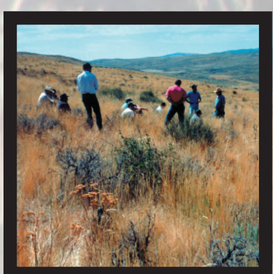

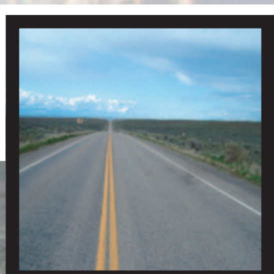

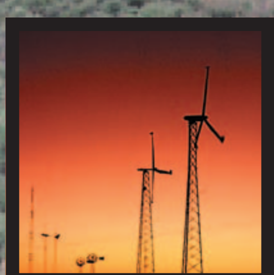

Conservation Plan for the Greater Sage-grouse in Idaho

July 2006

Conservation Plan for the Greater Sage-grouse in Idaho

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Executive Summary

Overview

The greater sage-grouse has historically been, and continues to be, an important species across the western rangelands. Centuries before European settlement of western North America, this bird was of ceremonial and subsistence significance to native peoples in the region. Sage-grouse are an important part of the sagebrush community and are also sometimes used as a measure of sagebrush ecosystem health.

Historical populations of sage-grouse in Idaho are not well documented. Prior to 1900 sage-grouse were not protected in Idaho. The first Idaho sage-grouse hunting season was established in 1900. As early as the 1920s, wildlife managers voiced concern about the future of Idaho's sage-grouse populations. In a trend mirroring that seen in other western states, Idaho has experienced substantial alteration and losses of sagebrush steppe habitat since European settlement.

The state of Idaho continues play a leadership role in sage-grouse conservation planning, monitoring and evaluation, and research activities. In 1997, the Idaho Sage-grouse Task Force, under direction of the Idaho Fish and Game Commission, completed the Idaho Sage-grouse Management Plan (IDFG 1997). The 1997 Plan divided Idaho into sage-grouse management areas and called for the creation of Local Working Groups (LWG) that would develop sage-grouse management plans for each of Idaho's sage-grouse planning areas. Since 1997 Local Working Group plans have been completed or drafted in 5 Sage-grouse Planning Areas (SGPA).

Between May 1999 and December 2003, the U.S. Fish and Wildlife Service (USFWS) received eight petitions to list as endangered or threatened, various populations of sage-grouse. In April 2004, USFWS determined that three of the petitions to list the greater sage-grouse as threatened provided substantial information that listing might be warranted, thus initiating a comprehensive range-wide status review. On January 7, 2005, a finding of Not Warranted was published in the Federal Register.

This 2006 Conservation Plan for the Greater Sage-grouse in Idaho (Plan) replaces the 1997 Idaho Sage-grouse Management Plan. This Plan incorporates significant new information and data and provides the overarching scientific and management framework within which the completed LWGs Plans will function.

This Plan includes:

- Background information and resources regarding sage-grouse and sagebrush ecology;
- A summary of the status of sage-grouse populations and habitat in Idaho;
- Identification and discussion of 19 threats to sage-grouse and their habitats;
- A toolbox of conservation measures to address each of those threats;
- Research, monitoring and evaluation guidelines and recommendations; and
- A number of appendices that provide additional information.

Management framework

The Sage-grouse Local Working Groups (LWGs) are the heart of Idaho's sage-grouse conservation strategy. The collaborative development and implementation of LWG plans is vital to successful conservation of sage-grouse in Idaho. This Plan is designed to provide guidance, tools, and resources to LWGs to facilitate development of their plans, while also encouraging a level of statewide consistency among the LWG plans. Establishment of LWGs in Sage-grouse Planning Areas (SGPAs) that currently lack them, and completion of LWG plans in all of Idaho's SGPAs, are significant priorities in Idaho.

Under the framework outlined in this Plan, the LWG plans will identify and prioritize local threats, and identify appropriate conservation measures at the mid- and fine-scale, while this state Plan identifies and prioritizes threats at the broad-scale. This Plan also provides a toolbox of fine-scale conservation measures for use and/or adaptation by LWGs (as appropriate to local population and habitat conditions), and for use in cases where a LWG plan has not been completed, or where no LWG currently exists.

Long-term monitoring of sage-grouse populations and habitats is crucial. This Plan outlines ways to accomplish this efficiently and effectively. Local working groups and others can then use these data to make good management decisions to conserve Idaho sage-grouse.

Goals

The primary goal of this Plan is to:

> ***Maintain, improve, and where possible, increase sage-grouse populations and habitats in Idaho, while considering the predictability and long-term sustainability of a variety of other land uses.***

Secondary goals of this Plan include:

1) Establishing broadly representative Local Working Groups in all SGPAs that currently lack them;

2) Fostering and supporting effective LWGs and their activities, throughout the range of sage-grouse in Idaho;

3) Fostering and supporting completion of LWG plans for all of Idaho's SGPAs and;

4) Fostering and supporting effective coordination among state and federal agencies, Tribes, and non-governmental cooperators to achieve the primary goal of this Plan.

Population and habitat objectives

The population objectives identified in this Plan are:

1) Maintain, and increase where possible, the present distribution and abundance of sage-grouse in Idaho; and

2) Reduce, eliminate, or mitigate the adverse impacts of human-related or unnatural disturbance to sage-grouse within or near breeding and winter habitat throughout Idaho.

The habitat objectives identified in this Plan are:

1) Maintain, enhance or restore sage-grouse habitat, and continuity of habitats, at multiple spatial scales; and

2) Manage Idaho's landscape to foster a dynamic sagebrush ecosystem that includes a diverse species composition of sagebrush, grasses, and forbs; and incorporates structural characteristics that promote rangeland health in general, and sage-grouse habitat requirements in particular.

Specific numeric population and habitat objectives will be refined and developed through the LWG planning processes, consistent with data developed through broad- mid- and fine-scale monitoring and evaluation activities, and then incorporated into future revisions of this Plan.

Threats and conservation measures

This Plan presents a discussion of 19 threats to sage-grouse and their habitats, together with a toolbox of conservation measures designed to address each individual threat. Priorities will differ by SGPA depending on local conditions. LWGs are expected to develop a list of local threats specific to their area. The recommended conservation measures associated with each threat are designed to eliminate, reduce, or mitigate threats to sage-grouse or to ensure the long-term sustainability of sage-grouse habitat in Idaho. Local Working Groups are encouraged to adopt these conservation measures or others that are more locally appropriate. The conservation measures identified in this Plan should be implemented where feasible unless documented to be inappropriate at the site or project scale. Examples of such documentation could include: description of alternative conservation measures arising from site-specific analysis, monitoring, research, or adaptive management.

Research, monitoring and evaluation

This Plan includes discussion of research, monitoring and evaluation needs, guidelines and protocols for sage-grouse population monitoring, guidelines and protocols for sage-grouse habitat evaluation and monitoring, and related adaptive management recommendations.

Although a great deal is known about sage-grouse ecology and habitat, additional research is needed in order to better understand the range of factors that affect sage-grouse populations, sage-grouse habitat, and the relationship between them. Research is also needed to identify better ways of addressing both population and habitat needs.

The evaluation and monitoring of sage-grouse habitats and selected threats are crucial components in the implementation of this Plan. Standardized approaches for the collection and aggregation of spatial and tabular data across multiple scales are presented along with specific tasks, timelines, and responsible parties. In some cases processes or protocols still need to be developed; in these cases suggested tasks and timelines are identified in the Plan to facilitate further action.

Implementation

In implementing this Plan and the LWG plans, a variety of multi-disciplinary expertise will be required. The commitment of landowners, resource users, and agency personnel to implementing the conservation measures, and monitoring and evaluation actions identified in this Plan, and in the LWG plans, is essential to successful conservation of sage-grouse and their habitat in Idaho.

When sage-grouse concerns arise at the local level, LWGs, agency representatives, landowners, and others will look first to the appropriate LWG plan for specific guidance. If a LWG plan is silent on the issue of concern, parties would look next to the state Plan for guidance. The LWGs are expected to work with, and through, the appropriate federal and state agencies, landowners, and regulatory processes to implement the conservation measures/actions identified in their LWG plans to reduce, eliminate, or mitigate identified threats to sage-grouse and sage-grouse habitat.

This Plan is intended to be a “living document” that will be periodically updated and/or amended as appropriate.

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iv Acknowledgements

The completion of a collaborative conservation plan of this scale and complexity requires the help, expertise, and patience of many people. The following acknowledgements are an attempt to recognize all of the individuals who contributed to the development of the Idaho Sage-grouse Conservation Plan (Plan). Those individuals who contributed to the Plan in multiple capacities are noted below in each of those capacities. Apologies to any individuals whose names may have been inadvertently omitted – and thanks to everyone who helped!

The following individuals were involved directly in writing, review, and editing of the Plan and participated in innumerable meetings and work sessions:

Project leader, Idaho Sage-grouse Advisory Committee:

Tom Hemker, Wildlife Program Manager Idaho Department of Fish and Game, Wildlife Bureau.

Lead author and editor:

Paul Makela, Wildlife Biologist, Idaho Bureau of Land Management State Office/Idaho Department of Fish and Game, Wildlife Bureau.

Facilitator and associate editor:

Alison Squier, Ziji Creative Resources Inc.

Idaho Sage-grouse Plan Development Subcommittee Members (in alphabetical order):

John Augsburger, Wildlife Biologist, Idaho Bureau of Land Management State Office; **Tracy Behrens**, Range and Cropland Program Manager, Idaho Department of Lands; **Ted Chu**, Wildlife Biologist, Idaho Conservation League; **Michelle Commons-Kemner**, Senior Wildlife Research Biologist, Idaho Department of Fish and Game (active member in 2004, advisory 2005); **Kenneth Crane**, Range Program Manager, Idaho Department of Agriculture; **Dr. Stephen Goddard**, Idaho Birdhunters, Ada County Fish and Game League, Idaho Wildlife Federation; **Jim**

Hagenbarth, Rancher, Upper Snake Local Working Group; **Rich Howard**, Biologist (retired) U.S. Fish and Wildlife Service (active member 2004); **Tom Hemker**, Wildlife Program Manager, IDFG Wildlife Bureau; **David Hensley**, Legal Counsel to Governor Kempthorne, (formerly Counsel for the Governor's Office of Species Conservation – active member 2004, advisory 2005); **Paul Makela,** Wildlife Biologist, Idaho Bureau of Land Management State Office/Idaho Department of Fish and Game Wildlife Bureau; **Robbert Mickelsen**, District Ranger, US Forest Service Dubois Ranger District, Caribou-Targhee National Forest, **Tom Perry**, Counsel for the Governor's Office of Species Conservation; and, **John Romero**, Idaho Cattle Association.

Members of the Subcommittee also wish to extend their sincere appreciation to the following individuals who contributed directly to the completion of this Plan by providing technical support, literature, comments, or other essential input (in alphabetical order):

Bruce Ackerman, Biometrician, Idaho Department of Fish and Game, Wildlife Bureau; **Dr. Robert Anson**, Department of Networking, Operations and Information Systems, Boise State University; **K Lynn Bennett**, State Director, Idaho Bureau of Land Management State Office; **Bart Butterfield**, GIS Manager, Idaho Department of Fish and Game; **Christa Braun**, Cartographic Technician, Idaho Bureau of Land Management State Office; **Jim Caswell**, Administrator, Governor's Office of Species Conservation; **Mark Collinge**, Idaho State Director, US Department of Agriculture Aphis-Wildlife Services; **Jeff Cook**, Outdoor Recreation Analyst, Idaho Department of Recreation**; John Courtright**, Information Technology Specialist, Idaho Bureau of Land Management State Office; **Kevin Church**, Program Coordinator, Idaho Department of Fish and Game, Conservation Data Center; **Crystal Christensen**, Office Specialist, Idaho Department of Fish and Game; **Brett Dumas**, Terrestrial Ecologist, Idaho Power Company; **Tim Dykstra**, Director Fish, Wildlife and Parks, Shoshone-Paiute Tribes; **Sean Finn**, GIS Specialist, US Geological Survey Snake River Field Station; **Jonathon Foster**, Resources and Science Branch Chief, Idaho Bureau of Land Management State Office; **Nicholas Hardy**, GIS Technician, Idaho Bureau of Land Management State Office; **Chuck Harris**, Nongame Wildlife Manager, Idaho Department of Fish and Game; **Susan Giannettino**, Deputy State Director, Resources, Idaho Bureau of Land Management State Office; **Terry Heslin**, Outdoor Recreation Planner, Idaho Bureau of Land Management State Office; **Rich Howard**, U.S. Fish and Wildlife Service, Retired; **Steven Huffaker**, Director, Idaho Department of Fish and Game; **Wendy Lowe**, Facilitator, Upper Snake, Challis, and Curlew Local Working Groups; **Rance Marquez**, Fire Use Specialist, Burley Field Office, Bureau of Land Management; **Diane McConnaughey**, GIS Specialist, Idaho Bureau of Land Management State Office; **Cindy Lou McDonald**, Geographic Sciences Specialist, Idaho Bureau of Land Management State Office; **Rich McDowell**, Cartographic Technician, Idaho Bureau of Land Management State

Office; **Tom Miles**, Rangeland Management Specialist, Idaho Bureau of Land Management State Office; **Dave Musil**, Senior Wildlife Research Biologist, Idaho Department of Fish and Game; **Andy Payne**, Field Office Manager, Shoshone Field Office, Bureau of Land Management; **Mike Pellant**, Great Basin Restoration Initiative Coordinator, Nevada Bureau of Land Management State Office; **Michele Porter**, GIS Specialist, Idaho Bureau of Land Management State Office; **Barry Rose**, Supervisory Public Affairs Specialist, Idaho Bureau of Land Management State Office; **Roger Rosentreter**, Botanist, Idaho BLM State Office; **Alan Sands**, Sage-grouse Habitat Restoration Coordinator, The Nature Conservancy; **Signe Sather-Blair**, Wildlife Biologist, Idaho Bureau of Land Management State Office; **Elena Shaw**, Resource Coordinator, Twin Falls District, Bureau of Land Management; **David Smith**, Office Specialist, Idaho Department of Fish and Game; **Nicole Ulacky**, GIS Technician, Idaho Bureau of Land Management State Office; and, **Krista Gollnick-Waid**, Fire-Use Specialist, Idaho Bureau of Land Management State Office.

Members of the Idaho Sage-grouse Advisory Committee provided important and essential guidance and review in the development of this plan.

Idaho Sage-grouse Advisory Committee Members:

John Augsburger, Bureau of Land Management; **Tracy Behrens**, Idaho Department of Lands; **Donna Bennett**, Owyhee Local Working Group; **Russ Boyer**, Curlew Local Working Group; **LaVelle Braun**, West Central Local Working Group; **Ted Chu**, Idaho Conservation League; **Ken Crane**, Idaho Department of Agriculture; **Dr. Stephen Goddard**, Idaho Birdhunters, Ada County Fish and Game League, Idaho Wildlife Federation; **Jim Hagenbarth**, Upper Snake Local Working Group; **Robbert Mickelsen**, US Forest Service; **Dr. William Platts**; **Peggy Redick**, Challis Local Working Group (Interim); **Mike Remming**, Jarbidge LWG; **Rob Rogerson**, Shoshone Local Working Group; **John Romero**, Idaho Cattle Association; and, **Dan Gossett**, Shoshone-Paiute Tribes.

Idaho Sage-grouse Advisory Committee Technical Advisors:

Mark Collinge, Wildlife Services, US Department of Agriculture; **Jack D. Depperschmidt**, US Department of Energy; **Brett Dumas**, Idaho Power, **Frank Fink**, National Resources Conservation Service; **Tom Hemker**, Idaho Department of Fish and Game; **David Hensley,** Idaho Office of the Governor; **Steve Duke**, U.S. Fish and Wildlife Service; **Quinn Jacobson**, University of Idaho, U.S. Sheep Experimental Station; **Tom Perry**, Office of Species Conservation; and **Paul Makela**, Bureau of Land Management/Idaho Department of Fish and Game.

The following experts participated in an "Expert Science Review Panel" discussion to identify and prioritize statewide threats to sage-grouse and regional extirpation risks. The results of this science panel have been invaluable in the drafting of this plan. Moreover, a number of these individuals provided additional input and expertise that was vital to the development of this plan:

Idaho Sage-grouse Science Panel Members:

Dr. Stephen Bunting, Professor, Department of Rangeland Ecology and Management, University of Idaho; **Dr. Jack Connelly**, Principal Wildlife Research Biologist, IDFG; **Dr. Steve Knick**, Research Ecologist, U.S. Geological Survey; **Dr. Karen Launchbaugh**, Department Head, Rangeland Ecology and Management, University of Idaho; **Dr. Kerry Reese**, Department Head, Fisheries and Wildlife Resources, University of Idaho, and; **Dr. J. Michael Scott**, Leader, Idaho Cooperative Fish and Wildlife Research Unit, University of Idaho.

Finally, members of the Subcommittee wish to extend their appreciation to the many individuals who provided thoughtful and insightful reviews of the evolving drafts of this document.

v Acronyms

APHIS	Animal and Plant Health Inspection Service
ATV	All Terrain Vehicle.
BAER	Burned Area Emergency Rehabilitation
BIA	Bureau of Indian Affairs
BLM	U.S. Bureau of Land Management
CREP	Conservation Reserve Enhancement Program
CSP	Conservation Security Program
DOD	Department of Defense
DOE	Department of Energy
EQIP	Environmental Quality Incentive Program
ERUs	Ecosystem Reporting Units
ESA	Endangered Species Act
ESR	Emergency Stabilization and Rehabilitation
FMP	Fire Management Plan
FMU	Fire Management Unit
GBRI	Great Basin Restoration Initiative
GIS	Geographic Information System
ICBEMP	Interior Columbia Basin Ecosystem Management Project
IDFG	Idaho Department of Fish and Game
IDL	Idaho Department of Lands
IDPR	Idaho Department of Parks and Recreation
IDWR	Idaho Department of Water Resources
INL	Idaho National Laboratory
IRMP	Integrated Resources Management Plan
ISDA	Idaho State Department of Agriculture
LWG	Local Working Group
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NF	National Forest
NFOP	Normal Fire Operations Plan
NGOs	Non-Governmental Organizations
NMFS	National Marine Fisheries Service
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
OHV	Off-highway Vehicle
OSC	Office of Species Conservation
PECE	Policy for Evaluation of Conservation Efforts (USFWS)

PFC	Proper Functioning Condition
PPQ	Plant Protection and Quarantine (USDA APHIS)
RFD	Rural Fire Department
SAC	Idaho statewide Sage-grouse Advisory Committee
SAC TAT	Sage-grouse Advisory Committee Technical Assistance Team
SGHPM	Sage-grouse Habitat Planning Map
SGPA	Sage-grouse Planning Area
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UV	Ultraviolet
WAFWA	Western Association of Fish and Wildlife Agencies
WHIP	Wildlife Habitat Incentives Program (NRCS)
Wildlife Services	USDA-APHIS-Wildlife Services
WNV	West Nile Virus

vi Endorsements of Conservation Plan for the Greater Sage-grouse in Idaho

This Conservation Plan for Sage-grouse in Idaho (Plan) summarizes the status of sage-grouse habitats and populations in Idaho, identifies statewide threats, and is intended to facilitate the implementation of conservation measures by state and federal agencies, Tribes, and willing non-governmental cooperators; and to complement and enhance the efforts of Local Working Groups. This Plan is the product of a collaborative effort that included state and federal resource agencies, Tribes, and non-governmental cooperators. Consultation and coordination with the Tribes will also occur through appropriate federal agency protocols.

This Plan will be implemented through the collaborative efforts of state and federal agencies, Tribes, Local Working Groups, and other willing non-governmental cooperators.

The following Sage-grouse Advisory Committee signature page and Memorandum of Understanding are intended to signal the commitment of various entities to collaboratively implement this Plan, while also acknowledging the different authorities, missions, and interests of the various parties to this Plan.

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Idaho Sage-grouse Advisory Committee Signature Page

Recognizing that this signature page has no legal authority to bind any individual, agency, or non-governmental organization to any specific action, the following members of the Idaho Sage-grouse Advisory Committee (SAC) agree, in their capacity as members of the SAC, to their endorsement of this Conservation Plan for Sage-grouse in Idaho (Plan); and agree to work collaboratively through the Idaho Local Working Groups, and other appropriate mechanisms, to support the intent and actions identified in this Plan.

This signature page applies only to the state Plan and does not imply individual endorsement of the LWG plans attached in Appendix J.

John Augsburger Bureau of Land Management	Date
Tracy Behrens Idaho Department of Lands	Date
Donna Bennett Chair, Owyhee Local Working Group	Date
Russ Boyer Member, Curlew Local Working Group	Date
Gene Gray Member, West Central Local Working Group	Date
Ted Chu Idaho Conservation League	Date
Ken Crane Bureau of Land Management	Date

Dr. Stephen Goddard
Idaho Birdhunters, Ada County Fish and Game League,
Idaho Wildlife Federation

Date

Dan Gossett
Sage-grouse Project Coordinator, Shoshone-Paiute Tribes

Date

Jim Hagenbarth
Member, Upper Snake Local Working Group

Date

Robbert Mickelsen
U.S. Forest Service

Date

Dr. William Platts
Citizen Participant

Date

Peggy Redick
Member, Challis Local Working Group

Date

Mike Remming
Member, Jarbidge Local Working Group

Date

Rob Rogerson
Member, Shoshone Local Working Group

Date

John Romero
Idaho Cattle Association

Date

Memorandum of Understanding

BETWEEN THE STATE OF IDAHO
BY AND THROUGH THE
DEPARTMENT OF AGRICULTURE,
DEPARTMENT OF FISH AND GAME,
DEPARTMENT OF LANDS,
OFFICE OF SPECIES CONSERVATION

AND

UNITED STATES DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT,
UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE-INTERMOUNTAIN REGION,
ANIMAL AND PLANT HEALTH INSPECTION SERVICE-WILDLIFE SERVICES,
NATURAL RESOURCES CONSERVATION SERVICE

This Memorandum of Understanding (MOU) is entered into by the STATE OF IDAHO, IDAHO DEPARTMENT OF AGRICULTURE (ISDA), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), IDAHO DEPARTMENT OF LANDS (IDL), OFFICE OF THE GOVERNOR, OFFICE OF SPECIES CONSERVATION (OSC) AND the USDI BUREAU OF LAND MANAGEMENT (BLM), USDA FOREST SERVICE (FS), USDA APHIS-WILDLIFE SERVICES and USDA NATURAL RESOURCES CONSERVATION SERVICE (NRCS) (collectively referred to as the Parties).

INTRODUCTION

WHEREAS, the parties agree that sage-grouse are an important natural component of the sagebrush ecosystem. To this end, the parties hereby enter into this MOU for the purpose of supporting and implementing, to the extent practicable and where appropriate, the intent and actions contained in the **2006 Conservation Plan for the Greater Sage-grouse in Idaho**.

WHEREAS, the parties herein agree that increased cooperative efforts, consistent with applicable statutory requirements, Local Working Groups (LWGs) and their respective Plans, and the State-wide Plan, are necessary to conserve sagebrush ecosystems for the benefit of sage-grouse, other sagebrush dependent species, and people.

WHEREAS, the aforementioned government agencies continue to recognize and applaud the efforts of LWGs in conserving sage-grouse. Said agencies will continue to support these LWGs and their respective Plans, as they represent the heart of Idaho's sage-grouse conservation strategy.

I. AUTHORITIES

a. STATE AGENCIES:

Idaho State Department of Agriculture: Title 22, section 103 of the Idaho Code allows the ISDA to contract with any state agency, federal agency or agency of another state concerning any matter, program or cooperative effort within the scope and jurisdiction of the authority pursuant to law.

Idaho Department of Fish and Game: Title 36, section 1102 of the Idaho Code grants authority to IDFG to protect birds, including game birds like sage-grouse, in Idaho.

Idaho Department of Lands: IDL is directed by Article IX-Section 8 of the Idaho Constitution to manage the approximately 2.4 million acres of state endowment lands in such a manner as to secure the maximum long-term financial return to the institution to which granted. To the extent that it is consistent with this mandate, IDL has adopted a management policy that recognizes the value of wildlife and their habitats, and considers the impacts to wildlife habitat in management plans or projects. Where appropriate, IDL takes measures that protect or improve important and critical wildlife habitat, subject to the fundamental mission of IDL to support the endowments.

Office of Species Conservation: Title 67, section 818 of the Idaho Code allows the Governor's Office of Species Conservation (OSC) to negotiate agreements with federal agencies concerning endangered species, threatened species and candidate species. OSC is also responsible for coordinating the efforts of all state departments and divisions with duties and responsibilities affecting endangered species, threatened species and species to be listed.

b. FEDERAL AGENCIES:

Bureau of Land Management: The Federal Land Policy and Management Act (FLPMA, Sec. 307, 43 USC 1737) which provides overall direction to the BLM for conservation and management of the public lands, also allows the agency to participate in conservation agreements. BLM Manual, Section 6840 (Special Status Species Management) provides overall policy direction to BLM managers to conserve listed threatened or endangered species on BLM administered lands, and to ensure that actions authorized, funded, or carried out on BLM administered lands do not contribute to the need for federal candidate or BLM Sensitive species to become listed.

Forest Service: The 2005 planning rule, in part, establishes requirements for the sustainability of ecological systems, the goal of which is "*to provide a framework to contribute to sustaining native ecological systems by providing ecological conditions to support diversity of native plant and animal species in the area*" (36 CFR 219.10). Agriculture Department Regulation 9500-4 directs the U.S. Forest Service (USFS) to manage "*habitats for all existing native and desired non-native plants, fish, and wildlife species in order to maintain at least viable populations of such species*," and to "*avoid actions which may cause a species to become threatened or endangered*." USFS Manual section 2672.1 (Sensitive Species Management), directs national forests to provide special management emphasis for sensitive species of plants and animals to ensure their viability and to preclude trends toward endangerment that would result in the need for federal listing. Manual section 2672.12 allows regional foresters to enter into conservation agreements with the USFWS to remove threats to candidate species.

Natural Resources Conservation Service: The mission of the NRCS is to provide leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment. Toward this end, NRCS is committed to improving biological resources by maintaining a high level of expertise in planning, using, and conserving soil, water, animals, plants, air, and related human resources. NRCS provides ecosystem-based assistance for the integrated management needed to sustain natural resources. Ecosystem-based assistance requires NRCS to use biological sciences to: 1) Develop and improve soil, water, animals, plants, air, and related human resources as integral components of all ecosystems, such as forest, range, cropland, and aquatic ecosystems, 2) Protect the habitat of threatened and endangered species of plants and animals and 3) Restore and safeguard unique ecosystems.

APHIS-Wildlife Services: Authority exists under the Act of March 2, 1931 (46 Stat. 1469; 7 U.S.C. 426-426b) as amended, and under the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988, (Public Law 100-202, 7 USC 426c) for APHIS-WS, acting under the Secretary of Agriculture, to conduct a program of wildlife services with respect to injurious animal species and to cooperate and enter into agreements with States, local jurisdictions, individuals, public and private agencies, organizations, and institutions in the control of nuisance mammals and birds and those mammal and bird species that are reservoirs for zoonosis diseases.

II. PURPOSE

The **purpose** of this MOU is to recognize the importance of the 2006 Conservation Plan for the Greater Sage-grouse in Idaho, as a backdrop for conserving sage-grouse in Idaho. In order to fully capture the value of said Plan, this MOU aims to illustrate the roles and responsibilities of the parties. Additionally, said MOU is intended to both emphasize the benefit contributed by the LWGs and encourage the efforts of the government agencies in supporting these vital groups.

The Parties herein also agree that increased cooperative efforts, consistent with applicable statutory requirements, LWGs and their respective Plans, and the State-wide Plan, are necessary to conserve sustainable healthy rangeland ecosystems to benefit sagebrush dependent species and the local economies that rely on them.

III. AGREEMENT PERIOD

This MOU shall be in effect when signed by all of the parties and remain in effect for five years. The MOU, however, may be extended or amended upon written request of any of the parties and the subsequent written concurrence of the others.

IV. RESPONSIBILITIES OF THE PARTIES

The Parties will coordinate activities and resources, when appropriate; however, the parties will control the expenditure of their own funds, in pursuing coordinated objectives.

Any costs borne by the parties under this MOU and any continuation thereof shall be contingent upon the availability of funds appropriated by the Congress of the United States or the Idaho Legislature.

V. OBLIGATIONS

a. STATE GOVERNMENT AGENCIES SHALL:

   i. Continue to support and recognize the important role of the LWGs and their respective plans in conserving sage-grouse;
      1. Consider and implement, to the extent possible, completed LWG plans as appropriate under agency regulations, policies and the law.

2. Actively participate, to the extent possible, in the planning and implementation of LWG goals and objectives outlined in their respective plans;
    a. Attend scheduled meetings and provide information to the LWG upon request;
    b. Make available to the LWG all relevant information regarding the management of sagebrush and sage-grouse habitats; and
    c. Cooperate with and provide advice to the LWG to the extent possible and consistent with the law, agency policy and regulations.
3. Continue to assist in the development and completion of new LWG plans, for areas where none currently exist, by providing the aforementioned services. IDFG will assume the lead role in initiating, coordinating, and maintaining functional LWGs.

ii. Implement, to the extent possible, the actions identified in the 2006 Conservation Plan for the Greater Sage-grouse in Idaho;
1. Work collaboratively with the aforementioned federal government agencies, to the extent possible, in supporting the intent and actions identified in said Plan; and
2. Work collaboratively through the Idaho LWGs, and other appropriate mechanisms, to support the intent and actions contained in said Plan.

b. <u>FEDERAL GOVERNMENT AGENCIES SHALL:</u>

i. Continue to support and recognize the important role of the LWGs and their respective plans in conserving sage-grouse;
1. Consider and implement, to the extent possible, completed LWG plans as appropriate under agency regulations, policies and the law.
2. Actively participate, to the extent possible, in the planning and implementation of LWG goals and objectives outlined in their respective plans;
    a. Attend scheduled meetings and provide information to the LWG upon request;
    b. Make available to the LWG all relevant information regarding the management of sagebrush and sage-grouse habitats; and
    c. Cooperate with and provide advice to LWG to the extent possible and consistent with the law, agency policy and regulations.

3. Continue to assist in the development and completion of new LWG plans, for areas where none currently exist, by providing the aforementioned services.

ii. Implement, to the extent possible, the actions identified in the 2006 Conservation Plan for the Greater Sage-grouse in Idaho;
   1. Work collaboratively with the aforementioned state government agencies, to the extent possible, in supporting the intent and actions identified in said Plan; and
   2. Work collaboratively through the Idaho LWGs, and other appropriate mechanisms, to support the intent and actions contained in said Plan.

VI. MODIFICATIONS

This agreement can be modified by the mutual, written consent of the parties at any time.

VII. CONGRESSIONAL RESTRICTIONS

Pursuant to Section 22, Title 41, United States Code, no member of or delegate to Congress shall be admitted to any share or part of this MOU or to any benefit to arise therefrom.

VIII. TERMINATION

This MOU may be terminated by any party upon sixty (60) days written notice to the other parties. The remaining parties can continue operating in accordance with the provisions of the MOU.

IX. ESTABLISHMENT OF RESPONSIBILITY

This MOU is not intended to, and does not create, any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity, by a party against the United States or the State of Idaho its agencies, officers, or employees.

Furthermore, this MOU does not necessarily validate or approve any specific LWG plan or recommendation. This MOU establishes the aforementioned agencies' commitment to continue to actively participate and cooperate with the LWGs, and consider LWG plans, as appropriate under the law and agency regulation.

X. NON-FUND OBLIGATING DOCUMENT

Nothing in this MOU shall obligate any of the parties to obligate or transfer any funds. Specific work projects or activities that involve the transfer of funds, services, or property among the various agencies and offices of the parties will require execution of separate agreements and be contingent upon the availability of appropriated funds. Such activities must be independently authorized by appropriate statutory authority. This MOU does not provide such authority. Negotiation, execution, and administration of each such agreement must comply with all applicable statues and regulations.

IN WITNESS WHEREOF, the parties hereto have executed this MOU as of the last date written below:

BUREAU OF LAND MANAGEMENT

By: ______________________________________ Date: ____________________

Bud Cribley, Acting State Director, Idaho BLM

FOREST SERVICE – INTERMOUNTAIN REGION

By: ______________________________________ Date: ____________________

Jack G. Troyer, Regional Forester,
Intermountain Region

IDAHO DEPARTMENT OF FISH AND GAME

By: ______________________________________ Date: ____________________

Steven M. Huffaker, Director

IDAHO STATE DEPARTMENT OF AGRICULTURE

By: ______________________________________ Date: ____________________
Patrick A. Takasugi, Director

IDAHO DEPARTMENT OF LANDS

By: ______________________________________ Date: ____________________
Winston A. Wiggins, Director

OFFICE OF SPECIES CONSERVATION

By: ______________________________________ Date: ____________________
James L. Caswell, Administrator

USDA NATURAL RESOURCES CONSERVATION SERVICE

By: ______________________________________ Date: ____________________
Richard W. Sims, Idaho State Conservationist

USDA-APHIS, WILDLIFE SERVICES

By: ______________________________________ Date: ____________________
Jeffrey S. Green, Western Regional Director

Chapter 1 – Introduction and Plan Overview

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1 Introduction and Plan Overview

1.1 Plan organization and overview

This Conservation Plan for the Greater Sage-grouse (*Centrocercus urophasianus*) in Idaho (henceforth referred to as Plan) includes six chapters and ten related appendices. This Plan has been developed to speak to diverse audiences and to fulfill a range of purposes. To facilitate use by a variety of audiences, this Plan is being produced as both a print and electronic document. In the electronic version of this document the individual chapters are available for download as separate PDF files. The electronic version of this document also contains hyperlinks to additional reference sources and materials. This Plan is intended to be a "living document," therefore, users may wish to check the associated web site at http://fishandgame.idaho.gov/cms/hunt/grouse/ periodically for any updates to the Plan.

