox (*Vulpes vulpes*) (Rasmussen and Griner 1938, Scott 1942, Patterson 1952, Dunkle 1977, Bunnell et al.1999. Predation of sage-grouse by ferruginous hawks (*Buteo regalis*) has been noted in southern Idaho (D. Gossett, pers. comm. in ISAC 2006, pg. 4-101; 1/2006). Willis et al. (1993) suggested that year-to-year fluctuations of sage-grouse productivity in Oregon may be highly influenced by changes in the abundance of coyotes and ravens.

The relative abundance of coyotes in southern Idaho appears to have increased since the early 1950s, based on an index of aerial hunting effort (USDA-APHIS 2002). Fichter and Williams (1967) reported that red fox populations increased locally beginning in approximately 1960, and have been relatively abundant in southern Idaho for the past several decades (USDA-APHIS 2002). USFWS Breeding Bird Survey data suggest that raven populations have increased steadily since 1968 (USDA-APHIS 2002). New high-voltage power transmission lines resulted in an increased number of breeding raptors and ravens in southern Idaho and Oregon, on rangelands where natural nest substrates were previously lacking (Steenhof et al. 1993).

Predation of adults: A number of predator species prey on both adult and juvenile sage-grouse including the coyote, badger (*Taxidea taxus*), bobcat (*Lynx rufus*), several species of raptors (Patterson 1952, Schroeder et al. 1999, Schroeder and Baydack 2001), and red fox (Bunnell et al. 1999).

Some authors suggest that predation is an important influence on females during incubation and brood-rearing, and for males during the breeding season (Patterson 1952, Schroeder et al. 1999). In a Colorado study, Zablan (2003), reported annual survival rates of 59.2% for adult females, 77.7% for yearling females, 36.8% for adult males, and 64.5% for yearling males. Two studies in Idaho reported adult annual survival rates ranging from 42 to 75% (Connelly et al. 1994, Wik 2002). Annual survival of breeding-aged birds tends to be greater than 50% in most situations, and as high as 75% for breeding-aged females in Idaho. In general, survival rates for sage-grouse are higher than those of other gamebirds (Connelly et al. 1994).

Chick Survival: Estimates of sage-grouse chick survival are limited, and in many cases not based on a standardized time periods, thus making comparisons between studies difficult (Beck et al. 2006). Similarly, chick survival is variable depending upon habitat condition and fragmentation (Aldridge and Brigham 2001), age class of brood hens (Gregg 2006), methodology used to estimate survival (Beck et al. 2006), etc. In general, chick survival or early juvenile survival has been identified as the time period from date of hatch to brood break-up (usually early September) [Connelly et al. 2009] or from the date of hatch to ≥ 50 days after hatch (Schroeder 1997). Chick survival during this time period has been estimated at 33.4% in north-central Washington (Schroeder 1997) and 18% in Canada (Aldridge and Brigham 2001). More recent research has estimated chick survival at 21 days post hatch to range from 34-42% in North Dakota (Herman-Brunson 2007), and 32-50% in South Dakota (Kaczor 2008). In general, chick survival in Idaho is limited and most cases unpublished.

Predation of nests: Nest predators noted in the literature include coyotes, badgers, ground squirrels (*Spermophilus spp.*), common raven, and magpies (*Pica pica*) (Patterson 1952, Schroeder et al. 1999, Schroeder and Baydack 2001). More recent information, however, suggests that ground squirrels have been erroneously identified as sage-grouse nest predators in the past, and are no longer believed to prey on sage-grouse eggs (Coates et al. 2008). Corvids (ravens) have been reported by several authors to prey on sage-grouse nests, and/or chicks (Batterson and Morse 1948, Nelson 1955, Autenrieth 1981, Young 1994, Delong et al. 1995, Sveum 1995). Near the Idaho/Nevada border, videography has documented raven depredation of sage-grouse eggs (Pete Coates, pers. comm. in ISAC 2006, pg. 4-102; November 3, 2005).

Most sage-grouse literature suggests that nest success varies widely, between 14.5% and 86.1% (Connelly et al. 2004). Summarized sage-grouse data from seven states and provinces (n=1,225 nests) and 16 radio-telemetry studies found an average nest success of 47.7% for the entire range and 49% in Idaho. Bergerud (1988) reported lower nest success (averaging 35%), across 12 studies (n=699 nests).

There is limited published information documenting whether nest predation is a limiting factor affecting sage-grouse numbers. In Idaho, Autenrieth (1981) suggested that corvid predation on sage-grouse nests may limit grouse numbers. More recent sage grouse research in Idaho (Robertson 1991, Connelly et al. 1993) found that nest predation was not a limiting factor on grouse populations. Gregg et al. (1994) found that low nest success in an Oregon study resulting from predation was ultimately a direct result of poor nesting habitat, i.e., tall grasses and medium height shrub cover (40-80 cm [15.7 to 31.5 in]).

Although predator control has been tried within sage-grouse range, Messmer at al (1999) concluded that removing predators may not be cost effective. Schroeder and Byadack (2001:28) suggest that predator management for sage-grouse should be accomplished through "manipulation of habitat, because it is believed to be the most economical, efficient, and viable log-term strategy to enhance populations."

2. Key Conservation Issues

An array of predator species may potentially influence sage-grouse populations. Predator control, as a practice, is controversial from ethical, economic, and effectiveness perspectives. Some people believe that predators are a major factor limiting sage-grouse, and feel that more effort should be expended on predator control activities. Others contend that since predation is a natural process, predators should not be controlled at all. Still others believe that predator control may be appropriate in certain situations, or only as a last-resort. Schroeder and

Baydack (2001) suggested that as populations of prairie grouse become smaller and more threatened, direct control of predators may need to be considered more carefully. Predator-related issues that may require specific conservation responses are grouped under the single conservation issue that follows.

Excessive levels of predation can be detrimental to sage-grouse populations. While some level of predation is always to be expected, the question of how much predation is acceptable before control actions are initiated is difficult to assess. Related to this question is the difficulty of understanding the complex interactions of multiple threats and landscape conditions, and how these factors collectively influence predation.

There is no universally accepted definition of excessive predation. Indicators of excessive predation may include on a three year running average: nest success rates below 25%, production rates below 2.25 juveniles per adult hen, adult female annual survival rates below 45%, in combination with declining population indices and assuming habitat and weather conditions are normal. Site-specific conditions influence what constitutes excessive predation. Moreover, isolated and at risk populations may not fit within these criteria.

Factors such as poor habitat quality, habitat fragmentation, and isolation of populations, may result in excessive predation on one or more sage-grouse sex or age-classes (e.g., egg, juvenile, adult female/male). The nature and degree of infrastructure development in some areas may also exacerbate predation risk, by concentrating certain predators. Very small or isolated populations have the potential to disappear in short timeframes due to the generally low reproductive rates of sage-grouse, and because grouse utilizing small areas of habitat are more vulnerable to predators.

Man-made structures can facilitate avian predation of sage-grouse. While we have a generally good understanding of lek locations and man-made structures in many areas, typically we do not know which structures may be posing a problem.

More information is also needed to determine the presence and possible effects of non-indigenous predators or abnormally high levels of predators on sage-grouse populations, regardless of habitat quality.

Because of the many variables and uncertainties associated with excessive predation, there is a clear need for a systematic approach that LWGs can use to assess sage-grouse population status, habitat conditions and threats at the local level so that appropriate actions can be identified and pursued. LWGs should utilize the approach outlined below, though LWGs may consider additional criteria, depending on local issues and conditions.

Considerations for addressing sage-grouse predation issues in Idaho:

Site-specific conditions, such as habitat quality or isolation, or weather events (e.g., extended drought) may influence predation at any given location. Due to cost, logistical, ecological and societal concerns related to predator control, it is essential to first adequately describe the context within which predation is operating, and to determine if predator control is indeed warranted. It is also essential that all interested parties, including APHIS-Wildlife Services be involved at the outset.

The Big Desert LWG should consider the following questions when determining the nature and extent of potential predator problems in a specific geographic area. The process outlined below will also be helpful in identifying other threats. Suggested threshold population indices or "triggers" are provided where appropriate. It is important that the Big Desert Sage-grouse LWG discusses these questions and document conditions prior to proposing predator control actions.

Such a systematic approach will help guide local planning efforts and will help to ensure that excessive predation and other threats are dealt with appropriately.

1. What is the status of the sage-grouse "population" in question (on a three-year running average)?
   - Is the population considered isolated or is it a stronghold? Refer to the latest version of the Idaho Sage-grouse Habitat Planning Map.
   - Is the population migratory or non-migratory?
   - Is the status of each lek known? Are lek counts conducted annually? Is production assessed annually?
   - Are population trend indices (e.g., lek counts) declining, stable, or increasing?
   - If population trend is down, what are the reasons? Has there been a recent drought or large wildfire or other factor influencing trend?
   - Is annual productivity, as determined by the fall ratio of juveniles/ hen below 2.25? (Note: 2.25 juveniles/hen is the suggested indicator for stable or increasing populations, Connelly and Braun 1997 and Edelmann et al. 1998).
   - Is nest success (proportion of nests that hatch at least one egg per season) less than 25%? Connelly et al. (2004) reported a range of 14.5% to 86.1%.
   - Is average adult female survival rate less than approximately 45%? Connelly et al. (2004) report a range of 48-75%.
   - Is annual hunter harvest within recommended WAFWA Guidelines? See Sport Hunting of this plan section for additional details.
2. What is the status of sage-grouse habitat in the area?
   - Are the important seasonal habitats known (breeding, late brood, winter)?
   - Are seasonal habitats generally contiguous or fragmented?
   - Do the respective seasonal habitats generally meet WAFWA Guidelines, or is there a considerable departure from the Guidelines for one or more of them?
   - If there is a departure from Guidelines, what can or should be done to restore desired habitat conditions (long-term habitat restoration combined with short-term predator control)?
   - What is the land status? Predominantly private, public, mixed?
3. What is the nature and extent of other threats in the area?
   - Is infrastructure (e.g., power pole cross-arms, or other man-made structures) providing opportunities for ravens or raptors to perch or nest in proximity to important habitats?
   - Is conifer encroachment inhibiting lek quality or activity?
   - Is human disturbance of leks or breeding habitat a significant factor?
4. What is the status of predation and predators in the area?
   - What potential predator species are present?
   - Do the predator species of concern have legal protection through state or federal law (e.g., game or protected non-game, Endangered Species Act, Migratory Bird Treaty Act,

Bald and Golden Eagle Protection Act, etc.) Who has management authority for the predator species?

- Is the suite of predators or population levels present inconsistent with what is expected in healthy sagebrush steppe habitats? Are there non-indigenous predators present?
- Has excessive predation of nests, juveniles or adults been documented?
- What is the predicted population response of other predator species to removal of the target species?

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

3. Conservation Measures

The following conservation measures were deemed appropriate in the event that excessive predation is documented for the Big Desert planning area:

1. Evaluate local conditions using the systematic approach presented in Section 4.3.12.2.1 (in ISAC 2006)..

   Depending on the outcome of the local evaluation consider implementing one, or a combination, of the conservation measures identified below:

   A. If excessive predation is the result of poor habitat conditions:
      - Take actions to correct the habitat deficiencies for the long-term.
      - Consider predator control for at risk or isolated populations as a short-term measure.

   B. If excessive predation is the result of artificial structures or developments (e.g., fences, roads, power lines, landfills, etc.) or if the presence of such structures in proximity to important habitats is suspected to be a problem:
      - LWGs and agency personnel should work closely with utilities, agencies, landowners, and others to document problem areas and develop suitable solutions on a case-by-case basis.
      - New man-made structures or developments should be designed and sited to minimize effects on sage-grouse populations.
      - Consider predator control for at risk or isolated populations as a short-term measure.

C. If excessive predation is the result of non-indigenous predator species or artificially high predator populations:

- Where possible, eliminate factors contributing to artificially high predator populations (e.g., unnatural food sources including landfills, dead animal pits, artificial nest substrates, etc.)
- Cooperate with Wildlife Services and IDFG in designing and implementing appropriate control measures. Ideally, such efforts should include monitoring that provides comparisons of habitat conditions and predator-species compositions between treatment and control (non-treatment) area(s).

H. Sport Hunting

1. Threat Summary

Controversy over the impacts of sage-grouse hunting dates to the early part of the 20th century (Hornaday 1916). Sage-grouse hunting has been a tradition in Idaho for many generations and many families spent opening weekend camped in sage-grouse country. During the early 1980s over 30,000 hunters pursued sage-grouse every year.

Early research suggested that hunting had little impact on sage-grouse populations (June 1963, Crawford 1982, Braun and Beck 1985). Wallestad (1975) reported that despite fluctuating population trends, Montana maintained liberal sage-grouse seasons because of high annual turnover, “law of diminishing returns,” and “opening day phenomena.” Harvest was generally thought to be a compensatory form of mortality (the proportion of the population that was harvested would die from some other factor if hunting did not occur). However, recent research has suggested that sage-grouse may be more susceptible to over-harvest than other upland game bird species because they have population characteristics that include relatively low reproductive rates, long lives, low annual turn-over, and high over-winter survival (Schroeder et al. 1999).

Autenrieth (1981) and Crawford and Lutz (1985) suggested that hunting may have negative effects on sage-grouse populations. Johnson and Braun (1999) concluded that up to some threshold level, hunting mortality was compensatory, but at or beyond that level, exploitation of sage-grouse may be additive (the number shot adds to those that die from other causes). Recent research in California, Nevada, and Wyoming also provided evidence indicating that hunting at some level may impact subsequent breeding populations (Connelly et al. 2004). Connelly et al. (2000c, 2003a) concluded that hunting can slow the rate of increase for sage-grouse populations and that harvest losses are likely additive to winter mortality and may result in lower breeding populations. However, a reported direct recovery rate of 7-10% of banded birds in North Park, Colorado, occurred from 1973 to 1990, a period when the number of displaying males counted increased from about 580 to over 1,500 (Zablan et al. 2003).

A more complete review of the impacts of hunting on sage-grouse is provided in Connelly et al. (2004). See also Connelly et al. (2005) for a comprehensive overview of historical and current thinking with respect to harvest management. Existing data support the conclusion that the current Idaho sage-grouse season structure is well within suggested hunting guidelines (Connelly et al. 2000b, Wambolt et al. 2002).

In 1953 when the first sage-grouse harvest estimates were developed for Idaho, season regulations were very conservative, as they were for most upland game species in Idaho. This approach reflected uncertainty over the impacts of bag limits and season lengths on hunter harvest and participation. From 1953 through 1989, seasons varied from 1-14 days, and the

estimated annual statewide harvest averaged 40,000 to 50,000 sage-grouse. From 1990 to 1995, the season was 30 days long statewide with an estimated annual harvest of about 25,000 sage-grouse. From 1996 to 2001, season frameworks varied across the state and estimated annual harvest declined to under 10,000 birds. From 2002-2004, seasons remained conservative relative to historic levels and estimated annual harvest averaged about 7,800 birds.

Methods used to estimate harvest varied from 1953 to 1999, and included a voluntary mail survey until 1983, and a telephone survey from 1983 to 1999. The sample size of hunters surveyed and accuracy of these two methods varied as survey budgets expanded and contracted. Since 2000, a special permit has been required to hunt sage-grouse and sharp-tailed grouse. This permit system has allowed for more efficient identification and sampling of Idaho sage-grouse hunters and provides more precise harvest estimates. The IDFG now interviews about 30% of the total number of permit-holders annually to develop harvest estimates. For example, IDFG interviewed 2,010 (27%) of the estimated 7,382 sage-grouse hunters in 2004.

Based on the annual permit-holder survey, since 2000 the estimated annual harvest of in the Southeast Region (majority occurs in Big Desert) of sage-grouse has averaged about 460 birds taken by about 467 hunters. This is significantly less than the hunter and harvest estimates made before 1996. This is in part due to the closing of the Curlew area, which was a large portion of the sage-grouse harvest prior to 1996. The apparent decline in hunter participation probably reflects more restrictive seasons and perceptions of lower sage-grouse populations. These two factors may have reduced interest in sage-grouse hunting although sage-grouse numbers have generally increased in the Big Desert since 1996. The opportunity to hunt sage-grouse provides population and distribution data (e.g., wing barrels and hunter interviews). In addition, interest in hunting contributes to support for sage-grouse conservation and maintains an Idaho tradition.

In 2007, a sage-grouse hunter check stations were conducted on opening weekend at the American Falls location. Wings collected at the check stations and wing barrels placed at 4 sites across the Big Desert provide information on the age and sex composition of harvested birds. Using these methods, a 3 year average of 59 hunters were interviewed at check stations for 2004-2006 to document hunter activities and a 10-year average (1997-2006) of 80 wings were collected and aged to document production.

Falconry. The Idaho Sage-grouse Science Panel identified falconry as a separate threat and ranked it last among the 19 threats evaluated, in terms of relative risk to sage-grouse. For the purposes of this Plan the discussion of falconry has been combined with hunting.

Falconers consider sage-grouse to be one of the most difficult prey species to catch and consider them a trophy. In 2003, Idaho had 73 licensed falconers of which approximately 15 hunted sage-grouse. Only seven or fewer falconers are believed to hunt sage-grouse more than seven days per year. During the 1980s, IDFG conducted an annual harvest survey of falconers. Because of the small take of quarry by falconry methods, this survey was deemed unnecessary and subsequently discontinued. Based on the small number of falconers that pursue sage-grouse in Idaho, the annual take is believed to be fewer than 100 grouse statewide.

Another potential issue associated with falconry is the possible disturbance of lekking grouse in March. In 1995 at the suggestion of the Idaho Falconers Association, the falconry season for upland game birds, including sage-grouse, was shortened by two weeks to March 15 to minimize any disturbance to sage-grouse near leks. Most sage-grouse breeding occurs after that date. Hunting winter flocks of grouse has not been considered a problem since sage-

grouse survival during winter is typically high, and low numbers of falconers pursue the species. If sage-grouse numbers demonstrate a significant decline, the falconry pursuit of the species will need to be readdressed. Removing falconry hunting during the winter season would be the first obvious action. Under current regulations, if areas are closed to firearms hunting, the falconry season is also closed.

2. Key Conservation Issues

Need for better hunter effort and success information: While current Idaho sage-grouse seasons and bag-limits are generally conservative, there is some uncertainty about the timing and impacts of hunter harvest especially on smaller or isolated populations.

Need for juvenile production data: While wing barrels and hunter check stations are currently operated in many strategic locations, not all hunters encounter check stations or barrels and check stations are generally run only during opening weekend. A higher proportion of wings need to be collected and existing wing data are in need of more careful analysis.

Need for season and harvest criteria: As mentioned previously, current seasons and bag-limits for sage-grouse are conservative, but establishing uniform criteria or "triggers" for change will help ensure consistency in approach across the state.

3. Conservation Measures

To ensure seasons and bag-limits are set using the best-available information and are consistent with ensuring sustainability of sage-grouse populations in Idaho, the Big Desert LWG agreed that the following conservation measures are appropriate:

1. Require a special permit to hunt sage-grouse in Idaho to allow for efficient identification and sampling of sage-grouse hunters.
2. Conduct an annual telephone survey in order to contact adequate numbers of sage-grouse hunters to allow for reliable statewide and local harvest estimates.
3. Collect, analyze, and report hunter data specific to the Big Desert Sage-grouse Planning Area.
4. Evaluate accuracy of current harvest estimate data and implement needed changes.
5. Consider the feasibility and potential value of implementing a permit system with mandatory reporting by all hunters.

Juvenile production data are crucial to sage-grouse management and wing collection from hunters is currently the only feasible way to collect these data. The following conservation measures would address the need for that data:

6. Conduct opening weekend hunter check stations at strategic locations statewide to collect harvest information and wings from harvested birds.
7. Place wing barrels at strategic locations to increase the sample of wings from harvested birds.
8. Provide wing envelopes to all Idaho sage-grouse hunters at the time they purchase their sage-grouse validation to increase the number of wings collected from harvested birds.
9. Annually analyze all sage-grouse wings collected to determine age, sex, and molt pattern of harvested birds.

10. Analyze existing wing data to determine the differences in sex and age of the harvest during the opening weekend, compared to later in the season, and summarize other long-term trends.