In writing this Plan the authors used peer-reviewed documents reflecting the best available science wherever possible. However, in some cases non-peer reviewed documents were also referenced due to the limited availability of information for certain subjects.

Following is an overview of the Plan's organization and content:

- ***Chapter 1*** provides an overview of the rangewide and statewide context within which this Plan was developed. The goals and purposes of the Plan are presented and the conservation objectives are identified. This chapter also includes a summary of the processes that led to the development of this Plan as well as the ongoing development of Local Working Group (LWG) plans. Most importantly, Chapter 1 identifies how this Plan is intended to be used by new and existing LWGs as well as in areas where no LWGs currently exist. Chapter 1 also speaks to the relationship between existing LWG plans and this Plan. Finally, the Western Association of Fish and Wildlife Agencies (WAFWA) sage-grouse habitat management guidelines, and their use in the context of this Plan are briefly discussed in Chapter 1.

- ***Chapter 2*** provides a summary discussion of sage-grouse and sagebrush ecology. A basic understanding of both sage-grouse and sagebrush ecology are important components of planning for, designing, and implementing effective sage-grouse conservation plans and projects. Those who wish to access additional information about sage-grouse and/or sagebrush ecology are directed in this chapter to other valuable informational sources.

- ***Chapter 3*** presents an overview of the status (at the time this Plan was completed) of sage-grouse habitat and populations in Idaho. This information is presented in this chapter at the mid-scale, Sage-grouse Planning Area (SGPA) level. Information included in this chapter includes a summary of land ownership, SGPA maps, SGPA population data and trends, and fragmentation analysis.

- ***Chapter 4*** consists of descriptions of 19 threats to sage-grouse and sage-grouse habitat, and provides a toolbox of conservation measures to address each of those threats.

- ***Chapter 5*** includes a discussion of research, monitoring and evaluation needs and recommendations. This chapter includes recommendations and methodologies for sage-grouse population monitoring and for habitat evaluation and monitoring. An overview of needed research and monitoring activities is also included. A discussion of adaptive management concludes this chapter.

- ***Chapter 6*** outlines the current implementation schedule for this Plan, that summarizes certain important tasks and target completion dates.

- ***Appendices*** to the Plan include: a definition of terms used in the Plan, a summary of sage-grouse petitions submitted to the U.S. Fish and Wildlife Service (as of May, 2004), the U.S. Fish and Wildlife Service 12-month Finding for three petitions to list the greater sage-grouse as threatened or endangered under the Endangered Species Act, the WAFWA Guidelines for Managing Sage-grouse Populations and Their Habitat, a summary of the January 2005 Idaho Science Panel threat prioritization and discussion, key sage-grouse planning contacts for Idaho, Idaho sage-grouse project ranking criteria, a booklet containing monitoring protocol guidelines, lek monitoring forms, a county MOU template, and the completed LWG plans.

1.1.1 Rangewide historical context

The greater sage-grouse has historically been, and continues to be an important species across the western rangelands which it inhabits. Centuries before European settlement of western North America, this bird was of ceremonial and subsistence significance to native peoples in the region. Recent excavations at the Bonneville Estates Rockshelter in Nevada suggest that humans began hunting sage-grouse, and depositing sage-grouse bones inside the shelter between 12,500 to 13,000 years ago, based on radiocarbon dating (Hockett 2005; B. Hockett, archaeologist, BLM Elko District, NV, personal communication, 9/6/2005).

Little is known about the population status of sage-grouse during the 19th century, though journal entries of certain explorers and naturalists describe encounters with the species. On June 5, 1805 Lewis and Clark first encountered the sage-grouse, at that time unknown to science, near the confluence of the Missouri and Marias Rivers in what today is central Montana. Lewis wrote, "*I saw a flock of the mountain cock, or a large species of heath hen with a long pointed tail which the Indians informed us were common to the Rockey [sic] Mountains…*" (Moulton and Dunlay 1987). On March 2, 1806, at Fort Clatsop near the mouth of the Columbia River, Clark wrote, "*the Heath Cock or cock of the Plains is found in the Plains of Columbia and are in great abundance from the enterance [sic] of Lewis's river [Snake] to the mountains which pass the Columbia between the Great falls and Rapids of that river*" (Moulton and Dunlay 1990).

In 1834, ornithologist John K. Townsend, encamped near the "Siskadee" or Green River in what is today, southwestern Wyoming wrote, "…*We have seen also another kind of game, a beautiful bird, the size of a half grown turkey, called the cock of the plains, (Tetrao urophasianus). We first met with this noble bird on the plains, about two days' journey east of Green river, in flocks or packs, of fifteen or twenty, and so exceedingly tame as to allow an approach to within a few feet, running before our horses like domestic fowls, and not unfrequently hopping under their bellies*…" (Townsend, J. K. 1839). For a more detailed discussion of the historical distribution of sage-grouse, see Schroeder et al. (1999).

By 1930 most land with potential for agricultural development was homesteaded and in private ownership (Braun 1998). Much of this land was planted to crops though some areas could not support crop production, and reverted to pastures or rangeland (Braun 1998). Settlement also brought ranches, mines, energy development, reservoirs, roads, fences, towns, power lines and vegetation treatments (Braun 1998). Invasive annual plant species, introduced near the end of the 19th century, also proliferated (Connelly et al. 2004). In the late 1940s, mechanical and chemical control of vegetation were initiated on western rangelands, peaking in the 1950s and 1960's (Miller and Eddleman 2001). By the early 1960s, the elimination or reduction of sagebrush to increase grass production on public and private rangelands was common practice, affecting several million acres (Call 1979). Public concern for wildlife increased greatly during the 1970s (Call 1979).

Eventually, habitat losses and conversions approached, and in cases exceeded 50% in some areas (Dobler 1994, Braun 1998, Knick 1999). Schroeder et al. (2004) suggest that the area of distribution of greater sage-grouse currently occupies approximately 56% of the pre-settlement (pre-1800) distribution of potential habitat. In general, habitat loss, deterioration and fragmentation, are considered to be primary factors contributing to historical declines in sage-grouse abundance across their range (Connelly and Braun 1997, Schroeder at al. 2004).

Estimates of sage-grouse abundance prior to the late 1950s were mostly anecdotal, due a lack of systematic surveys (Braun 1998). Sage-grouse populations in the 1960s and 1970s were two to three times higher than current populations (Connelly et al. 2004). Eleven of 13 states and Canadian provinces showed significant long-term declines in size of active leks (maximum count of males present per lek) between 1965 and 2003. Eight of ten states showed significant population declines during that same time frame, however, the annual rate of decline was much greater between 1965 and 1985 (-3.5%) than between 1986 and 2003 (-0.37%). Some believe sage-grouse declines coincided with the abandonment of broad-scale predator control efforts in the 1970s. During the post-1986 timeframe, however, sage-grouse populations overall stabilized, and in some instances increased. On-going concerns remain over impacts to sage-grouse habitat, West Nile Virus, and other factors (Connelly et al. 2004).

Between May 1999 and December 2003, the U.S. Fish and Wildlife Service (USFWS) received eight petitions to list as endangered or threatened, various populations, purported subspecies, or species, of sage-grouse (Appendix B). In April 2004, USFWS determined that three of the petitions to list the greater sage-grouse as threatened provided substantial information that listing might be warranted, thus initiating a comprehensive range-wide status review. On January 7, 2005, a finding of *Not Warranted* was published in the *Federal Register*.

1.1.2 Cultural significance of the greater sage-grouse for the Shoshone-Paiute Tribes of southern Idaho

1.1.2.1 Tribal off-reservation traditional and treaty-reserved rights concerning sage-grouse

The Shoshone-Paiute Tribes of the Duck Valley Indian Reservation are protected by various treaties, Executive Orders, and laws in the matter of their interest in and reliance on the sage-grouse, among which are the following:

- Treaty With The Sho Sho Nee Nation Of Indians, 1855 (unratified)
- Treaty With The Eastern Shoshoni, 1863
- Treaty With The Shoshoni—Northwestern Bands, 1863
- Treaty With The Western Shoshoni, 1863
- Treaty With Mixed Bands Of Bannacks And Shoshonees, 1863 (unratified)
- Treaty With The Snake, 1865
- Treaty With The Eastern Band Shoshoni And Bannock, 1868
- Treaty With The Shoshones, Bannacks, And Sheepeaters, 1888 (unratified; see letter attached to treaty)
- Executive Order 12875, Enhancing the Intergovernmental Partnership
- Executive Order 13007, Indian Sacred Sites
- Executive Order 13084, Consultation and Coordination with Indian Tribal
- Governments
- National Historic Preservation Act
- National Environmental Policy Act
- American Indian Religious Freedom Act
- Archaeological Resources Protection Act
- Native American Graves Protection and Repatriation Act
- Department of Defense American Indian and Alaska Native Policy

The Shoshone-Paiute Tribes have never relinquished their land and continue to hold the aboriginal land title to much of their vast historical range, including lands throughout southern Idaho. Further, since November 15, 1985, it has been the announced, administrative policy of the Portland Area Office of the Bureau of Indian Affairs that tribal off-reservation treaty-reserved rights are potentially exercisable on all federal lands within a tribe's ceded area, as well as on federal lands in other areas traditionally used for those activities, unless applicable treaties/executive orders state otherwise. This is to be interpreted as acknowledging the reserved rights of the Shoshone-Paiute to access their traditional subsistence resources on public lands that are a part of their traditional homeland. These rights include hunting, fishing, performance of ceremonies and gathering culturally-important resources such as sage-grouse.

1.1.2.2 Spiritual Practices Concerning Sage-grouse

When discussing sage-grouse, or any other cultural resource, Shoshone-Paiute tribal members invariably point out the interconnectedness of the total environment. These interconnections go well beyond biological interactions to include medicinal, ceremonial, and spiritual interactions. In fact, virtually all resource procurement by the Shoshone-Paiute involves both spiritual as well as practical aspects. Sage-grouse, like other fauna, are believed to have spirits. The Creator, who is responsible for all things, intended them to be used by the Shoshone-Paiute people for subsistence and spiritual purposes.

The Shoshone-Paiute learn in early childhood a set of basic principles of proper behavior for using environmental elements. When an element such as sage-grouse is needed by the people, a reciprocal action from the people is necessary in return. Reciprocal actions are usually prayers and/or offerings that serve to confirm the need to take and use sage-grouse, to ask permission of the Creator to use it, and to give thanks to the Creator and the sage-grouse's spirit for its availability as a blessing to the people. The Creator has shown the people how He wants resources to be used, so prayers and offerings are also a form of acknowledging that the sage-grouse is being treated according to His intentions.

Offerings are usually token gifts such as a pretty ribbon tied on a tree to decorate it, or small objects left at the site of resource procurement, such as tobacco or coins. Prayers are given at the time a resource is removed from the environment as well as when it is used. Tribal members often phrase this as "taking care of" or "being respectful of" the environment. Prayers include a statement of need (for what purpose a resource will be used) and wishes of good health and well-being both for the resource and for the people who depend on it. In cases where a plant or animal such as the sage-grouse must be killed to be used as a resource, prayers also help its spirit through a regenerative process. One Tribal elder stated this process succinctly:

> *When [a sage-grouse] is killed during hunting, tobacco or some other offering is left, and prayers are said to help [its] spirit get safely to the spirit world and so that the Creator would establish another one of those beings here and keep them plentiful. The prayer is both to the [sage-grouse's] spirit and to the Creator. It is done because you have taken something you need to survive, and it helps re-establish the harmony.*

Such reciprocal actions are believed to nourish the sage-grouse and assure that it will continue to be available and be nourishing to the people in the future.

"**Song of the Sage Hen**"[1]

Sage Hen landing on a mountain pass
Migrating around
Migrating around
Sage Hen landing on a mountain pass
Migrating around
Migrating around
Walks around there
On warm white sand
Walks around there
On warm white sand

To the Tribes sage-grouse, also known as Hoojah or Hoocha, are medicine birds. The males impart to certain tribal members a spirit of divination, making the possessor a medicine man with powers of healing, divination and exorcism. While this has been described in various publications that speak of the spiritual powers of sage-grouse in the past, this power can still be obtained from the sage-grouse, according to Shoshone-Paiute spiritual leaders. Sage-grouse and their leks are still honored by the Shoshone-Paiute Tribes in various ceremonies and sacred dances.

1.1.2.3 Subsistence reliance and practices concerning sage-grouse

As a subsistence resource, sage-grouse have multiple traditional uses. Depending upon the season, sage-grouse have been traditionally used as food, in clothing, as manufacturing materials, as food for other animals, as archetypes in stories and legends, in making toys and musical instruments, in ceremonial costumes, to assist prayers on their journeys, and as omens. Sage-grouse can be an important source of meat, a staple in the Shoshone-Paiute diet that is available nearly year-round. In early summer and between major salmon and steelhead adult returns, the Tribes dispersed into family units to hunt sage-grouse, while simultaneously gathering seeds, berries, and roots. Sage-grouse eggs are also important in diets, as are the eggs of various other bird species. Sage-grouse feathers are used in fans, on ceremonial costumes, and are preferred as fletching for arrows. Their bones are used for ceremonial whistles which helped prayers ascend to the spirits. Dances, regalia, and observances

[1] Newe Hupia: Shoshoni Poetry Songs. Beverly Crum, Earl Crum, and Jon P. Dayley. Logan: Utah State University Press.

celebrate the bird's place in Shoshone-Paiute culture and society. The sage-grouse is, in some respects, honored as much as the eagle.

Tribal members assert that sage-grouse leks must be protected because they are sacred. Many leks have been used for generations, while the use of some leks extended indefinitely into the past. Further, leks are often present around buttes and rimrocks, which is significant because the Tribes recognize that buttes and rimrocks have their own sanctity, and the presence of sage-grouse adds another level of sacredness to these significant areas.

Various proposals have been advanced for perimeters of protection around leks that extend outward for up to 5 miles, which tribal members believe are necessary for their protection. This is needed in part because the Tribes have noted that leks used for an extended period of time tend to be those that avoid excessive human or cattle-related disturbances. Consequently, actions must be taken to protect culturally-important habitat (including lek and nesting habitat) that the Tribes and sage-grouse depend on for their ongoing existence.

1.1.3 Cultural significance of the greater sage-grouse to the Shoshone-Bannock Tribes

Since time immemorial, the Shoshone and Bannock people have relied on the sagebrush steppe ecosystem to provide flora and fauna for subsistence needs. Prior to westward expansion, the sagebrush steppe ecosystem was vast, contiguous and unimpaired by man-made threats. The Shoshone and Bannock people consider the greater sage-grouse, a sagebrush steppe obligate, a staple for subsistence and ceremonial purposes. Today, the Shoshone-Bannock Tribes continue to utilize sage-grouse and are concerned about their ability to exist under current management conditions and the impacts that their demise would have on Tribal culture and traditions

The sage-grouse is significant in the Shoshone and Bannock cultures. The tangible significance of sage-grouse is illustrated in tribal traditional dance, sustenance and ceremonial songs. The intangible significance is evident in the spiritual belief associated with sage-grouse. The Chicken Dance is a traditional dance that honors the sage-grouse. This traditional dance imitates the dance the grouse performs during the mating season. The dancers' regalia reflect the image of the grouse in the headdress, bustle and whistle. The grouse is also a traditional sustenance resource and is a part of the traditional diet of the Shoshone Bannock Tribes. On a broad cultural scale the sage-grouse spiritual significance is observed in the acknowledgement that sage-grouse is a part of the web of life and plays an important role in maintaining balance of life. Specifically the sage-grouse spiritual importance is recognized in the songs sung in traditional ceremonies which speak of the power the sage-grouse possesses.

1.1.3.1 Off-Reservation Reserved Treaty Rights of the Shoshone-Bannock Tribes

On July 3, 1868, the Fort Bridger Treaty was entered into between the Shoshone-Bannock Tribes and the United States. Article IV of the Fort Bridger Treaty reserved off-reservation rights of the Shoshone-Bannock Tribes, specifically the right to hunt on unoccupied lands of the United States. The Fort Bridger Treaty provided for a unique relationship between the Tribes and the United States and created a formal trust responsibility to the Tribes. Under this obligation the United States has a special fiduciary responsibility to consider the best interests of the Shoshone-Bannock Tribes pursuant to the Fort Bridger Treaty. Today, most fundamentally, the modern form of the trust obligation is the federal government's duty to protect Indian lands and treaty resources, including the off-reservation rights the Tribes reserved. This duty to protect treaty resources includes preserving the integrity of lands upon which the resources are located

1.1.4 Idaho historical context

In the State of Idaho, the sage-grouse has been a species of interest for well over a century, providing food, recreational, and research opportunities for Idaho's citizens. Moreover, for centuries, the sage-grouse has also been important to the region's American Indian Tribes for ceremonial and subsistence reasons. It remains an important part of the sagebrush community and is sometimes used as a measure of sagebrush ecosystem health. The Idaho Bird Conservation Plan (Idaho Partners in Flight 2000) utilizes the sage-grouse as an umbrella species, in helping describe general objectives for sagebrush habitats. The sage-grouse was selected for this role since it is a sagebrush obligate, has a relatively large home range incorporating expanses of sagebrush habitat, and its habitat requirements are assumed to encompass those of many other sagebrush obligate avian species. Additional discussion regarding the utility of sage-grouse as an umbrella species can be found in Rowland et al. (2005).

Historical populations of sage-grouse in Idaho are not well documented. Before 1900 sage-grouse were not protected in Idaho. The first Idaho sage-grouse hunting season was established in 1900 (Autenrieth 1981).[2] Over the years Idaho's hunting seasons have varied greatly from three month seasons with a 15-20 bird bag in the early 1900s, to closed seasons for 21 of the 31 years from 1918 to 1948. As early as the 1920s, wildlife managers voiced concerns about the future of Idaho's sage-grouse populations. In a trend mirroring that seen in other western states, Idaho has experienced substantial alteration and losses of sagebrush steppe habitat since European settlement.

Drought conditions during the late 1980s through the early 1990s, which resulted in amplified pressures on shrub steppe ecosystems, in concert with continued declines in Idaho's sage-grouse populations, served to heighten concerns among local resource managers. Concerns regarding sage-grouse habitat and/or population trends also resulted in the species designation as Sensitive by Idaho Bureau of Land Management (BLM) and U.S. Forest Service (USFS) Region 4. Broad-scale monitoring of sage-grouse populations did not begin until the 1960s. Statewide, sage-grouse populations in Idaho showed an overall declining trend between 1965-2003 (Figure 1-1).

[2] The impetus for establishing this initial hunting season was to prohibit spring shooting during critical reproductive periods.

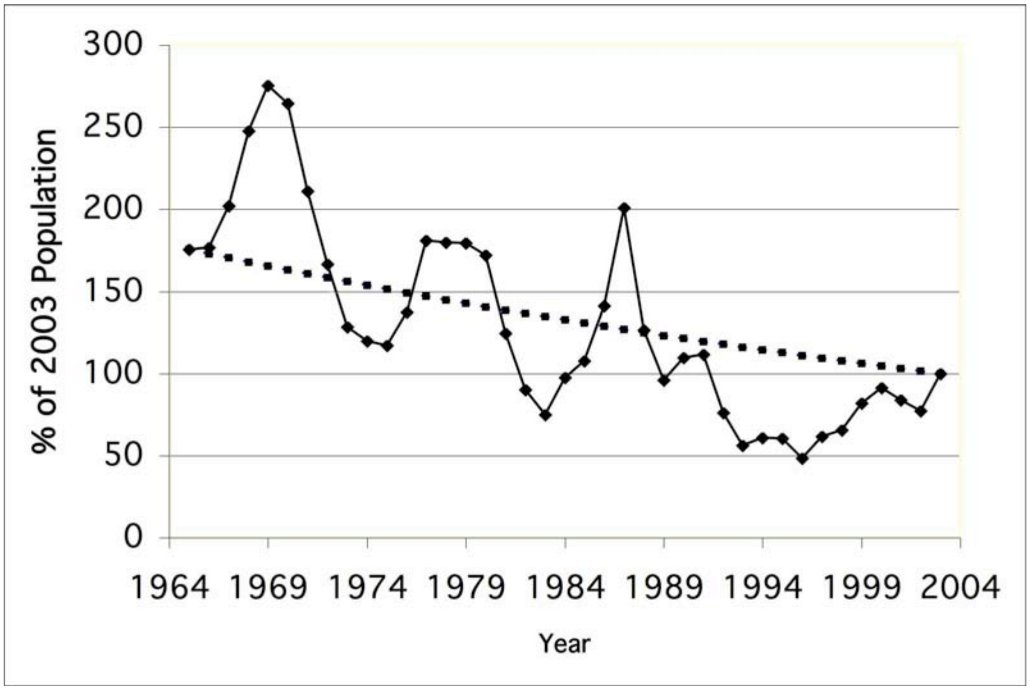

Figure 1-1 Change in the population index for greater sage-grouse in Idaho, 1965-2003 (Connelly et al. 2004)[3]

1.1.5 U.S. Fish and Wildlife Service 2005 Finding

On January 12, 2005, the USFWS announced the results of their 12-month Finding for three petitions to list the greater sage-grouse as threatened or endangered under the Endangered Species Act (USDI-FWS 2005). After reviewing the best available scientific and commercial information, they found that listing, at this time, is not warranted (Appendix C).

In the Finding the USFWS stated, "*Although sagebrush habitat continues to be lost and degraded in parts of the greater sage-grouse's range (albeit at a lower rate than historically observed), from what we know of the current range and distribution of the sage-grouse, its numbers are well represented. As a result, we find that the species is*

[3] The population index (irregular line) was derived from changes in counts of males on the same leks between consecutive years. The regression (dashed) line illustrates the overall downward trend from 1965-2003. For a detailed discussion of the process used in this analysis, see Connelly et al. (2004) pages 6-18 through 6-21. Pages 6-30 through 6-33 of Connelly et al (2004) discuss Idaho sage-grouse population trends in additional detail.

not in danger of extinction, nor is it likely to become endangered in the foreseeable future. We are encouraged that sage-grouse and sagebrush conservation efforts will moderate the rate and extent of habitat loss for the species in the future. We strongly encourage the continuation of these efforts" (USDI-FWS 2005).

The Endangered Species Act requires the USFWS to make a decision based on what is known at the time of listing. In the Finding the USFWS noted, "*the future health of both the sagebrush system and sage-grouse depends on how threats are expressed and how managers respond to them in the next 5 to 20 years*" (USDI-FWS 2005).

1.2 Goals and purposes of Plan

1.2.1 Goals

The primary goal of this Plan is to:

1. Maintain, improve, and where possible, increase sage-grouse populations and habitats in Idaho, while considering the predictability and long-term sustainability of a variety of other land uses.

Secondary goals of this Plan include:

2. Establishing broadly representative LWGs in all SGPAs that currently lack them;

3. Fostering and supporting effective LWGs and their activities, throughout the range of sage-grouse in Idaho;

4. Fostering and supporting completion of LWG plans for all of Idaho's SGPAs; and,

5. Fostering and supporting effective coordination among state and federal agencies, Tribes, and non-governmental cooperators to achieve the primary goal of this Plan.

This Plan is intended to be a **"living document"** that will be periodically updated and/or amended as appropriate (e.g., as new information becomes available, regional and local conditions change, new technologies or techniques become available, additional LWGs complete their local plans and contribute to increased refinement of local site-specific data and information).

1.2.2 Purposes

The overarching purpose of this Plan is to:

1. Effectively conserve Idaho sage-grouse populations and sagebrush communities through support of individual and collective efforts of LWGs, non-governmental organizations, local governments, state and federal agencies, Tribes, and members of the public. The Plan provides those individuals and entities with guidance, information, conservation tools, and related resources necessary to achieve locally and regionally appropriate conservation objectives.

Additional purposes of this Plan include:

2. Development of a framework that will encourage and promote greater consistency among Idaho's LWG plans (e.g., more standardized organizational structure and terminology) as they work to eliminate, reduce or mitigate threats to sage-grouse and sage-grouse habitat.

3. Integration, to the extent possible, of national, regional, and local knowledge and management objectives, in order to effectively conserve sage-grouse populations and sagebrush communities.

4. Provide for effective coordinated management across jurisdictional boundaries by fostering mechanisms and agreements to coordinate the efforts of: state agencies, federal agencies, and Tribes, with non-governmental individuals and organizations -- to cooperatively implement conservation measures for the sage-grouse and sage-grouse habitats within Idaho.

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

1.3 Conservation objectives

Given the distribution of sage-grouse across the Idaho landscape, migratory nature of certain sage-grouse populations, variety of seasonal habitats required, complexity of land ownership patterns, and magnitude of certain threats (e.g., wildfire, invasive annual grasses), the long-term viability of sage-grouse in Idaho is dependent on developing and implementing conservation measures across a range of scales.

Focusing efforts primarily at the fine-scale (project, site-specific) may overlook cumulative impacts and important landscape issues such as connectivity between sage-grouse population strongholds, or may divert limited funding from higher priorities in Idaho. Conversely, conservation efforts focused primarily at the mid- or broad-scale may neglect crucial site-specific circumstances or needs. In seeking to understand and address the complex interactions of factors influencing habitat quality and sage-grouse populations, managers should, whenever possible, look across multiple scales. Local working groups should develop and/or adopt local goals and objectives.

For the purposes of this Plan the broad-scale is defined as the State of Idaho (i.e., approximately 1:500,000-plus scale), mid-scale is defined as the Sage Grouse Planning Area (i.e., approximately 1:100,000 scale), and fine-scale is defined as the watershed and/or specific project scale (i.e., approximately 1:24,000 scale).

1.3.1 Population objectives

The following population objectives apply to the broad-, mid-, and fine-scales:

1. Maintain, and increase where possible, the present distribution and abundance of sage-grouse in Idaho.

2. Reduce, eliminate, or mitigate the adverse impacts of human-related or unnatural disturbance to sage-grouse within or near breeding and winter habitat throughout Idaho.

1.3.2 Habitat objectives

The following habitat objectives apply to the broad-, mid-, and fine-scales:

1. Maintain, enhance or restore sage-grouse habitat, and continuity of habitats, at multiple spatial scales.

2. Manage Idaho's landscape to foster a dynamic sagebrush ecosystem that includes a diverse species composition of sagebrush, grasses, and forbs; and incorporates structural characteristics that promote rangeland health in general, and sage-grouse habitat requirements in particular.

In addition to the broad conservation objectives identified above, following are specific broad-, mid- and fine-scale sub-objectives.

1.3.2.1 Broad-scale habitat sub-objectives

- Foster the maintenance or recovery of rangewide sage-grouse populations in a manner that complements similar efforts in adjacent states.
- Collaborate with states that share contiguous sage-grouse habitats to maintain, enhance or restore sage-grouse habitat.

1.3.2.2 Mid-scale habitat sub-objectives

- Manage sagebrush so that it is well distributed on the landscape, as ecological site conditions allow. Emphasis should be placed on maintaining or restoring large contiguous core areas or blocks of sagebrush that have the necessary species and age diversity of sagebrush and herbaceous components to produce sustainable sage-grouse habitat. The primary long-term objective is to ensure adequate areas within each SGPA suitable for meeting all seasonal habitat needs of sage-grouse and the sage-grouse population and distribution goals of this Plan. Using the 2004 sage-grouse Habitat Planning Map as a preliminary guide (See SGPA maps located in Chapter 3), maintain, enhance or restore existing key and stronghold sage-grouse habitat across SGPAs.
- Maintain smaller islands, corridors, or mosaic patterns when provision for large, extensive blocks of sagebrush is not feasible or appropriate due to ecological site limitations (e.g., mountainous areas with complex topographic features, sagebrush patches intermingled with forested cover types).
- Enlarge existing stronghold habitats.
- Establish or improve connectivity and genetic interchange between populations by re-establishing suitable habitat in intervening areas.
- Enhance habitat quality and quantity in isolated population areas to enhance population sustainability.
- Increase the proportion of key and stronghold habitat in SGPAs by (1) diversifying structural and species composition and re-establishing sagebrush within large perennial grass seedings, (2) rehabilitating annual exotic

grasslands, (3) managing conifer encroachment to restore sage-grouse habitat (4) improving understory habitat quality in areas where sagebrush cover limits the herbaceous cover needs of sage-grouse, (5) improving understory quality where sagebrush cover is otherwise suitable.[4]

1.3.2.3 Fine-scale sub-objectives

In addition to the appropriate broad- and mid-scale objectives identified above, fine-scale conservation objectives will be identified within each of the LWG plans once completed. The following objectives are also intended to serve as interim objectives in areas where LWG plans are not yet complete or where no LWG currently exists.

- Promote rangeland health and vegetation characteristics (e.g., species diversity including big sagebrush and other sagebrush species, perennial herbaceous cover, forbs, etc.) at the fine-scale that contribute to mid-scale objectives.

- Coordinate with appropriate agencies to map and monitor sage-grouse seasonal habitats (preferably at the population scale if known) to facilitate conservation planning, aid in the prioritization of habitat-improvement and restoration projects, and document the effectiveness of projects or management changes.

- Agencies will collaborate to understand the cumulative effects of management decisions.

- Projects and management actions should contribute to the maintenance, restoration, or rehabilitation of sage-grouse habitats.

1.4 Development of the Idaho Plan and Local Working Group plans

For all of the parties involved in sage-grouse conservation and planning efforts across the state of Idaho, there has been, and continues to be an ongoing learning process relative to: sage-grouse habitat and sage-grouse requirements, changing conditions and priorities across the landscape, effectiveness of various approaches to planning and development of LWG plans, and evolving tools and resources. This document reflects, and is also an artifact, of that fluid and dynamic process.

[4] Note: items 4 and 5 assume sagebrush is not otherwise limiting on the landscape.

1.4.1 1997 Idaho Plan

In 1997, the Idaho Sage-grouse Task Force, under direction of the Idaho Fish and Game Commission, completed the Idaho Sage-grouse Management Plan (IDFG 1997). The 1997 Plan subdivided Idaho into 13 sage-grouse management areas. These management areas reflected sage-grouse populations or groups of populations by discrete geographic areas in Idaho based on readily definable boundaries, administrative jurisdictions, and current information.

Subsequently, six sage-grouse LWGs were formed to assist in local sage-grouse planning and management efforts in selected areas of Idaho. A seventh group, previously established in Shoshone Basin in 1994, was also adopted as a LWG. The original LWG boundaries in most cases overlapped one or more of the original sage-grouse management areas.

1.4.2 Current and ongoing planning efforts

Planning for sage-grouse conservation has continued to evolve in Idaho since 1997. The preliminary planning efforts focused mostly on what were identified as priority areas. To ensure that all areas of Idaho that harbor sage-grouse habitat are eventually addressed, and to further statewide and local conservation efforts, the original 13 management areas were reconfigured into 13 SGPAs.

These 13 revised SGPAs (Figure 1-2) form the geographic foundation for mid-scale sage-grouse conservation planning and for the efficient marshalling of conservation resources. Although these new planning areas deviate somewhat from the original sage-grouse management areas described in the 1997 plan, they correlate directly with existing LWG area boundaries.

Figure 1-2 Idaho Sage-grouse Planning Areas.

In 2003, the Director of the Idaho Department Fish and Game appointed the Idaho Sage-grouse Advisory Committee (SAC). In addition to representatives from key agencies, this committee includes private citizens from agricultural and conservation groups and at least one member from each Local Working Group. In addition to improving communication between LWGs and advising the state on how to distribute federal grant funds, the SAC has assisted in updating the 1997 plan.

As of December 31, 2005 two LWG plans have been completed, and three are nearing completion (Table 1-1). The development of new LWGs in areas without them, and completion of LWG plans for those areas is a priority of this Plan.

Table 1-1 Status of LWGs and LWG Plans by SGPA

SGPA	LWG Status[5]	LWG Plan Status[6]
Big Desert	None at this time	None at this time[7]
Challis	Started 2002	In development
Curlew	Started 1998	Completed
East Idaho Uplands	None at this time	None at this time[6]
East Magic Valley	None at this time	None at this time[6]
Jarbidge	Started 1999	Draft complete
Mountain Home	None at this time	None at this time
Owyhee	Started 1998	Completed
Shoshone Basin	Started 1994	Draft complete
South Magic Valley	None at this time	None at this time[6]
Upper Snake River	Started 1998	Completed
West Central	Started 2004	In development
West Magic Valley	None at this time	None at this time[6]

1.4.3 Relationship between Local Working Group plans and state Plan

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

[5] As of December 31, 2005.

[6] As of December 31, 2005.