The following conservation measures would help ensure that hunting seasons and bag-limits are established using a consistent process:

11. Identify sage-grouse populations where overharvest is a risk because of (1) isolated or fragmented habitat, or (2) small numbers of birds. Develop appropriate hunting season recommendations for each hunting season to reduce risk.
12. The following guidelines should be considered by the IDFG when making sage-grouse season recommendations to the Idaho Fish and Game Commission (summarized in the table below):
    a. Do not hunt populations where less than 300 birds comprise the breeding population (100 or less males counted on leks). All populations geographically isolated by more than 15 miles will be considered separate populations unless specific data demonstrate otherwise.
    b. Restrict the hunting season if data indicate harvest of over 10% of the fall population for more than one year.
    c. The Big Desert LWG will use the criteria identified in the following table (duplicated from ISAC 2006) to develop recommendations to IDFG for hunting seasons within the Big Desert SGPA.

    Hunting season and bag-limit guidelines for sage-grouse populations

Option	3-year running average of lek counts	Days	Daily Bag
Closed	Less than 100 males observed Lek counts are less than 50% of 1996-2000 average counts Lek data not gathered for population	0	0
Restrictive	Lek counts are between 50% and 150% of the 1996-2000 average.	7	1
Standard	Lek counts exceed 150% of the 1996-2000 average.	23	2

If population and/or habitat monitoring demonstrate that significant challenges are emerging (due to West Nile Virus or catastrophic wildfire, for example) in the Big Desert SGPA, consider emergency closure for the following hunting season.

I. West Nile Virus

1. Threat Summary

Between 1999 and 2005, 284 species of birds were reported to the Centers for Disease Control and Prevention (CDC) West Nile Virus (WNV) avian mortality database including greater sage-grouse (CDC 2005). The disease appears to be spread primarily by mosquitoes (see detailed

discussion in Connelly et al. 2004). The virus was first documented on the east coast of the United States in 1999 and has rapidly spread westward (Naugle et al. 2004a).

Water that persists into late summer in dry landscapes may attract sage-grouse and expose them to insects that carry WNV, however the role that natural and human constructed water sources play in the spread of WNV is unclear (Walker et al. 2004, Naugle at al. 2004b). Monitoring of radioed sage-grouse was initiated in Wyoming and Montana in 2004 to quantify the relationship between various surface water sources and WNV vectors (Walker et al. 2004).

Infected birds in the field often show a lack of mobility, tilted or drooping head or drooping wings when roosting, or weak flight when flushed (Walker et al. 2004).

WNV represents a significant new stressor on sage-grouse and probably other at-risk species (Naugle et al. 2004a).

In greater sage-grouse, WNV was first detected in northeast Wyoming, eastern Montana, and southeast Alberta in summer 2003 (Naugle et al. 2004a). In 2003, WNV reduced late-summer survival an average of 25% in four radio-marked populations in Wyoming, Montana and Alberta, Canada (Naugle et al. 2004a). Late summer survival of radio-marked female sage-grouse in the Powder River Basin of Wyoming and Montana was 76% in two sites without WNV but was only 20% at a site with confirmed WNV mortalities (Walker et al. 2004). Most sage-grouse do not appear to be able to survive WNV infection or develop immunity (Naugle et al. 2004b). However, the Wyoming State Veterinary Laboratory recently confirmed that 10% (5 of 50) of blood samples from female greater sage-grouse collected in the Powder River Basin tested positive for antibodies to WNV (D. Naugle, pers. comm. in ISAC 2006, pg. 4-13; August 31, 2005, Casper Star-Tribune 8/25/2005).

In August 2004, the first infected bird, a magpie from Gooding County, tested positive (Idaho Department of Health and Welfare 2004). As of November 2006, IDFG biologists have reported that 11 dead sage-grouse have tested positive for WNV. Additionally, 30 dead sage-grouse were found in total in Owyhee County and the Duck Valley Reservation (USGS Wildlife Health Bulletin, 2006) and were thought to have died from WNV.

Continued surveillance for WNV is in progress. Instructions for the handling and transport of bird carcasses for subsequent WNV testing have been provided to IDFG regions and other agencies. There have been no confirmed WNV cases in sage-grouse in the Big Desert area, that is not to say that WNV is not an issue, just that it has not been detected in sage-grouse in the Big Desert thus far.

2. Key Conservation Issues

At present, given that there is little that can be done once sage-grouse have contracted

WNV, the key conservation issues involve detection and research.

- Need for continued surveillance for WNV: Early detection of WNV in sage-grouse can help managers better assess risk and determine further actions (e.g., alert the public, restrict seasons, increase monitoring).
- Need for better information concerning land management activities that reduce risk of transmission: The effects of land management activities on WNV and its vectors is largely unknown

3. *Conservation Measures*

The Big Desert LWG recommends implementation of the following conservation measure to support statewide research and monitoring efforts:

1. Continue cooperating with regional and state-level WNV monitoring and/or surveillance efforts.
2. If WNV is detected among sage-grouse populations in the Big Desert SGPA, the Big Desert LWG will work with the counties, land owners, and land managers to eliminate the mosquito source.

J. Climate Change

1. *Threat Summary*

The Society for Range Management recently published an issue paper titled Rangelands and Global Change (Brown et al. 2005; see http://www.rangelands.org/publications_brochures.shtml). The authors define "global change" as "any change in the global environment that may alter the capacity of the Earth to sustain life." While global change has been occurring since the beginning of time, there is concern with changes attributable to growth in human populations and their use of natural resources (Brown et al. 2005). For example, atmospheric carbon dioxide concentrations may have increased by about 30% due to human activities the past 200 years (Polley 1997). As a result of this, potential changes in land use and productivity, atmospheric chemistry, water resources, ecological systems and climate are of concern.

The impacts of climate change in the context of this plan involve changes in the atmospheric chemistry, long-term temperature and precipitation, and water resources. It must be recognized, however, that while the evidence for human-induced climate change at the global level is increasing, it remains difficult to credibly predict specifically how climate change will impact any particular area (Brown et al. 2005). Climatic variability such as the frequency and severity of extreme events (e.g., droughts, severe rain events, floods, etc.) may increase resulting in both positive and negative effects on the environment. Suring et al. (2005) estimated that over 4.2 million acres (1.7 million ha) of sagebrush cover types in the eastern Great Basin are at high risk of displacement by pinyon-juniper within the next 30 years. Modeling of projected vegetation distribution under seven climate change scenarios suggests decreases in shrubland area in the west during the next century, including a shift from shrubs toward savanna in the Great Basin (Bachelet et al. 2001). Some researchers suggest that sagebrush communities are projected to greatly decrease in area in the lower 48 states, or disappear altogether (Hansen et al. 2001). Additional information can be found at http://www.fs.fed.us/pnw/corvallis/mdr/mapss/.

Climate change is closely interrelated and synergistic with other important threats including wildfire and annual grasslands. Increased climatic variability may result in overall degradation of rangeland conditions and impairment of the ecosystem's elasticity. Rangeland ecosystems are increasingly under threat from weeds, both exotic and native. Increases in invasive exotic species such as cheatgrass, medusahead rye, red brome, knapweed, leafy spurge, yellow starthistle, and woody native species such as juniper, has dramatically reduced the productivity of rangelands by garnering more of the limited resources like water, nutrients and sunlight. Changes in land use and productivity frequently represent irreversible changes in ecosystem function on human time scales (Brown et al. 2005.)

Climate change impacts on community dynamics and health on rangelands may be magnified compared to other ecosystems due to the aridity and lower resiliency of these lands. Since climate change effects may be greater in these more arid landscapes, close analysis of management and restoration strategies used in the present is advisable, in order to be better prepared to meet potential climate related changes in the future (Mike Pellant, pers. comm. in ISAC 2006, pg. 4-89; July 2005). The response of rangeland vegetation to impending changes in the precipitation regime is likely to be complex and difficult to predict from existing knowledge. Plant response is likely to be highly species-specific, which suggests that current plant communities will not simply move to new landscape positions, but will be replaced by novel plant assemblages (Brown et al. 2005). Increased carbon dioxide ($CO_{2)}$ in the atmosphere will favor cool season plants relative to warm season plants. Recent research has demonstrated that cheatgrass may respond more favorably to increased CO_2 than do some native plants (Smith et al. 2006) and that recent increases in CO_2 may already have increased cheatgrass production, increasing fuel loads and wildfires (Ziska et al. 2005).

The key to managing rangelands successfully in a changing global environment is maintaining and enhancing ecosystem resilience. Resilience is that property of an ecosystem that defines how well it can recover after disturbance or stress. Rangelands should be managed at the landscape and ecosystem level as well as at the SGPA or watershed scale. Many of the impacts of global change will be expressed unevenly across the landscape, but will be the result of processes and changes that accumulate over time periods and over large scales. Rangelands should also be managed to avoid catastrophic changes. Many of the rangelands in the western U.S. exhibit nonequilibrium dynamics and much of the degradation that has occurred historically may be permanent, at least on a human time scale (Brown et al. 2005).

Managing rangelands in the face of global change requires a shift in focus toward the restoration and enhancement of ecosystem resilience. Management flexibility should be a goal at multiple spatial scales (Brown et al. 2005).

2. *Key Conservation Issues*

Global climate change is anticipated to be potentially detrimental to arid rangelands over time. Current management actions should consider long-term impacts and trends. The maintenance of resilient ecosystems is key to long-term maintenance. Changes in climate in the Intermountain area are expected to favor cool-season species of exotic invasives such as cheatgrass (Smith et al. 2006) and native trees such as juniper (USDA-Forest Service -PNW 2004). Restoration needs to consider these changes within the life-span of the restored vegetation, especially at the drier end of the vegetation continuum. New monitoring strategies will also be necessary. Key issues include the need to:

Increase awareness of expected impacts of climate change: Increased awareness of global climate change and the expected impacts of global climate change to sagebrush ecosystems are essential to effectively responding to these changes. Climate change is expected to be detrimental to arid rangelands including the sagebrush steppe, due to increases in cheatgrass and other weeds, juniper expansion, and increased wildfire risk. Ensuring that healthy sagebrush communities are maintained into the future will require adaptive management.

Maintain ecosystem resiliency: Maintain maximum resiliency of ecosystems by maintaining and/or managing towards healthy, diverse, sustaining vegetation communities with high levels of vegetation vigor.

Control exotic invasive species: Active management of exotic invasive species, such as cheatgrass, medusahead, and invasive weeds will be required to prevent continuing losses of native vegetation and the potential large-scale replacement of native plant communities with

exotic communities. Detailed information on the spatial distribution of invasive weed species, such as spotted knapweed, leafy spurge, rush skeletonweed, and others is maintained by the Idaho Department of Agriculture through county-level Cooperative Weed Management Area programs and agency offices.

Restoration with suitable plant materials: In restoration efforts in lower rainfall vegetation communities, include seed from warmer portions of a species range which will be better adapted to the predicted warmer conditions anticipated in the future. Factor climate change predictions into restoration efforts that are creating long-term vegetation communities.

Improved monitoring approaches: Develop monitoring strategies to track subtle, long-term changes to the vegetative landscape.

3. Conservation Measures

Increase Awareness of Expected Impacts of Climate Change. Without awareness and understanding of the significance of climate change on the sagebrush ecosystem successful adaptive management is less likely to occur. To reduce the potential for threats posed by a lack of awareness of expected impacts of climate change, the following conservation measure is appropriate:

1. Support efforts by the Society for Range Management, and others to inform constituents of the seriousness of global climate change expectations.

Maintenance of Ecosystem Resiliency. Conservative use and management will be necessary to allow plant communities to combat on-going environmental stress from climate change. To reduce the potential for threats posed by a lack of ecosystem resiliency, the following conservation measures are appropriate:

2. Avoid degradation of current vegetation communities.
3. Adjust resource use in periods of unusual climatic events.
4. Focus management of rangelands on restoration and resiliency of the vegetative resource.

Control Exotic Invasive Species. Maintain viability of native plant communities by decreasing stress caused by undesirable invasive species. To reduce the potential for threats posed by exotic invasive species associated with climate change, the following conservation measures are appropriate:

5. Increase knowledge and awareness of invasive species problems on native ecosystems.
6. Reduce impacts of land uses that increase the rate of spread of invasive species.
7. Manage native plant communities to maintain biotic soil crusts (where appropriate), improve or maintain high vigor of native vegetation, and reduce use during periods when use favors invasive species ecologically.
8. Consider integrated weed management practices (including targeted grazing) to control or eliminate invasive species.
9. Increase the pace of active control/elimination of invasive species in situations where other management is not capable of reducing the competition. Work closely with Cooperative Weed Management Areas/ programs to control invasive and noxious ~~invasive~~ weeds.

Restoration with Suitable Plant Materials. Restore plant communities that have the potential of surviving and adapting to climate change expectations. To reduce the potential for threats posed by restoration using unsuitable plant materials, the following conservation measures are appropriate:

10. Include seed from the warmer part of a species' range in mixes that are used to restore degraded sites.
11. Include Wyoming big sagebrush seed in mixes for drier/warmer areas that are on the lower transitional elevation fringes of mountain big sagebrush vegetative sites. Consider using alternative approaches to improve the likelihood of establishment, such as hand-planting seedlings, imprinters or other tools.
12. Use local, native seed stock (where feasible and desirable) to reseed disturbed areas. If native seedstock is not practical or available, consider using non-native species. (see the Wildfire and Sagebrush Management sections for additional information about reseeding.)
13. Anticipate impacts of climate change on biological control agents and potential for problems to native species.

Improved Monitoring Approaches. To manage the changes we must understand and anticipate the changes that are occurring. To enhance the benefits associated with monitoring, the following conservation measures are appropriate:

14. As opportunities permit, cooperate with Universities and other partners to:
    - Define the capability of ecosystems and vegetation communities to withstand stress and/or disturbance and maintain capability of full recovery.
    - Develop high quality, consistent, and accessible soil and vegetation data and models that describe how changes occur in response to stress and disturbance.
    - Develop a system that identifies the effects of global change in the very early stages and identifies appropriate management responses.
    - Develop new concepts of landscape scale management of rangelands to provide for adaptive management in response to climate change.
    - Develop monitoring systems that track and predict how changes in land use and cover affect ecosystem function across spatial scales on rangelands.
    - Acquire quantitative knowledge of ecological thresholds, indicators of change, and key decision points in the framework of comprehensive monitoring systems.
    - Improve coordination and communication links between researchers and land managers.
15. Include Idaho State University/Idaho National Laboratory long-term vegetation transect study data (from the Idaho National Laboratory) in annual reports when available.

K. Insecticides

1. Threat Summary

Sage-grouse using agricultural areas for brood-rearing can be exposed to pesticides (Connelly et al. 2000b). Organophosphate insecticides, such as dimethoate and methamidophos applied to crops can adversely affect sage-grouse (Blus et al. 1989). In Idaho, 63 out of 200 sage-grouse foraging in alfalfa and potato fields died after exposure to organophosphate insecticides in those fields (Blus et al.1989). Since sage-grouse often move long distances between seasonal habitats, the total sage-grouse use area influenced by chemicals may be quite large (Connelly et al. 2004). Ingestion of sub-lethal levels of pesticides by birds can result in abnormal or lethargic behavior, increasing risk of predation (see Insecticides, USDI–FWS 2005).

Mormon crickets and native rangeland grasshopper species are a normal component of the biota, and feed on grasses, forbs, and shrubs (USDA APHIS-PPQ 2004a, 2000b). Since young sage-grouse hatch in the spring approximately the same time as Mormon cricket and grasshopper populations begin to mature (USDA-APHIS-PPQ 2004a, 2000b), and since insects provide a critical source of protein for young grouse, grasshopper and Mormon cricket control efforts have the potential in some cases to impact food availability. Conversely, Mormon cricket and grasshopper infestations may impact herbaceous cover but the impact on sage-grouse has not been quantified. For example, Mormon crickets at a density of 10 per square yard can consume 375 lbs. of dry matter per acre over the course of a four-month lifespan (Cowan 1990 cited in USDA APHIS-PPQ 2004a). Mormon cricket infestations can also concentrate corvids resulting in increased avian predation on sage-grouse chicks (personal observation, J. Naderman, IDFG, May, 1999).

Rangeland grasshopper and Mormon cricket control efforts employing malathion, diflubenzuron and/or carbaryl bait reduce grasshopper or Mormon cricket densities in target areas. However, Norelius and Lockwood (1999), suggest that while grasshopper densities can approach 60/m2 during outbreaks, treatments that have a 90-95% mortality rate (of grasshoppers) still leave a density of grasshoppers (3-6/m2) that is greater than an average density found on rangelands, such as Wyoming, in a normal year (Schell and Lockwood 1997).

The chemical control of grasshoppers or Mormon crickets on Idaho rangelands has the potential to reduce the abundance and/or diversity of non-target insect species utilized by sage-grouse broods in certain areas. However, in sagebrush steppe situations, no more than 50% of treatment blocks receive direct application (USDA APHIS-PPQ 2005). Also, treatment acreages on federal lands have been comparatively low (Table 4-13) (USDA APHIS-PPQ 2005; R. McChesney, USDA APHIS-PPQ pers. comm. in ISAC 2006, pg. 4-114; January 2006). Specific treatment acreage figures for state and private lands are not readily available. However it is likely that, including state, private, and federal lands, less than 2.5% of the area inhabited by crickets and grasshoppers would be treated in a given year, even during outbreaks (R. McChesney USDA APHIS-PPQ pers. comm. in ISAC 2006, pg. 4-114; January 2006).

Table X. Acres of federal Idaho rangelands treated for Mormon crickets and grasshoppers.

Year	Federal Acres Treated in Idaho	
	Mormon Crickets	Grasshoppers
2005	68,520	2,394
2004	18,945	2,520
2003	13,585	11,705
2002	340	250
2001	—	420
2000	—	1,100

2. Key Conservation Issues

Impacts of agricultural pesticides on sage-grouse: Sage-grouse adults and broods have been noted to forage in irrigated farm fields. The use of certain insecticides, such as organophosphates, on agricultural crops while sage-grouse were present has resulted in mortality of birds in some cases. Other effects of organophosphates on birds, such as reduced alertness, can increase vulnerability to predation.

Impacts of Mormon cricket and rangeland grasshopper control on sage-grouse: Mormon cricket and grasshopper control has the potential to adversely affect food availability for sage-grouse in certain areas. However, acreages treated annually have be relatively low and research in Wyoming found grasshopper densities on treated areas still will above densities found on rangelands.

3. Conservation Measures

Impacts of Agricultural Insecticides on Sage-grouse. Some agricultural chemicals can cause direct or indirect mortality of sage-grouse foraging in farm fields. To reduce the potential for threats posed by agricultural insecticide use, the following conservation measures are appropriate:

1. Avoid the use of organophosphates on fields utilized by sage-grouse, or allow for suitable treatment buffers around field edges. Incentive or enhancement payments to offset economic impacts to farmers may be available through NRCS programs. Farmers/landowners are encouraged to discuss options with their local NRCS District Conservationist.
2. Work with plant and insect specialists to develop strategies that could be used to protect crops near sage-grouse habitat from insects, thus minimizing the use of insecticides. Planting the outside field borders with certain plants that attract, repel or control insects may be feasible.
3. As alternative brood habitat, manage nearby native habitats, especially moist meadows and riparian areas to be more attractive (e.g. cover, forb availability and diversity) to sage-grouse and broods.
4. LWGs, Cooperative Extension agents, NRCS, IDFG, NAGP and other partners should collaborate to inform farmers and commercial spray operators of concerns with insecticide use and to develop collaborative solutions to reduce adverse impacts to sage-grouse.

Impacts of Mormon Cricket and Rangeland Grasshopper Control on Sage-grouse. Mormon cricket and rangeland grasshopper control may reduce food availability for sage-grouse in certain areas. To reduce the potential threats posed by Mormon crickets and rangeland grasshoppers on sage-grouse, the following conservation measures is appropriate:

5. The Big Desert LWG, land management agencies, landowners, IDFG, IDA, and APHIS-Plant Protection and Quarantine should continue to collaborate closely to ensure annual control efforts focus on key problem areas, better delineate treatment avoidance areas, determine the treatment of least risk to sage-grouse, and monitor results.

K. Seeded Perennial Grasslands

1. Threat Summary

While of moderate risk individually, the link of perennial grasslands with other threats such as wildfire (and subsequent burned area rehabilitation), or annual grasslands (and restoration activities) suggest that its influence or significance as a threat may be more complex. This is particularly important given the history of wildfire within the Big Desert SGPA.