[7] In 2004, IDFG Regions, in cooperation with local partners, began identifying conservation issues for the Big Desert, East Idaho Uplands, East Magic Valley and West Magic Valley SGPAs, to aid in the preparation for the eventual establishment of LWGs in these areas. The South Magic Valley SGPA began preliminary discussions during 2005.

plans will identify threats and appropriate conservation measures at the mid-and fine-scale.

This state Plan is designed to provide guidelines and specific recommendations intended to promote a level of consistency (e.g., identification of range of threats, standard terminology, format, etc.) among LWG plans.

The state Plan and the LWG plans are expected to be "living documents," as new information becomes available, and/or techniques and technologies improve, the plans should be updated or revised.

1.4.3.1 Local Working Group Plans

The purpose of LWG plans is to increase sage-grouse populations and/or improve sage-grouse habitat within the Plan's boundary, while considering the predictability and long term sustainability of a variety of other land uses. The LWG plans should identify potential threats and provide recommended actions to mitigate those threats, benchmarks for completing those recommended actions, and monitoring protocols to address those threats that are affecting sage-grouse or their habitat within the LWG boundary.

The LWG plans provide the guidance that agencies, businesses, and individuals should consider when performing actions in sage-grouse habitats. In general, the expectation is that when sage-grouse concerns arise at the local level, LWGs, agency representatives, landowners, and others will look first to the appropriate LWG plan for specific guidance. If a LWG plan is silent on the issue of concern, parties would look next to the state Plan for guidance. The LWGs are expected to work with, and through, the appropriate federal and state agencies, landowners, and regulatory processes to implement the conservation measures/actions identified in their LWG plans to reduce, eliminate, or mitigate identified threats to sage-grouse and sage-grouse habitat

1.4.3.2 The Conservation Plan for the Greater Sage-grouse in Idaho

The goal of the Conservation Plan for the Greater Sage-grouse in Idaho is to maintain, improve, and where possible, increase sage-grouse populations and habitats in Idaho, while considering the predictability and long-term sustainability of a variety of other land uses.

Some geographic areas in Idaho do not have active LWGs. The Conservation Plan identifies statewide threats and a toolbox of conservation measures to address those threats.

The Conservation Plan will also serve as a useful reference tool to support all LWGs as well as areas without LWGs by:

- providing background information and resources regarding sage-grouse and sagebrush ecology;
- providing an overview of sage-grouse populations and sage-grouse habitats within the state;
- discussing threats at a state wide level;
- providing a toolbox of conservation measures which may be used by LWGs;
- discussing the data and research needs that would lead to a better understanding of sage-grouse and sage-grouse habitat; and
- providing protocols for monitoring and evaluation of sage-grouse populations and sage-grouse habitats.

By providing these various resources for consideration by LWGs, the Plan encourages a level of consistency among the LWG plans and actions.

All completed LWG plans will be incorporated as appendices to this Plan.

The most recent update of this Plan and each of the most recent version of the completed LWG plans will also be located together at http://fishandgame.idaho.gov/cms/hunt/grouse/ along with links to a selection of relevant informational resources.

1.4.4 Relationship to other planning efforts and regulations

Federal agencies administer roughly 73% of existing sagebrush lands in Idaho. State and private lands comprise an additional 7% and 19%, respectively. Complicating matters, the interspersion and continuity of land ownership patterns varies widely across Idaho; from large, contiguous acreages of federal and state lands in the southwestern part of the state to more fragmented or mosaic patterns of federal, state, and private lands in the south-central and eastern portions.

In addition to collaborative efforts within Idaho, coordination between Idaho and adjoining states will be necessary. The primary mechanisms for interstate coordination include the 1999 Memorandum of Understanding between member states comprising the Western Association of Fish and Wildlife Agencies (WAFWA), and the 2000 Memorandum of Understanding between WAFWA and the U.S. Forest Service, BLM, and USFWS. The 1999 MOU is currently under revision. A range-wide sage-grouse conservation strategy, also currently under development, will help guide these collaborative interstate efforts and will provide recommendations for more specific eco-regional conservation measures.

Parties to this Plan recognize that in some instances, federal and state agencies may need to formalize conservation measures or other actions through additional processes separate from this Plan, such as resource management plan amendments, terms and conditions, or other means including compliance with National Environmental Policy Act requirements or state law.

1.4.5 Authorities and missions

In implementing this Plan, a variety of multi-disciplinary expertise will be required. Resource users may have an intimate knowledge of local conditions, can sometimes provide innovative solutions to problems, and can contribute an important historical perspective. Agency personnel have expertise in monitoring and managing wildlife populations and habitats and generally have at their disposal state of the art technical equipment and procedures.

Cooperating agencies and organizations that will participate in the implementation of this Plan are themselves governed by specific legal mandates, responsibilities, and/or mission statements related to their respective involvement in conservation issues or conservation planning.

Following is a summary of the authorities and the mission statements of the various entities that have participated in development of this Plan and who will participate in the implementation of this Plan, and many LWG plans.

1.4.5.1 Local Working Groups

The LWGs are the heart of Idaho's sage-grouse conservation strategy, and are critical to the successful implementation of this plan. To be successful, the LWGs will need to represent a broad range of interests affected by, and concerned with, sage-grouse management and populations. Membership should include, but is not limited to, local land-owners; members of the public; non-governmental organizations; representatives of industry; local government; state and federal agencies; and American Indian Tribes. LWGs that represent a broad range of interests and perspectives ensure a diverse base of support for LWG proposed projects or actions. For example, if projects proposed by a LWG have broad public support they are less likely to be challenged. LWGs may also provide valuable input to inform and potentially improve agency decision-making.

The collaborative development of broadly-represented LWG plans is vital to successful execution of those plans through identification of local threats and appropriate conservation actions, project identification and implementation, contribution to monitoring and evaluation activities, and periodic updating of the LWG plans. As participants on the LWGs, state, federal and Tribal representatives are expected to keep LWG members apprised of any conflicting legal mandates or concerns as the local plans are in development.

1.4.5.2 Federal agencies

1.4.5.2.1 U.S. Bureau of Land Management

The Federal Land Policy and Management Act, or FLPMA, which provides overall direction to the U.S. Bureau of Land Management (BLM) for the conservation and management of public lands, also allows the agency to participate in cooperative agreements (43 USC 1737 Sec. 307b). BLM Manual section 6840 (Special Status Species Management) requires that actions authorized on BLM-administered lands do not contribute to the need to list federal candidate or Bureau sensitive species under provisions of the Endangered Species Act.

The land use planning process, mandated by FLPMA and described in the regulations at 43 CFR 1610, is used to identify desired outcomes (goals and objectives) and allowable uses and actions anticipated to achieve desired outcomes on BLM-administered lands. BLM's planning process will develop management direction consistent with the Idaho Conservation Plan for the Greater Sage-grouse and integrated across all resource uses.

BLM Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration (43 CFR Subpart 4180), in part, require the management of rangelands to ensure that "*Habitats are, or are making significant progress toward being, restored or maintained for Federal threatened and endangered species, Federal Proposed…and other special status species*" (43 CFR 4180.1).

In Idaho, 43 CFR 4180 is implemented through the Idaho Standards for Rangeland Health and Guidelines for Livestock Grazing Management, adopted August 1997 (USDI-BLM 1997). Where appropriate on the landscape, Idaho BLM rangelands are expected to meet eight Standards for Rangeland Health or should be making significant progress toward meeting the standards. Standard 8, which requires that "*Habitats are suitable to maintain viable populations of threatened and endangered, sensitive and other special status species*", is of particular relevance to sage-grouse.

BLM has developed a National Sage-Grouse Habitat Conservation Strategy (USDI Bureau of Land Management, 2004). The purpose of the comprehensive National Sage-grouse Strategy is to set goals and objectives, assemble guidance and resource materials, and provide a comprehensive management direction for the BLM's contributions to on-going multi-state sage-grouse conservation effort in cooperation with WAFWA. Implementation of BLM's National Sage-grouse Strategy and the state level Sage-grouse Conservation Strategies will complement and expand the ongoing efforts to conserve sagebrush ecosystems on public lands administered by the BLM for the benefit of sage-grouse and other wildlife species.

1.4.5.2.2 U.S. Department of Agriculture, Natural Resources Conservation Service

The mission of the Natural Resources Conservation Service (NRCS) is to "*provide leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment*." Toward this end, NRCS is committed to improving biological resources by maintaining a high level of expertise in planning, using, and conserving soil, water, animals, plants, air, and related human resources. NRCS provides ecosystem-based assistance for the integrated management needed to sustain natural resources. Ecosystem-based assistance requires NRCS to use biological sciences to: 1) develop and improve soil, water, animals, plants, air, and related human resources as integral components of all ecosystems, such as forest, range, cropland, and aquatic ecosystems; 2) protect the habitat of threatened and endangered species of plants and animals; and 3) restore and safeguard unique ecosystems.

1.4.5.2.3 U.S. Fish and Wildlife Service (Technical Advisors on Plan)

The U.S. Fish and Wildlife Service is a bureau within the U.S. Department of the Interior. Its mission is, "*working with others, to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.*" While not a formal party to this Plan, U.S. Fish and Wildlife Service has had ongoing representation on the SAC, and has provided helpful perspectives during the preparation of portions of this Plan.

1.4.5.2.4 U.S. Forest Service

The 2005 planning rule, in part, establishes requirements for the sustainability of ecological systems, the goal of which is "to provide a framework to contribute to sustaining native ecological systems by providing ecological conditions to support diversity of native plant and animal species in the plan area" (36 CFR 219.10). Agriculture Department Regulation 9500-4 directs the U.S. Forest Service (USFS) to manage "habitats for all existing native and desired non-native plants, fish, and wildlife species in order to maintain at least viable populations of such species," and to "avoid actions which may cause a species to become threatened or endangered". USFS Manual section 2672.1 (Sensitive Species Management) directs national forests to provide special management emphasis for sensitive species of plants and animals to ensure their viability and to preclude trends toward endangerment that would result in the need for federal listing. Manual section 2672.12 allows regional foresters to enter into conservation agreements with the USFWS to remove threats to candidate species.

1.4.5.2.5 U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services

The Animal and Plant Health Inspection Service (APHIS) is an agency under the U.S. Department of Agriculture, and the Wildlife Services program is one of several programs in APHIS. Under the authority of the Animal Damage Control Act of 1931, Wildlife Services provides Federal leadership and expertise in addressing a wide range of conflicts between humans and wildlife. Part of this role involves providing assistance to other agencies and the public in addressing wildlife damage to natural resources. This Plan and some of the LWG plans have identified predation as one of the multiple potential threats to sage grouse, and Wildlife Services can provide expertise and assistance in dealing with predation concerns at the local level.

1.4.5.3 American Indian Tribes

The United States has a unique legal relationship with American Indian Tribes as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, and court decisions. The Federal Government has enacted numerous regulations and policies that further establish and define a trust relationship with Indian tribes.

All federally-recognized American Indian Tribes have off-reservation interests in public lands and many retain pre-existing rights reserved through treaty or executive order language. The legal basis of these tribal rights and interests are founded in the inherent sovereignty of American Indian Tribes; continuing aboriginal rights; pre-existing rights reserved in treaties, executive orders; agreements; and federal statutes.

The relationship between Federal agencies and American Indian Tribes is defined by numerous laws and regulations addressing the requirement of Federal agencies to notify or consult with American Indian Tribes, or otherwise consider their rights and interests, when planning and implementing Federal undertakings. As such, federal land managing agencies participating in the Idaho's sage-grouse conservation Plan will work closely with American Indian Tribes through the government-to-government consultation process to appropriately address tribal rights and interests.

Sage-grouse have significant cultural importance to American Indian Tribes and must be considered in relation to the associated rights and interests American Indian Tribes have on federally-administered lands. In conservation planning and project development and implementation efforts for sage-grouse or their habitat occurring on federal lands, federal land managing agencies will ensure tribal involvement through the government-to-government consultation process.

1.4.5.4 State agencies

1.4.5.4.1 Idaho Department of Fish and Game

Idaho Code, Section 36-103 states, "*All wildlife, including all wild animals, wild birds, and fish within the State of Idaho is hereby declared to be the property of the State of Idaho. It shall be preserved, protected, perpetuated, and managed. It shall only be captured or taken at such times or places, under such conditions, or by such means, or in such manner, as will preserve, protect, and perpetuate such wildlife, and provide for the citizens of this state and, as by law permitted to others, continued supplies of such wildlife for hunting, fishing, and trapping*".

1.4.5.4.2 *Idaho Department of Lands*

The Idaho Department of Lands (IDL) is directed by Article IX-Section 8 of the Idaho Constitution to manage the approximately 2.4 million acres of state endowment lands "*in such a manner as to secure the maximum long-term financial return to the institution to which granted*." IDL has adopted a management policy that recognizes the value of wildlife and their habitats and considers the impacts to wildlife habitat in management plans or projects. Where appropriate, IDL takes measures that protect or improve important and critical wildlife habitat, subject to the fundamental mission of IDL to support the endowments.

1.4.5.4.3 *Idaho Governor's Office of Species Conservation*

Title 67, Section 818 of the Idaho Code allows Office of Species Conservation (OSC) to negotiate agreements with federal agencies concerning endangered, threatened, and candidate species. OSC is also responsible for coordinating the efforts of all state departments and divisions with duties and responsibilities affecting endangered species, threatened species, and species to be listed. In 2004, OSC's role was clarified to include petitioned and rare and declining species as well.

1.4.5.4.4 *Idaho State Department of Agriculture*

The mission of the Idaho State Department of Agriculture is "*serving consumers and agriculture by safeguarding the public, plants, animals, and the environment through education and regulation.*"

1.4.5.5 County government

County governments provide diverse services related to public safety, essential programs, natural resources, and manage public assets for the common well-being of each County's citizens. Counties have responsibilities related to planning and zoning, weed control, and permitting, among others. Some Idaho counties have also adopted local natural resource plans for purposes of creating a coordinating role with federal agencies, under FLPMA and the Forest Management acts. County government can play a valuable and important role in sage-grouse habitat conservation planning and implementation. Some counties have expressed an interest in entering into an MOU for sage-grouse habitat conservation. For those counties, a sample template for a County/IDFG MOU is located in Appendix K.

1.4.5.6 Non-governmental organizations and industry groups

1.4.5.6.1 Ada County Fish and Game League

The mission of the Ada County Fish and Game League is to assist in the conservation of wildlife resources in cooperation with similar associations and wildlife advocates for the benefit of all citizens, and to promote a high standard of sportsmanship and respect for Idaho's wildlife and associated natural resources on public lands.

1.4.5.6.2 Idaho Bird Hunters

The mission of Idaho Bird Hunters is to 1) enhance and perpetuate wild game birds in Idaho; 2) to establish and encourage conservation of game bird habitat; 3) to conduct research, training, and enhancement of knowledge concerning upland game birds; 4) to promote the shooting sport of game bird hunting through sportsmanship, educational programs on guns, and shot-gunning; and 5) field testing of gun dogs.

1.4.5.6.3 Idaho Conservation League

The Idaho Conservation League preserves Idaho's clean water, wilderness and quality of life through citizen action, public education, and professional advocacy.

1.4.5.6.4 Idaho Cattle Association

The mission of the Idaho Cattle Association is to coordinate and advance the economic well being of the Idaho Beef Industry through innovative and effective political, educational, and marketing programs accepted and supported by industry segments, partners, and coalitions.

1.4.5.6.5 Idaho Wildlife Federation

The mission of the Idaho Wildlife Federation is to promote the conservation and protection of our natural resources, wildlife, and wildlife habitat for current and future generations.

1.4.5.7 Landowners

Private landowners have specific rights in relationship to the lands they own. Their voluntary participation in actions that affect sage-grouse habitat is vital to the successful implementation of this Plan.

1.4.5.8 Members of the public

The participation of members of the public is important to the successful conservation of sage-grouse and sage-grouse habitat in Idaho.

1.5 Guidance, tools and resources

As noted previously, a primary purpose of this Plan is to support LWGs, non-governmental organizations, local governments, state and federal agencies, Tribes, private landowners, and members of the public, in their individual and collective efforts to effectively conserve Idaho sage-grouse populations and sagebrush communities. This Plan has been designed to provide those individuals and entities with guidance, information, conservation tools, and related resources necessary to achieve locally and regionally appropriate conservation objectives.

The following section includes some general and specific guidance, as well as a summary of some of the available tools and resources for use by new and existing LWGs, as well as in areas where no LWGs currently exist. Establishment of LWGs in SGPAs that currently lack them, and completion of LWG plans in all of Idaho's SGPAs, is a priority in Idaho. This Plan is intended to provide the basis for local planning so LWGs do not need to dwell on background or administrative detail in their plans. Thus, the LWGs may rely on the background information presented in this Plan and focus their efforts on local evaluations, on-the-ground projects, implementation and monitoring needs.

1.5.1 Summary of key activities

The following section summarizes the key activities that LWGs are expected to accomplish. In areas with an existing LWG some or all of these activities may have been completed or may be ongoing. Interim activities are also identified for areas with no LWG in place.

1.5.1.1 Areas with no Local Working Group

- In SGPAs with no LWG, the respective IDFG Region will lead organization of interagency start-up teams to begin aggressive outreach to establish a LWG. In 2004 and 2005 IDFG initiated start-up teams in several SGPAs that lack LWGs, including the Big Desert, East Idaho Uplands, and East, South, and West Magic Valley. These efforts will continue with initiation of LWGs in these areas anticipated by December 31, 2006. Formal IDFG regional support of a LWG in the Mountain Home SGPA is also anticipated by December 31, 2006. Table 1-2 identifies the primary agency offices in SGPAs that either lack LWGs or are in the process of starting up new LWGs.

Table 1-2 Summary of primary agency offices in sage-grouse planning areas currently without existing local working groups[8]

SGPA	Agency offices
Big Desert	BLM-Upper Snake, IDFG-Southeast, IDL, NRCS, ISDA, DOE
East Idaho Uplands	BLM-Pocatello, IDFG-SE & Upper Snake, IDL, Caribou NF, NRCS ISDA
East Magic Valley	BLM-Shoshone/Burley, IDFG-Magic Valley, IDL, National Park Service; Minidoka NWR, NRCS, ISDA
West Magic Valley	BLM-Shoshone, IDFG-Magic Valley, IDL, Sawtooth NF, NRCS, ISDA
South Magic Valley	BLM-Burley, Sawtooth NF, IDFG-Magic Valley, IDL, NRCS, ISDA, NPS
Mountain Home	BLM-Four Rivers, IDFG-SW & Magic Valley, Boise NF, NRCS, IDL, ISDA

- Interagency start-up teams, with the help of community members and others, will identify and recruit individuals who share an interest and stake in the conservation of sage-grouse and sagebrush communities to form and participate in a LWG. Interagency start-up teams should work aggressively to ensure a broad and balanced representation of interests on each LWG (e.g., private landowners, ranchers, farmers, citizens, non-governmental organizations, outdoor enthusiasts, conservationists, local government and industry, state and federal agency representatives, Tribal representatives, etc.).

- If start-up of a LWG is delayed the interim inter-agency team should identify threats or other conservation issues in order to initiate conservation actions (through projects, changes in management, etc.) deemed crucial to the conservation of sage-grouse and sage-grouse habitat in that SGPA. The interim

[8] Note: this list does not necessarily represent a comprehensive identification of agencies that would be involved, but is intended to represent primary agencies that may have specific management responsibilities in each SGPA.

inter-agency team should work together to ensure needed data are assembled and made available in support of annual updates to the Sage-grouse Habitat Planning Map (see Chapters 5 and 6), collaborate on annual updates to the SAC consistent with the guidelines for LWGs, and share other data as appropriate.

- Once a LWG is established in the individual SGPAs, it will be important for that LWG to review in the context of local conditions and information, any inter-agency products to identify (or refine) and prioritize, local threats and related conservation issues and measures. Interim identification of threats and conservation measures by inter-agency teams in areas without LWGs is in no way intended to preclude or supercede subsequent identification and prioritization of local threats in that SGPA once a LWG is in place and is operating.

- State and federal agency supervisors or line officers will support this interim process by assigning one or more local field staff (e.g., biologist, rangeland management specialist, fire use specialist, ecologist, or other, as appropriate) to participate on the start-up team (and subsequently on the LWG once it is established). Moreover, local agency managers should recognize there might be circumstances where their personal participation is also required. In addition, agency supervisors should also anticipate that there will be periodic need for timely GIS support at the local level.

1.5.1.2 Development of Local Working Group plan and timelines

- Each LWG should seek to assemble and maintain a diverse membership that includes a broad and balanced representation of interests (e.g., private landowners, ranchers, farmers, citizens, non-governmental organizations, outdoor enthusiasts, conservationists, local government and industry, state and federal agency representatives, Tribal representatives, etc.) The use of a trained facilitator is required from the initiation of LWGs through the development of a completed LWG plan. After the LWG plan is completed, a trained facilitator is strongly recommended, but optional, based on a decision of the LWG members. Funding for a trained facilitator will be provided.

- Develop and recommend quantifiable population objectives. Each LWG, with assistance from agency representatives, should develop and recommend specific population objectives based on lek counts, or best available data. LWG population objectives should contribute to the achievement of broad-scale population objectives presented in this Plan (see Section 1.3.1).

- Develop and recommend quantifiable habitat objectives. Each LWG, with assistance from agency representatives, should develop and recommend specific habitat objectives that maintain, and increase where possible, habitat quantity and quality based on local SGPA conditions and available monitoring data and research.

- Each LWG should identify, and to the extent possible, prioritize threats to sage-grouse populations and habitat at the local level. This state Plan provides a summary and prioritization of threats at a statewide scale. Several threats, including wildfire, infrastructure, annual grasslands, seeded perennial grasslands, and conifer encroachment have been substantially quantified at the SGPA level as well. This information is provided to facilitate the identification and prioritization of local threats at the SGPA or sub-SGPA level. LWGs that have not already completed this activity may wish to use the summary of statewide threats presented in this Plan as a starting point. Those who have already identified local threats may wish to review their identified threats in the context of the statewide threats.

- Existing LWGs with draft plans (i.e., Jarbidge, Shoshone Basin) should complete and finalize their plans no later than December 31, 2006.

- Existing LWGs that do not currently have draft plans (i.e., West Central, Challis) should complete and finalize their plans no later than December 31, 2007.

- New LWGs (i.e., formal LWG has not been initiated as of January 1, 2006) should make every effort to complete their respective plans within two years of inception of the LWG.

- Each LWG should identify appropriate conservation measures/actions to address localized threats to sage-grouse and sage-grouse habitat. This Plan includes a "toolbox" of recommended conservation measures for use and/or adaptation by LWGs in their own planning efforts.

- Each LWG should identify monitoring and evaluation actions necessary to update population and habitat data, and to gage the effectiveness of conservation actions. This effort should be closely coordinated with IDFG and other agencies. (See Chapter 5 for additional discussion.)

- New LWGs are expected to utilize the standardized outline for LWG plans presented in Section 1.5.2.2 of this Plan when developing their LWG plans.

- The SAC has not proposed a formal process for determining when a plan is complete. Currently, LWG plans are considered complete when approved by the

LWG (based on decision-making process and LWG membership as defined by each LWG).

1.5.1.3 Implementation of Local Working Group plans

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

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

- Participating state agencies (IDFG, IDL, and ISDA), the NRCS, and in some cases county government, are expected to assume the lead for coordinating with private landowners, pursuing necessary authorizations or agreements and funding, and cooperating with the implementation of projects or conservation measures on private and state lands.

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

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

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

1.5.2 Local Working Group plan outline

A number of the LWGs in Idaho have been working collaboratively on development of their plans for quite some time. The dedicated efforts of the private citizens, non-governmental organization and agency representatives, and facilitators, who have participated in these processes, have contributed substantially to the development of this state Plan.

Participants in these processes have indicated that providing consistent guidelines regarding the desired structure and overall content of the LWG plans as well as other tools that might facilitate the LWG plan development (e.g., a summary types of threats, biological background information, etc.), could substantially accelerate the development of new LWG plans, and contribute value to plans that are currently in development.

The following outline is based on lessons learned from the development of the initial LWG plans, ongoing planning efforts, ideas gleaned from other states' sage-grouse plans, and from Idaho's own statewide planning efforts. This outline is designed to promote consistency among Idaho's LWG plans and aid in the timely completion of those plans.

1.5.2.1 How the outline is intended to be used

This LWG plan outline is provided with the following specific *recommendations and/or requirements*:

- New LWGs (i.e., formal LWG not initiated as of January 1, 2006) will be *required* to use this outline as the basis for their LWG plans;
- Existing LWGs (i.e., formed prior to January 1, 2006) that are developing, but have not completed, their LWG plans as of December 31, 2006, are *strongly encouraged* to use this outline as the basis for their plans;
- LWGs that have completed or will complete their plans prior to December 31, 2006 are not required to use this outline but *may wish to consider* adopting this format when completing revisions or updates to their plans in the future.

1.5.2.2 Outline components

LWGs may wish to add additional chapters (other than those identified here) to their plans but the following outline identifies minimum content and recommended organization:

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 (see Chapter 3)
   - Habitat conditions overview (see Chapter 3)
     Note: the repetition of background information related to sagebrush and sage-grouse ecology is readily available in the state Plan and Rangewide Conservation Assessment. Unless there are compelling reasons, or unique local situations, the reiteration of this information is not needed or recommended.

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 (see Chapter 4).
   - Consider using the ranking process employed by the Idaho Sage-grouse Science Panel (Appendix E).

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 (see Section 4.3)

E. Monitoring and evaluation
   - Identify monitoring actions necessary to ascertain effectiveness of conservation measures and progress towards meeting conservation goals and objectives (see Chapter 5).
   - The Idaho sage-grouse habitat restoration coordinator is available to assist with monitoring-related questions/protocols (see Appendix F for contact information).

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

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

H. Literature citations

I. Appendices (as necessary)

1.5.3 Additional support and tools for Local Working Groups

The following support and tools will be provided to LWGs. The purpose of these activities and tools is to facilitate effectiveness of LWG processes and products, and to improve communication, coordination and consistency between LWGs.

- *Regular communication with and between LWG members.* Regular meetings of the Sage-grouse Advisory Committee (SAC), and other methods (e.g., regular email updates, etc.) will be used to ensure that LWG members receive regular and timely informational updates and have adequate opportunities to coordinate activities or talk with other LWGs as deemed beneficial to their objectives.

- *Provide for a neutral, trained facilitator.* To ensure LWG meetings are planned and executed around a specific agenda; foster balanced, constructive participation by all group members; assist the group in articulating key points; and ensure notes or minutes are recorded and disseminated in a timely manner, provisions will be made for a neutral, trained facilitator for each start-up LWG through to completion of a LWG plan. Those LWGs with completed plans are strongly encouraged to continue using a trained facilitator and funding will be provided for that purpose. Implementing agencies will identify funding needs and potential funding sources for additional facilitators.

- *Provide support to resolve internal LWG disagreements.* In cases where LWGs are unable to arrive at agreement or consensus with respect to local objectives, conservation measures, interpretation of data, or other issues, the LWG may request review of the issue by the statewide Sage-grouse Advisory Committee (SAC).

- *Make available expertise of the sage-grouse habitat restoration coordinator and other technical experts.* In 2005, IDFG hired an individual to assist LWGs with planning, grant/proposal writing, implementation and monitoring of restoration projects (see Appendix F for contact information.)

- *Facilitate NEPA and out-year project planning.* Participating federal agencies are expected to help LWGs by taking the lead in facilitating, preparing, or contracting necessary National Environmental Policy Act (NEPA) documentation, as needed, for specific recommended conservation actions on public lands. Project proposals or measures should also be incorporated into respective agency activity plans, annual work plans, or out-year funding proposals as appropriate.

1.6 Implementation funding

Adequate funding is essential to the success of this conservation effort. The SAC will quantify financial and staffing needs to implement this plan at both the local and statewide levels and identify strategies to obtain funding by December 31, 2006. The SAC will also coordinate with Western Association of Fish and Wildlife Agencies, the Western Governors Association, federal agencies, and others to obtain funding needed for sage-grouse conservation. Identification of adequate funding is a priority for the SAC. In addition, LWG members should work to identify alternative local and partnership funding.

1.7 Use of WAFWA guidelines in Plan

The Western Association of Fish and Wildlife Agencies (WAFWA) tasked a team of biologists to update sage-grouse habitat management guidelines developed in the mid 1970s (Braun et al. 1977). The resulting Connelly et al. guidelines (referred to in this document as the WAFWA guidelines, or Connelly et al. 2000*b*) were designed to pre-empt, reverse, or mitigate population declines and maintain viable populations of sage grouse based on best available current data and knowledge (Connelly et al. 2000*b*).

The WAFWA guidelines were based on a compilation of literature, and describe general site conditions necessary to meet the seasonal habitat requirements of sage-grouse (Connelly et al. 2000*b*). In presenting the WAFWA guidelines, the authors acknowledged information gaps and regional variations in habitat structure, composition, and other factors, and therefore recommended that local biologists apply quantitative data from habitat and population monitoring in responding specifically to local conditions.

Moreover, the WAFWA guidelines do not describe desired conditions for habitat on a landscape scale, nor do they identify plant composition and structural characteristics across all sagebrush communities in which sage-grouse occur. Some of the federal agencies are currently working to develop a strategy to evaluate habitat at the landscape scale, meet the habitat needs of sage-grouse and other animals that are associated with the sagebrush steppe ecosystem, and prescribe appropriate management strategies that address multiple scales.

In the context of this Plan the WAFWA guidelines were used as a technical reference to help guide development of a toolbox of conservation measures that LWGs and others may select from and/or adapt as appropriate to local conditions, in order to maintain and/or enhance sage-grouse populations and habitat in Idaho. The authors of this Plan recognize there may be important local variations in habitat structure and composition, as well as other local factors, which will also influence the selection, design, and implementation of appropriate site-specific conservation actions.

1.8 WAFWA Range-wide conservation strategy

The WAFWA Conservation Planning Framework Team has initiated development of the Range-wide Sage-grouse and Sagebrush Conservation Strategy (R-W Strategy). Completion is scheduled for December 2006. State-level (e.g., Idaho Sage-grouse Conservation Plan) and Local Working Group conservation plans will form the foundation of the R-W Strategy. Substrategies developed by various teams will address the following elements: (1) funding, (2) communication and outreach, (3) implementation monitoring, (4) conservation issues, (5) effectiveness monitoring, (6) adaptive management, and (7) research/technology. The national BLM Sage-grouse Habitat Conservation Strategy will also be incorporated in conjunction with Range-wide Strategies Team processes.

A national interagency group, the Sage-grouse Habitat Assessment Framework Technical Working Group, has also been formed to assist in developing a standardized approach for describing sage-grouse habitats. This tool will enhance cooperative conservation efforts across state and jurisdictional boundaries, by providing consistent processes, terminology and related information.

Chapter 2 – Sage-grouse and Sagebrush Ecology

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CHAPTER 2: TABLE OF CONTENTS

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2 Sage-grouse and Sagebrush Ecology

An overall understanding of sage-grouse ecology and sagebrush ecology is important to those who wish to participate in sage-grouse conservation planning and design and implementation of effective conservation actions. The following chapter briefly summarizes key highlights of sage-grouse ecology in Section 2.1, and provides an overview of sagebrush ecology in Section 2.2. Both sections provide references to additional information that Local Working Group members, agency staff, and other individuals and organizations using this Plan may find valuable. Additional details regarding sage-grouse seasonal habitat characteristics can be found in Chapter 5, Section 5.3.2 and Appendix D.

2.1 Sage-grouse ecology

A considerable wealth of information related to greater sage-grouse population biology and habitat use has been published over the past several decades. Idaho biologists have long played an important leadership role in research efforts to improve our understanding of this species. While questions continue to challenge biologists and wildlife managers, sage-grouse, nonetheless, are one of the most scrutinized and well-understood species of the sagebrush ecosystem. Space in this document does not permit an exhaustive review of the literature; however, Schroeder et al. (1999), Connelly et al. (2000*b*), Wambolt et al. (2002), Connelly et al. (2004), and Schroeder et al. (2004) offer up-to-date, detailed information on the ecology of greater sage-grouse. Additionally, Benedict et al. (2003) provides information on the genetics of greater sage-grouse. Crawford et al. (2004) provides a synthesis paper on the ecology and management of sage-grouse and sage-grouse habitat.

2.1.1 Taxonomy and behavior overview

Two species of sage-grouse occur in western North America. The greater sage-grouse is the focal species in this Plan. This grouse is a large upland game bird that was once widespread throughout sagebrush-dominated habitats of the western United States and Canada, and abundant in some areas. Adult males weigh 1.8-3.6 kg (4-8 pounds) and adult females 0.9-1.8 kg (2-4 pounds). This species currently occurs in ten western states and two provinces (Schroeder et al. 2004). Although the greater sage-grouse was divided into western and eastern subspecies (Aldrich 1946), recent genetic analysis has not supported this delineation (Benedict et al. 2003). The

Gunnison sage-grouse (*Centrocercus minimus*) inhabits portions of Colorado and southeastern Utah and is a smaller relative of the greater sage-grouse. The Gunnison species is currently classified by the USFWS as a candidate for threatened status and is being managed under separate conservation planning efforts.

During the spring (normally early March to mid-May), males gather on traditional breeding areas, called leks, for displaying and mating. Using elaborate plumage displays and inflatable air sacs that produce a loud “plopping” sound males attract females and protect their territory on the lek from other males. Females normally begin moving from winter to breeding areas from late February to early March, but actual lek attendance varies somewhat throughout the species range (Connelly et al. 2004). After breeding, females move away from the lek to establish nests. Evidence suggests that nest sites are selected independent of lek location (Wakkinen et al. 1992). In Idaho, hens nest an average of 3-5 km (2-3 mi) from their lek of capture but may move more than 18 km (11 mi) to nest (Connelly et al. 2004).

2.1.2 Migration

Three types of seasonal movement patterns have been described for greater sage-grouse: (1) non-migratory; grouse do not make long distance movements (e.g., >10 km (6 mi) one way), (2) one-stage migratory; grouse move between two distinct seasonal ranges, and (3) two-stage migratory; grouse move among three distinct seasonal ranges (Connelly et al. 2000*b*). Many sage-grouse populations in Idaho are migratory. Some birds range up to 125 km (77.5 mi) with a home range of 2,764 km^2 (1,067 mi^2) (Leonard et al. 2000). Most migratory movements tend to be slow and meandering (Dunn and Braun 1986*a*, Connelly et al. 1988), but relatively long-distance movements can occur over just a few days (Schroeder et al. 1999). In the late summer and early fall, migratory sage-grouse often congregate into flocks in preparation for movement to traditional wintering grounds. Despite large annual movements, greater sage-grouse show high fidelity to seasonal ranges (Schroeder at al. 1999). Female sage-grouse return to the same area to nest each year (Fischer et al. 1993) and some may nest within 200 m (656 ft) of their previous year’s nest (Lyon 2000).

2.1.3 Population biology

Sage-grouse are long-lived for an upland game bird. Four- and five-year-old birds are not unusual and 60-80% of adult females commonly survive each year. Survival rates of adult males usually range from 50 to 60% (Connelly et al. 2004). Sex ratios for adult sage-grouse are skewed in favor of females (Connelly et al. 2004), and the lower survival rate of males compared to females is the likely cause of this sex ratio. In contrast, most other upland game birds are characterized by populations with the majority of individuals under one year-of-age, and exhibit adult survival rates of about 30% each year.

Within 7 to 10 days after breeding the hen builds a nest. The peak of egg-laying and incubation varies from late March through mid-June depending on weather, elevation, and plant phenology (Schroeder et al. 1999). Nest bowls may be scratched or dug immediately before the first egg is laid although relatively few specifics are known. In Idaho, clutch sizes for greater sage-grouse average 6 to 7 eggs, relatively low for an upland game bird (Connelly et al. 1993, Apa 1998, Wik 2002). Incubation starts when the last egg is laid or one to two days after. The incubation period is 25 to 29 days (Schroeder et al. 1999). Adult female (≥2 years old) sage-grouse nest about 80% of the time, while yearling females nest about 55% of the time. In Idaho, about 15% of sage-grouse hens that lose a nest will subsequently re-nest (Connelly et al. 1993, Wik 2002). In contrast, nearly all sharp-tailed grouse (*Tympanuchus phasianellus*) and ring-necked pheasant (*Phasianus colchicus*) nest each year and may attempt to re-nest up to four times if previous nests are destroyed. The greater sage-grouse has one of the lowest reproductive rates of any North American game bird, and its populations are not able to recover from low numbers as quickly as many other upland game bird species.

Drought may affect sage-grouse populations by reducing herbaceous cover at nests, and food quality/quantity for hens and chicks (Hanf et al. 1994, Fischer et al. 1996*a*). Relatively wet springs may result in increased production (Wallestad 1975, Autenrieth 1981). However heavy rainfall during egg-laying or unseasonably cold temperatures with precipitation during hatching may decrease production (Wallestad 1975).

2.1.4 Habitat characteristics

Greater sage-grouse are dependent on large areas of sagebrush/grassland habitats with 15-25% sagebrush canopy cover for breeding habitat and 10-30% canopy cover for winter habitat. A healthy perennial grass and forb understory is also an important component of nesting and brood-rearing habitat. The availability of a diversity of forbs rich in calcium, phosphorus and protein are also important to pre-laying hens (Connelly et al. 2000b). On an annual basis migratory sage-grouse populations may occupy an area that exceeds 2,700 km^2 (1,042 square miles) (Hulet 1983, Leonard et al. 2000). During winter, Robertson (1991) reported that migratory sage-grouse in southeastern Idaho made mean daily movements of 752 meters (2,467 ft) and occupied an area greater than 140 km^2 (54 square miles). For a non-migratory population in Montana, Wallestad (1975) reported that winter home range size ranged from 11 to 31 km^2 (4.2 to 12 square miles). During summer, migratory sage-grouse in Idaho occupied home ranges of 3 to 7 km^2 (1.2 to 2.7 square miles) (Connelly and Markham 1983, Gates 1983).

Most sage-grouse select nest sites under sagebrush (Patterson 1952, Connelly et al. 1991). In general, sagebrush and perennial understory grasses and forb cover are key components of sage-grouse nesting and early brood-rearing habitat. If sagebrush is eliminated from a large area, it will not support sage-grouse populations because nesting success and/or juvenile survival will be reduced. Recent research has shown that perennial herbaceous cover is particularly important for sage-grouse reproduction (Barnett and Crawford 1994, Gregg et al. 1994). Benefits provided by herbaceous understory include increased access to insects and forbs by hens before breeding and by chicks. Herbaceous understory also provides cover to hide nests, eggs and chicks from predators.

Insects are a key component of sage-grouse early brood-rearing habitat. A high protein diet of insects is necessary for all young upland game birds during the first month of life. Sage-grouse chick survival is lower if insects are unavailable (Johnson and Boyce 1990), probably because of starvation and increased vulnerability to predation while searching for scarce food. The most productive sage-grouse brood-rearing habitat includes a perennial grass and forb canopy cover of ≥15%, as well as a 10-25% canopy cover of sagebrush (Connelly et al. 2000b). Late summer (mid-July to September) brood-rearing habitat may include agricultural fields, meadows, and riparian areas adjacent to big sagebrush communities. In years of above average summer precipitation, late summer brood-rearing habitat may overlap early summer brood-rearing habitat.

During winter, sage-grouse feed almost exclusively on sagebrush leaves (Patterson 1952, Wallestad et al. 1975). If adequate sagebrush is available for winter food and cover, sage-grouse are seldom impacted by severe winter weather, and sage-grouse gain weight during winter (Beck and Braun 1978). However, loss of sagebrush on winter ranges may severely impact sage-grouse populations (Beck 1977).

In general, sage-grouse populations decline when large areas of sagebrush/grassland habitat are altered or fragmented. Reducing or eliminating sagebrush canopy cover, seeding-introduced grass species, conversion to agriculture, fire, suburban development, invasion by annual grasses, and management that results in a significant reduction of the perennial grass/forb understory have all been responsible for sage-grouse habitat loss or degradation. Additionally, power lines, roads and highways, reservoirs, and other developments commonly cause fragmentation of sagebrush ecosystems (Connelly et al. 2004).

Connelly et al. (2000*b*) summarized habitat characteristics that were representative of productive sage-grouse habitat (Appendix D). The authors noted that vegetative characteristics generally associated with productive habitats might not occur in some areas. In these cases, the authors suggested that local biologists and range ecologists develop height and cover requirements that are reasonable and ecologically defensible. Additionally, Connelly et al. (2000*b*) indicated that because of gaps in our knowledge and regional variation in habitats, the judgment of local biologists/ecologists and quantitative data from population and habitat monitoring are necessary to implement management guidelines correctly. They urged agencies to use an adaptive management approach (MacNab 1983, Gratson et al. 1993) using monitoring and evaluation to assess the success of implementing the guidelines to manage sage-grouse populations. They also recommended that local and regional conservation plans should summarize conditions needed to maintain healthy sage-grouse populations and stated that local differences in conditions should be considered in these plans.

2.2 Sagebrush ecology

Sagebrush species and subspecies are distributed along complex and interacting gradients of elevation, precipitation, temperature, aspect, slope, and soil depth, texture, and salinity. The woody sagebrushes provide critical habitat components and are a major food source for sage-grouse (Braun et al. 1977, Drut et al. 1994b, Connelly et al. 2000*b*). Sage-grouse are dependant on the full diversity of sagebrush systems for their annual food and cover. This relationship is reflected by the close alignment of their distribution with the range of sagebrush, particularly big sagebrush (*Artemisia. tridentata*) and silver sagebrush (*A. cana*) communities. This relationship is perhaps tightest in the late autumn, winter, and early spring when sage-grouse are dependent on sagebrush plants themselves for both food and cover. In much of the west historically heavy livestock use has reduced forb, perennial grass, and biological soil crust components, allowing sagebrush and exotic annuals to become dense (Billings 1994, Rosentreter and Eldridge 2002).

Woody sagebrush species have been of major interest and concern to land managers for many years. An understanding of the types of sagebrush that sage-grouse utilize for food and cover, and where these sagebrush types occur on the landscape is essential in conservation planning for the species. Species and subspecies of sagebrush have moderate to vastly different palatability and structural characteristics which influence their particular values for wildlife (Sheehy and Winward 1981). Winward and Tisdale (1977) state that the separation of big sagebrush into subspecies assists in the recognition of habitat types, production potential, chemical content, and palatability preference.

The ability to recognize the various sagebrush communities is important because they are indicators of a given local ecosystem composed of specific vegetation types, soil depth, climate, topography, and wildlife species. Fortunately, sagebrush communities are generally repetitive and easily identifiable (Beetle 1960, West 1988). Winward (2004) provides a concise reference for many sagebrush species and subspecies, with excellent color photographs. However, initial and periodic refresher training, including field-trips, on the identification and ecology of the various sagebrush species and subspecies is strongly recommended for members of LWGs, including agency specialists. Differences in some sagebrush species and subspecies can be subtle to the untrained eye. To that end, sagebrush identification and ecology field trips can be arranged throughout Idaho. Interested LWGs or agency specialists should forward requests for such training to the Idaho Sage-grouse Advisory Committee coordinator.

While selected aspects of sagebrush identification and ecology are presented below, an exhaustive treatment of the subject is beyond the scope of this chapter. For additional detail, see the following references: Anderson and Holte (1981), Anderson and Inouye (2001), Hironaka et al. (1983), McArthur and Welch (1986), Miller et al. (1994), Miller and Eddleman (2001), Passey et al. (1982), Tisdale et al. (1969), Tisdale and Hironaka (1981), Schlatterer (1972), Welch (2005), Welch and Criddle (2003),West and Young (2000). Complete citations are located in the Literature Cited section of this Plan. Additional detailed information on sagebrush (and other plant species), and fire ecology/ management is readily available at the following websites:

- Fire Effects Information System: http://www.fs.fed.us/database/feis/
- Landfire website: http://www.landfire.gov/modelswestern.html

2.2.1 Palatability of sagebrush

An understanding of the relative palatability of sagebrush species and subspecies is potentially useful in delineating seasonal habitats or to aid in the selection of sagebrush species/subspecies for restoration purposes. However, the overall *availability* of sagebrush to meet the various seasonal cover and foraging needs of sage-grouse at local and broader scales is probably of greater importance in conservation planning. For example, in lower elevation sage-grouse wintering or nesting areas, the presence and availability of Wyoming big sagebrush on the appropriate ecological site is desirable from a conservation perspective, even though other sagebrush subspecies may be more palatable. With that in mind, the following two paragraphs, paraphrased from Rosentreter (2005), provide a concise overview of factors affecting the palatability of sagebrush.

It is well documented that some sagebrush species are more palatable to wildlife due to their specific chemical content (Morris et al. 1976, Sheehy and Winward 1981, Welch et al. 1983, Wambolt 2001). The difference in palatability is based on plant chemistry and the amount of volatile chemicals present in sagebrush leaf glands (Kelsey et al. 1984, Striby et al. 1987). Leaf glands vary seasonally in the amount and concentration of chemicals they contain, with concentrations highest in spring and lowest in winter (Cedarleaf et al. 1983, Kelsey et al. 1984). This is due to the semi-evergreen nature of sagebrush and the presence of persistent leaves produced in the spring, the glands of which are full of volatile chemicals that discourage herbivory. With release of volatile chemicals, the sagebrush leaf becomes more digestible. This process has been demonstrated through in vitro (laboratory) digestibility studies of sagebrush leaves and alfalfa with the addition of sagebrush-specific volatile compounds (Striby et al. 1987, Wambolt et al. 1991). Thus, while some sagebrush species' high crude protein content encourages herbivory, others contain chemicals such as volatiles, methacrolein, acetone, and 1-8 cineole that discourage feeding (Kelsey et al. 1982, Wambolt et al. 1991, Wambolt 1996).

Most sagebrush palatability information is not specific to sage-grouse, but instead is based on observations of other wildlife species and digestibility experiments by Kelsey, Wambolt, and others (Schwartz et al. 1980, Sheehy and Winward 1981, Kelsey et al. 1982, Yabann et al. 1987, Wambolt et al. 1991, Barnett and Crawford 1994, Wambolt 2001). The palatability of sagebrush and other plants varies depending on the adaptations of the individual animal or population of animals feeding on it. In addition to the chemical content of food, learned behaviors may also dictate the food choices animals make.

2.2.2 Types of sagebrush

Three major structural types of sagebrush plants in Idaho are (1) tall sagebrush, (2) dwarf sagebrush, and (3) sub-shrub sagebrush (Rosentreter 2005). These broad sagebrush types are used by sage-grouse for food, escape cover, and/or nesting habitat. Tall sagebrush types provide the best escape cover and nesting habitat for sage-grouse. Dwarf sagebrushes may be more palatable (Rosentreter 2005) and are critical food sources in the winter for sage-grouse but do not provide good escape cover or nesting habitat due to their lower stature. Subshrub sagebrushes are also low in stature and are of only moderate to low palatability (Rosentreter 2005).

2.2.2.1 Tall sagebrush types

Tall sagebrush types most common in Idaho are Wyoming big sagebrush, mountain big sagebrush, basin big sagebrush, and xeric big sagebrush. Additional species include threetip sagebrush and silver sagebrush.

Wyoming Big Sagebrush (*Artemisia tridentata ssp. wyomingensis*)**:** Wyoming big sagebrush is a medium-sized shrub from 1-3 ft tall; it branches from the base, and has an uneven crown (Rosentreter 2005). This subspecies occurs in foothills, undulating terraces, slopes, and plateaus, as well as basins and valley bottoms. Precipitation averages 7-12 inches (McArthur 2000). In Idaho, Wyoming big sagebrush occurs between 2,500 and 6,500 ft in elevation (Johnson 1999). Wyoming big sagebrush sites have fewer understory species compared to other big sagebrush subspecies (Howard 1999).

Many researchers believe fire historically played an important role as a disturbance factor in Wyoming big sagebrush (http://www.landfire.gov), though Miller and Eddleman (2001) suggest burn patterns in this type were patchy due to limited and discontinuous fuels. Other disturbance factors include insects such as the *Aroga* moth (see Welch 2005 for additional information), drought/wet cycles, rodents and lagomorphs, climate change, and grazing (http://www.landfire.gov). Fire return intervals reported in the literature vary (e.g., 25-100+ years, West 2000; 50-100 years Wright and Bailey 1982). Current scientific opinion is about 100 years (http://www.landfire.gov). However, Baker (2006) suggests fire rotations in Wyoming big sagebrush may be considerably longer, at 100-240 years. Fire return intervals have been shortened to 2-4 years in some areas of the Snake River Plain, due to cheatgrass (Whisenant 1990). Recovery of Wyoming big sagebrush post-fire can be slow, relative to other big sagebrush subspecies due to the relatively drier sites it occupies (Johnson 1999).

Wyoming big sagebrush is generally palatable, though its palatability is highly variable (Rosentreter 2005). Sage-grouse use Wyoming big sagebrush sites for wintering, pre-laying, nesting and brood-rearing habitat (Crawford et al. 2004).

Many Wyoming big sagebrush sites have been severely degraded, and converted to exotic annual grasslands (Hilty et al. 2003). Non-degraded, lightly grazed Wyoming big sagebrush sites have a high percentage of biological soil crusts and low percentage of cheatgrass (*Bromus tectorum*) cover (Rosentreter 1986, Kaltenecker et al. 1999, Rosentreter and Eldridge 2002). Due to their susceptibility to invasion and domination by cheatgrass and other exotic annuals, and slow recovery, use of fire to manage these sites must be approached with caution. Wyoming big sagebrush sites should be managed for the restoration or retention of the biological soil crust component where possible, most critically in the lower precipitation zones (Rosentreter 2005). Late fall, winter, and early spring are the most appropriate seasons of use for livestock in this low-elevation vegetation type (Rosentreter 2005). Four to six weeks of moist soil conditions in late spring facilitates growth of biological soil crusts disturbed by trampling (Memmott et al. 1998, Rosentreter and Eldridge 2002).

Mountain Big Sagebrush (*Artemisia tridentata ssp. vaseyana*): Mountain big sagebrush generally grows above 5,000 ft (Rosentreter 2005). Mean annual precipitation is 14-22 inches, but can range from 10-30 inches (Mueggler and Stewart 1980, Tart 1996). It typically occurs on moist, productive, rolling upland sites. Soils are typically deep and have well developed dark organic surface horizons (Hironaka et al. 1983, Tart 1996). This sagebrush subspecies branches from the base, grows to 3 ft tall, and typically has an even, flat-topped crown (Tisdale and Hironaka 1981, Rosentreter 2005).

Mean fire return intervals have been debated (Welch and Criddle 2003). Mountain big sagebrush communities were historically subject to stand replacing fires with a mean return interval ranging from 10 years at the Ponderosa pine ecotone, to 40+ years at the Wyoming big sagebrush ecotone, and up to 80 years in areas with a higher proportion of low sagebrush in the landscape (Crawford et al. 2004, Johnson 2000, Miller et al. 1994, Burkhardt and Tisdale 1969, Burkhardt and Tisdale 1976, Houston 1973, Miller and Rose 1995, Miller et al. 2000). However Baker (2006) suggests fire rotations were longer, ranging from 70-200 years.

Recovery rates for mountain big sagebrush vary, typically reaching 5% canopy cover in 8-14 years; and can reach 25% canopy in 25 years (range 9-70 years) (Winward 1991, Pedersen et al. 2003).

Mountain big sagebrush is highly palatable to wildlife; however, limited access in the winter and the chemical content in spring and summer may discourage herbivory (Kelsey and Shafizadeh 1978, Kelsey et al. 1984). Mountain big sagebrush sites generally provide winter, nesting and brood-rearing habitat for sage-grouse (Crawford et al. 2004). Mountain big sagebrush can be a major food source for sage-grouse in the winter months (Rosentreter 2005).

Mountain big sagebrush has a greater potential to increase its density, as compared to other sagebrush taxa, due to the higher moisture associated with its sites and its general ecology (Rosentreter 2005). Stands can become so dense that they may exceed sagebrush cover conditions needed for productive sage-grouse nesting or brood habitat described in the WAFWA Guidelines. At the ecotone with conifer forests or pinyon-juniper communities, mountain big sagebrush sites are readily invaded by these species in the absence of fire or other disturbance (Miller and Rose

1999). Mechanical control, burning, or other treatments may be necessary in some areas to restore desirable plant composition and structure to meet wildlife habitat objectives.

Basin Big Sagebrush (*Artemisia tridentata ssp. tridentata*): Basin big sagebrush is found between about 3,000-6,000 feet; annual precipitation ranges from 8 to 14 inches (see http://www.landfire.gov). It commonly grows on deep, fertile, well-drained soils in valley bottoms, lower foothill areas or in areas adjacent to drainages (Tirmenstein 1999). Because it tends to grow on productive sites, many areas once dominated by this subspecies are now farmland (Young and Evans 1981, Pechanec et al. 1954 cited in Tirmenstein 1999).

Basin big sagebrush tends to be single-trunked, or tree-like or Y-shaped in appearance and the crown is uneven (Rosentreter 2005). It normally reaches 3-10 feet in height. Areas dominated by Wyoming big sagebrush frequently have basin big sagebrush occurring along road ditches due to the extra moisture runoff from roads. Consequently, basin big sagebrush seed is often inadvertently harvested along with the seed of Wyoming big sagebrush (Rosentreter 2005).

In comparison with mountain and Wyoming big sagebrush, basin big sagebrush is least preferred by sage-grouse (Welch 1991 cited in Tirmenstein 1999). Relative palatability of basin big sagebrush appears to be among the lowest of 23 species or subspecies of sagebrush evaluated (Rosentreter 2005). Basin big sagebrush leaves have rarely been identified in sage-grouse scats (Rosentreter 2001, unpublished data; Vasquez 2002). Because of the treelike growth form, it is likely that mature stands of basin big sagebrush may provide only marginal cover value to nesting sage-grouse. Younger stands with lower growing plants may provide suitable cover for nesting and broods, but information in the literature is lacking. The currently limited extent of basin big sagebrush on the Idaho landscape also suggests that this subspecies is of less significance overall than other big sagebrush subspecies, such as Wyoming and mountain big sagebrush.

Fire-return intervals for basin big sagebrush types are estimated to average approximately 60 years, ranging from 10-150 years (see http://www.landfire.gov), and are intermediate between those of mountain and Wyoming big sagebrush (Sapsis 1990 cited in Tirmenstein 1999).

Xeric or Foothill Big Sagebrush (*Artemisia tridentata ssp. xericensis*): Xeric big sagebrush is a tall shrub (>3 ft) with Y-shaped architecture similar to that of basin big sagebrush (Rosentreter 2005). Its chemistry, leaf shape, and palatability are most similar to mountain big sagebrush (Rosentreter 2005). This Idaho subspecies is restricted to heavy clay-loam and drier, xeric soils, than mountain big sagebrush, and occurs from approximately 2,500-5,400 ft (Roesntreter and Kelsey 1991, Rosentreter

2005). Average annual precipitation ranges from 12-22 inches (Rosentreter and Kelsey 1991). It appears to have been initially derived through hybridization between basin big sagebrush and mountain big sagebrush (Rosentreter and Kelsey 1991). Its distribution is limited to west-central Idaho, predominantly Washington County, and portions of adjoining counties (Rosentreter and Kelsey 1991). Xeric big sagebrush is heavily utilized in winter by mule deer and, based on its chemistry (high crude protein) (Rosentreter and Kelsey 1991), is likely preferred by sage-grouse (Rosentreter 2005). Information on fire history is currently unavailable.

Tall Threetip Sagebrush (*Artemisia tripartita ssp. tripartita*)**:** Tall threetip sagebrush is a fairly tall, erect shrub. It ranges from 16-32 inches tall (Winward 2004) though can reach up to 4-6 ft (Rosentreter 2005). A second subspecies, Wyoming threetip sagebrush (*Artemisia tridentata* ssp. *rupicola*), apparently does not occur in Idaho, though occurs in Wyoming, Montana, and southern Oregon (Tirmenstein 1999, Winward 2004). In the Intermountain Region, tall threetip is found between approximately 3,400 to 7,100 ft elevation (Tirmenstein 1999). Tall threetip sagebrush grows on deep, well-drained soils, often mixed with basin or mountain big sagebrush, and can also dominate playa situations (Rosentreter 2005). Tall threetip will seldom layer[1] without disturbance but will vigorously stump-sprout and layer after burning (Rosentreter 2005). Because of this, it can increase in density and acreage when disturbed (Winward 2004), and can form nearly pure stands postfire (Tirmenstein 1999). In Idaho, tall threetip is common in parts of the Upper Snake River Plain. Information on fire return intervals is not readily available.

In southern Idaho, sage-grouse may include small amounts of threetip sagebrush leaves in their diets but it is not preferred browse for most wild ungulates (Tirmenstein 1999). It provides food, cover, and nesting habitat for sage-grouse (Gray 1967, Klebenow 1969, Hironaka et al. 1983, Sveum et al. 1998a).

Silver Sagebrush (*Artemisia cana*): Two subspecies of silver sagebrush occur in Idaho; mountain (*A. cana ssp. viscidula*) and Bolander (*A. cana ssp. bolanderi*) (Hironaka et al. 1983, Rosentreter 2005), and they are found in distinctly different habitats.

Mountain silver sagebrush ranges from 0.3 to 1 ft in height and occurs from 6,000-8,000 ft in Idaho (Schlatterer 1972). It occurs in mountain meadows, stream terraces and stringers along stream courses, terraces, or areas of heavy winter snowpack (Schlatterer 1972, Hironaka et al. 1983, Howard 2002, Rosentreter 2005,). Mountain silver sagebrush sites are very productive, with a diversity of forbs, grasses and other shrubs (Howard 2002, Winward 2004). Where these sites occur within the elevational range of sage-grouse, they provide forage and cover for sage-grouse

[1] To form roots where a stem or branch comes in contact with the ground.

adults and chicks (Winward 2004). Rosentreter (2005) ranked mountain silver sagebrush as highly palatable to sage-grouse. Mountain silver sagebrush is locally dominant on mountain grassland clay soils of central and eastern Idaho, where it forms the Camas Prairie association with common camas (*Camassia quamash*) (Rosentreter 1992 cited in Howard 2002).

Silver sagebrush resprouts strongly after being top-killed by fire (Britton1979, Cronquist et al. 1994, Wright and Bailey 1982, and Wright et al. 1979). Mean fire return intervals in mountain silver sagebrush range from 3 to 45+ years (Arno 1980, Arno 2000, Heyerdahl et al. 1994). Houston (1973) estimated that on the Snake River Plain of Idaho, fires probably cycled about every 25 years in the wetter areas favored by mountain silver sagebrush.

Bolander silver sagebrush is generally less than 3 ft in height (Howard 2002) and most commonly occurs within internally drained basins (playas) (Hironaka et al. 1983, Rosentreter 2005). Rosentreter (2005) ranked it as moderately palatable to sage-grouse. Fire history studies in Bolander silver sagebrush communities are apparently lacking (Howard 2002).

2.2.2.2 Dwarf sagebrush types

Dwarf sagebrush types most common in Idaho include early, black, and low sagebrush, and budsage. Chicken sage, while not an *Artemisia*, is also discussed briefly, due to its occurrence in Idaho.

Early (alkali) Sagebrush (*Artemisia longiloba*): Some references refer to early sagebrush as a variety of low sagebrush, or *Artemisia arbuscula*, (for example, see http://www.landfire.gov). However other authors consider it a separate species (Beetle 1960, Winward 2004, Rosentreter 2005). The color and morphology of *A. arbuscula* and *A. longiloba* are very similar (Winward 2004). Early sagebrush grows on shallow, ephemerally flooded soils, often with a claypan or skeletal rock layer near the surface (Robertson et al. 1966). It is frequently found in low-drainage areas of flats, plateaus, or tables (Rosentreter 2005). Early sagebrush is a prolific seed-producer and could be used for restoration in appropriate, shallow soil sites (Beetle and Johnson 1982, Monson and Shaw 1986). It “layers” and can re-sprout after cool fires (Rosentreter 2005). Rosentreter (2005) rated early sagebrush as highly palatable to sage-grouse and noted that some of the largest leks in Idaho are in areas dominated by this species. Early sagebrush flowers very early in the summer, in contrast to other low-statured species. Early sagebrush has also been confused with low-growing Wyoming big sagebrush because of its broadly cuneate (wedge-shaped) three-lobed leaves and with low sagebrush because of its dwarf size (Rosentreter 2005). It is palatable to sheep and, historically, stands were commonly used as lambing areas (Beetle and Johnson 1982). Early sagebrush has also been referred to as "alkali sage".

Mean Fire Return Intervals in early sagebrush sites are similar to low sagebrush and are estimated by some sources to be 125 years (http://www.landfire.gov). Intervals may range from 40 years (Steinberg 2002) to more than 400 years (Baker, 2006) and are probably strongly related to the fire regimes of surrounding vegetation communities (http://www.landfire.gov).

Black Sagebrush (*Artemisia nova*)**:** Black sagebrush is a low-growing (4-12 inches high), multi-branched shrub (Winward 2004). It can commonly be identified by its persistent brownish colored flower stalks (Winward 2004, Rosentreter 2005). This species grows well on very shallow, stony soils, often on windswept slopes and ridges at mid- to high elevations (Behan and Welch 1985). It prefers calcareous or well-decomposed granitic soils that seem to mimic calcareous sites due to weathering of calcium feldspars. It occurs most abundantly from 4,900 to 7,000 ft in elevation where annual precipitation averages between 7 to 18 inches (McMurray 1986).

There appear to be at least two chemical races of black sagebrush in the West (McArthur and Plummer 1978; Kelsey 2002, personal communication). One race, with grayer leaves, is highly palatable while the greener-leafed race has low palatability (McArthur and Plummer 1978). This latter form does not fluoresce under UV-light; the former does, and was rated as highly palatable for sage-grouse (Rosentreter 2005). Black and low sagebrush communities can provide important winter, pre-laying and brood-rearing habitat for sage-grouse (Crawford et al. 2004). Most black sagebrush populations have leaf glands visible with a 10x hand lens (Kelsey and Shafizadeh 1980). Resin from these glands causes a stickiness when leaves are crushed (Winward 2004).

Mean fire return intervals for mixed severity fires in black sagebrush are estimated at 100-140 years, and 200-240 years for stand-replacing events (http://www.landfire.gov).

Low Sagebrush (*Artemisia arbuscula*): Low sagebrush is a low-growing shrub 8-16 inches in height (Winward 2004). It grows on shallow soils with a restrictive layer of bedrock or clay pan (Rosentreter 2004). Annual precipitation ranges from 7 to18 inches (Stevens 1983), but usually exceeds 12 inches (Rosentreter 2005). In Idaho, low sagebrush grows at approximately 6,000-9,800 ft (Schlatterer 1972). Soil parent material is non-calcareous (Rosentreter 2005). Black, early, Bigelow, Lahontan, and chicken sagebrush are often misidentified as low sagebrush (Rosentreter 2005). Low and black sagebrush communities can provide important winter, pre-laying and brood-rearing habitat for sage-grouse (Crawford et al. 2004). Low sagebrush is readily consumed by sage-grouse (Klebenow 1973, Robertson 1986). Rosentreter (2005) rated low sagebrush as one of the most palatable sagebrushes for sage-grouse.

There is disagreement about fire frequency in low sagebrush communities. Estimates of mean fire return intervals range from 40 years (Steinberg 2002) to more than 400 years (Baker, 2006), and are probably strongly related to the fire regimes of surrounding vegetation (http://www.landfire.gov).

Budsage (*Artemisia spinescens or Picrothamnus desertorum*): Budsage grows on shallow, often saline soils at lower elevations and is frequently mixed with salt desert shrub vegetation (McWilliams 2003, Rosentreter 2005). It has spiny-tipped, thorn-like branches (Winward 2004), and reaches 4-10 inches in height (Institute for Land Rehabilitation 1979). It has palmately divided leaves that are deciduous. Budsage is considered to have low cover value for upland game birds (McWilliams 2003). Palatability for sage-grouse appears moderate, however its role with respect to sage-grouse use in Idaho is likely minor (Rosentreter 2005). Budsage communities rarely burn (McWilliams 2003). Specific information on fire regimes for bud sagebrush is not available, however they may be related to fire regimes of surrounding vegetation (McWilliams 2003).

Chicken Sage (*Tanacetum nuttallii*): Chicken sage grows on windswept benches and large flat areas with very shallow, calcareous gravels (Rosentreter 2005). It is woody with three-lobed leaves and a low (e.g. 4 inches tall) spreading growth form. It may be similar in appearance to a diminutive low sagebrush, hence its description here, but has smaller leaves (Rosentreter 2005). Sage-grouse can be found where this species is common, but use by sage-grouse is unknown (Rosentreter 2005).

2.2.2.3 Sub-shrub sagebrush types

The primary sub-shrub sagebrush types in Idaho include fringed sage and birdsfoot sage. In Idaho, fringed sagebrush is especially common in limestone-influenced valleys in the Challis and Salmon areas (R. Rosentreter, Botanist, BLM Idaho State Office, personal communication).

Fringed Sagebrush (*Artemisia rigida*): Fringed sagebrush is a small sub-shrub, woody only at the base. It occurs in a variety of soil types and depths but prefers shallow soils with “frigid” soil temperatures (Morris et al. 1976). Some sites are windswept and are readily available to wildlife in the winter. Studies in Montana (Peterson 1970, Wallestad et al. 1975) reported consumption of fringed sagebrush by sage-grouse, including juveniles. In Colorado’s Gunnison Basin, [Gunnison] sage-grouse have been observed feeding on fringed sage seedlings (Rosentreter 2005 citing J. Young, personal communication, Western State College, CO). Fringed sagebrush is rated as moderately palatable (Rosentreter 2005) and may be an important sage-grouse food seasonally in parts of Idaho, especially in mid-elevation sites and upward (R. Rosentreter, Idaho BLM state office, personal communication). There is no specific information in the literature concerning fire regimes for fringed sagebrush (McWilliams 2003).

Birdsfoot Sagebrush (*Artemisia pedatifida*): Birdsfoot sagebrush is found in sagebrush-grass and saltbush (*Atriplex* spp.) (Goodrich and Neese 1986); it commonly occurs on alkaline soils (Morris et al. 1976). It is found from 5,200 to 5,900 ft on clay soils (Winward 2004). Information on fire regimes is not documented (Tirmenstein 1987). Rosentreter (2005) rated palatability to sage-grouse as low.