Native perennial grasslands can serve as a foundation for future sage-grouse habitat and are a normal, temporary result of wildfire in healthy sagebrush ecosystems. Seeded perennial grasslands can serve various purposes including as an intermediate treatment during the restoration of annual grasslands. Sage-grouse are known to use small patches or strips of seeded perennial grassland if adjacent to or surrounded by sagebrush. However, since sage-grouse are dependent on sagebrush, extensive areas of exotic and/or mixed seeded perennial grasslands can pose a threat to sage-grouse due to a lack of adequate sagebrush cover to meet seasonal habitat requirements. Seeded perennial grasslands characterized by aggressive, introduced grasses, such as crested wheatgrass, can also be limited in plant species diversity and structure. The natural post fire recovery of sagebrush in large grasslands can also be hindered if sagebrush seed sources are limited. Without deliberate intervention to improve plant species diversity and structure, some large, seeded grasslands are unlikely to support habitat characteristics suitable for sage-grouse within a reasonable management timeframe.

In general, seeded perennial grassland areas within the planning area have been established for purposes of watershed stabilization following large rangeland wildfires; to provide competition from weeds; and to provide improved livestock forage in some areas. More recently, efforts have been initiated to restore degraded areas with more diverse native and/or introduced perennial grass and forb mixtures in order to replace hazardous fuels, such as cheatgrass, and improve rangeland health and wildlife habitat. In the past introduced perennial grasses (e.g., crested wheatgrass) were often planted due to low cost and high likelihood of seeding success. They were also selected due to limited quantities of suitable native species, however, the availability and supply of these has increased in recent years. Recent policy changes and initiatives have also fostered the use of native species. Regardless of the origin, large seeded grasslands with low plant species diversity, and/or sustained lack of sagebrush cover are not compatible with the recovery of sage-grouse, and diversification efforts may be warranted in some areas.

2. Key Conservation Issues

Spatial extent of perennial grasslands on the landscape: The Big Desert SGPA is dominated (51%) by perennial grassland. It is difficult at this time to spatially differentiate between true native grasslands, seeded native, seeded introduced or mixed native/introduced grasslands without more intensive mapping and ground-truthing efforts, or detailed review of agency project records. As mapping technologies and field inventory efforts improve, additional mapping refinements will be incorporated. The new ShrubMap regional landcover dataset (http://sagemap.wr.usgs.gov/) in addition to existing BLM, IDL and IDFG landcover datasets may be useful in preliminarily delineating annual and perennial grasslands.

Reduced species diversity and structure: At the finer more site-specific scale, some seeded perennial grasslands, aside from lacking in sagebrush cover, also may be deficient in plant species diversity and structure. Substantial acreages of Idaho BLM lands burned by wildfire have been aerially reseeded with sagebrush in recent years, and the use of native grass

species in fire rehabilitation seedings and restoration projects is being emphasized where possible. Some successes have been noted. However, Dalzell (2004) in a study of 35 fire rehabilitation projects on the Snake River Plain, found no significant differences in species composition of seeded and unseeded burn plots, though cover of introduced species on unseeded plots was likely an artifact of older seeding efforts. Dalzell (2004) also reported poor establishment of Wyoming big sagebrush via aerial seeding, and suggested alternative approaches. Sagebrush and native grass restoration efforts can be problematic and are contingent on numerous factors including site potential, short-term climatic conditions, application techniques, competition from invasives, past seeding activities, reoccurring wildfires, and other factors. There is a continuing need for improved documentation, monitoring and reporting of restoration projects to facilitate information transfer and adaptive management.

3. Conservation Measures

Lack of sagebrush on the landscape and lack of plant species diversity hinders the recovery of sage-grouse habitat. To reduce the potential threat posed by a lack of sagebrush on the landscape and/or lack of plant species diversity, the following conservation measures are appropriate:

1. LWGs, land management agencies, IDFG and other partners should work closely together to identify and prioritize perennial grasslands (exotic versus native) where plant species diversity or sagebrush is limiting on the landscape; and work cooperatively to identify options, schedules and funding opportunities for re-establishing sagebrush in higher priority areas.
2. When seeding sagebrush, use source-identified, tested seed adapted to local conditions.
3. Adopt new methods as they become available. Based on site conditions, consider using one or more of the following approaches for restoring sagebrush to improve likelihood of success (see Dalzell 2004 and Monsen et al. 2004):
    - Use of the “Oyer” compact row seeder, which compacts soil and presses seed onto the surface.
    - Use of the Brillion cultipacker seeder, where seed is broadcast over the surface followed by cultipacking.
    - Transplant bare-root or containerized stock in small, critical areas to establish a seed source.
    - Use the “mother plant” technique, and transplant bare-root or containerized stock in select locations throughout the area to establish a seed source.
    - For large areas (e.g., large wildland fires) aerial seed onto a rough seedbed (Monsen et al. 2004) coupled with one or more of the above options.
    - Use of livestock to incorporate the seed.
4. In established stands of introduced perennial grasses, transplant sagebrush into strategic patches or strips in critical sites or throughout the area. Scalp spots or strips to reduce grass competition prior to planting or as an alternative to scalps, consider the use of herbicides (see Monsen et al. 2004, Volume 3).
5. Where the diversification of crested wheatgrass or similar seedings with native species of grasses, forbs and/or shrubs is desired Pellant and Lysne (2005) recommend a 3-step process:

- Reduce competition of crested wheatgrass to facilitate the establishment and persistence of the desired species. Possibilities include use of livestock, capitalizing on drought episodes that reduce grass vigor, herbicides such as glyphosate, and mechanical treatments.
- Introduce desired, site-adapted species through drill seeding, aerial seeding followed by harrow, cultipacker or chaining, livestock trampling, transplanting container stock, bare-root stock or individual plants from native sources ("wildings"). Lambert (2005) provides descriptions, recommended seeding rates, and other useful information for nearly 250 species of native and non-native grasses, forbs and shrubs.
- Post-treatment management. Ensure that livestock grazing and rest intervals are matched with the phenology and life history characteristics of the desired/ seeded/ transplanted species. Implement monitoring to clearly document how, what, when and where treatments were implemented. Follow up with suitable effectiveness monitoring, to document success of the treatments relative to project objectives.

6. Use fire rehabilitation funds to address concerns about the expansion of three-tip sagebrush into big sagebrush communities. Consider chemical, mechanical, and biological methods to ensure re-establishment of forbs.
7. Private landowners may wish to enroll in NRCS incentive programs as related to sage-grouse/sagebrush habitats. Current NRCS programs that may provide some opportunities for economic offset of certain conservation measures include the CSP, WHIP, and EQIP programs. Landowners are encouraged to discuss the various opportunities available with their local NRCS district conservationist and the Big Desert LWG. Another potential source of project funding for private lands are Idaho Office of Species Conservation (OSC) project grants. Landowners interested in OSC grants are encouraged to work through their respective LWG or in the absence of an LWG, the appropriate IDFG Regional Office. Support for Idaho projects may also be available through the North American Grouse Partnership's (NAGP) Grouse Habitat Restoration Fund.

L. Agricultural Expansion

1. Threat Summary

Large-scale losses of big sagebrush in Idaho since historical times were largely attributed to increases of agricultural lands, as well as conversion of shrub-steppe vegetation to exotic forbs and annual grass (Wisdom et al. 2000b). Prime areas for growing crops (e.g. areas with deeper, fertile soils) were claimed first during settlement (Connelly et al. 2004).

Today, within the Big Desert SGPA, some agricultural cropland is being taken out of crop production and seeded to perennial grasses, forbs, and shrubs with the aid of Federal USDA farm programs to reduce erosion, stabilize crop production, improve water quality and provide habitat for wildlife species. Additional cropland may be taken out of crop production in the future to conserve water. These lands, seeded into perennial grasses, forbs, and sagebrush, can provide a direct benefit to sage-grouse by providing habitat to meet sage-grouse needs. They may also be used to provide reserve forage for livestock that may need to be removed from traditional grazing areas due to wildfire or to rest the area from grazing to improve range conditions.

2. Summary of Key Conservation Issues

Habitat loss and fragmentation: Hironaka et al. (1983) estimated that 99% of the basin big sagebrush type (which grow on deeper soils) in the Snake River Plain has been converted to cropland. Nearly one-third of lands in the Upper Snake Ecosystem Reporting Unit (which includes portions of several SGPAs) are described as currently agricultural (Wisdom et al. 2000b). Technological improvements in irrigation methods now permit agriculture development on steeper terrain (Connelly et al. 2004).

Insecticides: Chemicals applied to crops can also directly or indirectly affect sage-grouse foraging in farm fields (see discussion in Insecticides Section 4.3.15 in ISAC 2006).

Predation: Agricultural development, in addition to direct sage-grouse habitat loss or fragmentation, also influences adjoining sagebrush habitats due to increases in certain predators, such as red fox, ravens, and domestic cats (Vander Haegen and Walker 1999 and Vander Haegen et al. 2002; see discussion in Predation Section 4.3.12 in ISAC 2006)

Returning cropland to perennial grasses, forbs, and sagebrush: Federal USDA farm programs developed to reduce erosion, stabilize crop production, improve water quality, provide wildlife habitat, and conserve water provide a unique opportunity to return cropland to a condition that benefits sage-grouse. This can be done in at least two different ways. 1) by planting species that meet the seasonal needs of sage-grouse and, 2) by providing forage reserves to meet emergency grazing following wildfire and/or providing temporary reserve forage for livestock removed from tradition grazing areas to improve range conditions.

3. Conservation Measures

The Big Desert LWG believes there is a limited possibility of converting sagebrush steppe to agricultural production. However, there is potential for land that was formerly in agricultural production entering into programs (like the Conservation Reserve Program). Where possible, those lands should be converted back to sagebrush, if possible.

To reduce the potential threats posed by habitat loss and/or fragmentation associated with landscape level changes, the following conservation measures are appropriate:

1. Utilize the Conservation Reserve Program, Wetland Reserve Program, Grasslands Reserve Program, Farmland Protection Program or similar USDA incentives programs to recover habitat for sage-grouse where feasible.
2. Where possible, avoid the creation of additional cultivated cropland in areas of key habitat or potential restoration areas.
3. Where there are willing landowners, identify and prioritize parcels available for purchase or exchange that could be restored to perennial grasses, forbs and shrubs.
4. In conjunction with willing landowners, identify options for lands on the Snake River Plain recently withdrawn from irrigation. Options may exist for collaboratively funded restoration projects or development of forage reserves.
5. Where opportunities allow (incentives, partnerships, willing landowner, etc.), off-site mitigation should be employed to offset unavoidable alteration and losses of sage-grouse habitat. Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.

The Big Desert LWG agreed that the conservation measures in the Statewide Plan that address insecticides and predation are addressed elsewhere in the Big Desert Sage-grouse Conservation Plan.

M. Conifer Encroachment

The Big Desert LWG agreed that minimal conifer encroachment is occurring in the Big Desert Planning Area.

N. Falconry

The Big Desert LWG agreed that falconry was adequately addressed under the Sport Hunting Section

O. Isolated Populations

The Big Desert LWG agreed that research indicates that the population of sage-grouse found in the Big Desert Planning Area are well connected to other populations in the Magic Valley and the Upper Snake planning areas.

P. Mines, Landfills, and Gravel Pits

1. Threat Summary

Surface mining of any mineral resource, including gravel, will result in direct habitat loss for sage-grouse if the mining occurs in occupied sagebrush habitats (USDI-FWS 2005). Landfills may result in a loss of habitat and/or a site for corvid species of birds which may prey on sage-grouse.

2. Key Conservation Issues

Habitat loss: Mines, landfills, and gravel pits, by their nature, result in direct habitat loss and fragmentation. Indirect effects, such as establishment of invasive plants may occur in disturbed areas.

Disturbance to important seasonal habitats: Human activity and noise associated with machinery or heavy equipment in proximity to occupied leks or other important seasonal habitats may disturb sage-grouse.

Predation: Landfills can potentially facilitate predator and corvid (crows, ravens, and related) movements (Connelly et al. 2004). Infrastructure associated with mines or landfills may also facilitate avian predation (see Predation Section and Infrastructure Section in ISAC 2006 for additional discussion).

Specifically in relation to the Big Desert SGPA, there are no active mines; nor has there been much prospecting or mining activity in the past due to the nature of the landscape and geology of the planning area.

The counties within the planning area have no authorized landfills anywhere near sage-grouse habitat other than a Butte County landfill 1 mile east of Arco. But some scattered sites exist where people have dumped miscellaneous material. Generally this does not include foodstuffs, but may include packaging with residue of foodstuffs to the degree that corvids might use these sites to facilitate sage-grouse predation.

The following material or gravel pits are located in or near sage-grouse habitat:

- "Robber's pit" (4 acres) – a community pit west of the railroad tracks, between Atomic City and Big Southern Butte.
- An Idaho Department of Transportation pit (60 acres) near the turnoff to Frenchman's Cabin.
- A mineral material sale pit (14 acres) east of Butte City.
- A 5-acre free use permit pit east of Butte City.
- A small gravel pit (unknown size) on the BLM/INL boundary just north of Atomic City.

3. Conservation Measures

Habitat loss. The footprint associated with mines, gravel pits and landfills results in habitat loss until such areas are suitably rehabilitated. To reduce the potential threats posed by habitat loss associated with mines, landfills, and gravel pits, the following conservation measures are appropriate:

1. Discourage the establishment of new mines, landfills or gravel pits within sage-grouse breeding or winter habitat. Where possible, avoid occupied leks by at least 3.2 km (2-miles) (adopted from Connelly et al. 2000b, and Stinson et al. 2004).
2. If the placement of new mines, gravel pits, and landfills in or near breeding habitat is unavoidable, ensure that reclamation plans incorporate the appropriate seed mix and seeding technology to restore suitable breeding habitat characteristics.
3. During activities associated with the exploration, operation, and maintenance of mines, gravel pits, or landfills, ensure that adequate measures are implemented to control invasive plant species.
4. Ensure adequate weed control measures are implemented during the life of the operation and implementation of the subsequent reclamation plan.
5. Off-site mitigation should be employed to offset unavoidable alteration and losses of sage-grouse habitat. Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.

Disturbance to important seasonal habitats. Activity associated with mines, gravel pits and landfills have the potential to disturb sage-grouse. To reduce the potential threats posed by disturbance to important seasonal habitats, the following conservation measure is appropriate:

6. Apply seasonal-use restrictions (see Human Disturbance Section 4.3.5 in ISAC 2006) on activities associated with the exploration, operations, and maintenance of mines, gravel pits, or landfills, including those associated with supporting infrastructure

The Big Desert LWG agreed that the conservation measures in the Statewide Plan that addresses insecticides and predation are already addressed elsewhere in the Big Desert Sage-grouse Conservation Plan.

Q. Prescribed Fire

The Big Desert LWG agreed that prescribed fire is adequately addressed under the Sagebrush Management Section.

R. Urban/exurban Development

1. Threat Summary

Risk to ecological integrity is generally higher in proximity to areas with dense human population. Higher population densities in proximity to forest and rangeland vegetation types are rated as having higher risk than low population density areas. In contrast, well-managed, viable ranches and livestock grazing allotments can provide habitat and open space needed by sage-grouse and some other wildlife. Road building, camping, hiking, off-road vehicle use, development of recreation sites, and human-caused wildfire are all examples of activities and impacts that tend to increase in wildland areas in close proximity to population centers, with larger population centers having higher activity levels. Urban areas themselves remove habitat and present inhospitable environments for sage-grouse. However, the connecting roads, power lines, communication corridors, and use of surrounding regions for recreation exert a greater influence on sagebrush habitats (Connelly et al. 2004). In general, urban sprawl impacts sage-grouse to the extent that it infringes on sagebrush communities.

Increased affluence has also resulted in additional uses of lands surrounding cities for development of homes on larger acreages (e.g., ranchettes) (Connelly et al. 2004). Also, within the geographic distribution of sage-grouse, human populations have grown and expanded over the past century, primarily in the western portion of the sagebrush biome (Connelly et al. 2004). In Idaho, the resident population doubled between 1950 and 2000, increasing from 588,637 to 1,293,594 (U.S. Census Bureau). Areas surrounding Idaho Falls, and Pocatello have development expanding into sagebrush habitat. While much of the actual footprint of recent urban/exurban expansion in Idaho is probably occurring outside of the Big Desert SGPA boundary, in association with communities along the I-15 corridor, for example, the potential for increasing movement into more intact sagebrush communities is very real. Urban/exurban expansion and population growth are closely related to other threats such as infrastructure development, human-caused wildfires, human disturbance, and climate change, thus the direct and indirect influences of urban/exurban expansion are quite complex and far-reaching.

While urban/exurban development is not currently an issue within the Big Desert SGPA, it will be closely monitored, and the Big Desert LWG will comment on any proposed development that may be proposed in the future.

2. Key Conservation Issues

Non-urban areas have been developed throughout the sagebrush region because of economic factors combined with opportunities for recreation and other natural amenities (Riebsame et al. 1996). In addition, many “exurbanites” have migrated from cities into “ranchettes” created by subdividing larger ranches. While ranchettes may provide some sagebrush habitat as opposed to complete urbanization, such areas are probably rendered unsuitable for sage-grouse due to fragmentation and disturbances associated with new roads, dwellings, and human disturbance (Connelly et al. 2004).

Loss of habitat: Loss of sage-grouse habitat is the primary conservation issue associated with urban/exurban development and can be subdivided into three major categories (1) direct loss of sage-grouse habitat through development of previously occupied habitat for home sites and ranchettes, (2) direct loss of habitat through development of infrastructure to support the above home site developments, and (3) loss of habitat through physical degradation and human activities radiating out from the above developments.

3. *Conservation Measures*

Direct loss of sagebrush habitat to development of homes and ranchettes. To reduce the potential threats posed by urban, exurban development, the following conservation measures are appropriate:

1. Work with county and city zoning and planners to avoid developing important sagebrush habitat.
2. Educate landowners and developers to values of sagebrush habitat.
3. Encourage acquisition of easements when owners are willing to negotiate conservation agreements.
4. Acquire habitat where there are willing sellers and when it provides the best option to protect and/or restore important habitats:
   - Identify important parcels of habitat;
   - Work with landowners to identify willing sellers;
   - Use existing funding sources for acquisition.
5. Protect wildland areas from wildfire originating on private lands, infrastructure corridors and recreation areas.
6. Off-site mitigation should be employed to offset unavoidable alteration and losses of sage-grouse habitat. Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.

Direct loss of habitat through development of infrastructure to support site development. To reduce the potential threats posed by infrastructure development, the following conservation measures are appropriate:

7. Work with county and city zoning and planners to avoid developing important sagebrush habitat.
8. Educate landowners and developers to values of sagebrush habitat.
9. Acquire easements when owners are willing to negotiate conservation agreements.
10. Off-site mitigation should be employed to offset unavoidable alteration and losses of sage-grouse habitat. Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.

Loss of habitat through physical degradation and human activities radiating out from the above developments. To reduce the potential threats posed by physical degradation and human activities around development, the following conservation measures are appropriate:

11. Work with county and city zoning and planners to avoid developing important sagebrush habitat.
12. Educate landowners and developers to values of sagebrush habitat.
13. Acquire easements when owners are willing to negotiate conservation agreements.

V. MONITORING AND EVALUATION

The Big Desert LWG is committed to monitoring the implementation of this Conservation Plan to ascertain the effectiveness of conservation measures and progress towards meeting conservation goals and objectives.

A. Introduction

There are two primary reasons for monitoring sage-grouse populations and sage-grouse habitat on the Big Desert.

1. To document the present status of sage-grouse populations and the condition of sage-grouse habitat within the Big Desert SGPA and then to follow any changes in sage-grouse populations and habitat conditions over time.
2. To keep a record of all management actions (and the effectiveness of those actions) taken by the LWG, agencies, landowners, and livestock operators to maintain or increase sage-grouse numbers and/or maintain or improve sage-grouse habitat within the Big Desert SPGA.

Adequate monitoring and reporting will allow the LWG, agencies, landowners and livestock operators to develop databases that provide a history of what has taken place and what is changing in the Big Desert, and also help agencies, landowners, and livestock operators prioritize and implement management actions that are beneficial to sage-grouse in the Big Desert.

B. Annual Reporting

A report of all changes in sage-grouse populations and distribution, changes in sage-grouse habitat, and management actions taken by the LWG, agencies, landowners and livestock operators will be prepared annually. All of the topics listed below should be reported on each year even if no data were collected or no management action taken by the LWG. If no data were collected or no action was taken a simple comment to that effect should be included in the annual report.

A copy of each annual report will be contained in an appendix to this plan for documentation of changes and management actions and future reference for the LWG, and agencies. This appendix will provide a history of sage-grouse populations and sage-grouse habitat in the Big Desert and all management actions taken by the LWG, agencies, landowners and livestock operators.

Additional information on each topic can be found under the Specific Monitoring Actions section (below).

The follow are the topics that should be included in the Annual Report:

- A table containing the most recent 10-years of sage-grouse lek data.
- A report of survey efforts done over the past year to locate new leks.
- A report of leks surveyed during the past year that are not included on the lek routes.
- A table containing the most recent 6-years of hunter harvest estimates.
- A table containing the most recent 6-years of young:100 adult female ratio, the percent successful yearlings, and the percent successful adults.

- Report any changes in the distribution of annual grasslands that have occurred during the past year.
- Report efforts taken to reestablish perennial grasses and forbs, and/or sagebrush in areas dominated by annual grass during the past year.
- Report any changes in sage-grouse seasonal habitats that have been documented during the past year.
- Report what conservation measures were taken to reduce wildfire risk during the past year.
- Include an updated GIS map (described in the Wildfire section below) whenever wildfire has occurred on the Big Desert during the past year.
- Report any leks where OHV, maintenance activity, human activity associated with livestock management, or wildlife viewing/photography disturbance was observed during the past year and what action the LWG or agencies took to address this disturbance.
- Report any new infrastructure development that was proposed or occurred in the Big Desert LWG area during the past year, what actions the LWG took to minimize impact on sage-grouse populations and habitat and the response of the developer to the actions taken by the LWG.
- Report sage-grouse losses due to power lines, roads, etc. observed/reported during the past year, and what actions the LWG took to mitigate these losses.
- Report on allotments where sage-grouse habitat was assessed during the past year and whether they were meeting sage-grouse habitat requirements.
- Report any livestock management measures which were taken to address specific sage-grouse habitat concerns e.g. delayed turn-on date to improve sage-grouse nesting conditions, adjusted stocking rate or removed livestock early because of drought conditions, added additional water troughs to improve livestock distribution, changed salting location to address concern for sage-grouse nesting habitat, removed unneeded fence, built new fence to improve livestock distribution, etc.
- Report any trend changes in sage-grouse lek counts, young:100 adult female ratio, or female sage-grouse nest success that may be attributed for increased predation and any action the LWG took to address this concern.
- Report what recommendation the LWG made relative to sport hunting and the justification for the recommendation e.g. followed plan criteria, recommendation based on recent wildfire, etc.
- Report all sage-grouse mortality documented and/or suspected caused by West Nile virus during the past year, the extent of the mortality, the location of the mortality, and what action, if any, was taken by the LWG took to address the mortality.
- Report any measures taken to address climate change during the past year e.g. adjustment in resource use periods, habitat restoration projects, exotic invasive species invasion or juniper spread, including plant material from warmer areas in restoration projects, etc.
- Report any sage-grouse mortality reported by farmers during the past year that may be attributed to insecticide use, what insecticides were applied, and what actions were taken by the LWG to address the mortality.
- Report any projects to develop alternative brood habitat or manage native habitat near agricultural fields to attract sage-grouse away from agricultural fields that occurred during the past year.

- Report the acreages treated and insecticides used to control Mormon crickets and rangeland grasshoppers during the past year.
- Report the location and acreages that were reseeded/restored to native perennial forbs and/or sagebrush to improve sage-grouse habitat conditions during the past year, and the source(s) of funding to do the seeding.
- Report any follow-up monitoring done during the past year to determine the results/effectiveness of the reseeding attempts.
- Report the location and acreage of any native lands converted to agriculture cropland during the past year.
- Report the location and acreage or any agricultural lands reseeded to perennial grassland or grassland-shrubs during the past year that can be either used for reserve livestock forage or sage-grouse habitat.
- Report any new requests for mining operations, landfills, and gravel pits that occurred during the past year and what actions or recommendations were provided by the agency and/or LWG.
- Report any actions taken and recommendations provided by the agencies and/or LWG to city and county planning and zoning committees, county commissioners, local landowners, land developers relative to urban/exurban development.
- Report on all GIS layers that were updated during the past year and discuss the significance of the changes to future management actions of the LWG and/or agencies.

C. GIS Layers

In order to monitor and track the current condition and changes in sage-grouse distribution and habitat in the Big Desert SGPA the following GIS layers should be developed and updated annually as new data become available:

- A layer identifying areas presently dominated by annual grasses, areas where annual grasses are invading or where annual grasses have become established, but are still not dominant, and areas where annual grasses have not become established and show no sign of invasion.
- A layer displaying sage-grouse stronghold habitat and key habitat.
- A layer displaying sage-grouse seasonal habitats (breeding/nesting, early brood rearing, late brood rearing, fall, and wintering; or a combination of these).
- A layer showing habitats that currently meet or are trending toward meeting breeding or wintering habitat characteristics and areas where sagebrush cover is limiting or excessive on the landscape.
- A layer depicting where fuel breaks currently occur and identify locations where additional fuel breaks/buffers should be developed to better control wildfire spread.
- A layer identifying the location of water sources that can be used for fire suppression.
- A layer depicting all wildfires by year. Hotlink this layer to a spreadsheet for each fire that includes data on the fire such as: acreage, date, fire conditions, pre-fire fuels, pre-fire range assessment data, post-fire assessment, restoration efforts (date of restoration species, pure live seeding rate, method of seeding, soil conditions, follow-up monitoring, etc.), and other pertinent data/information.

- A layer of all known sage-grouse lek locations in the area. Identify leks as active (2 or more males have been observed displaying on the lek during 2 or more of the last 5-years) inactive (the lek has been checked annually but no males have been observed on the lek within the last 5-years, the lek has been checked annually but no more than 1 male has been observed on the lek during the last 5-years, the lek has been checked annually but males were observed only one time in the last 5-years), status unknown (the lek has not been checked during the last 5 or more years, or the lek has been checked only 1 time during the last 5 years and no males were observed). Hotlink each lek to a spreadsheet that includes the dates the lek was checked the number of males and the number of females observed and any pertinent comments relative to the conditions when the lek was checked. Provide the ability to buffer each lek.
- A layer of all roads and trails open to motorized vehicles. Identify road by type and allowable vehicle use (e.g. primary road open to all motorized vehicles, trail open to vehicles less than 42 inches wide, etc.) and seasonal use restrictions. Provide the ability to buffer the major roads relative to current knowledge of impacts.
- A layer of all active railroads within the area. Provide the ability to buffer the railroads relative to current knowledge of impacts.
- A layer of all utility lines. Identify lines by ownership, type (power or communication), voltage, pole type, or buried. Provide the ability to buffer lines relative to line type and current knowledge of impacts.
- A layer of all wireless communication towers within the area. Identify towers by ownership, type and height. Provide the ability to buffer the towers relative to tower type and current knowledge of impacts.
- If wind energy development occurs in the future it will be necessary to develop a wind energy layer. Identify developments by ownership, tower locations, tower type and tower height. Provide the ability to buffer the towers relative to current knowledge of impacts.
- A layer of existing fences in the area. Identify fences by type e.g. temporary, 1-wire electric, 3-strand with a top wire height of 36 inches, 4-strand with smooth bottom wire and top wire height of 42 inches, etc., and areas where fences have been modified to minimize sage-grouse mortality.
- A layer of areas dominated by perennial grasslands. These grasslands should be identified by type: (1) native, but lacking in perennial forbs, (2) native but lacking in sagebrush cover, (3) native, but lacking in both perennial forbs and sagebrush cover, (4) non-native and lacking in perennial forbs, (5) non-native and lacking in sagebrush cover, and (6) non-native and lacking in both perennial forbs and sagebrush.
- A layer showing the location of authorized mines, landfills, and gravel pits (distinguish between active and inactive). Provide the ability to buffer these developments relative to current knowledge of impacts.

These layers should be accessible to applicable field and district offices of all land management agencies managing lands within the area, Idaho DOE, the applicable NRCS field offices, and IDFG regions 5 and 6. Maps developed from the appropriate layers should be made available upon request to private landowners within the area, livestock operators grazing livestock within the area, research institutions doing research within or adjacent to the area, fire crews deployed in the area, and the LWG.

D. Specific Monitoring Actions

1. Lek Counts and Surveys

The Big Desert LWG management plan does not have a conservation section of sage-grouse population monitoring. However, several of the sections rely on data relative to sage-grouse populations and distribution.

At the present time there are 5 lek routes with a total of 38 leks that are monitored annually within the Big Desert LWG area. All of these routes and leks are located in the northwest portion of the LWG area. This is because historically there were two sage-grouse lek routes (Arco and Big Lake) located in Butte County and this was also the area where extensive research on sage-grouse populations and distribution relative to prescribed fire was conducted in the 1980's and early 1990's. The rest of the LWG area has not been systematically surveyed for leks.

The IDFG will be responsible for ensuring that the 5 lek routes presently monitored in the Big Desert continue to be monitored annually. The LWG will seek necessary funding to survey those parts of the Big Desert SGPA that have not been systematically surveyed (following the procedures recommended by Connelly et al. 2003b) to identify additional lek locations and review these locations to see if additional lek routes can also be monitored annually. A GIS layer will be developed and kept current of all sage-grouse lek locations. This layer will be hot-linked to a spreadsheet for each lek that records the date the lek was checked, the number of males observed, the number of females observed and all pertinent comments relative to the conditions when the lek was checked e.g., weather, disturbances observed, predators observed, activity of birds, general distribution of birds, etc.

Data on sage-grouse lek route counts will be reported annually and the Big Desert LWG will use the trends in lek route counts to recommend hunting seasons (see Sport Hunting Section in ISAC 2006) in the Big Desert SGPA.

Data on sage-grouse seasonal habitat use is also the most complete for the northwest portion of the Big Desert because of the research on sage-grouse that was done there.

The IDFG, all land management agencies, landowners, and others with knowledge of sage-grouse on the Big Desert will work to improve knowledge of sage-grouse seasonal habits in the Big Desert SGPA. A GIS layer will be developed and kept current of sage-grouse seasonal habitats on the Big Desert.

2. Harvest Survey and Wing Data

The IDFG conducts a survey of sage-grouse hunters to obtain an estimate of sage-grouse harvest and collects a sample of wings from hunter harvested sage-grouse using wing-barrels, check stations and voluntary hunter mail-in wings. The LWG will also encourage IDFG to examine ways to increase the sample of hunter-harvested sage-grouse wings.

The LWG will report annually the estimated hunter harvest of sage-grouse from the Big Desert LWG area; and the young:100 adult female ratio, the percent of successful yearling hens, and the percent successful adult hens obtained from sage-grouse wings harvested from the Big Desert SGPA.

3. Annual Grasslands

The primary area of concern for annual grassland invasion is the southern portion of the Big Desert SGPA. However, invasion and dominance of annual grass should be monitored

throughout the planning area. Annual grass invasion and dominance in the Big Desert LWG area increases fine-fuel loads and shortens fire-return intervals.

Conservation measures identified by the Big Desert LWG direct the "LWG, land management agencies, IDFG, and other partners to work closely together to identify and prioritize annual grassland areas for restoration". This information "should be updated annually". And the areas identified for restoration should be prioritized relative to, (1) sites adjacent to or surrounded by stronghold habitats, (2) sites outside stronghold habitats but adjacent to or within approximately two miles of key habitat, and (3) sites beyond two miles of key habitat.

Develop a GIS map with, (1) a layer identifying areas presently dominated by annual grass, areas where annual grasses are invading or where annual grasses have established but are still not dominant, and areas where annual grasses have not become established and show no sign of invasion, and (2) a layer displaying sage-grouse stronghold habitat and key habitat.

The LWG will review this map annually and update when new data are collected on changes in annual grass distribution and dominance, and changes in sage-grouse stronghold and key habitat.

4. Sagebrush Management

To reduce the potential threats posed by inadequate planning and implementation of sagebrush control projects the Big Desert LWG will develop a GIS map with a layer displaying sage-grouse seasonal habitats (breeding/nesting, early brood rearing, late brood rearing, fall, and wintering; or a combination of these). The ISAC (2006) - Chapter 5 provides guidelines for the characteristics of seasonal habitats. Develop another GIS layer showing habitats that currently meet or are trending toward meeting breeding or wintering habitat characteristics and areas where sagebrush cover is limiting or excessive on the landscape.

The LWG will review this map annually and update when new data on sage-grouse seasonal habitats or changes in sagebrush cover relative to breeding and wintering habitat characteristics become available.

5. Wildfire

Wildfire poses a substantial threat to sage-grouse habitat. This is especially true for the Big Desert SGPA where summers are hot and dry and includes areas dominated by cheatgrass. Wildfires that have occurred since 1996 in the Big Desert SGPA have affected substantial acreages of sage-grouse habitat. Consequently, proactive fire management and reduction of wildfire risk must be a priority for this area.

Develop a GIS map by using the map developed under Annual Grasslands and develop another layer depicting where fuel breaks currently occur and identify locations where additional fuel breaks/buffers should be developed to better control wildfire spread. High priority should be in areas where annual grasslands border key or other important areas such as recent restoration projects.

Develop another GIS map that will be made available to fire fighting crews that identify priority 1 areas – stronghold habitats, priority 2 areas – key habitat, priority 3 areas – restoration habitat, and priority areas 4 – juniper or annual grasslands. Another layer of this map should identify the location of water sources that can be used for fire suppression. It may be desirable to include the annual grassland layer and current fuel break layers on this map.

Develop a GIS layer depicting all wildfires by year. Hotlink this layer to a spreadsheet for each fire that includes data on the fire such as: acreage, date, fire conditions, pre-fire fuels, pre-fire

range assessment data, post-fire assessment, restoration efforts (date of restoration species, pure live seeding rate, method of seeding, soil conditions, follow-up monitoring, etc.), and other pertinent data/information.

These layers will be updated annually as necessary.

The LWG will report annually what conservation measures were taken (e.g. installing and maintaining fire danger signs along main access roads; public outreach, information and education programs relative to sagebrush ecosystems, fire risk mitigation, and fire ecology and related issues; media opportunities used to increase public awareness and understanding of fire-related risk during times of high to extreme fire danger and red flag conditions; work done with railroad companies to minimize wildfire ignitions; and the efforts by local enforcement of existing fire restrictions).

6. Human Disturbance

Develop a GIS map using the lek layer and the roads and trails layer and identify the leks where potential OHV disturbance may occur. Monitor these leks periodically for disturbance. Make this map available to livestock operators and construction and maintenance crews and discuss ways to minimize disturbance to lekking sage-grouse.

Include in the annual report the leks where OHV, maintenance activity, human activity associated with livestock management, or wildlife viewing/photography disturbance was observed.

7. Infrastructure Development

Annually report any new infrastructure development that was proposed or occurred on the Big Desert LWG area that year, what actions the LWG took to minimize impact on sage-grouse and habitat and the response of the developer to the actions taken by the LWG.

Annually report sage-grouse losses (power line mortalities, road mortalities, etc.), and disturbances to leks that were observed and/or reported during that year, and what actions the LWG took to mitigate these losses or disturbance.

8. Livestock Impacts

Update the following table annually as new data are collected and include it in the annual report.

Allotment	**Agency Responsible**	**Year evaluated**	**Method (see below)**	**Meeting sage-grouse habitat criteria (yes, no)? If no, is livestock a significant factor (yes, no)?**	**Comments (recovering from fire, inadequate sagebrush canopy, inadequate herbaceous understory, etc.**

Method description (describe what measurements were taken, and the sampling design.)

1.

2.

3.

(*Note:* It is assumed that the land management agency keeps a file of monitoring results of each individual allotment to provide a history of changes and actions taken for each allotment. However, if the land management agency responsible for the allotment does not keep a file of these monitoring results and actions then the LWG should develop and maintain a database of this data for each allotment.)

Report annually when livestock management actions were taken to address specific sage-grouse habitat concerns e.g. delayed turn-out date to improve sage-grouse nesting conditions, adjusted stocking rate or removed livestock early because of drought conditions, added additional water troughs to improve livestock distribution, changed salting location to address concern for sage-grouse nesting habitat, removed unneeded fence, built new fence to improve livestock distribution, etc.

9. Predation

The LWG should review annually trends in sage-grouse lek route counts and individual sage-grouse leks to determine if they indicate a downward trend based on 3-year running averages. If a downward trend is observed compare this trend to trends of nearby lek routes or leks to determine how widespread the downward trend is. If it is determined that the downward trend is isolated to specific lek routes or individual leks the LWG should review any changes in human disturbance, infrastructure development and habitat, e.g. a recent wildfire. If there has been a change in human disturbance, infrastructure or habitat the LWG should review alternatives to address these problems.

If no discernable changes in infrastructure or habitat are obvious the LWG should review the young:100 adult female ratio and percent successful hen data to determine if it has declined below 2.25 young:100 adult females and/or percent successful hen has dropped below 25%. If the ratio is below 2.25:100 adult female and/or successful hen percentage is below 25% the LWG should review the criteria listed in the sport hunting section of this plan to determine if predator control may be helpful in addressing the downward trend in lek counts.

Field personnel and livestock operators, when working in the area, should be observant of corvid nests on utility structures and report these to the LWG to discuss/recommend alterations of the structures with the utility owners.

10. Sport Hunting

The LWG should follow the guidelines presented in the Sport Hunting section of this plan when recommending sport-hunting seasons. However, if there have been significant changes in habitat, e.g. recent wildfire, infrastructure development, or West Nile Virus losses within the last 3 years the LWG should also take these factors into consideration when making season recommendations.

11. West Nile Virus

Annually report all sage-grouse mortality documented and/or suspected caused by West Nile virus, the extent of the mortality and the location of the mortality on the Big Desert LWG area and what action, if any, the LWG took to address the mortality.

12. *Climate Change*

Annual report will make note of any climate trends.

13. *Insecticides*

The LWG should report annually:

- Any sage-grouse mortality reported by farmers that may be attributed to insecticide use, what insecticides were applied and what actions were taken to address the mortality.
- All projects to develop alternative brood habitat or manage native habitat near agricultural fields to attract sage-grouse away from agricultural fields.
- Acreages treated and insecticides used to control Mormon cricket and rangeland grasshoppers.

14. *Seeded Perennial Grasslands*

Annually report the location and acreages that were reseeded/restored to native perennial forbs and/or sagebrush to improve sage-grouse habitat conditions, and the source(s) of funding to do the seeding. This report should also include follow-up monitoring of the results/effectiveness of the reseeding attempts in following years.

15. *Agricultural Expansion*

Annually report the location and acreage of any native lands converted to agriculture cropland and the location and acreage or any agricultural lands reseeded to perennial grassland or grassland-shrubs that can be either used for reserve livestock forage or sage-grouse habitat.

16. *Mines, Landfills, and Gravel Pits*

Annually report any new requests for mining operations, landfills, and gravel pits and actions taken and recommendations provided by the agency and/or LWG.

17. *Urban/exurban Development*

Annually report any actions taken and recommendations (e.g. conservation easements, land trusts, educational meetings, etc.) provided by the agencies and/or LWG to city and county planning and zoning committees, county commissioners, landowners, land developers relative to urban/exurban development.