Chapter 3 – Status of Sage-grouse Populations and Habitat in Idaho

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3 Status of Sage-grouse Populations and Habitat in Idaho

3.1 Broad-scale

3.1.1 Statewide overview of population status

Sage-grouse have been monitored in Idaho since the 1950's, though in some areas, data are limited. Overall, from 1965-2003, Idaho's sage-grouse population declined at an average rate of 1.47% per year. The most dramatic decline occurred between 1965-1984, when the sage-grouse population declined by an average rate of 3.04% per year. Between 1985 and 2003, the average decline slowed, to 0.12% annually. In general, Idaho sage-grouse numbers reached a low in the mid 1990s but have increased since that time (Connelly et al. 2004).

Efforts to implement more comprehensive and consistent counts are ongoing. Over time, this should lead to more accurate data on short- and long-term population trends (see Chapter 5 for additional discussion).

3.1.2 Statewide overview of habitat status

3.1.2.1 Background

Landscape ecology is the study of spatial patterns and processes in the environment. An understanding of basic landscape ecology principles is essential for effective conservation planning for sage-grouse and other species since the effects of habitat loss and fragmentation on species' persistence can be substantial. For purposes of this Plan, habitat *loss* occurs when vegetation communities that previously provided suitable habitat, or had the potential to be restored to suitable habitat, are converted permanently or semi-permanently to non-habitat. Some examples include the replacement of sagebrush communities with towns, exurban home sites and intensive agriculture that has occurred along much of Idaho's Interstate Highway corridors and Snake River Plain.

Historically (ca 1850-1890), source habitats[1] for sage-grouse were widespread and continuous over much of the Interior Columbia Basin, particularly in the Columbia Plateau, Northern Great Basin, and Idaho's Owyhee Uplands and Upper Snake Ecosystem Reporting Units (ERUs). This assessment also reported that roughly 48% of the Interior Columbia Basin showed a decline in the extent of sagebrush habitat, with moderate declines estimated for the Owyhee Uplands, and extensive declines in the Upper Snake ERUs (Wisdom et al. 2000).

Agricultural development has played a role in the loss or fragmentation of sage-grouse habitat historically as well as in more recent years. For example, almost all of the basin big sagebrush (*Artemisia tridentata tridentata)* habitat on the Snake River Plain has been converted to cropland (Hironaka et al. 1983).

Habitat *fragmentation* results when larger, contiguous patches of habitat are broken into smaller, more disjunct patches (Morrison et al. 1998), and may or may not lead to habitat loss. For example, a series of wildfires might temporarily fragment a previously contiguous area of sagebrush that provided nesting habitat, but the burned areas may eventually become suitable again naturally or through rehabilitation. In contrast, a ranchette placed within a sagebrush patch is for all intents and purposes permanent, leading to a loss of habitat. Numerous factors interact to influence the response of wildlife to such fragmentation, including habitat patch size and shape, inter-patch distance, edge length and composition, species natural history, patch composition, vegetation structure, and others (Morrison 2002). If fragmentation progresses, patches may eventually may become too small to sustain a local population or even individual territories (Fahrig 2003). Also, as fragmentation increases, time spent in the surrounding unsuitable habitat also increases, which may lead to higher mortality rates or decreased productivity (Fahrig 2002). Fragmentation effects on songbirds [and possibly sage-grouse] in shrubland or grassland systems may be most evident in situations where disturbance of a previously homogenous habitat results in a highly contrasting mosaic of suitable and unsuitable habitats, and less so in areas that are naturally heterogeneous (Knick and Rotenberry 2002).

While some basic principles of landscape ecology are described below, further reading is recommended. In addition to the citations noted in this section, other recommended references include Bissonette (1997), Forman (1995), Gutzwiller (2002), and Morrison et al. (1998). Dramstad et al. (1996) provide a very readable, and concise handbook of landscape ecology, and is recommended preliminary

[1] Note: the term "source habitat" is used in this particular quote as defined in the Interior Columbia Basin Ecosystem Management Plan or ICBEMP as "Those characteristics of macro vegetation that contribute to stationary or positive population growth. Distinguished from habitats associated with species occurrence; such habitats may or may not contribute to long-term population persistence.

reading. Selected key principles illustrated in the book, that conservation planners and habitat managers should be aware of regarding the effects of habitat fragmentation on wildlife are presented below. An interpretation of how each principle applies to sage-grouse conservation planning in Idaho has been added.

- *"The probability of a species becoming locally extinct is greater if a patch is small, or of low habitat quality."*
    - Interpretation: Sage-grouse populations occupying areas where more extensive sagebrush habitats have become fragmented into smaller patches, or where habitat quality is low are at risk.
- *"The probability of a species going locally extinct is greater in an isolated patch. Isolation is a function not only of distance, but also of the characteristics (i.e., resistance) of the intervening matrix habitat."*
    - Interpretation: Sage-grouse populations that are isolated from other populations due to large distances and/or unsuitable surrounding habitats are at greater risk of extirpation than populations that can interact.
- "*Removal of a patch causes habitat loss, which often reduces the population size of a species dependent upon that habitat type, and may also reduce habitat diversity, leading to fewer species*."
    - Interpretation: As areas (patches) of sage-grouse habitat are lost, such as due to cheatgrass conversion, wildfire or other factors, the ability of the landscape to support sage-grouse populations, or other species, may be reduced.
- "*Removal of a patch reduces the size of a metapopulation (i.e., an interacting population subdivided among different patches) thereby increasing the probability of local within-patch extinctions, slowing down the recolonization process, and reducing stability of the metapopulation*."
    - Interpretation: Loss of habitat patches can hinder the ability of nearby sage-grouse populations to interact or expand.

The loss and fragmentation of sage-grouse habitat in some parts of Idaho are of major concern. Connelly et al. (2004) provided a broad-scale, rangewide analysis of a variety of factors, including a composite analysis of the "human footprint" on the landscape. Fragmentation by anthropogenic features in the Snake River Plain was considered high.

Detailed habitat fragmentation studies in Idaho are scarce. In southwestern Idaho, Knick and Rotenberry (1997) evaluated the effects of various disturbances on landscape characteristics. Fragmentation patterns due to a combination of wildfire and agriculture, or with repeated fires originating from military training, resulted in a landscape where natural recovery of shrublands is likely slow. The presence of cheatgrass, which shortens fire-return intervals and hinders shrubland recovery efforts, was more likely in areas containing high proportions of shrubland/grassland edge or in small shrubland patches. These small shrubland patches, with little interior area, are likely to be completely removed by wildfire, since cheatgrass can easily invade the entire patch (Knick and Rotenberry 1997, Knick and Rotenberry 2000). More recently, Shepherd (2006), examined sage-grouse habitat-use in fragmented and unfragmented habitats in southern Idaho.

3.1.2.2 Fragmentation analysis

Due to the limited availability of landscape-level habitat fragmentation analyses for Idaho, we completed a preliminary analysis described below. Landscapes and ecosystems are complex, thus no single measure of habitat fragmentation should be relied upon in and of itself (Davidson 1998). While numerous techniques are available to describe and quantify aspects of habitat fragmentation, *sagebrush-grassland edge density* and *sagebrush aggregation index* appeared to provide two relatively straightforward and meaningful factors to analyze and portray graphically. The primary purpose of the analysis was to provide LWGs and LWG startup teams additional information, which is not otherwise readily available, to aid in identifying general areas where sage-grouse/sagebrush habitat fragmentation may be of particular concern and thus where they might consider focusing restoration efforts or further study. We used the USGS 2005 Shrubmap digital landcover dataset as a foundation for the analysis. While this analysis provides a general idea of fragmentation patterns, subsequent analyses should be considered as the quality of digital landcover imagery evolves and becomes available. Finer scale (e.g., watershed or other) analyses should also be considered where habitat fragmentation is of particular concern. Quantification of other metrics such as number of sagebrush patches, sagebrush patch size, or other measures of interest may be valuable.

3.1.2.2.1 Edge density

Edge density (ED) is expressed as the total length of patch edge per unit area (McGarigal and Marks 1995). In this analysis, we focused on ED between sagebrush and grassland vegetation covertypes. By definition, areas of high sagebrush-grassland ED are more fragmented than areas of low sagebrush-grassland ED (i.e., contiguous sagebrush). Also, areas of high ED are likely at greater risk for rapid invasion of cheatgrass into sagebrush patches, and wildfire effects (Knick and Rotenberry 1997). When portrayed on a map as a gradient of color (high to low ED), the information can help identify areas where the degree of habitat fragmentation may or may not be of potential concern. While the threshold value at which sagebrush-grassland ED becomes detrimental to sage-grouse is currently unknown, the species' dependence on sagebrush suggests that areas of higher ED may be at risk and warrant additional site-specific analyses.

3.1.2.2.1.1 Edge density methods

Sagebrush-grassland ED was quantified in ft/acre and spatially mapped across all SGPAs using GIS in conjunction with the computer program FRAGSTATS[2] Version 3 (McGarigal et al. 2002). For a base vegetation map, we reclassified the USGS 2005 Shrubmap regional landcover dataset[3], by collapsing the covertypes into four classes, "Sagebrush", "Grassland", "Pinyon-Juniper", and "Other." "Sagebrush" is defined in Shrubmap as a pixel (30 x 30 m) comprised of at least 10% total shrub cover, with sagebrush being the dominant shrub. The aggregated "Sagebrush" class included all sagebrush types in Shrubmap, relevant to Idaho. The aggregated "Grassland" class included all perennial and annual grassland types defined by Shrubmap, as well as those defined as "recently burned." Pinyon-juniper types were also combined as a single class due to interest in this covertype in Idaho. All remaining covertypes were combined into a single class labeled "Other." Neither "pinyon-juniper" nor "Other" classes were included in the ED analysis, though they were portrayed in the final map product for reference. We completed an accuracy assessment (Table 3-1) of the reclassified, combined covertypes, based on an evaluation of accuracies published for USGS Shrubmap. User accuracies for most covertype classes was acceptable (>75%). For the ED map product, ED was calculated using a 180 m moving window, within which the linear interface of sagebrush and grassland covertypes was quantified. While any range of moving window search radii could have been utilized, 180 m, in contrast to 1000 m, appeared to yield more meaningful map resolution.

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[2] FRAGSTATS is a computer software program designed to compute a variety of landscape metrics. The original version was released to the public domain in 1995 as a USDA Forest Service General Technical Report (McGarigal and Marks. 1995), and has since been updated. [http://www.umass.edu/landeco/]

[3] A new regional vegetation cover dataset, "Shrubmap" was published in September 2005 on SAGEMAP. The longer title is "*Current distribution of sagebrush and associated vegetation in the Columbia Basin and Southwestern Regions*". Multi-season satellite imagery, using 1999-2003 Landsat 7 ETM+, and digital elevation model derived datasets (e.g. elevation, landform, aspect, etc.) were used to derive rule sets for the various landcover classes. For additional details, review the associated metadata also posted on SAGEMAP. [http://sagemap.wr.usgs.gov/]

Table 3-1 Accuracy (%) assessment for reclassified USGS Shrubmap covertypes used in the edge density and contagion analysis.

Shrubmap Geographic Area	SGPAs Represented	Grassland	Sagebrush	Pinyon-Juniper	Other	Overall
Southeast Idaho	Curlew, EIU, SMV	46.15	81.93	75.00	87.31	81.40
Lost River	US, Chal	62.50	89.82	100.00	97.84	93.37
Snake River Plain	WC, MH, WMV, EMV, BD	96.67	93.04	100.00	97.42	95.27
Sawtooth	N/A	70.27	84.77	N/A	93.05	88.37
Owyhee Uplands *	Ow, Jar, SB	100	100	100	100	100
Basin and Range*	Ow	83.33	95.27	100.00	93.75	94.48

* Comparatively few validation sites were available in these areas. Refinement of the landcover map using additional information is in progress.

3.1.2.2.1.2 Edge density results

Sagebrush-grassland ED is shown in Figure 3-1 for all SGPAs. Areas of high grassland-sagebrush ED are portrayed as orange-red. These areas imply relatively high sagebrush/grassland interface or patchiness and greater risk to sage-grouse habitat integrity. Opportunities may exist for restoration however, as sagebrush seed sources are present. Protection from wildfire coupled with sagebrush restoration efforts could eventually decrease sagebrush patchiness, though understory quality needs to be considered as well. Where these areas also interface with larger, (yellow) grasslands, impacts on sage-grouse may be of particular concern, due to the apparent limited availability of sagebrush on the landscape (e.g., see especially, portions of the West Central, East Magic Valley, Big Desert, Jarbidge).

Extensive areas with low sagebrush-grassland ED (dark green) are also evident, such as in most of the Upper Snake and Challis SGPAs, as well as portions of other SGPAs. Maintaining the integrity of these larger sagebrush landscapes should be considered a management priority. The interpretation of ED for some parts of the state, such as southeastern Idaho should be done with caution, as user accuracy for grasslands is low compared to other parts of the state (Table 3-1).

Figure 3-1 Idaho Sage-grouse Planning Areas: Vegetation cover and sagebrush/grassland edge density from reclassified 2005 regional landcover dataset.

3.1.2.2.2 Aggregation Index

For this analysis, aggregation index, or AI, (He et al. 2000) provides a means of evaluating the clumpiness or aggregation of sagebrush covertypes on the landscape. Areas with high AI reflect a high degree of adjacency of sagebrush map pixels, and therefore a high degree of aggregation. Areas with low AI occur when pixels show little adjacency, and thus are disaggregated. While the edge density analysis quantified sagebrush-grassland edge, sagebrush AI reflects the degree of aggregation of sagebrush, independent of other vegetation classes. AI values range from 0% (i.e., no adjacency of sagebrush pixels, and high fragmentation or patchiness) to 100% (i.e., maximum aggregation, with contiguous sagebrush). By definition, areas of high sagebrush AI are more contiguous and thereby less fragmented than are areas of low sagebrush AI. Areas with a high AI are assumed to provide more available sagebrush for sage-grouse than areas of low AI, though ecological site potential plays a role. That is, while some areas may reflect a low AI due to fragmentation of sagebrush communities due to wildfire or human impacts, other areas may naturally have a low sagebrush AI due to variability in site potential and a diversity of covertypes.

When portrayed on a map as a gradient of color from low AI (red) to high AI (dark green), the information can help identify areas where sagebrush aggregation (or lack thereof), may or may not be of potential concern. While the threshold value at which lower sagebrush AI's becomes detrimental to sage-grouse is currently unknown, the species' dependence on sagebrush suggests that areas of lower AI may provide less desirable habitat and warrant additional site-specific analyses, again, assuming the site potential should otherwise support a greater extent of sagebrush.

3.1.2.2.2.1 Aggregation index methods

Sagebrush AI was quantified and spatially mapped across all SGPAs using GIS in conjunction with the computer program FRAGSTATS[4] Version 3 (McGarigal et al. 2002). For a base vegetation map, we reclassified the USGS 2005 Shrubmap regional landcover dataset[5], by collapsing the covertypes into two classes, "Sagebrush", and

[4] FRAGSTATS is a computer software program designed to compute a variety of landscape metrics. The original version was released to the public domain in 1995 as a USDA Forest Service General Technical Report (McGarigal and Marks. 1995), and has since been updated. [http://www.umass.edu/landeco/]

[5] A new regional vegetation cover dataset, "Shrubmap" was published in September 2005 on SAGEMAP. The longer title is "*Current distribution of sagebrush and associated vegetation in the Columbia Basin and Southwestern Regions*". Multi-season satellite imagery, using 1999-2003 Landsat 7 ETM+, and digital elevation model derived datasets (e.g. elevation, landform, aspect, etc.) were used

"Other". "Sagebrush" is defined in Shrubmap as a pixel (30 x 30 m) comprised of at least 10% total shrub cover, with sagebrush being the dominant shrub. The aggregated "Sagebrush" class included all sagebrush types in Shrubmap, relevant to Idaho. All remaining covertypes were combined into a single class labeled "Other." The "Other" class was not analyzed for AI, though it appears in the final map product for reference. See Table 3-1 and the related discussion in edge density for information related to the accuracy assessment of the collapsed sagebrush covertypes. For the AI map product, AI was calculated using a 180 m moving window.

3.1.2.2.2.2 Aggregation index results

Sagebrush AI was spatially portrayed across all SGPAs as a color gradient from low AI (red) to high AI (green) (Figure 3-2). Red areas imply relatively higher sagebrush patchiness and greater risk to sage-grouse habitat integrity. In these areas, opportunities may exist for restoration and expansion of sagebrush aggregation, since sagebrush seed sources are present. However understory quality needs to be considered as well. As with the higher sagebrush-grassland edge density areas, protection from wildfire coupled with appropriate restoration efforts could eventually increase AI (i.e., increase sagebrush aggregation). All SGPAs harbor at least some areas of low AI (red; low degree of sagebrush aggregation), but in some (e.g., West Central, Owyhee, East Magic Valley, South Magic Valley) some extensive areas are evident.

Relatively extensive areas with higher sagebrush AI (dark green; high sagebrush aggregation) are also evident, such as in much of the Upper Snake, and Challis and portions of the Big Desert, West Magic Valley, Jarbidge and Owyhee SGPAs. Maintaining the integrity of these larger sagebrush landscapes should be considered a management priority.

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to derive rule sets for the various landcover classes. For additional details, review the associated metadata also posted on SAGEMAP. [http://sagemap.wr.usgs.gov/]

Figure 3-2 Idaho Sage-grouse Planning Areas and sagebrush aggregation index from reclassified 2005 regional landcover dataset.

3.1.2.2.3 Fragmentation analysis summary

The information provided here should be considered preliminary, due to the broad-scale nature of the analysis, and limitations in thematic map imagery. Where apparent high edge densities of sagebrush-grassland vegetation types, and/or where low sagebrush aggregation indices have been identified, LWGs should pursue further analyses and field mapping at finer scales (e.g., 1:100,000 to 1:24,000). This is necessary since, in some cases, these index values may be a function of local ecological site variability or mapping/ imagery errors. Alternatively, they may be driven by factors such as cheatgrass, wildfire or human activities that warrant management intervention.

3.2 Mid-scale

Spatial analysis of sage-grouse habitat in Idaho, based on a gross comparison of historical habitat (Schroeder et al. 2004), with Idaho's 2004 Sage Grouse Habitat Planning Map suggest that approximately 14.5 million (14,522,755) acres of sage-grouse habitat have been lost, with approximately 13.3 million acres of key habitat and potential restoration areas (perennial grasslands, annual grasslands, conifer encroachment areas) remaining (USDI BLM 2004a). The majority (63%) of current key sage-grouse habitat in Idaho is comprised of lands administered by the BLM. Private lands collectively comprise a smaller though significant proportion (19%) of key habitat. State, USFS, and DOE lands collectively provide 18%. Other land ownerships (National Park Service [NPS], Bureau of Indian Affairs [BIA], Department of Defense [DOD], and USFWS) collectively contribute approximately 1% (Table 3-2).

Table 3-2 Extent of existing key sage-grouse habitat in Idaho as of June 2004[6]

Land status	Acres by status	Percent of total
BLM	5,684,923	63
Private	1,705,475	19
State	636,712	7
USFS	502,439	6
DOE	385,227	4
Other	98,116	1
Total	**9,012,892**	**100**

[6] Source: USDI-BLM 2004*a*.

3.2.1 SGPA population and habitat status

The following information summarizes the status of sage-grouse habitat and populations by each of Idaho's 13 SGPAs, based on the best-available information.

3.2.1.1 Background population status

Population trend information for sage-grouse is conducted by recording the high count of males on established leks or lek routes each spring. The quality of lek data in Idaho varies greatly. Data for some areas has been collected consistently for many years. In other areas, data were collected inconsistently, thus not allowing an accurate evaluation of population trends. In this section, lek data are presented for areas where lek routes have been consistently monitored for at least 20 years. Although most SGPA's have inconsistent counts, all lek data should be carefully evaluated by each LWG to determine its quality and what might be done to improve collection of lek data using the techniques outlined in Chapter 5.

3.2.1.2 Background habitat Status

Habitat figures and SGPA maps shown in the sections to follow reflect several broad covertypes and land ownership status, based on the 2004 version of the Idaho Sage-grouse Habitat Planning Map. This map was initially developed cooperatively by BLM, IDFG and other partners in 2000, to facilitate wildland fire suppression planning and other habitat conservation efforts. It has been periodically updated and refined, based on annual wildfire activity and other factors. Accuracy and precision of the map varies. Some polygons, such as certain perennial or annual grasslands resulting from recent wildfires reflect relatively high precision and accuracy, since boundaries of BLM rangeland wildfires are routinely mapped using GPS and GIS technology. Large areas of the map, however, represent only the best current approximation of general habitat status, based on interdisciplinary or interagency input.

The map is a work in progress and will continue to evolve as mapping technology improves and as habitat changes occur. It will be up to each LWG to identify needed changes, alterations, or additions to the current habitat planning maps during the scheduled annual updates each fall/winter so that appropriate changes can be made in a timely manner prior to the next field (fire) season. See the Chapter 5 for additional details.

Covertype definitions include:

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

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

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

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

Acreage figures reported below reflect approximate total acreages of combined Key and Potential Restoration Areas within each SGPA, and proportion of this total, by land ownership. Areas of non-habitat are excluded in order to focus planning efforts on habitats relevant to sage-grouse. Consequently, total acreage and land status figures reported below for some SGPAs are less than if all lands and habitats within the SGPA boundaries had been included.

The habitat figures were derived from the July 2004 edition of the Idaho Sage-grouse Habitat Planning map via GIS query (USDI-BLM 2004*a*). The 2004 edition incorporated fire polygons through the 2003 fire season and is not inclusive of fires or other habitat alterations that may have occurred in summer 2004 or later. It does, however, incorporate several relatively minor polygon edits suggested in spring 2004 for portions of the Upper Snake; Big Desert; and East, West, and South Magic Valley SGPAs. Because of the fluid nature of habitat conditions and landscape threats such as wildfire, and time-lags associated with annual updates to the map, acreage figures reported here are mainly for context, and should not be considered as absolute.

3.2.1.3 Big Desert SGPA

3.2.1.3.1 Population

Figure 3-3 shows the average number of males per lek counted (includes all leks counted with zeros) from 1964-2005. The data used to develop Figure 3-3 includes all lek counts along the Big Desert lek routes (Big Desert # 1, Big Desert # 3, Big Desert # 5, South Big Desert, and Fingers Butte).

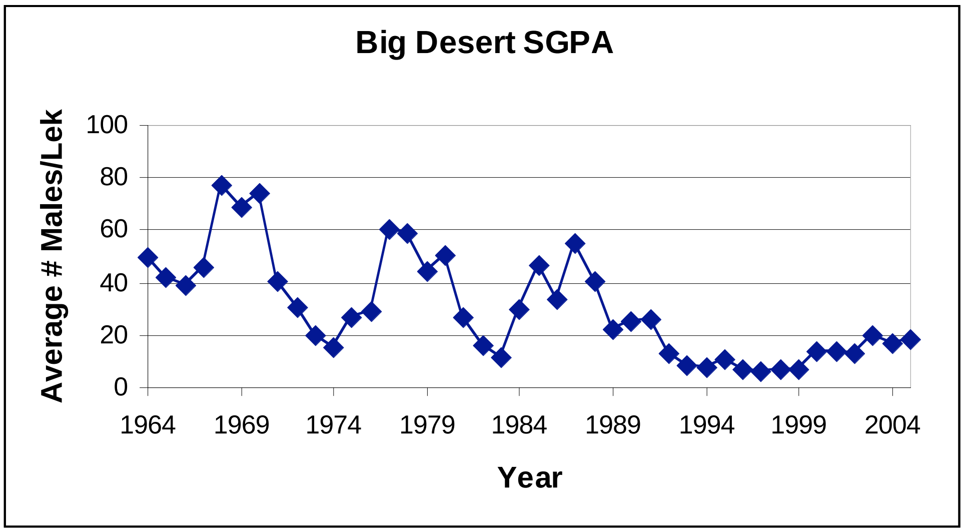

Figure 3-3 Changes in average number of males/lek 1964-2005, Big Desert Sage-grouse Planning Area.

3.2.1.3.2 Habitat

The sage-grouse habitat within the Big Desert SGPA (Figure 3-4) is about 850,000 acres in size. Thirty-four percent of the area is classified as key sage-grouse habitat, 51% is dominated by perennial grassland and 15% is annual grasslands. The Bureau of Land Management (including lands within the Craters-of-the-Moon National Monument boundary) administers 76% of the sage-grouse habitat within the area, 7% is administered by the Department of Energy, 7% is private, 10% is managed by the State, and <1% is managed by the National Park Service.

Figure 3-4 Map of Big Desert Sage-grouse Planning Area, 2004

3.2.1.4 Challis SGPA

3.2.1.4.1 Population

Lek data collected within the Challis SGPA are too inconsistent to develop a trend graph. Some individual leks were counted annually between 1985 and 2005 in the Lemhi drainage. However, the individual leks were part of established lek routes that were not all counted on the same morning.

3.2.1.4.2 Habitat

The sage-grouse habitat within the Challis SGPA (Figure 3-5) is about 878,000 acres in size. The Bureau of Land Management administers 81% of the sage-grouse habitat within the area, 9% is private, 5% is managed by the State, and 5% is administered by USDA Forest Service. Ninety-nine percent of the area is classified as key sage-grouse habitat and 1% is dominated by perennial grassland. Conifer Encroachment Areas likely exist, but have not been incorporated into the Sage-Grouse Habitat Planning Map as of 2004. It should be noted that the Challis and Upper Snake LWG Plans both address habitat in the Big Lost drainage, from Willow Creek Summit to Pass Creek.

Figure 3-5 Map of Challis Sage-grouse Planning Area, 2004

3.2.1.5 Curlew SGPA

3.2.1.5.1 Population

Lek data collected within the Curlew SGPA are too inconsistent to develop a trend graph. Two lek routes established during the late 1980s (Curlew and Rockland) were not counted annually until 1996.

3.2.1.5.2 Habitat

The sage-grouse habitat within the Curlew SGPA (Figure 3-6) is about 394,000 acres in size. The Bureau of Land Management administers 53% of the sage-grouse habitat within the area, 30% is private, 3% is managed by the State, and 14% is managed by USDA Forest Service. Seventy-two percent of the area is classified as key sage-grouse habitat, 26% is dominated by perennial grassland, and 2% is conifer encroachment area.

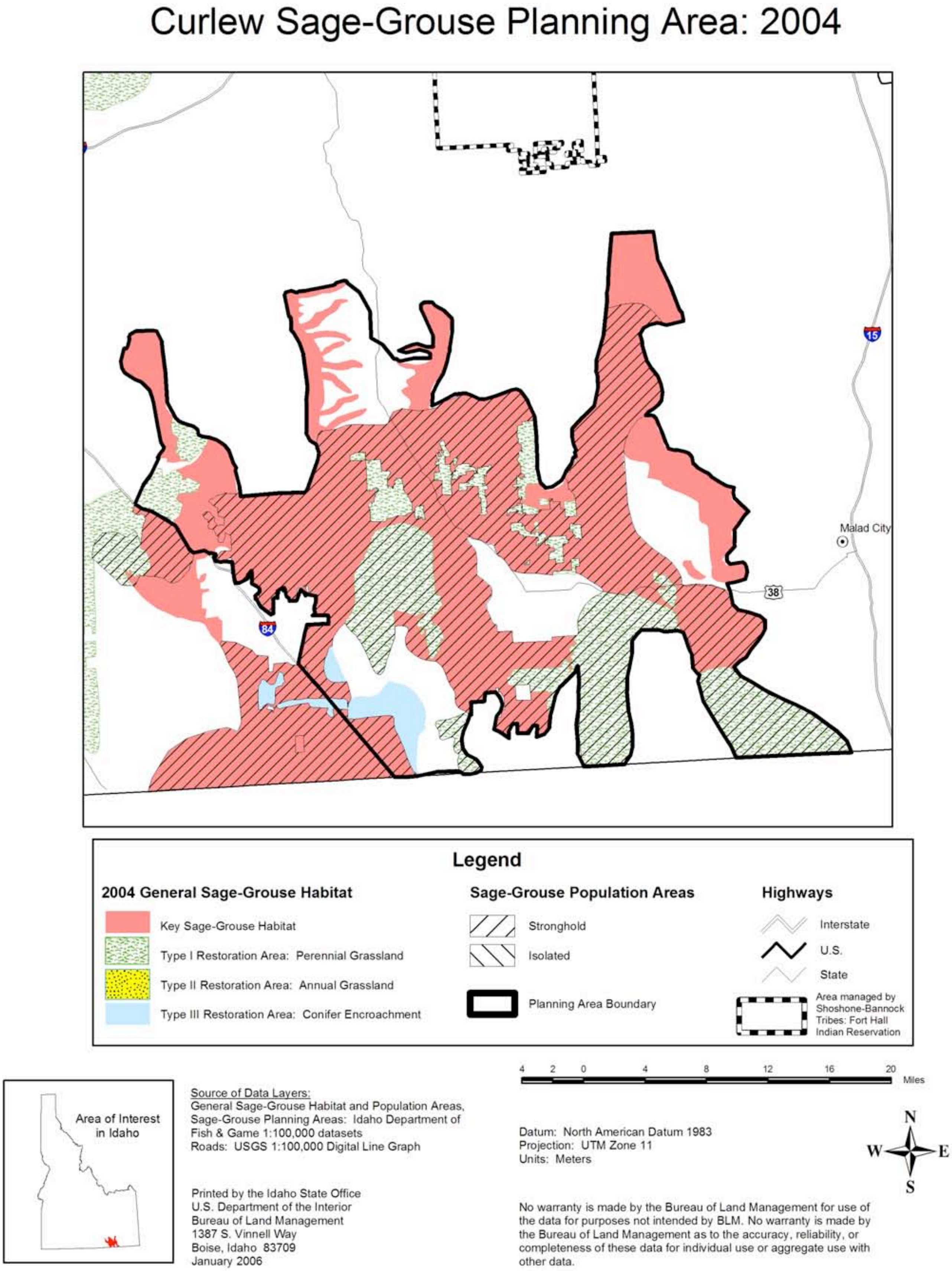

Figure 3-6 Map of Curlew Sage-grouse Planning Area, 2004

3.2.1.6 East Idaho Uplands SGPA

3.2.1.6.1 Population

Only one lek route was established within the East Idaho Uplands SGPA. This route, in Caribou County, east of Soda Springs was consistently counted from 1980-2003. Figure 3-7shows the average number of males/lek (includes lek counts with zeros) within the Caribou County lek route only. Other leks have been counted sporadically in Bear Lake and Bingham Counties. However, there is not enough information to document trends for the rest of the SGPA.

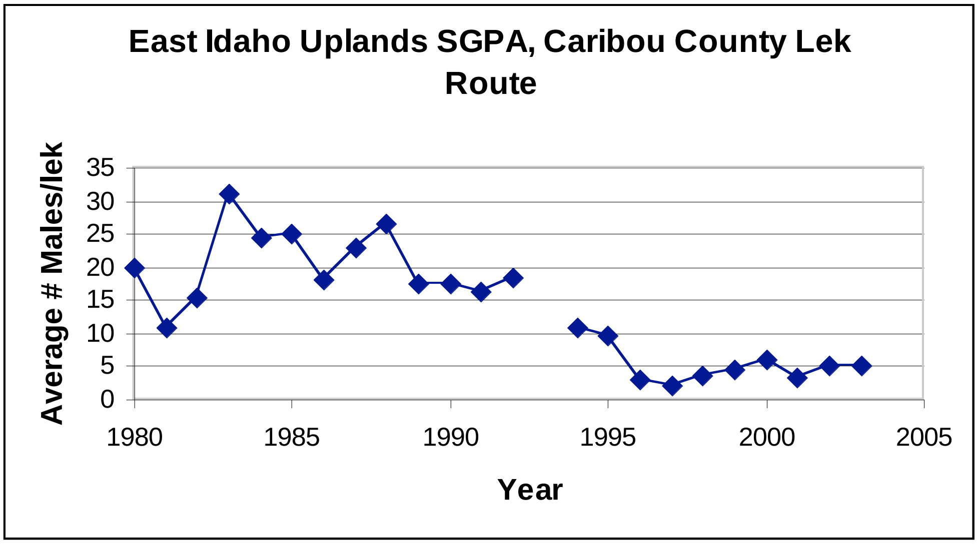

Figure 3-7 Changes in average number of males/lek 1980-2003, Caribou County lek route within the East Idaho Uplands Sage-grouse Planning Area.

3.2.1.6.2 Habitat

The sage-grouse habitat within the East Idaho Uplands SGPA Planning Area (Figure 3-8) is about 520,000 acres in size and encompasses numerous isolated areas of sagebrush (mountain ranges weave in and out of sagebrush meadows). BLM manages approximately 15% of the SGPA; 56% is private, 16% is managed by the State, and 2% is administered by the Bureau of Reclamation. Approximately 11% of the SGPA occurs within the boundaries of the Fort Hall Indian Reservation, an area managed by the Shoshone-Bannock Tribes. The USDA Forest Service and U. S. Fish and Wildlife Service administer less than 1%. Ninety-seven percent of the planning area is classified as key sage-grouse habitat and 3% is annual grasslands.