VI. IMPLEMENTATION STRATEGY

# and Title of Conservation Measure	Responsible Party and/or Land Ownership Area	Timetable, Location, and/or Related Actions
Conservation Measures to Address Threats Associated with Annual Grasslands		
1. Identify and prioritize areas for restoration.	LWG, land management agencies, landowners, IDFG and other partners.	Ongoing; update annually. Based on proximity to stronghold and/or key habitat.
2. Restore identified sites.	Land management agencies, landowners.	As funding and logistics permit. Use native species where success is probable. Non-native seed could be used as an intermediate step.
3. Control and/or eradicate invasive species.	Land management agencies, landowners.	Ongoing where needed (including monitoring).
4. Use Certified weed-free seed in all seedings.	Land management agencies, landowners.	As project areas are identified and based on funding availability.
5. Require certified weed-free forage by permitted and casual users.	Land management agencies.	Update agency policy as necessary.
6. Consider enrolling in incentive or other programs to improve or enhance sage-grouse/sagebrush habitats.	Landowners, NRCS & FSA (from hereon shown as USDA)	Ongoing, based on available funds. See Conservation Plan narrative for further information on opportunities.
7. Utilize the best available science relative to seeding technology and plant materials.	Land management agencies, landowners.	Use tools such as USDA's "VegSpec" website on a site-by-site basis.
8. Design vegetation treatments in areas of high fire frequency.	Land management agencies, landowners.	Actions may include: fire-resistant or "green-strip" seedings, mowing vegetation along roadsides, grazing strategies, or other related measures.
9. Convert cheatgrass areas to perennials, or establish buffers of perennial species to reduce the risk of fire spread.	Land management agencies, landowners, railroad companies.	Where appropriate and feasible. Maintain fuelbreaks after establishment.
10. Require the washing of fire vehicles (including undercarriage)	Fire management agencies.	Prior to deployment and prior to demobilization from wildfire incidents.
11. Ensure annual grass restoration priority areas are incorporated into FMPs.	Land management agencies, landowners.	Annual updates of FMPs.
Conservation Measures to Address Threats Associated with Sagebrush Management		
1. Map sage-grouse seasonal habitats throughout the planning area.	LWG, Land management agencies, IDFG	By December 2009. Updated as needed.
2. Assure consideration of seasonal habitat characteristics.	Land management agencies, landowners, IDFG	Ongoing.
3. Avoid the use of prescribed fire, and other sagebrush reduction projects in certain areas.	Land management agencies, landowners.	In habitats that currently meet or are trending toward meeting breeding or winter habitat characteristics or in areas where sagebrush is limiting on the landscape.
4. Design habitat manipulation projects to achieve desired objectives.	Land management agencies, landowners, IDFG	Ongoing. See ISAC 2006 for further information on opportunities.
5. Monitor success of treatments	Land management agencies, landowners.	As soon as possible after treatment and periodically thereafter. Various monitoring protocols may pertain.

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6. Establish and maintain a proposed treatment/treated area database.	Land management agencies, landowners, IDFG, USDA	Ongoing, throughout the planning area. Willing landowners will be able to submit projects on private ground for inclusion in this database.
7. Take action to prevent further spread of invasive species following treatments	Land management agencies, landowners.	In habitats prone to the expansion of three-tip sagebrush, cheatgrass or other invasives. In many if not most cases, this will likely require chemical treatments and reseeding.
8. Consider chemical control to lessen three-tip sagebrush expansion.	Land management agencies, landowners.	Ongoing, throughout the planning area.
9. Follow chemical control of three-tip sagebrush with planting of sagebrush seedings as soon as possible.	Land management agencies, landowners.	Ongoing, throughout the planning area.
10. Plan, execute and monitor prescribed fire in a manner that provides for adequate control and provision for contingency resources.	Land management agencies, landowners.	Ongoing, throughout the planning area. Burn plans will be approved before project implementation.
11. Ensure burn plans address the importance of preventing escaped fires.	Land management agencies, landowners.	Throughout the planning area, but especially when prescribed fires are planned in the vicinity of stronghold and key habitat.
Conservation Measures to Address Threats Associated with Wildfire		
1. Identify and prioritize areas most conducive for restoration to perennial species.	LWG, land management agencies	Coordinate closely with USGS Snake River Field Station, GBRI, Universities, local partners, BLM emergency stabilization and rehabilitation planning processes, and IDFG, as appropriate
2. Consider an incremental or “buffer” approach, (i.e., green stripping) to protect existing intact habitat.	Land management agencies	Where funding and logistical factors permit, create fire-resistant “buffers” by progressively converting broad bands of annual grasslands to perennial species.
3. Employ fire suppression tactics that minimize the average size of unplanned fires.	Land management and/or fire management agencies	In situations where human safety or property will not be compromised or threatened. In the event of multiple fire starts, suppression priority will be as outlined by specific FMU for the FMP.
4. Ensure that a knowledgeable field level Resource Advisor is available for any “extended attack” fire (>300 acres in size).	BLM and Idaho Department of Lands line officers	Availability by phone or “on-call” is appropriate in some circumstances, such as during times of low fire danger. During times of high or extreme fire danger, red flag, or other similar conditions, resource advisors should be field-ready on short notice.
5. Suppress fires and hotspots in unburned sagebrush areas.	Fire management personnel	If doing so will not compromise fire crew safety, poses little risk of escape, and to the extent that resources allow.
6. Make use of private landowners, permittees, and other available local resources as can be done safely and appropriately.	Fire management personnel	Discuss with landowners what water sources are available and what actions can be taken concerning their private lands to aid in overall suppression and control efforts.
7. Deploy the appropriate pre-identified appropriate management response as soon as possible to minimize loss of habitat to fire and to reduce the scale of subsequent ESR efforts. .	Fire management agencies and operations personnel	Throughout the planning area, but especially when fires threaten or occur within sage-grouse stronghold habitats.
8. Burn-out/backfiring operations should be conducted in a manner that minimizes the loss of sagebrush.	Fire management personnel	When "islands" or large blocks of sagebrush could be saved without endangering fire suppression personnel.
9. Use post-fire After Action Reviews and/or evaluations	Fire management agencies and operations personnel, IDFG.	On fires that are large enough and/or intense enough to have adversely affected sage-grouse habitat.

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10. Re-assess priorities and opportunities through updates of Fire Management Plans (FMPs).	Land management agencies, landowners, IDFG.	Annually. Incorporate the conservation measures outlined in this plan, particularly identifying the appropriate management response in FMUs where stronghold and key habitat exist.
11. Update the Idaho Sage-grouse Habitat Planning Map and incorporate it into the FMPs.	Land management agencies, landowners, IDFG.	Annually.
12. Explore creative options for the establishment of water supply sources.	LWG, land management agencies, landowners, grazing permittees.	In areas of limited water availability and/or remote locations. See ISAC 2006 for further information on opportunities.
13. Consider staging initial attack resources in high fire incident areas to ensure quicker initial attack response times in remote areas.	Fire management agencies (including cities/counties)	Where feasible, throughout and near the planning area.
14. Employ pre-suppression tactics, public education and vegetation treatments to minimize or reduce the risk of the escape of human-caused fire.	Fire management agencies (including cities/counties)	At the wildland-urban interface bordering rangelands, and as opportunities for education become available.
15. Strategically place pre-treated strips/areas to provide fuel breaks as an aid to controlling wildfire and reducing the block size damaged by wildfire.	LWG, land management agencies.	The ability to implement these practices will depend upon the availability of annual funding, therefore, areas to be treated should be prioritized by the LWG according to proximity to key/critical sage-grouse habitats.
16. Identify and maintain strategic roads to allow for more rapid suppression response.	LWG, land management agencies, counties, private landowners.	Ongoing as funding allows. Coordinate among entities.
17. Identify and list private water sources in agency records for the use of assigned resource advisors and other personnel as fires occur.	Landowners, grazing permittees, land management agencies.	Ongoing. Can be discussed in yearly grazing permittee meetings
18. Provide annual training for all personnel to include awareness of issues and potential impacts of suppression activities in sage-grouse habitats and for other resource issues of management concern.	Land management agencies and local government agencies.	Ongoing, as needed, and as new personnel come onboard.
19. Increase public awareness of fire danger by installing and maintaining additional fire danger signs along main access roads.	Local governments and land management agencies	Ongoing, where needed.
20. Increase public outreach, information, and education related to sagebrush ecosystems, fire risk mitigation, fire ecology and related issues.	LWG, all agencies, outreach groups.	Ongoing. Examples include. media interviews and articles (especially during times of high to extreme fire danger and red flag conditions), presentations to schools and civic organizations, brochures or similar efforts.
21. Utilize the media to increase public awareness of wildfire danger during critical time periods.	Land management agencies	Yearly, when "red flag" or extreme fire conditions exist.

# and Title of Conservation Measure	Responsible Party and/or Land Ownership Area	Timetable, Location, and/or Related Actions
22. Work closely with railroad companies to minimize wildfire ignitions, improve suppression response (where needed), and to manage fuels/invasives within railroad rights-of-way.	Land management agencies, landowners	Ongoing, where needed.
23. Support enforcement of restrictions or closures and related measures	Land management and law enforcement agencies, LWG, IDFG.	(1) In accordance with the High Fire Danger Closure and Restriction Plan. (2) Promote practices that discourage or limit firelines (e.g., dozer lines or other trails created by equipment) from being converted to 2-track roads or OHV/ATV trails.
24. Promote practices that discourage or limit firelines (e.g., dozer lines or other trails created by equipment) from being converted to 2-track roads or OHV/ATV trails.	Land management agencies, landowners	Ongoing, where needed
25. Assess pre-burn vegetation to determine plant species composition/diversity. Consider/evaluate fire severity.	Land management agencies	via mapping, fuels/vegetation surveys or allotment monitoring records. Gather other data where available and feasible. Acquire satellite or aerial imagery of the burn to help estimate the extent of burned and unburned areas, including islands.
26. Evaluate unburned islands and the areas adjacent to burned areas.	Land management agencies	To help predict plant species composition and diversity within the burned area, in the absence of information for areas directly affected by the burn.
27. When necessary, rehabilitate areas using the proper sagebrush species.	Land management agencies	Determine the need from pre-burn and post-burn info, and a site potential analysis.
28. Use fire rehabilitation funds to address concerns about the expansion of three-tip sagebrush into big sagebrush communities.	Land management agencies, landowners	Ongoing, where needed. Consider chemical, mechanical, and biological methods to ensure re-establishment of big sagebrush.
29. Ensure that sage-grouse habitat considerations are incorporated into restoration and burned area rehabilitation plans.	LWG, land management agencies, IDFG.	Where needed, and particularly in or near stronghold, key and isolated habitats.
30. Emphasize the use of native plant materials to the greatest extent possible. Seeds should be certified weed free.	LWG, land management agencies, landowners	As appropriate for present site conditions; as available and if deemed best for all resource concerns (soil protection, success of establishment, etc.)
31. Use proper site-preparation techniques, seeding techniques, and seed mixes in designing restoration and burned area rehabilitation plans.	Land management agencies, landowners	The restoration of annual grasslands may require preparatory chemical treatments and/or an exotic/native seed mix. Perennial grasslands (existing seedings or native) may require seeding or planting of sagebrush.
32. When planting or reseeding sagebrush, favor the sagebrush species, subspecies, that are appropriate for the ecological site. Source identified seed is preferable.	Land management agencies, landowners	To maximize the likelihood of establishment, consider multiple approaches, such as aerial seeding, ground broadcast seeding with harrow or roller, and planting of seedlings in strategic patches or strips. Avoid seeding sagebrush or other shrubs near road margins if the road and road margin might otherwise serve as a fuel break in the event of future fires.
33. Recognize the need to sometimes use exotic perennial grasses and forbs in restoration.	Land management agencies, landowners	use species whose growth form, forage value, and phenology would meet objectives.
34. Provide for noxious weed control	Land management agencies and CWMAs	Ongoing, as needed in burned area rehabilitation projects.

# and Title of Conservation Measure	Responsible Party and/or Land Ownership Area	Timetable, Location, and/or Related Actions
Conservation Measures to Address Threats Associated with Human Disturbances		
1. Limit recreational OHV use to existing designated roads and trails	Land management agencies, landowners	Implement through agency travel planning decisions, and posting of private lands. Consider a "closed unless posted open" approach where appropriate.
2. Discourage the creation of new roads and trails in sage-grouse breeding or winter habitat.	Land management agencies, landowners	Implement through agency travel planning decisions, and posting of private lands.
3. Apply use-restrictions where needed and appropriate, to minimize nonessential recreational OHV activity between 6:00 PM to 9:00 AM.	Land management agencies.	In general this guideline should be applied from approximately March 15 through May 1 in lower elevation habitats and March 25 through May 15 in higher elevation habitats, where OHV or vehicular disturbance is a problem.
4. Work collaboratively with recreational OHV user groups to increase awareness of the potential adverse impacts of OHVs.	Land management agencies, IDFG	Ongoing.
5. Foster further communication and collaboration between the military, land management agencies and landowners.	LWG, IDFG; land management agencies; landowners	Ongoing
6. Avoid human activities near leks from approximately 6:00 PM to 9:00 AM.	Land management agencies; landowners	In general this guideline should be applied from approximately March 15 through May 1 in lower elevation habitats and March 25 through May 15 in higher elevation habitats.
7. The viewing of sage-grouse on leks should be conducted so that disturbance to birds is minimized or eliminated.	Land management agencies	Limit the use of blinds for photography at leks to outside of peak breeding activity, as determined locally.
8. Consider designating 1-3 lek locations for public viewing. Other alternatives might include establishing one or more seasonal blinds for public use,	Land management agencies, IDFG	Utilize agency staff or trained volunteers to guide viewers to selected leks during designated times, and limit close-up viewing/photography of selected leks to the latter portion of the breeding season after most breeding has occurred.
9. Camping on occupied leks should not be allowed in order to eliminate sustained disturbance.	Land management agencies	Public education and signing of roads near the leks.
10. Improve the dissemination of information in order to increase understanding of sage-grouse and sagebrush steppe conservation issues.	IDFG, LWG, land management agencies	Literature and brochures, classes, group meetings, media releases.
11. Monitor leks in a manner that minimizes disturbance to sage-grouse.	IDFG, land management agencies, volunteers	Update and follow lek count procedure.
Conservation Measures to Address Threats Associated with Infrastructure Development		
1. Human activities that result in, or will likely result in, disturbance to lekking birds should be avoided from approximately 6:00 PM to 9:00 AM.	Utility companies, IDFG, land management agencies and landowners	In general, this guideline should be applied from approximately March 15 to May 1, in lower elevations; and March 25 to May 15, in higher elevations. At or near (1 km or 0.6 miles) occupied leks
2. Use of guy-wires on towers should be avoided.	Utility companies, land management agencies	Stipulation of permitted actions.

# and Title of Conservation Measure	Responsible Party and/or Land Ownership Area	Timetable, Location, and/or Related Actions
3. LWGs and/or land-management agencies should work closely with power companies and related entities in assessing problem areas and developing creative solutions.	LWG, IDFG, land management agencies, utility companies	Ongoing, as needed. Where existing utility lines are known to be causing adverse impacts locally, or where such impacts are likely.
4. New above ground major power transmission lines should be sited in a manner that avoids sage-grouse habitat to the extent possible, or they should be buried.	Land management agencies, utility companies	Permitted project requirements. Mitigation stipulations when conservation measure, as stated, is not feasible.
5. New, smaller power distribution lines, or similar structures (e.g., telephone lines, communications towers) should be buried (as appropriate) or sited as far as possible from occupied leks and other important sage-grouse seasonal habitats	Land management agencies, utility companies	Preferably at least 3.2 km (~2 miles) away, or as determined locally. Follow permitted project requirements. Mitigation stipulations when conservation measure, as stated, is not feasible.
6. The placement of raptor perch deterrents should be considered on a site-specific basis.	Land management agencies, utility companies	In areas where population impacts from raptors or ravens is likely or is a documented problem. Areas that may be of particular concern include fragmented habitats with high raptor and/or raven activity.
7. Ensure access roads, rights-of-ways and disturbed areas associated with facilities are managed in a manner that restores disturbed areas to perennial vegetative cover.	LWG, land management agencies, utility companies, landowners.	Coordinate with land-management agencies and others in selecting the most appropriate plant species. Consider the use of fire-resistant species in high fire-frequency/ cheatgrass areas. Encourage companies to participate in Coordinated Weed Management Areas. LWGs may be of assistance in helping to identify particular problem areas.
8. Avoid locating wind turbines and related infrastructure in known sage-grouse areas.	Land management agencies, LWG, landowners, wind energy companies, IDFG	To the extent possible on a case-by case basis. Consider movement corridors, migration pathways or areas where sage-grouse are highly concentrated (e.g., wintering areas).
9. Avoid fragmenting large, contiguous tracts of sage-grouse habitat.	Land management agencies, LWG, landowners, wind energy companies	Where practical, select fragmented or degraded habitats for development, rather than relatively intact areas.
10. Ensure that new public trails, roads, and highways avoid or skirt areas of key or stronghold habitat (including restoration areas intended to become key/stronghold in the future) to the extent feasible.	LWG, Land management agencies, landowners. ITD	Coordination as needed.
11. Work collaboratively with the appropriate agency(ies) to develop measures to reduce the risk of road-related mortalities of sage-grouse.	LWG, Land management agencies, landowners. ITD, IDFG	Consider speed limits, brush control, signing, and public education.
12. Reduce the risk of vehicle or human-caused wildfires, and spread of invasives, by planting perennial vegetation (e.g. green-strips) paralleling road rights-of-way.	Land management agencies	Ongoing, on a case-by case basis depending on fire risk, vehicle activity, vegetation type, importance of the area, or other factors.
13. Employ seasonal closures, permanent closures, rerouting of existing roads/trails or other measures	Land management agencies	As deemed appropriate

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14. Work with the railroad companies and private landowners to reduce or control invasive plants along railroad rights-of way.	Land management agencies, landowners, railroads	Ongoing, as appropriate
15. Manage fuels along railroad rights-of-way to reduce fire risk.	Land management agencies, landowners, railroads	As deemed appropriate. Where cheatgrass or other vegetation presents a high-fire risk, replace with suitable perennial species.
16. Locate new oil or gas pipelines and related facilities away from occupied leks or place along existing corridors to the extent possible.	Oil/gas companies, land management agencies, LWG, landowners	Ongoing, to the extent possible on a case-by case basis. Work together to find creative solutions. Site as far away as possible (preferably at least 3.2 kilometers/2 miles)
17. Reduce or control invasive plants along pipeline rights-of-way and access roads. This will include ensuring that disturbed areas are seeded to an appropriate perennial seed mix.	Oil/gas companies, land management agencies, landowners	Ongoing, where needed.
18. Avoid placing wind turbines and related infrastructure in breeding or winter habitat.	Land management agencies, LWG, landowners, wind energy companies, IDFG	To the extent possible on a case-by case basis. If turbines must be sited within breeding habitat, avoid placing turbines within five miles of occupied leks where feasible.
19. Minimize perching and nesting sites for use by raptors and ravens.	Land management agencies, wind energy companies	Require tubular supports with pointed tops rather than lattice supports to minimize bird (raptor, raven) perching and nesting opportunities. Avoid placing external ladders and platforms on tubular towers.
20. Avoid the use of guy wires or mark with recommended bird deterrent devices.	Land management agencies, wind energy companies	Require where feasible in new construction, and where appropriate for existing structures.
21. Place electric power lines underground or on the surface as insulated, shielded wire to avoid electrocution (and collisions) of birds.	Land management agencies, wind energy companies	Where feasible.
22. Mitigate impacts to offset unavoidable alteration and losses of sage-grouse habitat.	Land management agencies, wind energy companies	Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.
23. Monitor sage-grouse populations and habitat to complement the existing knowledge of impacts and to help in the design of future conservation measures.	Land management agencies, wind energy companies, IDFG	Where wind energy development within sage-grouse habitat is unavoidable. Monitor (a) for at least 3 years before project construction; (b) during construction, and (c) for at least 3 years after construction is completed and implementation has begun,
Conservation Measures to Address Threats Associated with Livestock Impacts		
1. Use established scientifically-based agency protocols and procedures for evaluating rangeland health and sage-grouse habitats.	Land management agencies, landowners, livestock operators	Ongoing, throughout the planning area.
2. Continue and/or establish specific habitat objectives and implement effective grazing management practices and/or vegetative manipulation.	Land management agencies, landowners, livestock operators	Ongoing, where appropriate.
3. Secure funding sources to provide private landowners with incentives to achieve sage-grouse habitat objectives.	LWG, landowners, USDA	When and where appropriate.