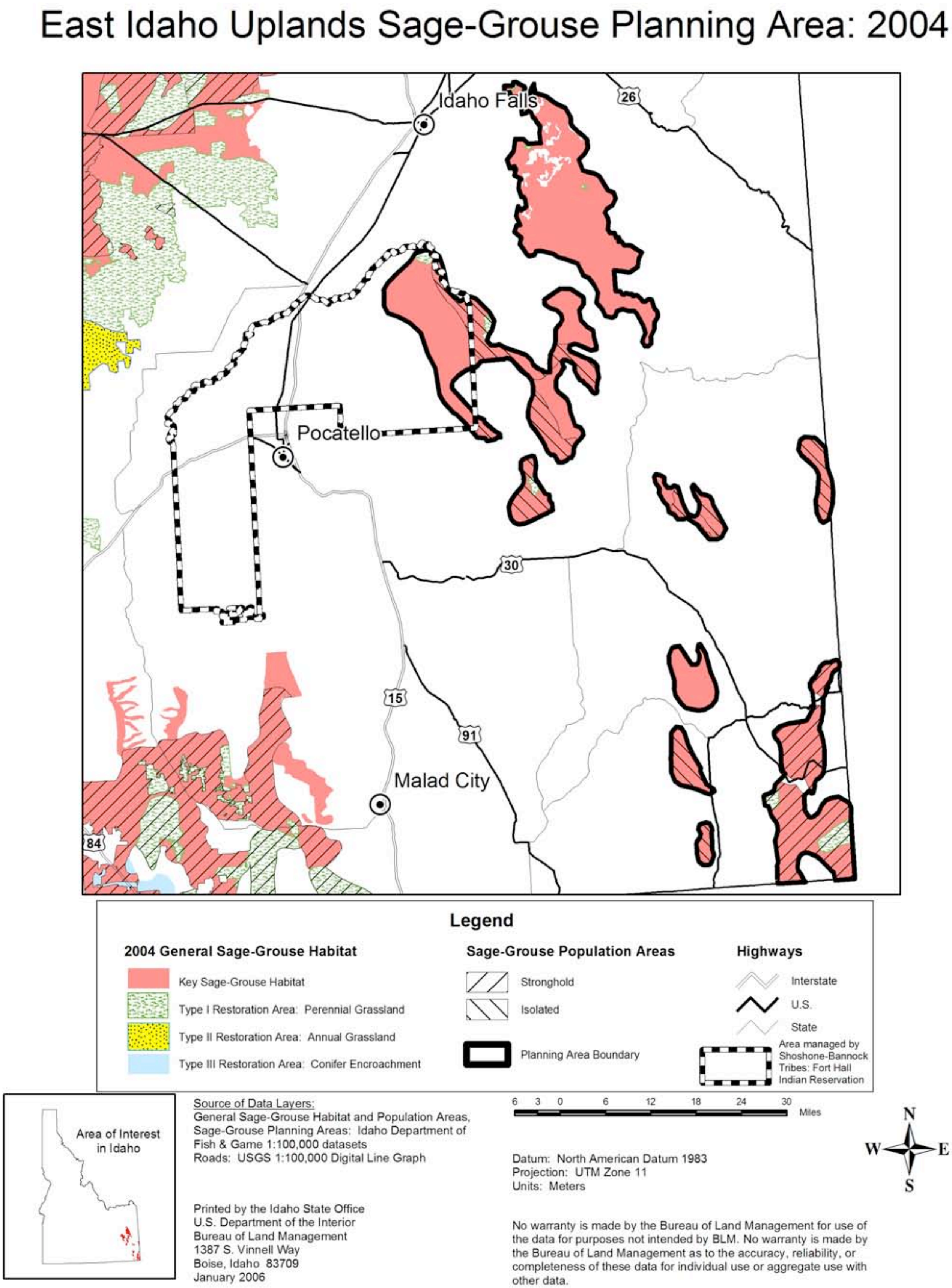

Figure 3-8 Map of East Idaho Uplands Sage-grouse Planning Area, 2004

3.2.1.7 East Magic Valley SGPA

3.2.1.7.1 Population

Figure 3-9 shows the average number of males per lek counted (includes all leks counted with zeros) from 1979-2005. The data used to develop Figure 3-9 includes all lek counts along the East Magic Valley lek routes (Timmerman, Paddleford Flats, Picabo, and Lincoln Minidoka).

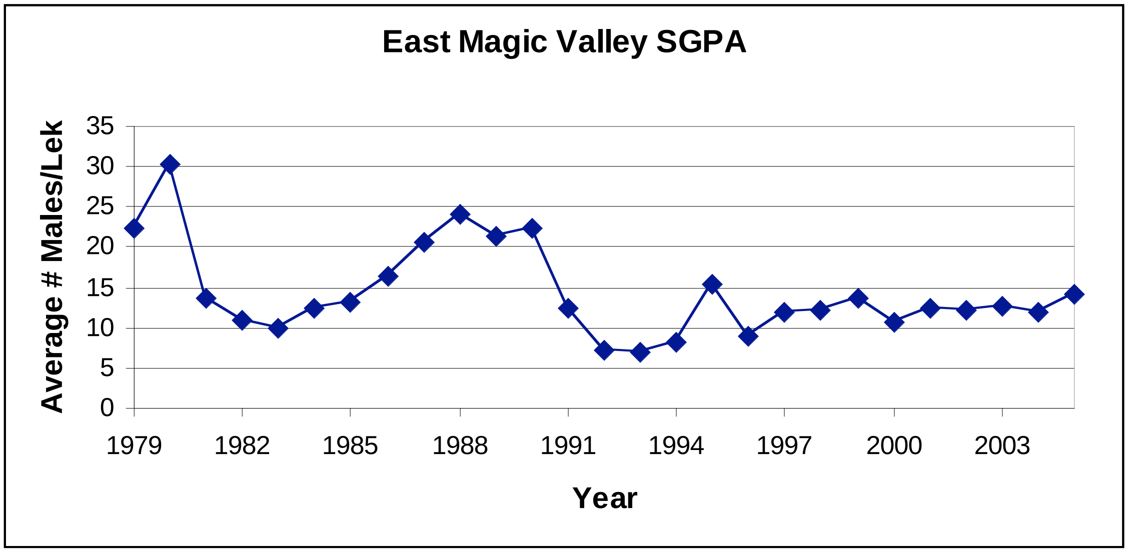

Figure 3-9 Changes in average number of males/lek 1979-2005, East Magic Valley Sage-grouse Planning Area.

3.2.1.7.2 Habitat

The sage-grouse habitat within the East Magic Valley SGPA (Figure 3-10) is about 1.3 million acres in size. The Bureau of Land Management (including BLM lands within the Craters-of-the-Moon National Monument boundary) administers 80% of the sage-grouse habitat within the area, 2% is managed by the National Park Service, 12% is private, and 6% is managed by the State. Less than 1% of the area is administered by USDA Forest Service, U.S. Fish and Wildlife Service, and other. Forty-two percent of the area is classified as key sage-grouse habitat, 39% is dominated by perennial grassland, and 19% is annual grasslands.

Figure 3-10 Map of East Magic Valley Sage-grouse Planning Area, 2004

3.2.1.8 Jarbidge SGPA

3.2.1.8.1 Population

Lek data within the Jarbidge SGPA are too inconsistent to develop a trend graph. One lek route (Brown's Bench) located on the eastern edge of the SGPA has had consistent counts since 1992.

3.2.1.8.2 Habitat

The sage-grouse habitat within the Jarbidge SGPA (Figure 3-11) is about 1.2 million acres in size. The Bureau of Land Management administers 85% of the sage-grouse habitat within the area, 7% is private, 5% is managed by the State, and 3% is managed by the Department of Defense. Forty-nine percent of the planning area is classified as key sage-grouse habitat, 51% is dominated by perennial grasslands, and <1% is annual grasslands.

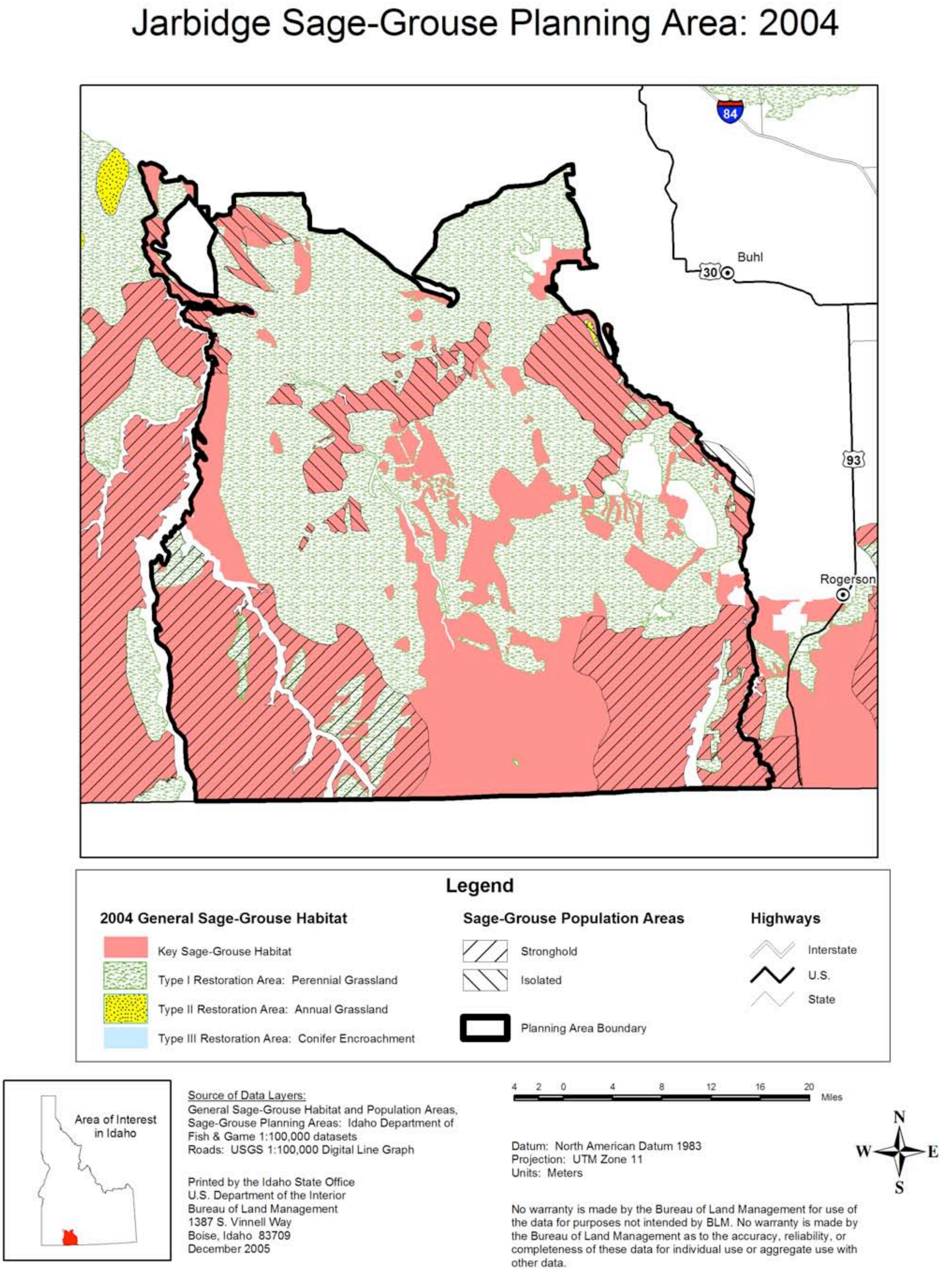

Figure 3-11 Map of Jarbidge Sage-grouse Planning Area, 2004

3.2.1.9 Mountain Home SGPA

3.2.1.9.1 Population

Lek data within the Mountain Home SGPA are too inconsistent to develop a trend graph. Only 2 leks were counted annually between 1966 and 1990.

3.2.1.9.2 Habitat

The sage-grouse habitat within the Mountain Home SGPA (Figure 3-12) is about 277,000 acres in size. The Bureau of Land Management administers 58% of the sage-grouse habitat within the area, 27% is private, 12% is state, and 3% is administered by USDA Forest Service. Seventy percent of the area is classified as key sage-grouse habitat, 10% is dominated by perennial grasslands, and 20% is annual grassland.

Mountain Home Sage-Grouse Planning Area: 2004

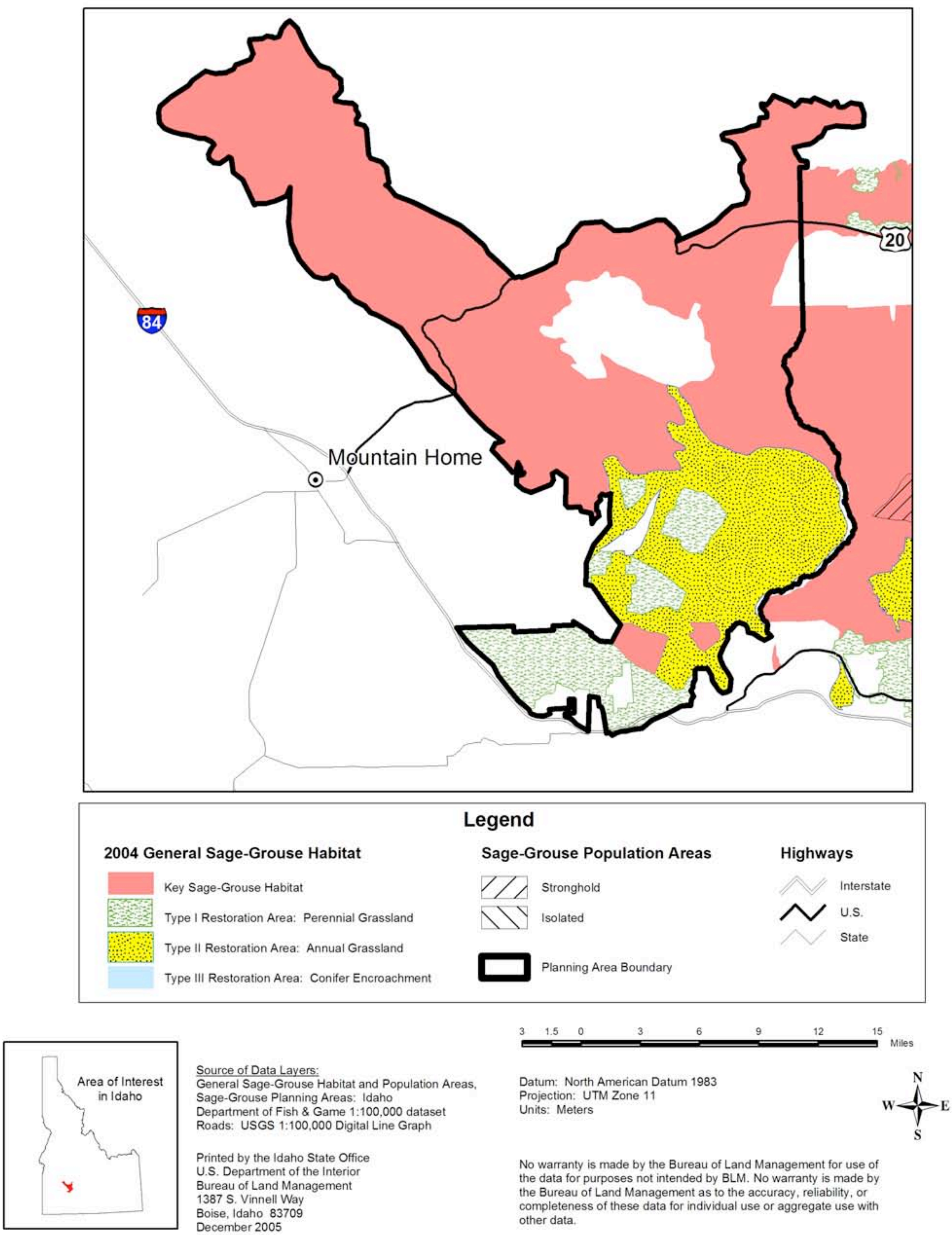

Figure 3-12 Map of Mountain Home Sage-grouse Planning Area, 2004

3.2.1.10 Owyhee SGPA

3.2.1.10.1 Population

Lek data within the Owyhee SGPA are too inconsistent to develop a trend graph. Numerous individual leks have been inconsistently counted between 1966 and 2005. More consistent counts along established lek routes did not begin until 1998.

3.2.1.10.2 Habitat

The sage-grouse habitat within the Owyhee SGPA (Figure 3-13) is about 2.6 million acres in size. The Bureau of Land Management administers about 83% of the sage-grouse habitat within the planning area, 10% is private, 7% is managed by the State. Seventy-three percent of the planning area is classified as key sage-grouse habitat, 11% is dominated by perennial grasslands, 5% is annual grasslands, and 11% is conifer encroachment. Further refinements of this map will be possible in the near future, as a result of mapping efforts underway via the Great Basin Restoration Initiative's Owyhee Uplands project.

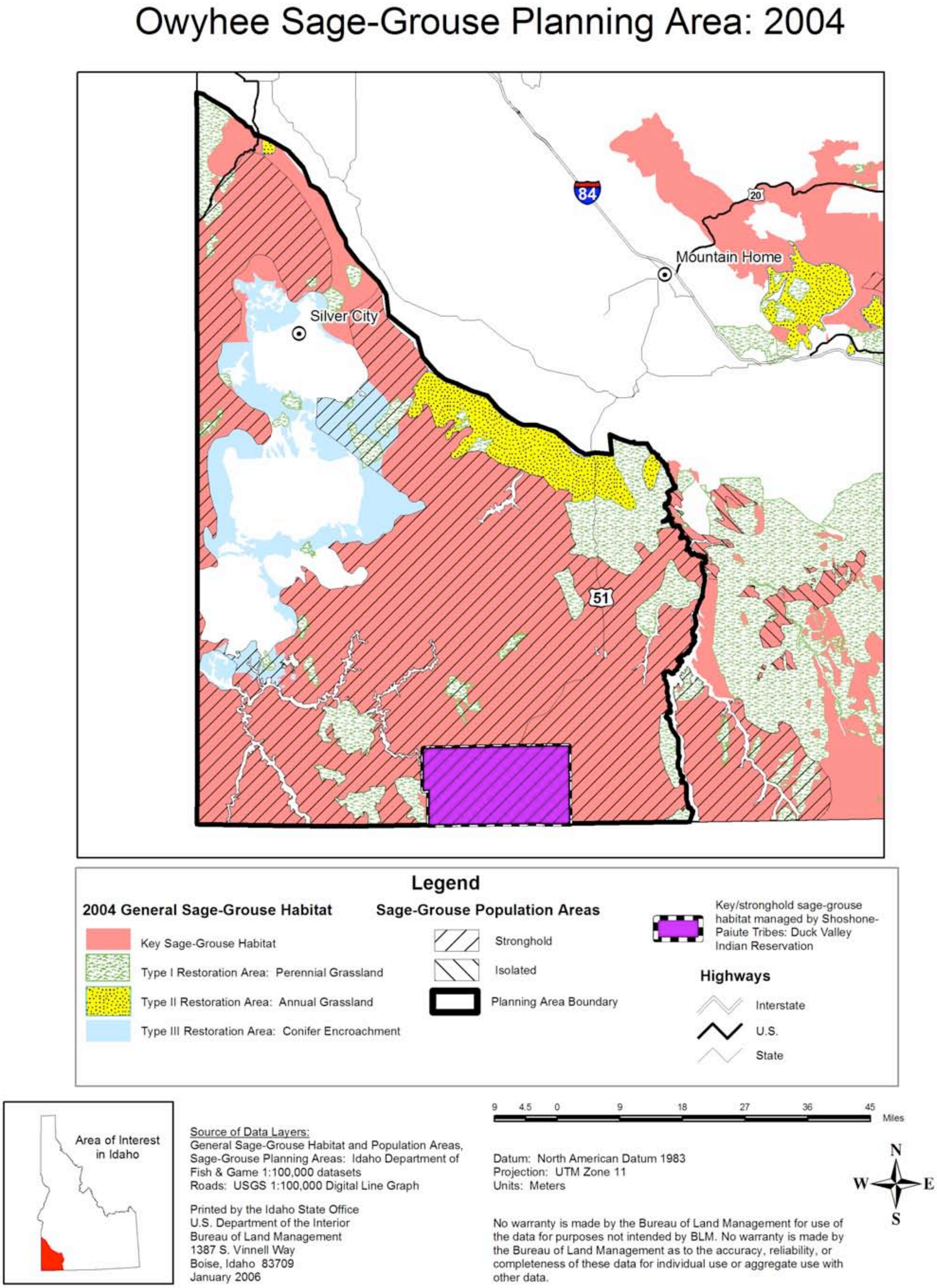

Figure 3-13 Map of Owyhee Sage-grouse Planning Area, 2004

3.2.1.11 Shoshone Basin SGPA

3.2.1.11.1 Population

Figure 3-14 shows the average number of males per lek counted (includes all leks counted with zeros) from 1986-2005. The data used to develop Figure 3-14 includes all lek counts along the Shoshone Basin lek route. Prior to 1986, only 2 leks along the established route were counted annually.

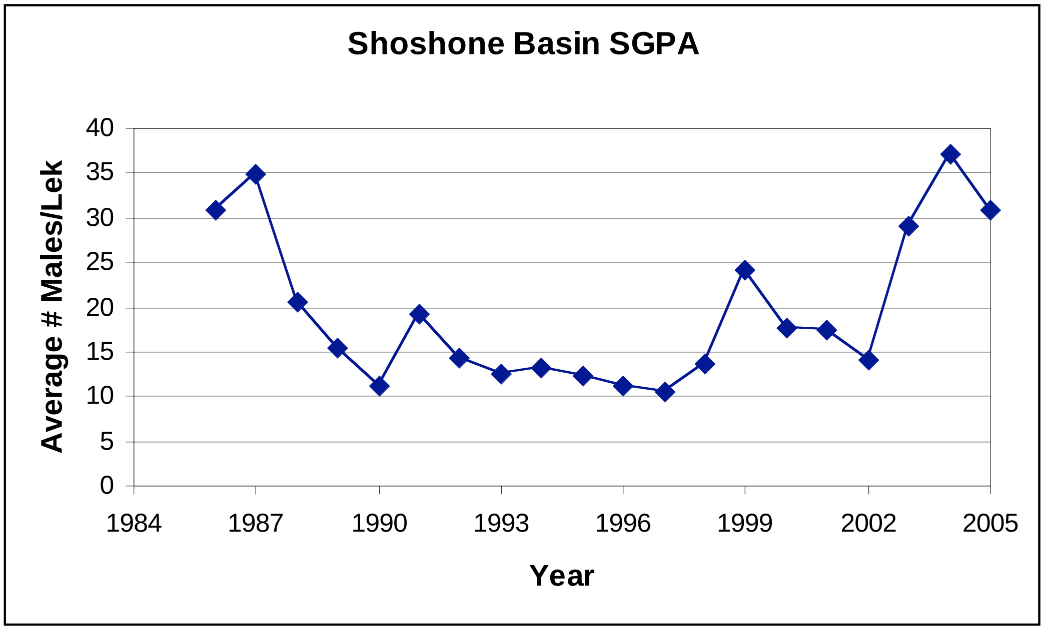

Figure 3-14 Changes in average number of males/lek 1986-2005, Shoshone Basin Sage-grouse Planning Area.

3.2.1.11.2 Habitat

The sage-grouse habitat within the Shoshone Basin SGPA (Figure 3-15) is about 180,000 acres in size. The Bureau of Land Management administers 51% of the sage-grouse habitat within the area, 45% is private, 4% is managed by the State, and <1% is USDA Forest Service. Eighty-seven percent of Shoshone Basin is classified as key sage-grouse habitat and 13% is dominated by perennial grasslands.

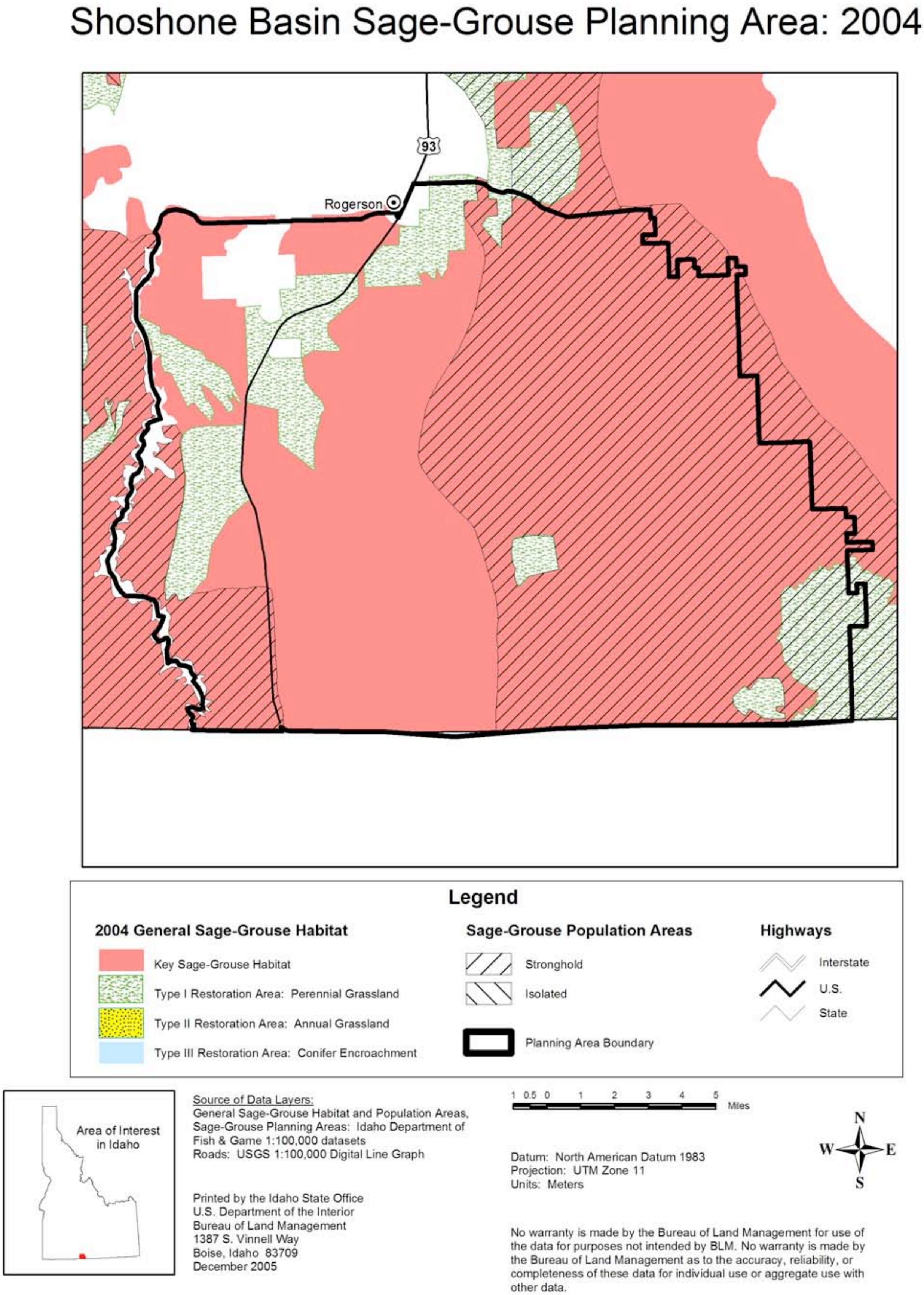

Figure 3-15 Map of Shoshone Basin Sage-grouse Planning Area, 2004

3.2.1.12 South Magic Valley SGPA

3.2.1.12.1 Population

Lek data within the South Magic Valley SGPA are too inconsistent to develop a trend graph. Numerous individual leks were counted between 1980 and 2005. One lek route was developed in the mid 1990s.

3.2.1.12.2 Habitat

The sage-grouse habitat within the South Magic Valley SGPA (Figure 3-16) is about 761,000 acres in size. The Bureau of Land Management administers 48% of the sage-grouse habitat within the area, 21% is private, 5% is managed by the State, and 26% is managed by USDA Forest Service. Less than 1% is managed by the National Park Service. Sixty-five percent of the area is classified as key sage-grouse habitat, 24% is dominated by perennial grasslands, and 11% is conifer encroachment.

Figure 3-16 Map of South Magic Valley Sage-grouse Planning Area, 2004

3.2.1.13 Upper Snake SGPA

3.2.1.13.1 Population

Figure 3-17 shows the average number of males per lek counted, using data collected between 1953-2005. Some of the lek routes used in the analysis were not initiated until the late 1980s-1990s. Analysis is inclusive of all leks counted with zero males. Data used to develop Figure 3-17 includes lek counts from 13 lek routes (Red Road, Sheep Station, Market Lake, Jacoby, Plano, Stibal Road, Table Butte, Lidy, Medicine Lodge, Crooked Creek, Upper and Lower Birch Creek, and Little Lost).

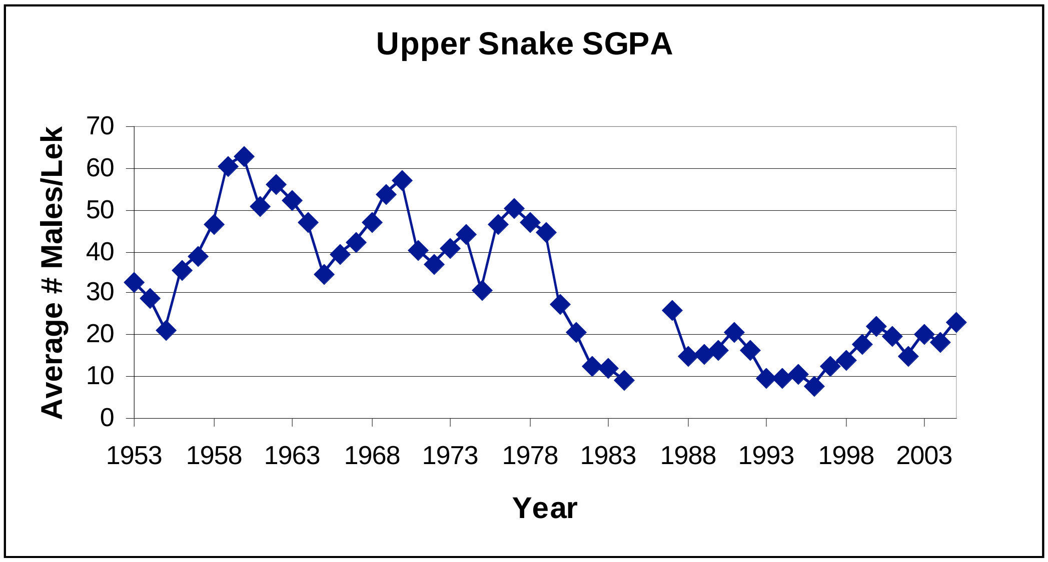

Figure 3-17 Changes in average number of males/lek 1953-2005 Upper Snake Sage-grouse Planning Area.

3.2.1.13.2 Habitat

The sage-grouse habitat within the Upper Snake SGPA (Figure 3-18) is about 2.5 million acres in size. The Bureau of Land Management administers 47% of the sage-grouse habitat within the area, Department of Energy administers 18%, 17% is private, 8% is managed by the State, 9% is administered by USDA Forest Service, and <1% is administered by U.S. Fish and Wildlife Service. Ninety percent of the area is classified as key sage-grouse habitat and 10% is dominated by perennial grassland. Conifer encroachment areas likely exist, but have not been incorporated into the Sage-Grouse Habitat Planning Map, as of 2004. On the

Upper Snake River Plain, 29,762 ha (73,512 acres) of sagebrush rangeland were converted to cropland between 1975 and 1992 (Leonard et al. 2000). This represents an 11% loss of sage-grouse key habitat within the study area (this does not represent the entire Snake River SGPA). It should be noted that the Challis and Upper Snake LWG Plans both address habitat in the Big Lost drainage, from Willow Creek Summit to Pass Creek.

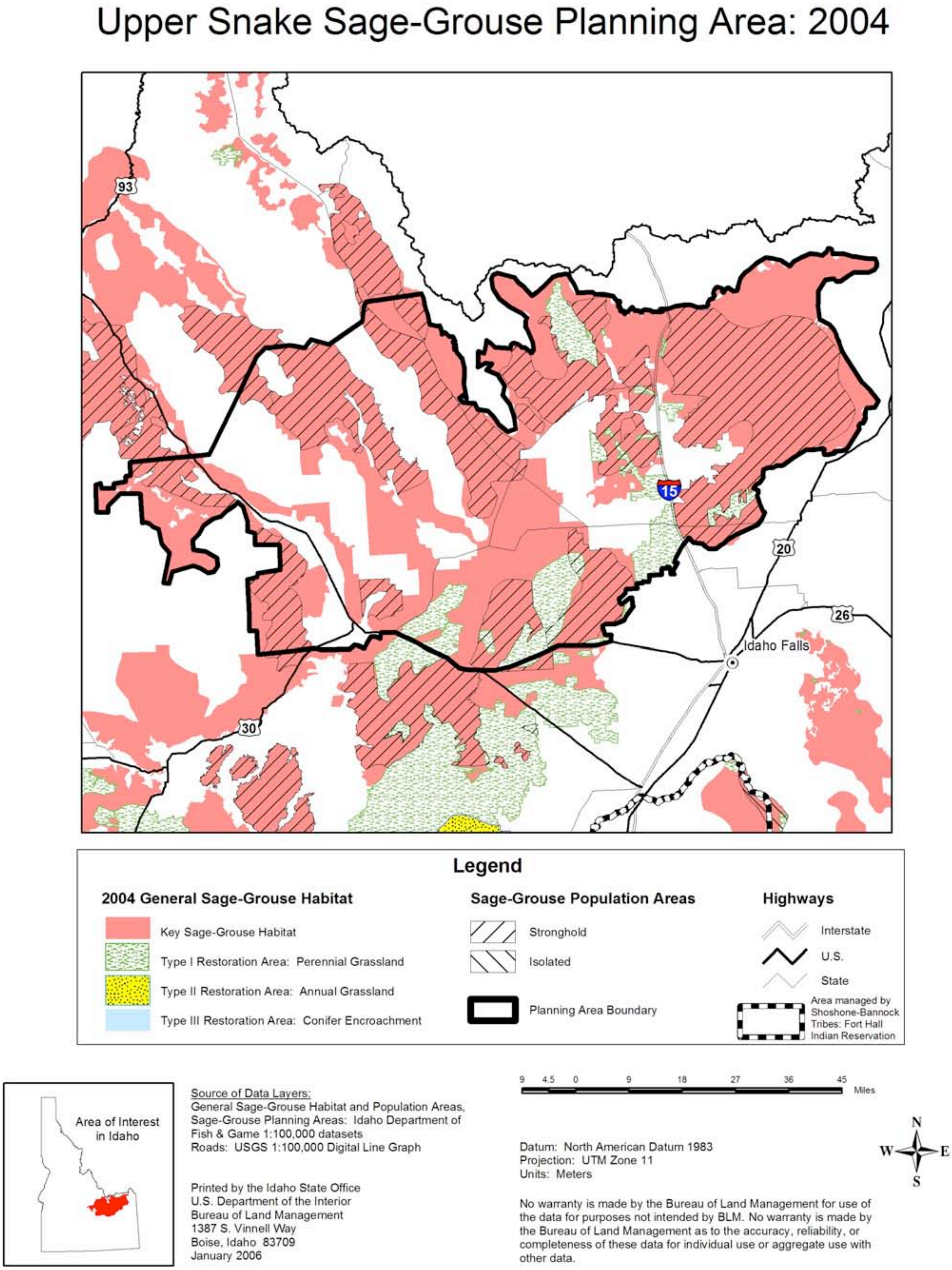

Figure 3-18 Map of Upper Snake Sage-grouse Planning Area

3.2.1.14 West Central SGPA

3.2.1.14.1 Population

Lek data within the West Central SGPA are too inconsistent to develop a trend graph. Four lek routes established in the mid 1990s have had consistent counts since 1996.

3.2.1.14.2 Habitat

The sage-grouse habitat within the West Central SGPA (Figure 3-19) is about 875,000 acres in size. The Bureau of Land Management administers 32% of the sage-grouse habitat within the area, 62% is private, 6% is managed by the State, and less than 1% is administered by USDA Forest Service. Thirty-one percent of the area is classified as key sage-grouse habitat, 25% is dominated by perennial grassland, and 44% is classified as annual grassland. Much of the perennial grassland is dominated by native grasses with islands of sagebrush. A change in the classification from perennial grassland to key habitat may be appropriate for some portions of the SGPA, contingent on the extent of sagebrush cover, distribution of sagebrush islands or other factors. Field-level ground truthing of these areas in the near future is warranted because much of the native perennial grassland type does not need to be rehabilitated. The annual grassland type will need to be monitored for presence/absence of sage-grouse as some of the area may be unsuitable for rehabilitation to sagebrush habitat due to topography and terrain.

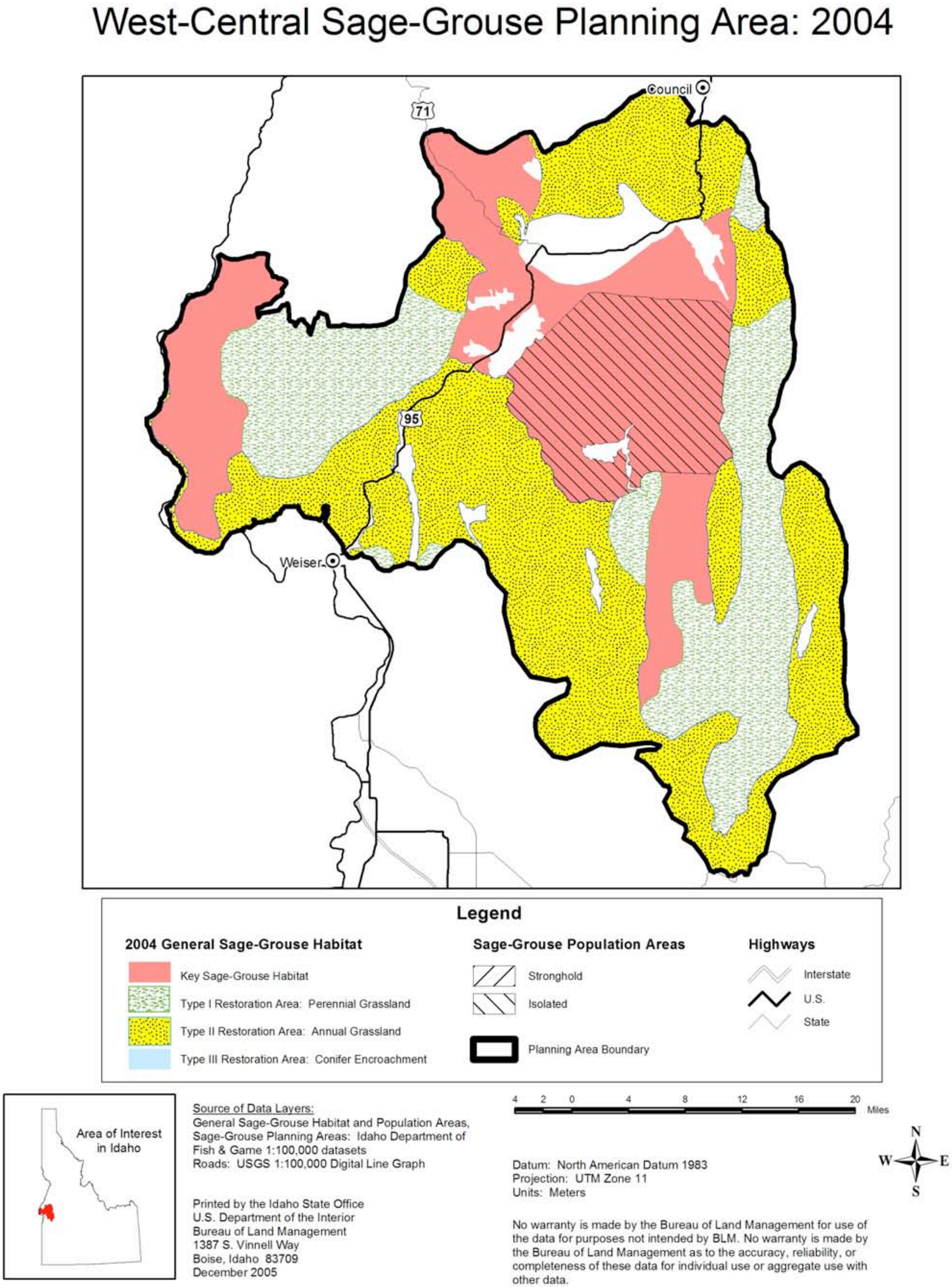

Figure 3-19 Map of West Central Sage-grouse Planning Area, 2004

3.2.1.15 West Magic Valley SGPA

3.2.1.15.1 Population

Figure 3-20 shows the average number of males per lek counted (includes all leks counted with zero males) from 1976-2004. Data used to develop Figure 3-20 includes lek counts from North Shoshone, Rock Creek, and Bliss/Hill City lek routes.

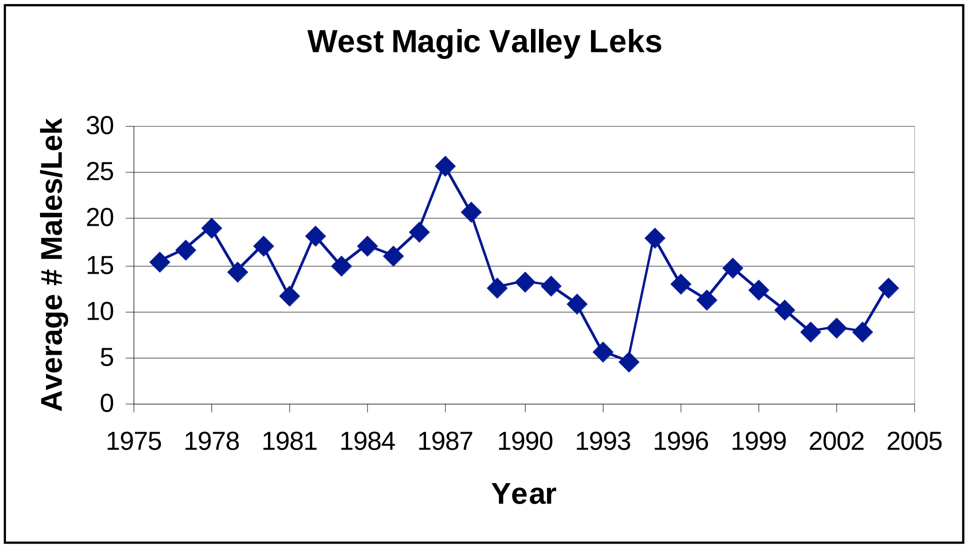

Figure 3-20 Changes in average number of males/lek 1976-2004, West Magic Valley Sage-grouse Planning Area.

3.2.1.15.2 Habitat

The sage-grouse habitat within the West Magic Valley SGPA (Figure 3-21) is about 731,000 acres in size. The Bureau of Land Management administers 78% of the sage-grouse habitat within the area, 15% is private, and 7% is managed by the State. Less than 1% is administered by USDA Forest Service. Fifty-six percent of the area is classified as key sage-grouse habitat, 38% is dominated by perennial grasslands, and 6% is annual grassland.

Figure 3-21 Map of West Magic Valley Sage-grouse Planning Area, 2004

Chapter 4 – Threats and Conservation Measures

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4 Threats and Conservation Measures

This chapter describes threats to sage-grouse and sage-grouse habitat, and provides recommended conservation measures to address those threats. The primary purpose of the information presented here is to assist Local Working Groups (LWGs) in the development or refinement of LWG sage-grouse conservation plans. Information in this chapter is presented in a hierarchical context starting at the rangewide scale, descending to the statewide scale, and then to the scale of the Sage-grouse Planning Areas (SGPA). This chapter includes background information, data, maps and selected hyperlinks as deemed appropriate. Much of this information is presented at the statewide scale. Where possible, threat data have been quantified at the SGPA scale. Over time, it is anticipated that LWGs and affiliated agencies will contribute finer resolution data that will be used in updating this information.

4.1 Rangewide threats overview

Detailed information on rangewide threats is presented in the *Conservation Assessment of Greater-Sage-grouse and Sagebrush Habitats* (Connelly et al. 2004). This assessment, along with information provided to the USFWS by other sources (e.g., state and federal agencies, non-governmental organizations, private individuals) was considered during the course of the status review and preparation of the Endangered and Threatened Wildlife and Plants: 12-Month Finding for Petitions to List the Greater Sage-grouse as Threatened or Endangered (USDI-FWS 2005, see Appendix C).

In the course of the status review, an expert panel identified the 19 most important threats to sage-grouse across its range, and assigned a relative rank to each threat within three geographical areas representing the eastern portion, western portion and entire range (USDI-FWS 2005). Overall, the panel determined that the highest ranking threats exerted their influence by habitat loss (USDI-FWS 2005).

Invasive species was ranked as the primary extinction risk factor for sage-grouse rangewide. In the western portion of the range, of which Idaho is a part, wildfire ranked second. In summary, the highest ranking rangewide threats, in order of rank, included: (1) invasive species, (2) infrastructure as related to energy development and urbanization, (3) wildfire, (4) agriculture, (5) grazing, (6) energy development, (7) urbanization, (8) strip/coal mining, (9) weather, and (10) pinyon-juniper expansion. Other threats such as disease and predation, hard-rock mining, hunting, and contaminants were considered by the panel to be of lesser importance. Several panelists expressed concern about the synergistic aspects of threats, such as the connection between infrastructure increases and the expansion of invasive plant species (USDI-FWS 2005). The panel also predicted that the range of the greater-sage grouse would contract and fragment due to continued habitat modifications and loss (USDI-FWS 2005).

4.2 Statewide threats overview

On February 1-2, 2005, the Idaho sage-grouse science panel was convened in Boise to assist with identifying and ranking statewide threats and in estimating extirpation risk by geographic areas within Idaho. The panel consisted of six Idaho scientists (Dr. Steve Bunting, Professor, Department of Range Science, University of Idaho; Dr. Jack Connelly, Principal Wildlife Research Biologist, Idaho Department of Fish and Game; Dr. Steve Knick, U.S. Geological Survey/Biological Resources Division; Dr. Karen Launchbaugh, Chairperson, Department of Range Science, University of Idaho; Dr. Kerry Reese, Professor, Department of Fisheries and Wildlife, University of Idaho; and Dr. Mike Scott, Leader, Cooperative Fisheries and Wildlife Research Unit, University of Idaho) with acknowledged expertise in sage-grouse, rangeland, fire and landscape ecology. Appendix E provides additional details regarding the panel's composition, procedures, and findings. Results of the panel process are as follows:

Risk of extirpation of sage-grouse: Extirpation risk was evaluated for seven broad geographic areas of the state, each encompassing one or more SGPAs (see Science Panel Executive Summary, Appendix E). For consistency, the panel assumed that current management and trends/trajectories of threats, habitats and populations would continue. SGPAs with apparently higher extirpation risk (West Central, East Idaho Uplands, Curlew, East and West Magic Valley, Mountain Home) potentially have a more urgent need for conservation actions. However, proactive conservation planning and management actions in lower risk areas (Owyhee, Challis) are also important. For example, in these lower risk areas, the maintenance of ecosystem health and integrity should be priorities so that extirpation risk remains low.

Statewide threats to sage-grouse: The panel identified and ranked 19 threats to sage-grouse in Idaho (Figure 4-1). The statewide rankings are intended to serve as a tool for LWGs to consider as they identify and prioritize threats at the local SGPA level. It is important to note that the rankings reflect the collective, expert opinion of the panelists, based on a scoring process, and are not intended to imply unanimous agreement among the panelists. Because of the statewide focus, their rankings in many cases may not mirror threats or rankings at the finer scale SGPA/ LWG level.

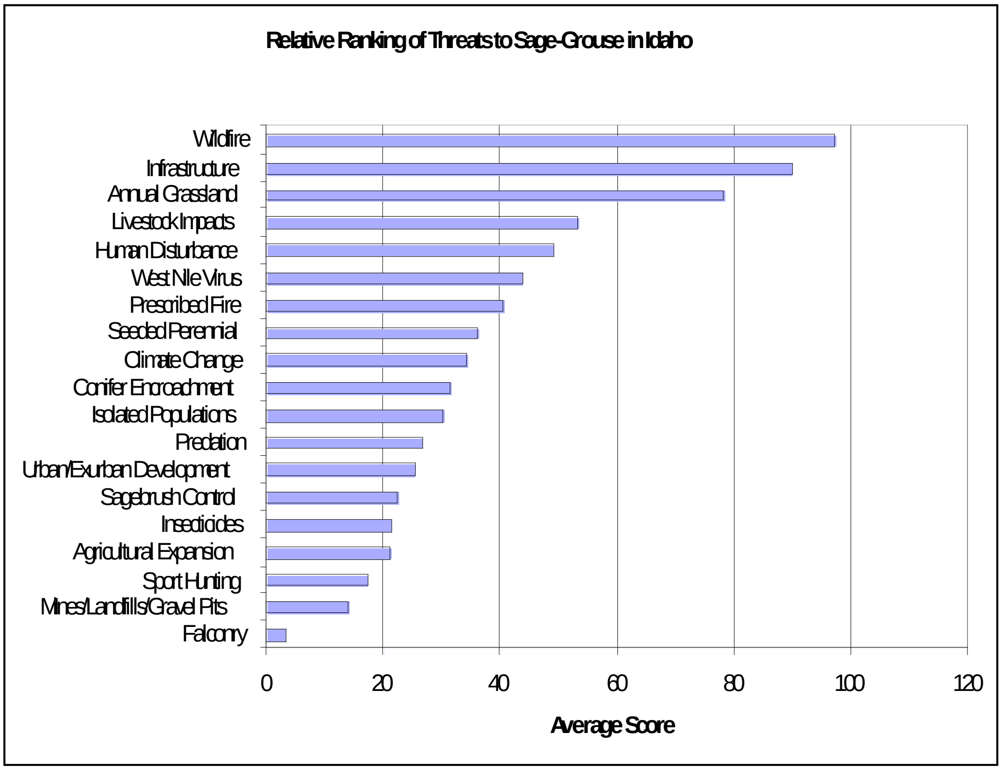

Figure 4-1 Summary ranking of threats to sage-grouse in Idaho (horizontal axis reflects an average of scores assigned by six Panelists)[1]

While Figure 4-1 places the array of threats in relative context with one another, there is also a great deal of inter-relatedness between many of the threats. That is, certain threats are closely linked to other related threats and therefore influence one another (e.g., annual grasslands and wildfire; human disturbance or urban development and infrastructure; climate change and annual grasslands/conifer encroachment). It is also important to recognize that while certain threats ranked relatively high or low in a statewide context, they may be ranked differently at the local level. The panel's findings are included to help shed light on various threats to sage-grouse statewide, however, the rankings are in no way intended to preclude or supersede the identification and prioritization of threats at the SGPA/ LWG level.

[1] Idaho Sage-Grouse Science Panel. February 1 and 2, 2005, Boise, Idaho.

4.3 Specific threats and related conservation measures

In the following pages, each of the 19 threats described by the Idaho sage-grouse science panel will be discussed and conservation measures presented. Depending on the particular threat, more or less supporting data and other information will be provided. In some cases, such as wildfire and infrastructure, a considerable effort was expended acquiring and analyzing available information. For other threats, such as mines/landfills/gravel pits, and sagebrush control, little data were readily available. Conservation measures are presented in the context of the particular threat they address, and are further grouped by issues specific to each threat.

In general, healthy rangelands provide a basic foundation for productive sage-grouse habitat. 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). Several of the described threats negatively affect sage-grouse as well as rangeland and their impacts may be cumulative. Rangeland health is addressed indirectly within the discussion of a number of the threats (e.g., infrastructure and human disturbance) and is addressed more directly in the threat discussion of annual grasslands and livestock impacts.

The recommended conservation measures presented in this chapter are designed to eliminate, reduce, or mitigate threats to sage-grouse or to ensure the long-term sustainability of sage-grouse habitat in Idaho. LWGs are encouraged to adopt these conservation measures or others that are more locally appropriate. These conservation measures should be implemented where feasible unless documented to be inappropriate at the site or project scale. Examples of such documentation could include: description of alternative conservation measures arising from site-specific analysis, monitoring, research, or adaptive management.

4.3.1 Wildfire

4.3.1.1 Threat summary and background

Crawford et al. (2004) suggested that the management of wildfire (and prescribed fire) "is considered one of the key issues in maintaining sage-grouse populations in sagebrush-dominated landscapes." In Idaho, wildfire poses a substantial threat to sage-grouse populations and habitat. Depending on weather, fuel conditions and other factors, wildfires potentially can quickly affect hundreds of thousands of acres of habitat in a single season. Consequently, proactive fire management and reduction of wildfire risk must continue to remain a priority.

4.3.1.2 Summary of key conservation issues

Several key issues are of primary concern. The establishment and proliferation of cheatgrass has resulted in altered fire regimes in some areas, resulting in more frequent fires and reduced habitat quantity and quality. Many wildfire ignitions are the result of a variety of human activities, and are largely preventable. Large wildfires have resulted in the reduction of significant acreages of sagebrush communities in some SGPAs, and have also hindered the recovery of sagebrush in older burns or rehabilitation areas. Finally, the rehabilitation of burned areas, while technically a management response to wildfire rather than an issue, is a crucial component of resource management on some southern Idaho rangelands, and therefore will be discussed separately.

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. See Chapter 2, Sagebrush Ecology section, for a more detailed discussion by sagebrush types. Fire regimes have changed across portions of the sagebrush biome (Connelly et al. 2004). Of particular concern in Idaho are lower elevation Wyoming big sagebrush sites, where wildfires have become much more frequent, due to the expansion of flammable, invasive annual grasses.

The proliferation of cheatgrass, an invasive annual grass species introduced in the late 1800s, has contributed to reduced fire-return intervals in parts of the Snake River Plain (Whisenant 1990). On many of these sites, fire-return intervals have been shortened to between two and four years (Whisenant 1990). Cheatgrass was reported as common on four million acres of Idaho rangelands as early as 1949 (Stewart and Hull 1949 cited in Pellant 1990). Cheatgrass and other problematic annuals such as medusahead rye (*Taeniatherum caput-medusae*) mature earlier than native grass species, provide flammable, easily ignited fuels, and increase the likelihood of repeated fires (Young et al. 1987 cited in Pellant 1990). Many fires in south-central and western Idaho are fueled by the proliferation of the annual grasses described above.

Human-caused ignitions: Many Idaho wildfires are human-caused. Of 1,966 wildfires occurring from 1994 through 2003 on Idaho BLM lands, ignitions were determined to be 57% human-caused and 43% lightning-caused (USDI-BLM 2003). A more detailed analysis of point data from 1980 through 2003 revealed that in sage-grouse habitat on USFS and Department of Interior (BLM, BIA, USFWS, NPS) lands in Idaho, approximately 51% of ignitions were of natural origin (e.g., lightning) and the remainder were human-caused or unknown (Table 4-1).

Table 4-1 Summary of general ignition sources of fire on BLM, BIA, USFWS, NPS, and USFS lands in Idaho Sage-grouse Planning Areas, 1980-2003 (USDI-BLM 2004*i*)

General ignition source	Percent (and number) of ignitions within key sage-grouse habitat and potential restoration habitat[2]		Percent (and number) of ignitions not within[3] key sage-grouse habitat or potential restoration habitat		Percent (and number) of all ignitions within SGPA perimeter	
Unknown	1	(46)	3	(25)	2	(71)
Natural e.g., lightning	51	(1,621)	48	(463)	50	(2,084)
Campfire	3	(87)	5	(44)	3	(131)
Smoking	1	(30)	3	(27)	1	(57)
Unauthorized burning[4]	10	(307)	16	(155)	11	(462)
Incendiary	4	(140)	3	(27)	4	(167)
Equipment	9	(297)	5	(51)	8	(348)
Railroads	5	(145)	5	(51)	5	(196)
Juveniles	1	(23)	2	(16)	1	(39)
Miscellaneous[5]	15	(478)	11	(103)	14	(581)
Total ignitions		**(3,174)**		**(962)**		**(4,136)**

[2] Potential restoration habitat includes perennial grassland, annual grassland, and conifer encroachment areas within Sage-Grouse Planning Areas, as delineated on the 2004 Idaho Sage-Grouse Habitat Planning Map.

[3] Defined as areas not classified as key sage-grouse habitat or potential restoration habitat within SGPAs, as delineated on the 2004 Idaho Sage-Grouse Habitat Planning Map.

[4] Wildfire ignitions that result from activities such as trash burning, burning dump, field burning, land clearing, slash burning, or right-of-way burning.

[5] Wildfire ignitions due to activities such as blasting, burning building, power line, or fireworks.

While lightning does play a substantial role in Idaho wildfire occurrences, there may be opportunity for reducing incidences of human-caused fires. Wildfire ignition sources by SGPA are shown in Table 4-2. Some SGPAs appear to be particularly troubling with respect to certain ignition sources, and many are likely preventable. For example, one-third of ignitions in the Challis SGPA and nearly one-quarter of ignitions in the East Idaho Uplands appear to have resulted from activities such as trash burning, field burning, land clearing and related practices. Railroad fires have been the source of ignitions in 14% of East Magic Valley wildfires. Use of equipment has apparently played an important role in Big Desert (12%), East Magic Valley (13%), Mountain Home (20%), and Shoshone Basin (16%) wildfire ignitions. A substantial proportion of wildfires in many SGPAs are of miscellaneous human origin. Accordingly, it may be appropriate to more aggressively target wildfire prevention, education, and enforcement efforts.

Table 4-2 Summary by Sage-grouse Planning Area of percent and number of general ignition sources within key and potential restoration habitat[6] on BLM, BIA, USFWS, NPS and USFS lands in Idaho, 1980-2003 (USDI-BLM 2004*i*)

	Percent (and number) of wildfire ignitions by general source																				
SGPA	**Unknown**		**Natural (lightning)**		**Campfire**		**Smoking**		**Fire use[7]**		**Incendiary**		**Equipment**		**Railroads**		**Juveniles**		**Misc.[8]**		**Total ignitions**
Big Desert	**3**	(4)	**55**	(69)	**1**	(1)	**2**	(2)	**7**	(9)	**2**	(3)	**12**	(15)	**0**	(0)	**0**	(0)	**18**	(22)	(125)
Challis	**0**	(0)	**38**	(68)	**10**	(18)	**6**	(10)	**33**	(60)	**2**	(4)	**4**	(8)	**0**	(0)	**1**	(2)	**6**	(11)	(181)
Curlew	**1**	(2)	**74**	(122)	**1**	(2)	**0**	(0)	**5**	(9)	**4**	(7)	**5**	(8)	**0**	(0)	**0**	(0)	**9**	(14)	(164)
East Idaho Uplands	**1**	(1)	**45**	(42)	**1**	(1)	**1**	(1)	**23**	(21)	**5**	(5)	**6**	(6)	**0**	(0)	**2**	(2)	**15**	(14)	(93)
East Magic Valley	**1**	(6)	**39**	(198)	**1**	(6)	**1**	(4)	**10**	(50)	**5**	(27)	**13**	(68)	**14**	(73)	**0**	(2)	**15**	(77)	(511)
Jarbidge	**1**	(2)	**58**	(177)	**1**	(2)	**0**	(0)	**7**	(22)	**10**	(30)	**5**	(15)	**<1**	(1)	**<1**	(1)	**19**	(57)	(307)
Mountain Home	**0**	(0)	**49**	(52)	**3**	(3)	**0**	(0)	**7**	(8)	**4**	(4)	**20**	(21)	**1**	(1)	**1**	(1)	**16**	(17)	(107)
Owyhee	**2**	(6)	**57**	(140)	**<1**	(1)	**<1**	(1)	**7**	(17)	**2**	(6)	**7**	(17)	**1**	(2)	**<1**	(1)	**22**	(55)	(246)
Shoshone Basin	**0**	(0)	**49**	(24)	**2**	(1)	**2**	(1)	**6**	(3)	**0**	(0)	**16**	(8)	**0**	(0)	**0**	(0)	**24**	(12)	(49)
South Magic Valley	**3**	(12)	**72**	(320)	**1**	(6)	**<1**	(1)	**5**	(23)	**3**	(13)	**5**	(24)	**0**	(0)	**1**	(5)	**9**	(40)	(444)
Upper Snake	**1**	(5)	**46**	(154)	**5**	(18)	**2**	(7)	**10**	(35)	**3**	(9)	**10**	(32)	**6**	(19)	**1**	(2)	**16**	(55)	(336)
West Central	**2**	(4)	**62**	(137)	**6**	(13)	**1**	(2)	**2**	(4)	**2**	(5)	**7**	(16)	**4**	(9)	**<1**	(1)	**14**	(30)	(221)
West Magic Valley	**1**	(4)	**30**	(118)	**4**	(15)	**<1**	(1)	**12**	(46)	**7**	(27)	**15**	(59)	**10**	(40)	**2**	(6)	**19**	(74)	(390)
Total ignitions		**(46)**		**(1,621)**		**(87)**		**(30)**		**(307)**		**(140)**		**(297)**		**(145)**		**(23)**		**(478)**	**(3,174)**

[6] Inclusive of key sage-grouse habitat and potential restoration areas (perennial grassland, annual grassland, and conifer encroachment areas) as delineated on the 2004 Idaho Sage-Grouse Habitat Planning Map.

[7] Wildfire ignitions as a result of activities such as trash burning, burning dump, field burning, land clearing, slash burning, or right-of-way burning.

[8] Wildfire ignitions due to activities such as blasting, burning building, power line, or fireworks.

- **Reduction or modification of habitat:** Wildfires that have occurred since 1990 alone, have affected substantial acreages of sagebrush rangelands in Idaho, and pose a significant risk in some SGPAs. Spatial analysis of BLM and USFS wildfire occurrences in key habitat and potential restoration areas (perennial grasslands, annual grasslands, conifer encroachment areas) in Idaho indicate 2,155,088 "footprint acres" of wildfire between 1990 and 2003 (Table 4-3). The "footprint" concept serves to quantify actual on-the-ground habitat burned and set back to an earlier seral stage during the timeframe and does not include repeated burns of the same polygon(s). In terms of the proportion of sage-grouse habitat burned, wildfire appears to have played a relatively minor role in several SGPAs including the Challis, Owyhee, Shoshone Basin, Upper Snake, and West Central; however, fire has impacted substantial proportions of others, most notably the Big Desert, East and West Magic Valley, Jarbidge, and Curlew (Figure 4-2). In such areas, large, repeated fires provide little opportunity for sagebrush to recover to levels characteristic of breeding or winter habitat.

Table 4-3 Acres of wildfire by Sage-grouse Planning Area, 1990-2003 (USDI-BLM 2004*b*)

SGPA	Footprint acres of sage-grouse habitat burned[9]	Percent of sage-grouse habitat burned[10]
Big Desert	536,531	63
Challis	6,703	<1
Curlew	81,886	21
East Idaho Uplands	46,429	9
East Magic Valley	446,853	35
Jarbidge	346,495	29
Mountain Home	50,621	18
Owyhee	107,494	4
Shoshone Basin	6,932	4
South Magic Valley	105,960	14
Upper Snake	191,668	8
West Central	48,206	6
West Magic Valley	179,310	25
Total	2,155,088	18

[9] Based only on wildfires within key sage-grouse habitat and potential restoration areas (perennial grassland, annual grassland, or conifer encroachment) as delineated on the 2004 Idaho Sage Grouse Habitat Planning Map (SGHPM). Not inclusive of fires in habitats unsuitable for sage-grouse (e.g., timber). Repeat-burns are not included.

[10] Percent of habitat (as defined in footnote 9) burned within the SGPA. Last row in table reflects total acres of wildfire and percent of key and potential restoration habitat burned, inclusive of all SGPAs.

Figure 4-2 Fires burned in Idaho Sage- Grouse Planning Areas: 1990-2003[11]

[11] Red areas show cumulative burned areas within key sage-grouse habitat or potential restoration areas (described as annual grasslands, perennial grasslands and conifer encroachment areas), based on the 2004 Idaho Sage-Grouse Planning Map. Pink areas illustrate burns in areas that are not key habitat or potential restoration areas, or that are outside of Sage-Grouse Planning Areas.

An increased incidence of wildfire can pose a substantial threat to sage-grouse and sage-grouse habitat in Idaho in several ways. Frequent and/or large-scale wildfires (e.g., tens of thousands of acres or more) 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.

Studies of fire-effects on sage-grouse have been done in the context of both wildfires and prescribed fires. Some of these studies are referenced here in the wildfire section due to the similarity of the issues. Most fire-effects studies have been short-term involving a span of ten years or less (Crawford et al. 2004). The specific effects of fire on sage-grouse habitat vary and are driven by a number of factors including site potential; ecological condition; limiting functional plant groups; and the pattern, size, and season of burning (Crawford et al. 2004).

On the Hart Mountain National Antelope Refuge in Oregon, Byrne (2002) reported nest success in burns > 20 years old (29%, n=6/21 nests) was similar to nest success in unburned areas (28%, n=49/177 nests) but was zero in burns ≤ 20 years old (n=0/5 nests). Habitat characteristics around nests in burns > 20 years old were similar to those of unburned areas.

A nine-year study in Idaho suggested that late summer prescribed fire in Wyoming big sagebrush did not improve brood habitat (Connelly et al. 1994, Fischer et al. 1996*a*). Fischer et al. (1996*b*) noted that the abundance of *Hymenoptera* (e.g. ants) was significantly lower in burned habitats the second and third years after the burn. In a study of twenty wildfires and prescribed burns in Idaho, Nelle et al. (2000) reported that the relative abundance of ants and beetles, important sage-grouse chick foods, was significantly greater in the 1-year old burn category, but had returned to unburned levels by 3-5 years postburn; no difference was detected in forb abundance between different aged burns.

In another Idaho study, Pedersen et al. (2003) modeled the effects of sheep grazing and fire on sage-grouse populations. The study area included higher elevation (4,800-5,400 ft) breeding habitat characterized by mountain big sagebrush (with stands of threetip sagebrush also present) and winter habitat characterized by black sagebrush. With respect to fire alone, model simulations suggested that frequent (every 17 years) large wildfires (impacting 10% or more of the spring use habitat) are very detrimental to sage-grouse and could cause local extinctions.