# and Title of Conservation Measure	Responsible Party and/or Land Ownership Area	Timetable, Location, and/or Related Actions
4. Design and implement grazing management systems that maintain or enhance herbaceous understory cover, height, and species diversity that occurs during the spring nesting season.	Land management agencies, landowners, livestock operators	Take into account site potential, and if current livestock grazing practices are limiting nesting habitat quality and/or quantity. Where appropriate, consider and employ (singly or in combination) various management actions or strategies.
5. Livestock operators will be notified of lek locations and encouraged to avoid leks during breeding season when trailing, bedding, salting, or watering livestock.	IDFG, land management agencies, landowners, livestock operators	Yearly (mid-March through mid-to-late-May) where necessary. If marking sites is appropriate, careful consideration should be made in determining what kind of site marker will be used.
6. Manage allotments using grazing management techniques that promote and maintain a diversity of desirable annual and perennial forbs	Land management agencies, landowners, livestock operators	Based on site potential for forb composition. Where appropriate, consider and employ (singly or in combination) various management actions or strategies.
7. Adjust livestock use (utilization, stocking, intensity, and/or duration) during drought to minimize the additional stress placed on herbaceous species.	Land management agencies, landowners, livestock operators	When considering reducing utilization, stocking rates or duration, work closely with permittees to provide viable forage alternatives.
8. Appropriately use salt or mineral supplements in relation to sage-grouse habitat.	Land management agencies, landowners, livestock operators	When using salt or mineral supplements: a) place them in existing disturbed sites, areas with reduced or excessive sagebrush cover, seedings, or cheatgrass sites (for example) to reduce impacts to sage-grouse breeding habitat, b) where feasible, use salts or mineral supplements to improve management of livestock for the benefit of sage-grouse habitat.
9. Determine which fences may pose the greatest risk for collision mortality.	Land management agencies, landowners, LWG	Use existing knowledge, allotment/pasture maps and lek distribution maps. Some fences may need to be relocated or removed.
10. Mitigate impacts of existing fences.	Land management agencies, landowners	Where significant sage-grouse mortality is documented. Such actions might include marking with permanent flagging or other suitable means, relocation or removal.
11. Placement of new fences and structures should include consideration of their impact on sage-grouse.	Land management agencies, landowners	In general, avoid constructing new fences within 1 km (0.6 mi) of occupied leks. Where feasible, place new structures as far as possible from occupied leks to reduce opportunities for perching raptors. Careful consideration, based on local conditions, should also be given to the placement of new fences or structures near other important seasonal habitats (winter-use areas, movement corridors etc.) in order to reduce potential impacts.
12. New spring developments should be designed to maintain or enhance the free-flowing characteristics of the water source.	Land management agencies, landowners, NRCS	by the use of float valves on troughs or other features where feasible. Retrofit existing water developments during normal maintenance activities.
13. Fit troughs and storage tanks with ramps to facilitate the use of and escape by sage-grouse and other wildlife.	Land management agencies, landowners	Do not use floating boards or similar objects, as these are too unstable and are ineffective. See Wildlife Watering and Escape Ramps on Livestock Water Developments (Sherrets 1989) for suggestions for ramp designs.
14. Choose sites and designs for water developments that will provide the greatest enhancement for sage-grouse and sage-grouse habitat, and help secure funding for implementation.	LWG, land management agencies, landowners, IDFG, NRCS	When placing new water developments in sage-grouse breeding and/or brood-rearing habitat.
15. Avoid placing water developments into higher quality native breeding/early brood habitats that have not had significant prior grazing use.	Land management agencies, landowners, IDFG, NRCS	Ongoing consideration, identification of areas. Analyze (NEPA) possible impacts when a project is proposed.

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16. Establish strategically located forage reserves, which might also serve as fuel breaks depending on location and configuration.	Land management agencies, landowners, NRCS	When and where feasible. focus on areas unsuitable for sage-grouse habitat restoration, or lower priority habitat restoration areas. Work with ranchers to determine the site feasibility and palatability of seedings considered for forage reserves.
17. Evaluate each rehabilitation/restoration site prior to grazing turnout.	Land management agencies, landowners, livestock operators	Ongoing, on a site-by-site basis.
18. Identify and utilize economic incentive programs to assist private landowners in implementation of appropriate sage-grouse habitat conservation actions on private lands.	LWG, land management agencies, landowners, USDA, USFWS, IDFG, OSC	Ongoing, where appropriate.
Conservation Measures to Address Threats Associated with Predation		
1. Take actions to correct habitat deficiencies for the long-term or consider predator control for at risk or isolated populations as a short-term measure.	LWG, APHIS, land management agencies, landowners, IDFG	If excessive predation is the result of poor habitat. No specific predator control actions have been identified at this time.
2. Document problem areas and develop suitable solutions and/or design and site new structures/developments to minimize predator effects.	LWG, APHIS, utility companies, local governments, land management agencies, landowners, IDFG	If excessive predation is the result of artificial structures. No specific predator control actions have been identified at this time. New structures and developments will have mitigation measures applied.
3. Eliminate factors contributing to artificially high predator populations and/or cooperate with Wildlife Services and IDFG in designing and implementing appropriate control measures.	IDFG, LWG, APHIS, local governments, land management agencies, landowners.	Ideally, such efforts should include monitoring that provides comparisons of habitat conditions and predator-species compositions between treatment and control (non-treatment) area(s). No specific predator control actions have been identified at this time.
Conservation Measures to Address Threats Associated with Sport Hunting (including Falconry)		
1. Require a special permit to hunt sage-grouse in Idaho to allow for efficient identification and sampling of sage-grouse hunters.	IDFG	As necessary
2. Conduct an annual telephone survey in order to contact adequate numbers of sage-grouse hunters to allow for reliable statewide and local harvest estimates.	IDFG	Annually, as funding is available.
3. Collect, analyze, and report hunter data specific to the Big Desert Sage-grouse Planning Area.	IDFG, LWG	Ongoing
4. Evaluate accuracy of current harvest estimate data and implement needed changes.	IDFG	Ongoing

# and Title of Conservation Measure	Responsible Party and/or Land Ownership Area	Timetable, Location, and/or Related Actions
5. Consider the feasibility and potential value of implementing a permit system with mandatory reporting by all hunters.	IDFG	As appropriate
6. Conduct opening weekend hunter check stations in the SGPA to collect harvest information and wings from harvested birds.	IDFG	Annually, at strategic locations
7. Place wing barrels to increase the sample of wings from harvested birds.	IDFG	Annually, at strategic locations
8. Provide wing envelopes to all Idaho sage-grouse hunters at the time they purchase their sage-grouse validation to increase the number of wings collected from harvested birds.	IDFG	Annually, before the hunting season.
9. Analyze all sage-grouse wings collected to determine age, sex, and molt pattern of harvested birds.	IDFG	Annually
10. Analyze existing wing data to determine the differences in sex and age of the harvest during the opening weekend, compared to later in the season.	IDFG	Annually. Summarize long-term trends.
11. Identify sage-grouse populations where overharvest is a risk.	IDFG, LWG	Consider whether the problem is (1) isolated or fragmented habitat, or (2) small numbers of birds. Develop appropriate hunting season recommendations.
12. Follow the guidelines (outlined in the Statewide Plan) by the Idaho Fish and Game Department when making sage-grouse season recommendations to the Idaho Fish and Game Commission.	IDFG, LWG	Annually
Conservation Measures to Address Threats Associated with West Nile Virus		
1. Continue cooperating with regional and state-level WNV monitoring and/or surveillance efforts.	IDFG, APHIS	Ongoing
2. Work with the counties, land owners, and land managers to eliminate mosquito sources.	LWG, IDFG, APHIS, local governments, land management agencies, landowners	As necessary (If WNV is detected among sage-grouse populations in the Big Desert SGPA). Approved eradication procedures will be followed.
Conservation Measures to Address Threats Associated with Climate Change		
1. Inform constituents of the seriousness of global climate change expectations.	LWG, IDFG, land management agencies	Ongoing education opportunities
2. Avoid degradation of current vegetation communities.	Land management agencies, landowners	Ongoing management, incorporating needed modifications.
3. Adjust resource use in periods of unusual climatic events.	Land management agencies, Landowners, livestock operators, resource users	Periodically as evident and necessary.

# and Title of Conservation Measure	Responsible Party and/or Land Ownership Area	Timetable, Location, and/or Related Actions
4. Focus management of rangelands on restoration and resiliency of the vegetative resource.	Land management agencies, landowners, livestock operators, resource users	Ongoing management, incorporating needed modifications. Individual site evaluation and appropriate restoration.
5. Increase knowledge and awareness of invasive species problems on native ecosystems.	CWMA, LWG, IDFG, land management agencies	Ongoing education opportunities, group meetings, field trips.
6. Reduce impacts of land uses that increase the rate of spread of invasive species.	Land management agencies, Landowners, livestock operators, resource users	Ongoing management, incorporating needed modifications.
7. Maintain biotic soil crusts (where appropriate), improve or maintain high vigor of native vegetation.	Land management agencies, landowners, livestock operators.	Ongoing management, incorporating needed modifications. Reduce grazing use during certain periods.
8. Consider integrated weed management practices (including targeted grazing) to control or eliminate invasive species.	CWMA, land management agencies, landowners. livestock operators, NRCS	Analyze each site and condition, and implement appropriate action.
9. Increase the pace of active control/elimination of invasive species in situations where other management is not effective.	CWMA, land management agencies, landowners. livestock operators, resource users, NRCS	Analyze each site and condition, and implement appropriate action.
10. Include seed from the warmer part of a species' range in mixes that are used to restore degraded sites.	IDFG, land management agencies, landowners, NRCS	When and where rehabilitation/restoration actions are deemed necessary.
11. Include Wyoming big sagebrush seed in mixes for drier/warmer areas.	IDFG, land management agencies, landowners, NRCS	Consider using alternative approaches to improve the likelihood of establishment, such as hand-planting seedlings, imprinters or other tools.
12. Use local native seed stock where deemed effective to reseed disturbed areas.	IDFG, USDA, land management agencies, landowners, NRCS	Where feasible and desirable. Non-native seed is appropriate where natives do not have a good chance of establishment and the non-natives would act as a placeholder or provide an intermediate step.
13. Anticipate impacts of climate change on biological control agents and potential for problems to native species.	IDFG, land management agencies, landowners, NRCS	Ongoing and as new information becomes available.
14. Understand the capability of ecosystems and implement appropriate resource management.	Academia, USDA, land management agencies, LWG and other groups.	Keep abreast of research results and recommendations. Continue to use and update ecological site information and mapping. Implement adaptive management.
15. Include ISU/INL long-term study data in annual reports.	IDFG, LWG	Annually, as data is available
Conservation Measures to Address Threats Associated with Insecticides		
1. Avoid the use of organophosphates on fields utilized by sage-grouse, or allow for suitable treatment buffers around field edges.	USDA, Landowners, IDFG	Incentive or enhancement payments to offset economic impacts to farmers may be available through USDA programs. Farmers/landowners are encouraged to discuss options with their local USDA District Conservationist.
2. Develop strategies to protect crops near sage-grouse habitat from insects, thus minimizing the use of insecticides.	USDA, APHIS, landowners, IDFG	Planting the outside field borders with certain plants that attract, repel or control insects may be feasible.

# and Title of Conservation Measure	Responsible Party and/or Land Ownership Area	Timetable, Location, and/or Related Actions
3. Manage nearby native habitats to be more attractive to sage-grouse and broods.	IDFG, land management agencies, landowners, NRCS	When appropriate, and where the opportunity presents itself.
4. Inform people of the concerns with insecticide use, and work to reduce adverse impacts to sage-grouse.	LWGs, Cooperative Extension agents, USDA, IDFG, NAGP and other partners	LWG meetings and other meetings and educational opportunities
5. Collaborate to ensure annual control efforts for Mormon Crickets and grasshoppers focus on key problem areas,	LWG, land management agencies, landowners, IDFG, IDA, APHIS	Better delineate treatment avoidance areas, determine the treatment of least risk to sage-grouse, and monitor results.
Conservation Measures to Address Threats Associated with Seeded Perennial Grasslands		
1. Work cooperatively to identify options, schedules and funding opportunities for re-establishing sagebrush in higher priority areas.	LWG, IDFG, USDA, Land management agencies, Landowners, NRCS	Identify and prioritize perennial grasslands (exotic versus native) where plant species diversity or sagebrush is limiting on the landscape. Consider interseeding, etc.
2. When seeding sagebrush, use source-identified, tested seed adapted to local conditions.	IDFG, Land management agencies, Landowners	Ongoing policy as first priority.
3. Consider using one of the various approaches identified in Monsen et al. 2004 for restoring sagebrush.	IDFG, Land management agencies, Landowners	Where and when sagebrush seeding is deemed necessary, use these methods as appropriate and as equipment is available, and based on soil type and soil moisture. Adopt new methods as they become accepted.
4. Transplant sagebrush into strategic patches or strips and/or scalp spots or strips to reduce grass competition.	IDFG, Land management agencies, Landowners	In established stands of introduced perennial grasses; in critical sites or throughout the area.
5. Where the diversification of existing seedings is desired, consider and implement the 3-step process outlined by Pellant and Lysne (2005).	IDFG, Land management agencies, Landowners, NRCS	When and where applicable. Consider the use of livestock, chemical, and appropriate mechanical means. Follow up with suitable effectiveness monitoring to document success of the treatments relative to project objectives.
6. Use fire rehabilitation funds to address concerns about the expansion of three-tip sagebrush into big sagebrush communities.	Land management agencies	Consider chemical, mechanical, and biological methods to ensure re-establishment of forbs.
7. Enroll in incentive programs as related to sage-grouse/sagebrush habitats.	USDA, USFWS, Landowners	Programs that may provide some opportunities include the CSP, WHIP, and EQIP programs administered by USDA; Idaho Office of Species Conservation (OSC) project grants; and the North American Grouse Partnership's (NAGP) Grouse Habitat Restoration Fund.
Conservation Measures to Address Threats Associated with Agricultural Expansion		
1. Utilize incentive programs to recover habitat for sage-grouse.	Landowners, USDA	Where feasible.
2. Avoid the creation of additional cultivated cropland.	Landowners, NRCS	Throughout the planning area, but especially in areas of key habitat or potential restoration areas.
3. Identify and prioritize parcels available for purchase or exchange that could be restored to perennial grasses, forbs and shrubs.	LWG, IDFG, landowners, land management agencies, land trusts	Where there are willing landowners.

# and Title of Conservation Measure	Responsible Party and/or Land Ownership Area	Timetable, Location, and/or Related Actions
4. Identify options for lands on the Snake River Plain recently withdrawn from irrigation. Options may exist for collaboratively funded restoration projects or development of forage reserves.	LWG, IDFG, landowners, land management agencies, NRCS	In conjunction with willing landowners.
5. Off-site mitigation should be employed to offset unavoidable alteration and losses of sage-grouse habitat.	IDFG, landowners, land management agencies, NRCS	Where opportunities allow (incentives, partnerships, willing landowner, etc.). Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.
Conservation Measures (Possible Permit Requirements) to Address Threats Associated with Mines, Landfills, and Gravel Pits		
1. Discourage the establishment of new mines, landfills or gravel pits within sage-grouse breeding or winter habitat.	Local governments, landowners, land management agencies	Where possible, avoid occupied leks by at least 3.2 km (2 miles) (adopted from Connelly et al. 2000b, and Stinson et al. 2004).
2. Ensure that reclamation plans incorporate the appropriate seed mix and seeding technology to restore suitable breeding habitat characteristics.	Local governments, landowners, land management agencies	If the placement of new mines, gravel pits, and landfills in or near breeding habitat is unavoidable.
3. Ensure that adequate measures are implemented to control invasive plant species.	Local governments, landowners, land management agencies	During activities associated with the exploration, operation, and maintenance of mines, gravel pits, or landfills.
4. Ensure adequate weed control measures are implemented	Local governments, landowners, land management agencies	During the life of the operation, and implementation of the subsequent reclamation plan.
5. Off-site mitigation should be employed to offset unavoidable alteration and losses of sage-grouse habitat.	IDFG, local governments, landowners, land management agencies	Where opportunities allow (incentives, partnerships, willing landowner, etc.). Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.
6. Apply seasonal-use restrictions on activities associated with the exploration, operations, and maintenance of mines, gravel pits, or landfills.	Local governments, landowners, land management agencies	As applicable for the site, and after considering possible impact to sage-grouse if the action is not taken.
Conservation Measures to Address Threats Associated with Urban/Exurban Development		
1. Work with county and city zoning and planners to avoid developing important sagebrush habitat.	IDFG, local governments, landowners, land management agencies, LWG	Coordination meetings, planning efforts
2. Educate landowners and developers to values of sagebrush habitat.	IDFG, land management agencies, NRCS, LWG	Ongoing education opportunities, group meetings, field trips.
3. Acquire easements when owners are willing to negotiate conservation agreements.	IDFG, landowners, land management agencies, land trusts, LWG	Ongoing efforts and through seeking new opportunities.
4. Acquire habitat where there are willing sellers and when it provides the best option to protect and/or restore important habitats:	Land trusts, IDFG, landowners, land management agencies	Identify important parcels of habitat; • Work with landowners to identify willing sellers. Use existing funding sources for acquisition.

# and Title of Conservation Measure	Responsible Party and/or Land Ownership Area	Timetable, Location, and/or Related Actions
5. Protect wildland areas from wildfire originating on private lands, infrastructure corridors and recreation areas.	Local fire districts, landowners, land management agencies	Agreements, coordination efforts, updated Fire Management Planning.
6. Off-site mitigation should be employed to offset unavoidable alteration and losses of sage-grouse habitat.	IDFG, local governments, landowners, land management agencies	Where opportunities allow (incentives, partnerships, willing landowner, etc.). Off-site mitigation should focus on acquiring, restoring, or improving habitat within or adjacent to occupied habitats and ideally should be designed to complement local sage-grouse conservation priorities.

VII. ADAPTIVE MANAGEMENT

The Big Desert LWG was originally convened by the Idaho Department of Fish and Game. The LWG will continue to meet for the foreseeable future. After completing its Plan, the LWG will meet periodically to monitor sage-grouse populations and habitat and to monitor implementation of the overall Conservation Plan as well as any conservation projects conducted within the Planning Area. In addition, the LWG can be convened for special objectives on an as needed basis. Meetings can be scheduled in response to the request of any Core Group member (individual who participated in the development of the Conservation Plan).

All future meetings will be facilitated by a trained, neutral group process facilitator. The Big Desert LWG will continue to work collaboratively for the foreseeable future. This means that all decisions to make changes to the Plan must be approved by consensus. Consensus is defined as all understand, agree with, and will support the decision.

Meetings will be announced by e-mail and hard copy mailing to the entire mailing list no later than two weeks in advance of the meeting. Meeting locations will typically be the Bingham County Senior Citizens Center in Blackfoot, Idaho.

The LWG recognizes that it will be necessary to modify the Plan on occasion in the future to address new research findings, changes in funding, changes in agency directives, and any changes in the legal status of sage-grouse. Accordingly, the LWG has established a mechanism for amending its Plan.

Any proposed changes to the Plan must be considered and approved at an announced meeting of the LWG. Announcements for Big Desert LWG meetings must be distributed to the current mailing list no less than two weeks in advance of the meeting. Proposed changes to the Plan must be distributed to all individuals on the mailing list along with the meeting announcement.

In the event that the members of the LWG are not able to reach consensus on a proposed change to the Plan, a subsequent meeting will be announced to the entire mailing list for a second attempt at consensus to adopt the proposed change. If consensus cannot be achieved by the end of the second scheduled meeting of the full LWG to adopt the proposed change, then the Plan will not be changed.

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APPENDIX B. BIG DESERT SAGE-GROUSE LOCAL WORKING GROUP'S WORKING CHARTER

I. Background

In July 2006, the Idaho Sage-Grouse Advisory Committee completed the ***Conservation Plan for Greater Sage-Grouse in Idaho***. The Conservation Plan was signed by Governor Jim Risch, Bud Cribley (Acting Idaho State Director for the Bureau of Land Management), Jack G. Troyer (Intermountain Regional Forester, U.S. Forest Service), Steven M. Huffaker (Director, Idaho Department of Fish and Game), Patrick Takasugi (Director, Idaho State Department of Agriculture), Winston Wiggins (Director, Idaho Department of Lands), James L. Caswell (Administrator, Office of Species Conservation), Richard W. Sims (Idaho State Conservationist, USDA Natural Resources Conservation Service), and Mark Collinge (USDA-APHIS, Wildlife Services) in addition to all members of the Idaho Sage-Grouse Advisory Committee.

The Conservation Plan called for development of Sage-Grouse Conservation Plans in thirteen local Sage-Grouse Planning Areas throughout Idaho.

II. The Big Desert Sage-Grouse Planning Area

The Big Desert Sage-Grouse Planning Area includes portions of Bingham, Blaine, Bonneville, Butte, and Power counties as depicted in Attachment A. The Planning Area includes areas classified as sagebrush steppe as well as adjacent cultivated agricultural lands - which are not currently considered critical habitat areas - because they provide food and cover for sage-grouse under certain conditions. In addition, conservation projects in these cultivated areas that benefit to sage-grouse populations may be eligible for funding for sage-grouse conservation projects under federal programs.

The Local Working Group does not intend that many conservation measures included in the Local Working Group's Conservation Plan are appropriate for cultivated land. In addition, the Local Working Group has no authority to mandate implementation of any conservation measures. The Local Working Group understands its role in helping to educate the public, including private land-owners, on the needs of sage-grouse and best practices that will benefit (or minimize harm) to the species.

III. Role of the Local Working Group

In accordance with the ***Conservation Plan for Greater Sage-Grouse in Idaho*** the Big Desert Sage-Grouse Local Working Group is expected to:

- Seek and maintain a diverse membership that includes broad and balanced representation of interests
- Retain the services of a trained neutral facilitator through the development of a completed LWG plan
- Complete a LWG plan within two years of the inception of the LWG
- Develop and recommend quantifiable population objectives
- Develop and recommend quantifiable habitat objectives
- Identify, and to the extent possible, prioritize threats to sage-grouse populations and habitat at the local level

- Identify appropriate conservation measures/actions to address localized threats to sage-grouse and sage-grouse habitat
- Identify monitoring and evaluation actions necessary to update population and habitat data, and to gauge the effectiveness of conservation actions
- Utilize the standardized outline for LWG plans presented in the Statewide Plan.

IV. Expected Outline for the Big Desert Sage-Grouse Conservation Plan

In accordance with the ***Conservation Plan for Greater Sage-Grouse in Idaho***, it is expected that the Big Desert Sage-Grouse Local Working Group's Conservation Plan will follow the required outline, as follows:

A. Introduction
   - Conservation goals and objectives for the SGPA
   - Summary of LWG participation and planning process

B. Status of sage-grouse habitat and population in the SGPA
   - Population overview
   - Habitat conditions overview

C. Threats to sage-grouse and sage-grouse habitat in the SGPA
   - Identify local threats to sage-grouse and sage-grouse habitat
   - Use the discussion and prioritization of statewide threats presented in this state Plan as a starting point to identify and prioritize local threats

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

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

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

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

H. Literature citations

I. Appendices (as necessary)

V. Proposed Process for Developing the Big Desert Sage-Grouse Conservation Plan

It is expected that the East-Idaho Uplands Sage-Grouse Local Working Group will complete its work on the following draft schedule:

Meeting Objectives	Meeting Date
Kick-off, define information needs for the LWG	Feb-07
Orientation to sage-grouse ecology	Mar-07
Orientation to sagebrush ecology	Apr-07
Status of sage-grouse populations in the sage-grouse planning area	May-07
Status of sage-grouse habitat in the sage-grouse planning area	Jun-07
Overview of statewide threats to sage-grouse	Jul-07
Discussion and ranking of local threats	Aug-07
Set population objectives	Sep-07
Set habitat objectives	Oct-07
Frame conservation measures to address highest threats to habitat	Nov-07
Frame conservation measures to address highest threats to habitat (cont)	Dec-07
Frame conservation measures to address highest threats to habitat (cont)	Jan-08
Frame conservation measures to address highest threats to habitat (cont)	Feb-08
Frame conservation measures to address highest threats to habitat (cont)	Mar-08
Draft sections of the LWG plan	Apr-08
Proposal for OSC funds	May-08
Draft sections of the LWG plan (cont)	Jun-08
Pull together entire plan	Jul-08
Final changes by LWG	Aug-08
Agency review and address agency comments	Sep-08
Public meeting	Oct-08
Address public comments	Nov-08
Finalize	Dec-08

VI. Membership of the Big Desert Sage-Grouse Local Working Group

The following agencies and individuals were invited to attend the first meeting of the Big Desert Sage-Grouse Local Working Group.

Federal Agencies:

Agricultural Research Service in Aberdeen

Bureau of Land Management

Farm Services Agency

Natural Resources Conservation Service

Park Service

Shoshone-Bannock Tribes

U.S. Department of Energy

U.S. Fish and Wildlife Service

Wildlife Services

State Agencies:

Agriculture

Fish and Game

Fish and Game Commissioners

Lands

Office of Species Conservation

Local Government:

Cooperative Weed Management Authorities and/or County weed supervisors

County Commissioners for Bingham, Blaine, Butte, and Power counties

Soil and Water Conservation Districts

Atomic City

Private Businesses:

Idaho Power

Idaho Wind Energy Working Group

S.M. Stoller Corp.

Union Pacific

Utah Power

Idaho Landowners/Permittees:

Minidoka Grazing Association

East Idaho Grazing Association

Idaho Citizens Grazing Association

John Houghlan

Ken Wixom

Dennis Lake

Lyle Soderquist

Non-Government Organizations:

Audubon Society

Blackfoot River Bowmen

Blue Ribbon Coalition

Greater Yellowstone Coalition

Idaho Bird Hunters

Idaho Cattle

Idaho Conservation League

Idaho Falconers

Idaho State University

Idaho Wildlife Federation

Idaho Woolgrowers

Justin Naderman

Native Plant Society

Nature Conservancy

North American Grouse Partnership

Pheasants Forever

Rocky Mountain Elk Foundation

Safari Club International

Seed Company/Idaho Grimm Growers

Society for Range Management

South Idaho Mule Deer Foundation

Sportsmen for Fish and Wildlife

Western Watersheds Project

Wildlife Conservation Society

Elected Officials:

Federal Congressionals (Senator Larry Craig and Mike Crapo) and Representative Mike

Simpson

State legislators

Others will be added as appropriate.

VII. Ground Rules for Meetings of the Big Desert Sage-Grouse Local Working Group

The following ground rules will apply for all meetings of the Big Desert Sage-Grouse Local Working Group:

- Everyone participates
- No one dominates
- One person speaks at a time
- No personal attacks
- No cell phones
- No attacks on groups of people
- The facilitator will prepare a group memory for distribution.
- The group will meet on Tuesdays and will try to schedule two meetings in advance when possible.
- All meetings will end by 8:30 p.m.

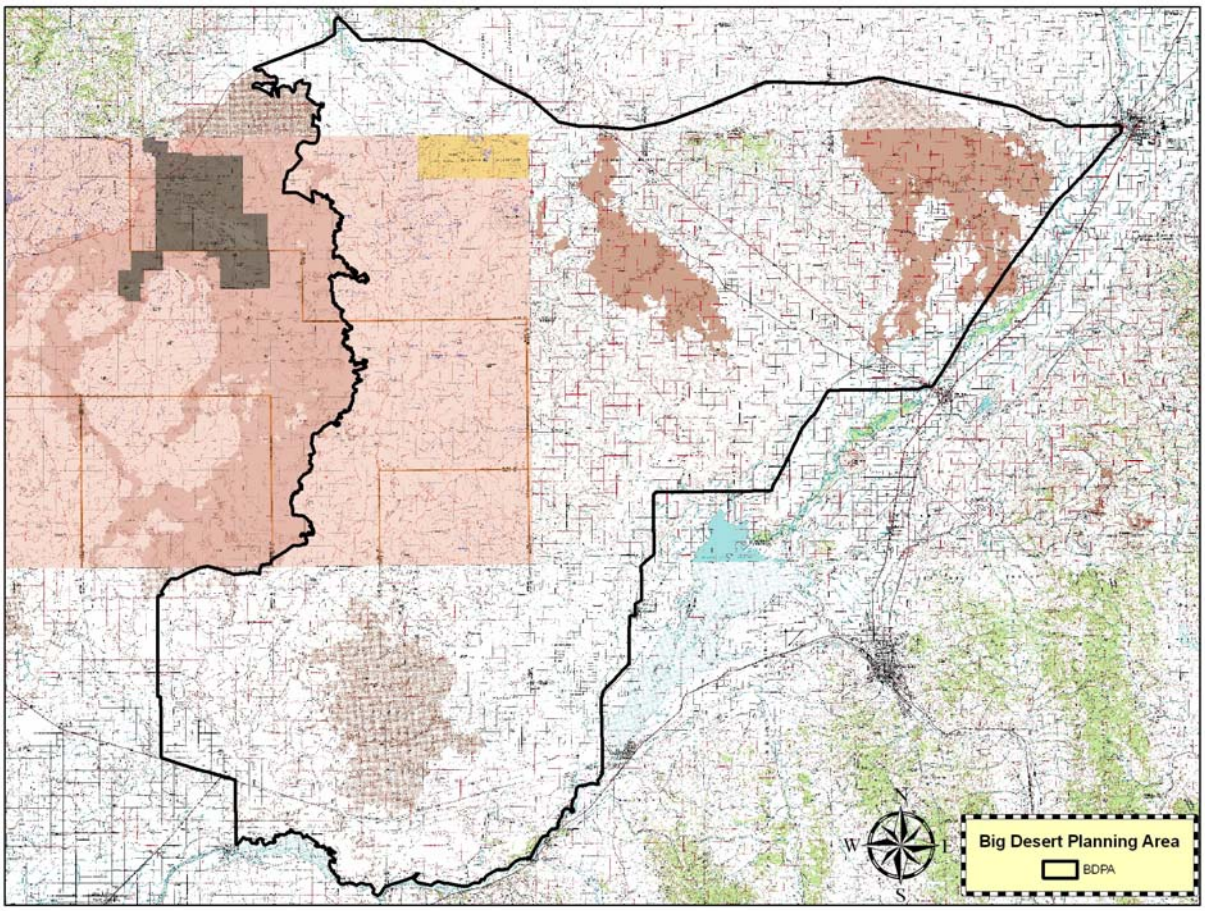
VIII. Process for Local Working Group Decision-Making

The Local Working Group will use consensus-building processes during discussion, meaning that all will be allowed to share concerns and participate in discussions leading up to decision-making.

In order to make decisions in an efficient manner, a super majority of 80% will be required. In order to earn voting privileges, an individual must have attended at least one-half of the meetings in the prior six months. This rule will apply from now through the completion of the Big Desert Sage-Grouse Conservation Plan.

Decisions may be reopened (questioned and discussed again) at the beginning of the very next meeting. If not challenged at the next meeting, decisions will not be revisited.

Attachment A.



APPENDIX C. AGENCY COMMENTS AND LOCAL WORKING GROUP RESPONSES

On August 12, 2009, an Agency Review Draft of the group's draft Conservation Plan was sent to the following list of 58 individuals with an invitation to comment by September 18, 2009:

- Lori Armstrong, Bureau of Land Management - Shoshone Field Office, Shoshone, ID
- Bill Baker, Bureau of Land Management - Twin Falls District, Twin Falls, ID
- Seth Beal, Commissioner, Butte County Commissioners, Arco, ID
- Tom Bowman, Commissioner, Blaine County Commissioners, Hailey, ID
- Stan Boyd, Executive Director, Idaho Wool Growers Association, Boise, ID
- Wayne Brower, Commissioner, Bingham County Commissioners, Blackfoot, ID
- Pat Brown, Idaho Department of Lands, Idaho Falls, ID
- Ladd Carter, Commissioner, Bingham County Commissioners, Blackfoot, ID
- John Cenarrusa, Blaine County Weed Superintendent, Carey, ID
- Roger Christensen, Dave Radford, and Lee Staker, Bonneville County Commission, Idaho Falls, ID
- Dan Christopherson, Shoshone Bannock Tribes, Fish and Wildlife Department, Fort Hall, ID
- Alonzo A. Coby, Chairman, Fort Hall Business Council, Fort Hall, ID
- Mark Collinge, U.S. Department of Agriculture Wildlife Services, Idaho State Director, Boise, ID
- Mike Courtney, Bureau of Land Management - Burley Field Office, Burley, ID
- Kent Cummins, Commissioner, Butte County Commissioners, Arco, ID
- Cary Curtis, Farm Services Agency - Minidoka County, Rupert, ID
- Frank Fink, Natural Resources Conservation Service, Boise, ID
- Nathan Fisher, Office of Species Conservation, Boise, ID
- Gerald Fleischman, Idaho Energy Division, Department of Water Resources, Boise, ID
- Steve Fullmer, Farm Service Agency, Bingham County, Blackfoot, ID
- Mark Gamblin, Idaho Department of Fish and Game, Pocatello, ID
- Brad Gamett, Butte County Weed Superintendent, Arco, ID
- Jeff Groat, Farm Services Agency - Blaine County, Shoshone, ID
- Tom Hemker, Idaho Department of Fish and Game, Boise, ID
- Farhana Hibbert, Senator Mike Crapo's Office, Pocatello, ID
- Lynn Hunsacker, Minidoka County Commission, Rupert, ID
- Jeff Isham, Chair, Butte Soil and Water Conservation District, Howe, ID
- Cleone Jolley, Commissioner, Bingham County Commissioners, Blackfoot, ID
- Ron Kay, Idaho Department of Agriculture, Boise, ID

- Don Kemner, Idaho Department of Fish and Game, Boise, ID
- Deb Koziol, Natural Resources Conservation Service, Pocatello, ID
- Joe Kraayenbrink, District Manager, Bureau of Land Management, Idaho Falls District, Idaho Falls, ID
- Colleen Mann, Farm Service Agency, Bonneville County, Idaho Falls, ID
- Angenie McCleary, Commissioner, Blaine County Commissioners, Hailey, ID
- Damien Miller, U.S. Fish and Wildlife Service, Chubbock, ID
- Dennis Miotla, US Department of Energy, Idaho Operations Office, Idaho Falls, ID
- Bob Moore, Minidoka County Commission, Rupert, ID
- Paul Muirbrook, Bingham County Weed Superintendent, Blackfoot, ID
- Jerry Nicolescu, Administrator, Idaho Soil Conservation Commission, Boise, ID
- Butch Otter, Governor, Boise, ID
- Dave Pacioretty, Bureau of Land Management, Pocatello, ID
- Jeffrey Pettingill, Bonneville County Weed Superintendent, Idaho Falls, ID
- Tony Potter, Farm Services Agency - Butte County, Arco, ID
- Wendy Reynolds, Bureau of Land Management, Idaho Falls, ID
- James Risch, US Senator, Pocatello, ID and Idaho Falls, ID offices
- Laurel Sayer, Congressman Mike Simpson's Office, Idaho Falls, ID
- Steve Schmidt, Idaho Department of Fish and Game, Idaho Falls, ID
- Larry Schoen, Commissioner, Blaine County Commissioners, Hailey, ID
- Bob Simpson, Chair, Blaine Soil Conservation District, Carey, ID
- Dan Stapelman, Minidoka County Commission, Rupert, ID
- Mark Stauffer, Commissioner, Butte County Commissioners, Arco, ID
- Matt Woodard, Chair, Eastside Soil and Water Conservation District, Idaho Falls, ID
- Bingham County Cooperative Extension Agent, Blackfoot, ID
- Blaine County Extension Office, Hailey, ID
- Bonneville County Cooperative Extension Agent, Idaho Falls, ID
- Bonneville County Extension Office, Idaho, ID
- Butte County Extension Office, Arco, ID.

The comments that were received are presented below, along with the responses.

A. Comments submitted by Frank Fink, Natural Resources Conservation Service

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From: "Fink, Frank - Boise, ID" <Frank.Fink@id.usda.gov>
To: <wendy@p2-solution.com>
Cc: "Fink, Frank - Boise, ID" <Frank.Fink@id.usda.gov>
Subject: draft s.g. conservation plan
```

Date: Thursday, August 13, 2009 11:56 AM

Wendy,

Reviewed the draft sage-grouse conservation plan, well put together, no comments, NRCS looks forward to working with the LWG and landowners within the planning area.

Frank Fink

NRCS

Response: Thank you for taking the time to review the draft Conservation Plan.

B. Comments submitted by Ann Moser, Idaho Department of Fish and Game.

Review of Draft Big Desert LWG Plan

Comment: There is a mix of sage grouse and sage-grouse.

Response: Accepted and incorporated.

Comment: There is a mix of IDF&G and IDFG.

Response: Accepted and incorporated.

Comment: Page 5, top paragraph. Sage-grouse productivity does vary annually, but productivity is not influenced by sample size. Our ability to accurately estimate productivity depends on sample size; i.e. the more wings are collected the better the estimate is. Statisticians recommend at least 100 female wings in an area to adequately assess productivity (Autenrieth et al. 1982). Recent work, however, demonstrated that the number of wings needed is much larger, depending on the desired level of confidence and precision (Hagen and Loughin 2008).

Response: Similar comment submitted by other commenter. Text revised to address both comments.

Comment:

Autenrieth, R. E., W. A. Mollini, and C. E. Braun. 1982. Sage grouse management practices. Western States Sage-grouse Committee Technical Bulletin Number 1. Idaho Department of Fish and Game, Twin Falls, Idaho.

Hagen, C. A., and T. M. Loughin. 2008. Productivity estimates from upland bird harvests: estimating variance and necessary sample sizes. Journal of Wildlife Management 72(6):1369-1375.

Response: Citations added; thank you.

Comment: Page 18, 2nd to last paragraph. Scientific name needs to be italicized.

Response: Comment accepted; text revised.

Comment: Page 46, #8 and Page 81, #18. IDFG has been doing mail-in wings for the past 3 years (and is doing again in 2009). This does increase the sample of wings in some areas, so I'm not sure the wording "to test" is needed. Also our goal is to not really to increase the *proportion* of wings, but the *number* of wings.

Response: Comment accepted; text revised to more clearly state Local Working Group's recommendation.

Comment: Page 47, 12c. Suggest change May 1 to July 1. Our current sage-grouse season setting process is that IDFG regions and LWGs provide their input to the Upland Game Manager by mid-July. That information goes to the commission for review at the end of July and the Commission sets the season in mid-August. Furthermore, some lek routes are still being counted in early May, so all the data might not be available by May 1.

Response: Comment accepted; text revised.

Comment: Page 65, 2nd bullet. FYI - The stronghold map was developed in 2001 and has not been updated since.

Response: The LWG is hoping this layer will be kept current.

Comment: Page 67, Under Harvest Survey and Wing Data and Page 80, #3 under Sport Hunting: IDFG has updated its sage-grouse reporting zones to reflect these concerns. Beginning in 2009, IDFG will be collecting harvest and wing data that is more aligned with the Big Desert SGPA.

Response: Thank you! Text revised.

Comment: Page 76, under Responsible parties in #7, 8, 9. Capitalize the first word "Land".

Response: Comment accepted; text revised.

Comment: Page 77, #10. Highways is spelled wrong.

Response: Comment accepted; text revised.

Comment: Page 78, #19. Capitalize first word "Minimize".

Response: Comment accepted; text revised.

Comment: Page 83, #1 under seeded perennial grasslands. Capitalize first word "Work".

Response: Comment accepted; text revised.

C. Comments submitted by Karen Rice, Bureau of Land Management, Idaho Falls District

Page 5 – paragraph 2 – Seems like part of the decrease in harvest should be attributed to less hunters.

Response: Similar comment submitted by other commenters. Text revised to address both comments.

Page 9 – paragraph 1 – Where did the 5% dominated by cheatgrass figure come from. This seems high to me. Maybe it is how you define dominated.

Response: Comment accepted; text revised

Page 10 – paragraph 3 – Here the plan talks about height in cm and in other pages the plan uses inches. Shouldn't we use one measurement systems? And if this is for the public consumption, perhaps not metric.

Response: Comment accepted; text will be revised accordingly.

Page 10 – paragraph – 4 – regarding Big Desert Sheep Allotment – The actual determination stated that Big Desert Sheep Allotment was meeting all four applicable standards. This does not seem to be what is said in the plan.

Response: ***Comment accepted; text revised.***

Page 10 – paragraph 5 - Houghland allotment was making progress towards meeting standards and should be moved from the group of allotments not meeting standards and added to the group of four allotments making progress in the next sentence.

Response: Comment accepted; text revised.

Page 13 – paragraph 1 – Is there really such a thing as "certified weed free forage"? I guess the word I am having trouble here with is forage.

Response: Comment noted. Wording adopted from the July 2006 Idaho Sage-grouse Conservation Plan. No changes made.

Page 16 – paragraph 5 – The FMDA is not draft anymore.

Response: Comment accepted; text revised.

Page 17 – paragraph 14 – the statement "three tip sagebrush from getting worse" Maybe shouldn't use the word worse- this could have different meanings to different people. Probably meant to say to "three tip from increasing.

Response: Comment accepted; text revised.

Page 29 – paragraph 1 – talks about prairie grouse?

Response: Comment noted. Wording adopted from the July 2006 Idaho Sage-grouse Conservation Plan. No changes made.

Page 36 – part 4 – I know what they are trying to say but designing a grazing system to minimize effects on height is rather problematic. Maybe would be better to design a system to maintain sufficient height in combination with all of the other factors.

Response: Comment noted. Wording adopted from the July 2006 Idaho Sage-grouse Conservation Plan. No changes made.

Page 37 – part H. It doesn't hurt to identify alternative areas but there never seems to be much. Although this would support a forage reserve idea.

Response: Observation acknowledged; no changes made.

Page 37 – part 5 – is this part just talking about sheep or all livestock. If it includes cattle this could be problem because many of the leks are located at troughs along the pipelines and the leks are there because of the disturbance of the troughs.

Response: Observation acknowledged; no changes made.

Page 38 – part 12 – At least on the BLM portion you do not have to worry about new spring developments.

Response: Comment noted; no changes made.

Page 39 – part 17 – not sure if you want to put two grazing seasons. Could be more or less depending on a lot of factors.

Response: Comment accepted; text revised.

Page 55 – paragraph 2 – true the seedings are not the best for grouse but as mentioned in other parts of the document the can be a useful tool as forage reserves, cheatgrass prevention and just as areas to move cows in the allotment during critical times.

Response: Comment noted.

Page 55 – paragraph 3 – we have pretty good maps that identify most of our larger seedings.

Response: Comment noted.

Page 56 – part 5 – not clear what the 3 step process is.

Response: Comment accepted; text revised.

D. Comments submitted by Mark Collinge, Idaho State Director, Wildlife Services

Dear Wendy,

Thanks for providing the opportunity to comment on the Big Desert Sage-Grouse Local Working Group's draft conservation plan. The group has obviously put a great deal of effort into their plan and has done a good job. I will limit my comments primarily to those aspects of the plan related to the threat of predation, and I hope the group will consider these thoughts. The predation discussion closely parallels that in the Conservation Plan for the Greater Sage-Grouse in Idaho, but the Big Desert Local Working Group has an opportunity to improve on the discussion of this topic in their own plan. Response:

Response: Thank you for taking the time to review our document.

- On pp. 39-40 of the draft plan, the discussion about predation on sage-grouse nests indicates that "Nest predators noted in the literature include coyotes, badgers, ground squirrels (*Spermophilus spp.*), common raven, and magpies (*Pica pica*) (Patterson 1952, Schroeder et al. 1999, Schroeder and Baydack 2001)." That's a true statement, but it would be more accurate to include a follow-up sentence something like the following: "More recent information, however, suggests that ground squirrels have been erroneously identified as sage-grouse nest predators in the past, and are no longer believed to prey on sage-grouse eggs (Coates et al 2008, http://www2.isu.edu/headlines/?p=1308)." This would be consistent with the findings of Sargeant et al. (1987), who determined that prairie-dwelling ground squirrel species of similar size as the ground squirrel species inhabiting sage-grouse habitat in Idaho, virtually never preyed on mallard or blue-winged teal eggs. Holloran and Anderson (2003) likewise confirmed that 2 species of ground squirrels were unable to bite sage-grouse eggs. Their jaws simply aren't able to open wide enough to bite the eggs.

Response: Comment accepted; text revised.

- Also on pp. 39-43, the draft plan discusses predation on adults and on sage-grouse nests, but there's no discussion about predation on chicks. The potential impacts of predation on sage-grouse chicks haven't been studied to the extent that predation on adults and nests has been, but some research suggests this could be a significant factor. Survival of radio-transmittered chicks in 1999 and 2000 in eastern Idaho was found to be only 15% and 18% respectively, with pretty much all of the mortality due to predation within the first 2-3 weeks after hatching. (Those numbers came from an abstract of a presentation authored by Nathan

Burkepile, Kerry Reese, and Jack Connelly, presented at The Wildlife Society's 8th Annual Conference in 2001.) I'm not aware of a peer-reviewed publication which discusses this data, but a September, 2006 sage-grouse ecology project completion report (https://research.idfg.idaho.gov/wildlife/Wildlife%20Technical%20Reports/W-160-R-33-53%20Completion.pdf) suggests that *"High mortality during the first 3 weeks post hatch appears to be a major factor affecting greater sage-grouse populations. Efforts to increase greater sage-grouse populations should focus on increasing chick survival."*

Keister and Willis (1986) likewise concluded the major factor affecting sage-grouse levels in their study area was loss chicks during the first 3 weeks of life.

Efforts to increase cover of native grasses and forbs would help provide additional protection of chicks from predators during this vulnerable first 3 weeks after hatching, but temporary, focused reduction of predators immediately prior to and during this critical period would also be expected to increase chick survival. Initiating such predator removal efforts just prior to nesting would be expected to increase both nest success and chick survival. Most sage-grouse in Idaho nest within 2-3 miles of their lek (Wakkinen et al. 1992, Fischer 1994), so providing protection from predators within a 3-mile radius around each lek should protect most of the nests and chicks associated with each of the leks. Identification of a potential project area might involve circumscribing an area around as many of these 3-mile circles as could reasonably be protected within the limits of available resources. Other leks in the Local Working Group's planning area, but outside of the planned predator control area, would ideally be monitored as well to help provide insight into the potential benefits of predator removal as compared to no removal.

Response: Comment noted. The Local Working Group will develop wording to describe predation on chicks for inclusion in the next draft. We appreciate the suggestion.

- On p. 39 of the draft plan, the last sentence of the 1st paragraph under the "Predation Threat Summary" section states "*Willis et al. (1993) suggested that year-to-year fluctuations of sage-grouse productivity in Oregon may be highly influenced by changes in the abundance of coyotes and ravens*." That's true, but Willis et al. actually stated things more strongly than that sentence suggests. From p. 47 of that publication: "…*fluctuations in predator abundance in southeastern Oregon have probably been the most important single factor affecting annual productivity of sage grouse in that region*."

  Response: Comment noted. Wording adopted from the July 2006 Idaho Sage-grouse Conservation Plan. No changes made.

- On p. 40 of the draft plan, the end of the 4th paragraph concludes *"Little information is available regarding the impacts of predator control on nest success. In Wyoming coyote control actions failed to produce an effect on nesting success (Slater 2003)."* Although there may not be a great deal of information available regarding the impacts of predator control on sage-grouse nesting success, there's more than just the one study cited from Wyoming. Batterson and Morse (1948) documented heavy predation on sage-grouse nests in northeastern Oregon and concluded that the greatest single limiting factor for sage-grouse populations was nest predation by ravens. The authors initiated a raven control program and subsequently documented a 51% nesting success rate in their treatment area versus a 6%

nesting success rate in an area where no ravens were removed. The authors also believed that raven predation on chicks up to 10 days old accounted for the greatest predatory loss of chicks in their study areas.

Coates and Delehanty (2004) measured the effects of raven removal on sage-grouse nesting success in northern Nevada and documented a nesting success rate of 74%. They concluded that raven removal efforts were likely responsible for the high level of nesting success, and suggested that raven control could help sage-grouse populations while habitat restoration efforts were being undertaken.

Response: Comment noted; text revised.

- On pages 41-43 of the draft plan, under the heading of "Considerations for addressing sage-grouse predation issues in Idaho", the plan states *"Site-specific conditions, such as habitat quality or isolation, or weather events (e.g., extended drought) may influence predation at any given location. Due to cost, logistical, ecological and societal concerns related to predator control, it is essential to first adequately describe the context within which predation is operating, and to determine if predator control is indeed warranted."* The plan then goes on to list a number of relevant questions and issues for consideration. As pointed out earlier, what may be one of the most relevant issues (i.e., chick survival) isn't even listed. The answers to some of these questions (e.g., information on annual productivity, nest success, average adult female survival rates) require a significant investment of resources, and might take years to develop. And it's important to realize that even if a Local Working Group is able to obtain answers to many of theses questions, this information can change every year depending on local circumstances. If drought conditions have contributed to poor nesting cover and low nest success and low chick survival for a couple of years, those were the years when predator control probably would have helped the most. It's problematic if the decision-making process requires gathering this data before ever even considering implementation of predator control.

  Consider for example the data on two consecutive years of nesting success in a southern Idaho study area, as reported in a recent Idaho Department of Fish & Game project progress report (https://research.idfg.idaho.gov/wildlife/Wildlife%20Technical%20Reports/Upland%20Game%20Bird%20Ecology%20Study%20I%20PR08.pdf). On p. 17 of this report we learn that in 2007, sage-grouse nesting success was only 13.3%, well below the 25% threshold suggested for consideration of predator control. But in 2008, nest success in the same area was 27.3%. Predator control was probably justifiable in 2007, but if you only implemented it after gathering the nest success data from 2007, you'd have implemented it when it wasn't advisable, at least according to the Western Association of Fish & Wildlife Agencies' guideline of the 25% nesting success threshold (Connelly et al. 2000).

  An alternative to requiring desired data on nesting success, annual productivity, adult survival and/or chick survival would instead be to make decisions about implementing predator control based on other logical and relevant factors. If a local sage-grouse population is declining, and other factors are already being addressed (e.g., habitat improvement efforts are being undertaken, hunting seasons have been restricted or eliminated), it may make sense to try implementing predator control actions focused just on the spring nesting and early

chick-rearing period. Inclusion of monitoring efforts both on the predator removal area and on a similar non-removal area would help provide insight into whether or not predator removal was beneficial.

Another example of when it may be logical to consider predator control, regardless of whether data exists on past annual productivity, nesting success, or survival rates, would be after wildfire has affected a sage-grouse planning area. The scattered, isolated islands of sagebrush habitat that sometimes remain after a range fire tend to concentrate the remaining wildlife in these patches. This makes it much easier for predators to find and prey on sage-grouse nests, chicks and adults. Schroeder and Baydack (2001) suggested that as habitats become more fragmented and prairie grouse populations become more threatened, it becomes more important to consider predator control as a potential management tool.

Response: Comment noted; no changes made. The Local Working Group notes that there is no nest success/predation data for the Big Desert SG Planning Area. The LWG adopted the process described in the statewide plan which is based on a series of considerations that would support predator control measures if certain conditions were documented. While the suggested additional data would be beneficial; funding limits what is possible. Based on existing funding realities, the LWG currently must base its recommended conservation measures on data that is already being collected, include wing data, lek counts, and harvest data.

- One last note, regarding the absence of discussion about sage-grouse chick survival as a consideration when making decisions about predator control to protect sage-grouse: The work conducted by then University of Idaho graduate student Nathan Burkepile on this issue was not completed until after the publication of the Western Association of Fish & Wildlife Agencies' sage-grouse management guidelines. So while those guidelines do address thresholds for nest success and adult female survival at which predator control should be considered, they did not similarly address any threshold of chick survival at which predator control should be considered. But as noted in the 2006 IDFG project report cited at the earlier-referenced link, "*Efforts to increase greater sage-grouse populations should focus on increasing chick survival.*"

  Response: Comment noted. The Local Working Group will consider changes to address the possibility of establishing a threshold for chick survival.

If any of the Local Working Group members would like to discuss any of these comments, they are welcome to contact me.

Sincerely,

Mark Collinge
State Director
Idaho Wildlife Services

Literature Cited

Response: Citations for Coates 2004 and 2008 added. Thank you.

Batterson, W. M., and W. B. Morse. 1948. Oregon sage grouse. Oregon Fauna Series Number 1, Oregon State Game Commission, Portland, USA.

Coates, P. S., and D. J. Delehanty. 2004. The effects of raven removal on sage grouse nest success. Proceedings of the Vertebrate Pest Conference. 21:17-20.

Coates, P. S., J. W. Connelly, and D. J. Delehanty. 2008. Predators of Greater Sage-Grouse nests identified by video monitoring. Journal of Field Ornithology 79:421-428.

Connelly, J. A., 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.

Fischer, R. A. 1994. The effects of prescribed fire on the ecology of migratory sage grouse in southeastern Idaho. Ph.D. diss. Univ. of Idaho, Moscow.

Hollaran, M. J. and S. H. Anderson. 2003. Direct identification of Northern Sage-Grouse, *Centrocercus urophasianus*, nest predators using remote sensing cameras. Canadian Field Naturalist 117:308-310.

Keister, G. P., Jr. and and M. J. Willis. 1986. Habitat selection and success of sage grouse hens while nesting and brooding. Progress Report. P. R. Proj. W-87-R-2. Oregon Dept. of Fish and Wildlife. 10 pp.

Sargeant, A. B., M. A. Sovoda, and R. J. Greenwood. 1987. Responses of three prairie ground squirrel species, *Spermophilus franklinii, S. richardsonii,* and *S. tridencemlineatus*, to duck eggs. Canadian Field-Naturalist 101:95-97.

Schroeder, M. A., and R. K. Baydack. 2001. Predation and the management of prairie grouse. Wildlife Society Bulletin 29:24-32.

Wakkinen, W. L., K. P. Reese, and J. W. Connelly. 1992. Sage grouse nest locations in relation to leks. Journal of Wildlife Management 56:381-383.

E. Comments submitted by Sandi Arena, US Fish and Wildlife Services

Regarding the following paragraph "The IDFG also collects sage-grouse wing data from harvested birds within the Big Desert SGPA. Currently, IDFG collects hunter harvested bird wings from four wing barrel locations within the Big Desert SGPA. Wings are also collected through mail in bird hunter surveys and sage-grouse check stations. All BDPA wings are combined and analyzed annually to determine sage-grouse production from that spring (Table 2). Sage-grouse wing collection has greatly decreased over the past 20 years (Table 2). Sage-grouse production varies annually, in some cases is influenced by sample size. If sage-grouse

wing collection continues to decrease, other alternatives for collecting sage-grouse production may need to be considered."

Comment: This section seems to be indicating two things; either wing collection is down because sage grouse numbers are down, or wing collection is down because people just aren't using the wing barrels. Not sure what the reasoning is for the drop in wing collection, but this might need to be clarified better to make it more clear here.

Response: Comment accepted; text revised.

Regarding Table 3

Comment: "Looking at superscript 'c' below, it appears that the southeast region consists of zones outside of the Big Desert planning area. If that's the case, you may want to apply that same superscript to the table title as well, for clarification."

Response: Comment accepted; text revised.

Regarding Table 3

Comment: "What is superscript '3' referring to?"

Response: Comment accepted; text revised.

In reference to the text stating, "Of the total burned, thirty percent is classified as key sage-grouse habitat (areas with intact sagebrush cover), 65 percent is dominated by perennial grassland, and approximately 5 percent is dominated by annual grassland."

Comment: "Currently classified as such, or classified that way before the fires? Also, it may be good to clarity who classified it as key sage grouse habitat...that is...is this something that's specified in the State's Plan? Or is it BLM classification?"

Response: Comment accepted; text revised.

In reference to the text stating, "On private lands, consider enrolling in incentive or other programs to improve or enhance sage-grouse/sagebrush habitats. Current Natural Resources Conservation Service (NRCS) programs that may provide some opportunities for economic offset of certain conservation measures include the Conservation Security Program (CSP), the Wildlife Habitat Incentive Program (WHIP), and the Environmental Quality Incentive Program (EQIP). Funding may also be available for certain private lands projects through BLM's hazardous fuels program or through IDFG and OSC."

Comment: Funding opportunities also may be available through the Fish and Wildlife Service's Partners for Fish and Wildlife Program.

Response: Comment accepted; text revised.

In reference to the sentence stating, "Support for Idaho projects may also be available through the North American Grouse Partnership's (NAGP) Grouse Habitat Restoration Fund."

Comment: FWS

Response: Comment accepted; text revised.

In reference to the text stating: "Spatial analysis of major roads (Figure 4-4 in ISAC 2006) in Idaho indicate there are approximately 977.6 miles of major paved roads (Interstate, U.S., state) intersecting Idaho SGPAs (USDI-BLM 2004a). Applying a 10 km (6.2 mile) buffer along each side of these roads to account for an influence from predation and noise disturbance (Connelly et al. 2004), the total buffer area influenced by major paved roads within SGPAs is 6,890,485 acres. SGPAs with the greatest total major road mileage include the Challis, East Magic Valley, and Upper Snake. For eight SGPAs, Challis, Curlew, East Magic Valley, Mountain Home, Shoshone Basin, Upper Snake, West Central, West Magic Valley."

Comment: Is this information necessary...since this is the Big Desert's plan, and you'd be most interested on baseline info for your specific planning area, info relevant to other planning areas may not be necessary.

Response: Comment accepted; text revised.

In reference to the text stating: "Some authors suggest that predation is an important influence on females during incubation and brood-rearing, and for males during the breeding season (Patterson 1952, Schroeder et al. 1999). In a Colorado study, Zablan (2003), reported annual survival rates of 59.2% for adult females, 77.7% for yearling females, 36.8% for adult males, and 64.5% for yearling males."

Comment: This discussion on survival rates seems out of place here as it is not linked back to predation.

Response: Comment noted.

In reference to the text stating: "Overall, the literature suggests that sage-grouse nest success varies between 14.5% and 86.1% (Connelly et al. 2004). Bergerud (1988) considered sage-grouse nest success as generally low, averaging 35%, across 12 studies (n=699 nests).

Comment: Again, the discussion on nest success seems out of place here without any link back to predation.

Response: Comment accepted; text revised.

In reference to the statement: "In Idaho, the first probable human case was reported in November 2003 (Idaho Department of Health and Welfare 2005)."

Comment: Though interesting, I'm not sure this statement is necessary.

Response: Comment accepted; text revised.

In reference to the statement: "Additionally, 30 dead sage-grouse were found in total in Owyhee County and the Duck Valley Reservation (USGS Wildlife Health Bulletin, 2006)."

Comment: and were thought to have died from WNV?

Response: Comment accepted; text revised.

In reference to the statement: “Annually report any measures taken to address climate change e.g. adjustment in resource use periods, habitat restoration projects, exotic invasive species invasion or juniper spread, including plant material from warmer areas in restoration projects, etc.”

Comment: In theory, this seems like a good monitoring action to track. However, this reviewer questions whether impacts on the landscape (be it exotic invasives or juniper spread, etc) can really be linked back conclusively to climate change, and thus what measures may be taken to address climate change may not be known.

Response: Comment accepted; text revised.

F. Comments submitted by Jesse Rawson, Bureau of Land Management, Burley Field Office

Cmt #	Page #	Line #, Figure #, or Table #	Comment
1.	1	Figure 1	The description of Figure 1 does not mention Minidoka County. However, the BDPA boundary as shown in Figure 1 appears to include a portion of Minidoka County. ***Response: Comment accepted and document revised accordingly.***
2.	10	Paragraph 3, Sentence 5	"For Standard 8 (special status species), the areas where sagebrush was removed as a result of wildfire was found to be unsuitable as sagebrush breeding habitat." Comment: sage-grouse? ***Response: Comment accepted; text revised.***
3.	15	Paragraph 2, Sentence 3 (Hyperlink)	http://www.fs.fed.us/rm/pubs/rmrs_gtr136.html Comment: This hyperlink is not working, or the website is no longer available. ***Response: Comment accepted; hyperlink fixed.***

Cmt #	Page #	Line #, Figure #, or Table #	Comment
4.	21	Paragraph 2, Sentence 1	"When fires threaten or occur within sage-grouse stronghold habitats, deploy the appropriate pre-identified appropriate management response as soon as possible to minimize loss of habitat to fire and to reduce the scale of subsequent ESR efforts." Comment: Appropriate is used twice in this sentence. I recommend removing the second usage to help with sentence clarity. ***Response: Comment accepted; text revised***
5.	32	Livestock Impacts, Paragraph 1	Although an increase in annuals may be occurring in the some areas, Comment: Remove "the" ***Response: Comment accepted; text revised.***
6.	34	Paragraph 2	"This might only be found on private irrigated lands which may or may not be being grazed" Comment: Word confusion. I recommend replacing being with actively. ***Response: Comment noted; text revised.***
7.	51	#9	"Work closely with Cooperative Weed Management Areas/ programs to control invasive and invasive weeds" Comment: noxious(?) and invasive weeds. ***Response: Comment accepted; text revised.***

Cmt #	Page #	Line #, Figure #, or Table #	Comment
8.	58	Conifer Encroachment	The Big Desert LWG agreed that what little conifer encroachment is occurring may actually benefit sage-grouse in the Big Desert Planning Area. Comment: I recommend specifically describing why limited conifer encroachment is a benefit. ***Response: Comment accepted; text revised***
9.	69	Table	Comment: If the allotment is not meeting Sage-grouse habitat criteria, I recommend that a comment be made describing whether or not it was attributed to livestock grazing. Or, Meeting sage-grouse habitat criteria (yes, no); If not meeting sage-grouse habitat criteria is livestock a significant factor (yes, no). ***Response: Comment accepted; table revised.***