In Oregon, frequency of ground-dwelling beetles was not influenced by prescribed fire; spring and fall burning increased total forb cover and diversity, but decreased sagebrush cover (Pyle and Crawford 1996). In mountain big sagebrush communities, fire can enhance native perennial forbs and grasses where sagebrush is abundant if a healthy assemblage of native grasses and forbs is present and invasive plant species are limited (Crawford et al. 2004). Prescribed fire should not be used where sagebrush cover is a limiting factor for sage-grouse (Crawford et al. 2004). In general, caution should be exercised in the use of prescribed fire in sage-grouse habitats (Byrne 2002, Connelly et al. 2004, Crawford et al. 2004).

Spatial analysis of all wildfire occurrences, including repeat burns between 1990 and 2003, indicate a total of 2,436,936 acres of wildfire occurred in key or potential restoration habitat within the 13 SGPAs (Table 4-4). Of this total, 1,413,588 acres (58%) occurred in the adjacent Big Desert, East Magic Valley, and West Magic Valley SGPAs. An additional 370,577 acres of wildfire occurred in sage-grouse habitat within the Jarbidge SGPA. Although wildfire poses a potential risk to sage-grouse habitat in all SGPAs, it appears that this threat has been especially problematic in these SGPAs during the past fifteen years. Appropriate wildfire suppression, rehabilitation, restoration, and education efforts are warranted.

Table 4-4 Total wildfire acres in sage-grouse habitat[12] by Sage-grouse Planning Area, 1990-2003 (USDI-BLM 2004*b*)

	Acres[13]														
SGPA	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**Misc.**	**Total**
Big Desert	-	6767	12599	-	250	7308	238690	2708	23063	179698	185780	1839	23	177	102	659004
Challis	-	-	-	-	-	-	-	-	-	-	-	-	-	6703	-	6703
Curlew	2533	9854	27252	-	12647	576	321	13	8605	1289	10384	8492	-	712	-	82678
E Idaho Uplands	1005	3130	25610	-	2350	1379	2565	-	-	4099	6118	-	89	2841	-	49186
E Magic Valley	12295	6704	176195	60	36460	30225	206232	335	2825	69871	5815	6810	9137	7459	-	570423
Jarbidge	2299	9891	16127	-	17627	112412	57964	6025	5873	26510	72323	19588	21569	2369	-	370577
Mt. Home	183	1216	24698	-	-	-	1009	1026	14	684	20657	1234	-	-	-	50721
Owyhee	12204	4534	1671	440	12523	2083	6675	87	156	22483	15611	15415	13808	211	-	107901
Shoshone Basin	-	-	-	-	135	-	732	-	-	183	5574	309	-	-	-	6933
S Magic Valley	12319	34	3430	-	4875	656	9659	197	338	7802	55306	2009	10266	497	-	107388
Upper Snake	-	3021	2438	47	29781	8497	21945	495	142	31541	39510	22	121	52927	2153	192640
West Central	1978	3328	15422	-	79	-	7045	277	3131	71	2812	2829	10217	1432	-	48621
W Magic Valley	73257	1190	28238	946	14	3592	36880	3408	2070	3785	9666	17911	68	3136	-	184161
Total	118073	49669	333680	1493	116741	166728	589717	14571	46217	348016	429556	76458	65298	78464	2255	2,436,936

[12] Sage-grouse habitat areas as delineated on the 2004 Idaho Sage-grouse Habitat Planning Map. Inclusive of areas areas defined as key sage-grouse habitat, and potential restoration areas (perennial grassland, annual grassland, and conifer encroachment areas).

[13] Table reflects total acres of wildfire in sage-grouse habitat as defined in footnote 12, above, including repeat fires. Figures are rounded to the nearest acre. "Misc." column reflects acres of fire that occurred sometime during 1999-2003, but the specific year was not available.

- **Restoration and burned area rehabilitation:** 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 of 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.html) provide a comprehensive and up-to-date source of information relative to the 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 between 1997-2004, 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.[14] 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.

  - Idaho BLM is preparing a "Fire, Fuels, and Related Vegetation Management Direction Plan Amendment," which will amend 12 Land Use Plans in Shoshone, Burley, Pocatello, and Idaho Falls. The final decision is scheduled for October 2006. The preferred alternative recognizes that the sagebrush steppe ecosystem and its associated wildlife species, including sage-grouse, are at risk from increased wildfire and other disturbances. The emphasis of this alternative is to

[14] Areas with similar resource objectives.

maintain existing high quality sagebrush steppe habitat and to increase the quantity of resilient sagebrush steppe through post-wildland fire rehabilitation and proactive restoration. Wildland fire efforts would emphasize protection of sagebrush steppe habitats.

- 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.

4.3.1.3 Wildfire conservation measures

Goal: To reduce the risk, incidence and extent of wildfires within Sage-grouse Planning Areas, and to ensure that burned areas are rehabilitated, and historically altered sites are restored, where appropriate, in a manner consistent with long-term habitat needs for sage-grouse.

Issue Addressed	Rationale	Conservation Measure(s)
Altered fuels and fire regimes	Areas dominated by cheatgrass or medusahead have higher frequency of wildfire and minimal habitat value.	1. See conservation measures for Annual Grasslands section. 2. Identify and prioritize annual grasslands most conducive for restoration to perennial species. Coordinate closely with USGS Snake River Field Station, GBRI, Universities, local partners, and IDFG, as appropriate. 3. Since it is impossible to restore large annual grasslands all at once due to cost and logistics, consider an incremental or “buffer” approach, to protect existing in-tact 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.

Issue Addressed	Rationale	Conservation Measure(s)
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.	**Wildfire suppression tactics:** 1. 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). a. Wyoming big sagebrush sites (in general, lower elevations). b. Mountain big sagebrush sites (in general, higher elevations). c. Other habitats (e.g. early sagebrush, low sagebrush sites). *Priority 2* - Key habitat. a. Wyoming big sagebrush sites (in general, lower elevations). b. Mountain big sagebrush sites (in general, higher elevations). c. Other habitats. *Priority 3* - Restoration habitat. a. Areas with established or recovering sagebrush. b. Areas with minimal or no sagebrush cover. *Priority 4* - Juniper or annual grasslands where delaying initial attack does not threaten priorities 1-3 above. 2. BLM and USFS 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. 3. In all sage-grouse habitats (key, stronghold, potential

Issue Addressed	Rationale	Conservation Measure(s)
		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. 4. 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. 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. 5. 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. 6. 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. **Strategic wildfire suppression planning:** 1. 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.

Issue Addressed	Rationale	Conservation Measure(s)
		2. In FMPs, annually update the Idaho Sage-grouse Habitat Planning Map (see Chapter 5). 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. 3. 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. 4. Where feasible, consider staging initial attack resources in high fire incident areas to ensure quicker initial attack response times in remote areas. 5. 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. 6. Strategically place pre-treated strips/areas (e.g., mowing, herbicide application, strictly managed grazed strips, etc.) to aid in controlling wildfire should wildfire occur near critical habitats. **Firefighter training:** 1. Provide annual training for rangeland fire personnel (including appropriate Rural Fire Department (RFD) personnel), 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	Over half of wildfires in Idaho are human-caused.	**Public outreach and education:** 1. Increase public awareness of fire danger by installing and maintaining additional fire danger signs along main access roads.

Issue Addressed	Rationale	Conservation Measure(s)
		2. 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. 3. Via media opportunities increase public awareness and understanding of fire-related risk during times of high to extreme fire danger and red flag conditions. 4. Work closely with railroad companies to minimize wildfire ignitions, improve suppression response, where needed, and to manage fuels/invasives within railroad rights-of-way. **Enforcement of restrictions or closures and related measures:** 1. Increase local enforcement of existing fire restrictions or closures 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.
Restoration and burned area rehabilitation	Analyze burned area to assess possibilities of natural regeneration. Deliberate seeding of some areas is essential to ensure that needed habitat components are restored.	1. 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. 2. 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. 3. 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. 4. Ensure that sage-grouse habitat considerations are incorporated into restoration and burned area rehabilitation plans, particularly in or near stronghold, key and isolated habitats. 5. Emphasize the use of native plant materials to the greatest extent possible, and as appropriate for site

Issue Addressed	Rationale	Conservation Measure(s)
		conditions. Seeds should be certified weed free. 6. 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. 7. 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. 8. When using exotic perennial grasses and forbs in restoration use species whose growth form, species, and phenology, most closely mimic native species. 9. Provide for noxious weed control in burned area rehabilitation projects.

Research, monitoring or evaluation needs: Identify and prioritize specific areas for habitat restoration and fuels modification (e.g., cheatgrass). Identify and prioritize areas bordering roads, railroads, farmlands or other areas where cheatgrass or other vegetation poses a high fire risk. Research methods to improve the establishment and survival of sagebrush seeding efforts. Expand efforts to improve the commercial supply of native grasses and forbs suitable for Idaho rangelands.

4.3.2 Infrastructure

In the context of this Plan, the term infrastructure relates to human-made features on the landscape that provide or facilitate transportation, energy, and communications activities.

4.3.2.1 Threat summary and background

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. Six priority infrastructure features that currently affect or potentially affect sage-grouse and sage-grouse habitat in Idaho are addressed in greater detail below. Linear features include utility lines, roads, active railroads, and oil and gas pipelines. 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, LWGs and others concerned with sage-grouse conservation should actively engage in opportunities to provide comment and recommendations for avoiding or mitigating impacts to sage-grouse and other resource values.

4.3.2.2 Summary of key conservation issues

4.3.2.2.1 Linear infrastructure features

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 in some areas. Sage-grouse may also avoid utility lines and other tall structures, though published data are limited. Corridors, access roads, and associated rights-of-way, may also facilitate the spread of invasive plant species (Gelbard and Belnap 2003) and facilitate the movement of predators (Connelly et al. 2004). Utility lines may also directly affect sage-grouse by posing a collision hazard (Braun 1998).

  While it was not possible to map and quantify all utility lines in Idaho at the scale of this plan, information for major power transmission lines (> 138 kv) was readily available. In Idaho, major power transmission lines within SGPAs total 1,503 miles. All SGPAs are affected by inclusion of major power transmission lines (USDI BLM 2004*c*; Table 4-5). Applying a 5 km (3.1 mile) buffer on each side to account for potential influences of avian predation (Connelly et al. 2004; S. Knick personal communication 2/9/2005), power line buffers incorporate approximately 4,526,893 acres, or 28% of all SGPAs combined. Some SGPAs are affected more than others. For example, while major power line buffers incorporate relatively small portions of the Curlew and Owyhee SGPAs, over 55% of the East Idaho Uplands, Mountain Home, West Central and West Magic Valley SGPAs are incorporated. Numerous smaller power distribution lines and telephone lines, not quantified or spatially portrayed here, also potentially influence sage-grouse and/or habitat, and may be of additional interest to LWGs.

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

Table 4-5 Idaho Sage-grouse Planning Areas and major power transmission lines (USDI BLM 2004*c*)

POWER TRANSMISSION LINE 5 km BUFFER ANALYSIS					
SGPA Name	**Total acres within SGPA boundary**	**Length of transmission lines (meters) within SGPA**	**Transmission line mileage within SGPA**	**5km (6.2 mile) buffer[15] acres within SGPA**	**Percentage of SGPA covered by 5km buffer**
Big Desert Planning Area	884,715.33	84,089.08	52.25	234,972.35	27%
Challis Planning Area	1,826,860.33	189,349.82	117.66	341,561.96	19%
Curlew Planning Area	476,227.62	20,103.73	21.49	67,665.58	14%
East Idaho Uplands Planning Area	538,483.11	156,375.18	97.17	301,589.71	56%
East Magic Valley Planning Area	1,410,610.29	452,811.75	281.36	648,675.20	46%
Jarbidge Planning Area	1,250,139.39	75,172.38	46.71	217,389.16	17%
Mountain Home Planning Area	305,934.77	126,509.29	78.61	180,140.20	59%
Owyhee Planning Area	3,230,100.47	152,434.34	94.72	396,016.09	12%
Shoshone Basin Planning Area	187,380.44	73,387.31	45.60	87,300.74	47%
South Magic Valley Planning Area	898,358.79	96,337.10	59.86	219,593.29	24%
Upper Snake Planning Area	3,360,620.46	391,955.02	243.55	790,142.31	24%
West Central Planning Area	931,953.66	308,278.37	191.56	578,960.24	62%
West Magic Valley Planning Area	774,265.85	293,031.37	182.08	462,886.61	60%
TOTALS	**16,075,650.48**	**2,419,834.74**	**1,503.62**	**4,526,893.45**	**28%**

[15] Buffer of 5 km each side of transmission line as per by Connelly et al. (2004).

Figure 4-3 Idaho Sage-grouse Planning Areas and major transmission lines

- **Major paved roads:** It was not possible to quantify all improved and unimproved roads at the scale of this plan. However, major paved roads (State, U.S., and/or Interstate Highways) intersect most SGPAs in Idaho, with the exception of the Jarbidge (Table 4-6 and Figure 4-4). 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 noxious 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). 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 Idaho indicate there are approximately 977.6 miles of major paved roads (Interstate, U.S., state) intersecting Idaho SGPAs (USDI-BLM 2004d). 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, >50% of the area is potentially influenced by major roads, based on the 10 km buffer concept. None of the Jarbidge SGPA appears influenced by major paved roads. 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, personal communications). 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 personal communication).

Table 4-6 Idaho Sage-grouse Planning Areas and major roads [16] (USDI BLM 2004*d*)

MAJOR ROADS 10 km BUFFER ANALYSIS					
SGPA Name	**Total Acres within SGPA boundary**	**Length of major roads (meters) within SGPA**	**Length of major roads (miles) within SGPA**	**Total Acres of buffered[17] major roads within SGPA**	**Percentage of SGPA covered by 10km buffer**
Big Desert Planning Area	884,715.33	57,350.87	35.64	289,897.35	32.77%
Challis Planning Area	1,826,860.33	291,023.46	180.83	1,114,792.15	61.02%
Curlew Planning Area	476,227.62	74,939.22	46.57	367,829.76	77.24%
East Idaho Uplands Planning Area	538,483.11	17,484.88	10.86	128,238.93	23.81%
East Magic Valley Planning Area	1,410,610.29	177,343.04	110.20	841,070.06	59.62%
Jarbidge Planning Area	1,250,139.39	0.00	0.00	28,262.53	2.26%
Mountain Home Planning Area	305,934.77	37,046.81	23.02	182,483.13	59.65%
Owyhee Planning Area	3,230,100.47	127,989.14	79.53	680,616.32	21.07%
Shoshone Basin Planning Area	187,380.44	29,096.02	18.08	108,809.65	58.07%
South Magic Valley Planning Area	898,358.79	56,142.47	34.89	426,392.28	47.46%
Upper Snake Planning Area	3,360,620.46	462,974.06	287.68	1,752,052.78	52.13%
West Central Planning Area	931,953.66	104,482.95	64.92	394,815.77	42.36%
West Magic Valley Planning Area	774,265.85	137,424.93	85.39	575,224.53	74.29%
Total	**16,075,650.48**	**1,573,297.85**	**977.60**	**6,890,485.25**	**42.86%**

[16] Based on USGS 1:100,000 Digital Line Graph.

[17] Buffer of 10 km each side of road, as per Connelly et al. (2004). Jarbidge SGPA shows buffer acreage despite 0.0 miles of major roads due to overlap of buffers from roads outside but near the SGPA boundary.

Figure 4-4 Idaho Sage-grouse Planning Areas and major roads

- **Active Railroads**: Railways are largely attributed with the initial spread of cheatgrass in the intermountain region (Young and Sparks 2002 cited in Connelly et al. 2004). 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). 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 2004*e*). Rapid fire suppression and provision for perennial species along railroad corridors are important factors in managing this threat.

Table 4-7 Idaho Sage-grouse Planning Areas and active railroads[18] (USDI BLM 2004*e*)

RAILROAD 3 KM BUFFER ANALYSIS					
SGPA Name	**Total acres within SGPA boundary**	**Length of active railroads (meters) within SGPA**	**Active railroad mileage within SGPA**	**3 km (1.86 mile) buffer[19] acres within SGPA**	**Percentage of SGPA covered by 3 km buffer**
Big Desert Planning Area	884,715.33	60,839.83	37.80	84,122.99	10%
Challis Planning Area	1,826,860.33	0.00	0.00	0.00	0%
Curlew Planning Area	476,227.62	0.00	0.00	168.17	0%
East Idaho Uplands Planning Area	538,483.11	10,027.12	6.23	28,595.43	5%
East Magic Valley Planning Area	1,410,610.29	122,369.43	76.04	157,847.43	11%
Jarbidge Planning Area	1,250,139.39	0.00	0.00	0.00	0%
Mountain Home Planning Area	305,934.77	4,444.45	2.76	8,515.27	3%
Owyhee Planning Area	3,230,100.47	0.00	0.00	0.00	0%
Shoshone Planning Area	187,380.44	0.00	0.00	0.00	0%
South Magic Valley Planning Area	898,358.79	0.00	0.00	0.00	0%
Upper Snake Planning Area	3,360,620.46	100,436.98	62.41	163,198.69	5%
West Central Planning Area	931,953.66	20,414.05	12.68	20,227.78	2%
West Magic Valley Planning Area	774,265.85	44,177.05	27.45	69,732.60	9%
Total	**16,075,650.48**	**165,028.07**	**225.38**	**532,408.36**	

[18] Based on US Census Bureau data 1:100,000

[19] Buffer of 3 km each side of railroad, as per Connelly et al. (2004), to account for potential for invasive species.

Figure 4-5 Idaho SGPAs and active railroads

- **Oil/gas pipelines:** Pipelines intersect minor portions of seven SGPAs (Table 4-8 and Figure 4-6). 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.

Table 4-8 Idaho Sage-grouse Planning Areas and oil/gas pipelines[20] (USDI BLM 2004*f*)

PIPELINE 1 KM BUFFER ANALYSIS					
SGPA NAME	**Total acres within SGPA boundary**	**Length of Pipeline (meters) within SGPA**	**Pipeline Mileage within SGPA**	**1 KM buffer[21] acres**	**Percentage of SGPA Covered by 1 km buffer**
Big Desert Planning Area	884715.33	0.00	0.00	0.00	0%
Challis Planning Area	1826860.33	0.00	0.00	0.00	0%
Curlew Planning Area	476227.62	6,422.98	3.99	4,918.70	1%
East Idaho Uplands Planning Area	538483.11	19,114.70	11.88	9,057.03	2%
East Magic Valley Planning Area	1410610.29	26,476.05	16.45	13,631.50	1%
Jarbidge Planning Area	1250139.39	0.00	0.00	0.00	0%
Mountain Home Planning Area	305934.77	27,584.55	17.14	8,716.65	3%
Owyhee Planning Area	3230100.47	103,157.36	64.10	51,163.33	2%
Shoshone Basin Planning Area	187380.44	0.00	0.00	0.00	0%
South Magic Valley Planning Area	898358.79	40,210.23	24.99	16,984.27	2%
Upper Snake Planning Area	3360620.46	0.00	0.00	0.00	0%
West Central Planning Area	931953.66	0.00	0.00	7.25	0%
West Magic Valley Planning Area	774265.85	20,772.38	12.91	10,189.35	1%
Total	**16,075,650.48**	**243,738.25**	**151.45**	**114,668.10**	

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[20] Based on Idaho BLM 1:24,000 Corporate dataset

[21] Buffer of 1 km each side of pipeline as per Connelly et al. (2004) to account for potential influences of predation, invasives, noise

Figure 4-6 Idaho Sage-grouse Planning Areas and oil/gas pipelines

4.3.2.2.2 Cumulative effects and density of linear infrastructure features

While buffers of certain linear infrastructure features such as oil/gas pipelines and active railroads encompass relatively small portions of SGPAs, an analysis of merged buffers of all four linear features (where buffers for major roads, major power lines, active railroads and oil/gas pipelines are dissolved so that acres are not double counted) suggests that linear features, in the aggregate, influence substantial proportions of many SGPAs (Figure 4-7). Buffered linear features encompass over 50% of the acreage of ten SGPAs, and 75% or more of the Mountain Home, West Magic Valley, Curlew, and West Central SGPAs (Table 4-9). While the synergistic effects of linear infrastructure features on sage-grouse are unknown and difficult to predict, it is clear that proposals for further development in this regard should be carefully evaluated.

While an area-based analysis of buffered linear infrastructure features provides one means by which to evaluate the scale of infrastructure on the landscape, another metric is linear density, reported here in feet/acre (Table 4-9). While the biological meaning of particular linear density values to sage-grouse is unknown, the information nevertheless provides a quantitative baseline by which the relative magnitude of infrastructure density can be compared, by SGPA. Certain SGPAs, such as the Jarbidge (0.20 ft/acre) and Owyhee (0.38 ft/acre), show a relatively low linear density, while others are considerably higher (e.g. Mountain Home 2.05 ft/acre; West Magic Valley 2.13 ft/acre).

Figure 4-7 Idaho Sage-grouse Planning Areas and combined linear infrastructure threats

Table 4-9 Idaho Sage-grouse Planning Areas and combined linear threat features[22]

COMBINED LINEAR INFRASTRUCTURE BUFFER ANALYSIS				
SGPA Name	**Total acres of SGPA**	**Total Acres of combined linear infrastructure buffers**	**Percentage of SGPA covered by combined linear infrastructure buffers**	**Density of clustered linear features[23] (ft/acre)**
Big Desert Planning Area	884,715.33	417,663.12	47%	0.87
Challis Planning Area	1,826,860.33	1,120,877.34	61%	0.88
Curlew Planning Area	476,227.62	369,487.38	78%	0.70
East Idaho Uplands Planning Area	538,483.11	346,460.34	64%	1.20
East Magic Valley Planning Area	1,410,610.29	978,083.41	69%	1.83
Jarbidge Planning Area	1,250,139.39	227,967.10	18%	0.20
Mountain Home Planning Area	305,934.77	259,317.99	85%	2.05
Owyhee Planning Area	3,230,100.47	1,014,721.41	31%	0.38
Shoshone Basin Planning Area	187,380.44	108,811.86	58%	1.85
South Magic Valley Planning Area	898,358.79	490,758.54	55%	0.75
Upper Snake Planning Area	3,360,620.46	1,870,639.91	56%	1.00
West Central Planning Area	931,953.66	698,214.98	75%	1.48
West Magic Valley Planning Area	774,265.85	631,520.03	82%	2.13
Total	**16,075,650.48**	**8,534,523.41**		

[22] Dissolved buffers for major power lines, major roads, active railroads and oil/gas pipelines.

[23] Linear density based on FRAGSTATS analysis of rasterized Sage-grouse Habitat Planning Map, assuming a 90 m grid cell. Clustered linear features were created by snapping linear features (major roads, major power lines, active railroads, gas/oil pipelines) into one feature if they were within 100 m (328 ft) of one another. Doing so ensures that nearby parallel features are counted only once.

4.3.2.2.3 Nonlinear Infrastructure Features

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. The current distribution of wireless communications towers in Idaho is relatively extensive, but most currently occur along Interstate or other highway corridors outside of SGPAs (USDI BLM 2004*g*; Figure 4-8). Wireless towers nonetheless occur within each SGPA.

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

  A number of wind energy-related structures currently exist within several SGPAs including the Owyhee, West Magic Valley, South Magic Valley, East Idaho Uplands, and Challis (USDI BLM 2004*h*; Figure 4-9).

  The majority of these are wind monitoring towers 70 ft or shorter in height. Data available in March 2005 indicate that there currently are no operating turbines within SGPAs. Several sites currently under review for wind energy development in Idaho have the potential to impact sage-grouse, including Brown's Bench (Jarbidge SGPA), Danskin Mountain (Mountain Home SGPA), Glenn's Ferry (Mountain Home/West Magic Valley) and Cotterel Mountain (South Magic Valley SGPA). Other sites may be identified 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*b*) 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.”

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*b*), could affect sage-grouse behaviorally, especially if in proximity to leks though further information is not available.

4.3.2.2.4 Combined linear and nonlinear infrastructure features

Figure 4-10, illustrates the extent of all six combined nonlinear and buffered linear infrastructure features on the Idaho landscape. The potential for synergistic, cumulative effects of infrastructure features on sage-grouse and sage-grouse habitat is relatively high in some SGPAs, and care should be taken in siting additional proposed projects.

Figure 4-8 Idaho Sage-grouse Planning Areas and wireless communication tower structures

Figure 4-9 Idaho Sage-grouse Planning Areas and wind energy sites

Figure 4-10 Idaho Sage-grouse Planning Areas and combined infrastructure threats

4.3.2.3 Infrastructure conservation measures

Goal: Reduce, minimize, or mitigate adverse impact to sage-grouse populations and habitat through careful planning, design, maintenance and/or modification of infrastructure features.

Issue Addressed	Rationale	Conservation Measure(s)
All infrastructure issues, disturbance to leks.	Human disturbance resulting from construction and maintenance activities can adversely affect breeding sage-grouse.	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[24]. 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.
Utility lines, communications towers, and related facilities.	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.	1. Use of guy-wires on towers should be avoided. 2. 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. 3. 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. 4. New, smaller power distribution lines, or similar structures (e.g., telephone lines, communications towers) should be buried (as appropriate) or sited as far as possible, preferably at least 3.2 km (~2 miles) from occupied leks and other important sage-grouse seasonal habitats (Connelly et al. 2000*a*), as determined locally. 5. 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

[24] Timeframe is from Washington State sage-grouse recovery plan. Also, concept is also presented in Connelly et al. 2000*b*.

Issue Addressed	Rationale	Conservation Measure(s)
		concern include fragmented habitats with high raptor and/or raven activity. See “Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996” (APLIC 1996). 6. Utility companies should ensure access roads, rights-of-ways and disturbed areas associated with their facilities are managed in a manner that restores disturbed areas to perennial vegetative cover, and controls the spread of noxious weeds and invasive plant species. Coordinate with land-management agencies and others in selecting the most appropriate plant species. 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.
Major roads	Roads can result in 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.	1. 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. 2. LWGs should identify specific roads or road sections where sage-grouse mortality has been documented. Work collaboratively with the appropriate agency(s) to develop measures to reduce the risk of road-related mortalities of sage-grouse. Consider speed limits, brush control, signing, and public education. 3. Reduce the risk of vehicle or human-caused wildfires, and spread of invasives, by planting perennial vegetation (e.g. green-strips) paralleling road rights-of-way. This measure is applicable to existing as well as new paved or gravel roads in sage-grouse habitat. The need for the green-strips should be evaluated on a case-by-case basis depending on fire risk, vehicle activity, vegetation type, importance of the area, or other factors. Avoid the use of species palatable to sage-grouse. 4. Manage existing roads and trails to minimize disturbance to occupied leks or other important seasonal habitats. Employ seasonal closures, permanent closures, rerouting of existing roads/trails or other measures, as deemed locally appropriate.

Issue Addressed	Rationale	Conservation Measure(s)
Active railroads	Disturbed areas along railroads can facilitate the establishment and spread of invasive plants. Certain invasives (e.g., cheatgrass) increase the likelihood of wildfire ignitions from trains.	1. Railroad companies should work closely with agencies and private landowners, as appropriate, to reduce or control invasive plants along railroad rights-of way, 2. Railroad companies should work closely with agencies and private landowners to manage fuels along railroad rights-of-way to reduce fire risk. Where cheatgrass or other vegetation along rights-of-way presents a high-fire risk, replace with suitable perennial species.
Gas and Oil Pipelines	Oil/gas pipeline construction can fragment habitat and facilitate the spread of invasive plants.	1. Locate new oil or gas pipelines and related facilities as far as possible, preferably at least 3.2 km (approximately 2 mi) from occupied leks or place along existing corridors to the extent possible. LWGs and/or land-management agencies should work closely with gas/oil companies and related entities in identifying potential problem areas and creative solutions. 2. Oil/gas companies should work closely with agencies and private landowners, as appropriate, to reduce or control invasive plants along pipeline rights-of-way and access roads. This should include ensuring that disturbed areas are seeded to an appropriate perennial seed mix.
Wind Energy Development	Wind energy development involves an array of potential direct and indirect adverse impacts to sage-grouse and sage-grouse habitat.	1. Due to the complexity of wind energy development and related support facilities, we refer the reader to USDI BLM (2005*b*) and USDI FWS (2003) for a more comprehensive list of mitigation measures and site evaluation guidelines. Key conservation measures recommended for Idaho include: A. Wind energy project and design approval should focus on avoiding, minimizing, or restoring habitat degradation (on-site mitigation). Consider one or more of the following specific recommendations: ▪ 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

Issue Addressed	Rationale	Conservation Measure(s)
		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. 2. Measures to mitigate impacts at off-site locations should also 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. 3. Where wind energy development within sage-grouse habitat is unavoidable, monitor sage-grouse populations and habitat (a) for at least 3 years before project construction; (b) during construction, and (c) for at least 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,

Issue Addressed	Rationale	Conservation Measure(s)
		private landowners and LWGs, in designing the appropriate monitoring strategy.

Research, monitoring or evaluation needs: Research the avoidance distance of sage-grouse to utility lines and the incidence of, and effect of, avian predation due to utility lines. Evaluate sage-grouse response to new and existing power lines as related to habitat conditions and avian predator densities. Research/monitor the effects of wind energy development in sage-grouse habitats with respect to sage-grouse survival, habitat-use and behavior including: abandonment of leks, nesting, brood rearing or winter habitat and the distance from the wind turbines that effects are experienced. Of additional interest are the effects of low frequency noise, shadow flicker, presence of tall structures etc. Map and quantify secondary and other roads (e.g., paved county, gravel, two-tracks), smaller power distribution lines (< 138 kv), telephone lines in SGPAs. Identify specific potential problem areas. Identify utility, railroad, and road rights of way where invasive plants increase fire risk. Research or model the synergistic effects of multiple infrastructure features on sage-grouse survival, habitat use, and behavior. Document the incidence and extent of avian predation on sage-grouse nest success, and juvenile and adult survival in areas with extensive infrastructure and areas without extensive infrastructure. Evaluate sage-grouse response to new and existing power lines as associated with habitat conditions and avian predator densities.

4.3.3 Annual grassland

4.3.3.1 Threat summary and background

The proliferation of invasive annual species, particularly cheatgrass, in portions of Idaho (e.g., Wisdom et al. 2000), poses a significant threat to sage-grouse and sage-grouse habitat. Within the five-state area of Washington, Oregon, Idaho, Utah, and Nevada, cheatgrass and medusahead rye dominate or have a significant presence (>10% composition by weight) on approximately 70,000 km^2 (17,297,000 acres) of public land (Connelly et al. 2004). The spread of invasive annual grasses has been most extensive in the Wyoming big sagebrush cover type (Crawford et al. 2004). Risk of invasion increases below elevations of 1,500 m (4,920 ft), and is extreme below 1,000 m (3,280 ft) (Crawford et al. 2004). Exotic annual grasses do not usually dominate more mesic, cooler mountain big sagebrush or low sagebrush communities (Crawford et al. 2004). 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). In Idaho, the majority of the Snake River Plain shows a moderate to high risk of cheatgrass displacement of sagebrush over the next 30 years (Connelly et al. 2004). For a detailed discussion on the history, ecology and risk of cheatgrass expansion, see Suring et al. (2005). While annual grasslands are the focus of this section, noxious weeds also pose a threat to sage-grouse habitat, and are discussed briefly in the Climate Change section.

4.3.3.2 Summary of key conservation issues

- **Spatial extent of annual grasslands on the landscape**: Several large areas of annual grassland are evident across southcentral, southwestern and western Idaho (Figure 4-11), and comprise nearly one million acres within SGPAs (Table 4-10). In general, these figures represent only larger areas with dominance or significant presence of annual grasslands. Smaller inclusions or areas where annuals are present but not dominant may not be well represented due to the difficulties associated with mapping habitats at the mid-scale. As mapping technologies and field inventory efforts improve, additional refinements will be incorporated. Several SGPAs show a particularly strong presence of annual grasslands. Approximately 41% of the total annual grassland acreage is in the adjacent West Magic Valley, East Magic Valley, and Big Desert SGPAs. Substantial acreages are also associated with the Owyhee, Mountain Home, and West Central SGPAs. Land ownership of identified annual grasslands is BLM (62%), BLM National Monument (3%), private (29%), and state (6%). Other ownerships constitute a negligible proportion. Given the magnitude of annual grassland acreages on the Idaho landscape, 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.

Figure 4-11 Idaho Sage-grouse Habitat Planning Map. Yellow areas indicate annual grasslands.

Table 4-10 Annual grasslands by Idaho SGPA and land-ownership status (USDI-BLM 2004*a*)

	Land-ownership status[25]										
SGPA	BLM	BLM NM	BIA	USFS	Other	MIL	NPS	Private	IDL	USFWS	Total
Big Desert	89,584	14,983	0	0	0	0	961	19,676	6,165	0	131,369
Challis	0	0	0	0	0	0	0	0	0	0	0
Curlew	0	0	0	0	0	0	0	0	0	0	0
East Idaho Uplands	0	0	0	0	0	0	0	0	0	0	0
East Magic Valley	207,028	14,729	0	0	963	0	154	4,126	10,732	0	237,732
Jarbidge	675	0	0	0	0	0	0	3	0	0	678
Mountain Home	46,837	0	0	0	0	0	0	5,979	2,476	0	55,292
Owyhee	128,628	0	0	0	0	0	0	3,153	7,846	0	139,627
Shoshone Basin	0	0	0	0	0	0	0	0	0	0	0
South Magic Valley	0	0	0	0	0	0	0	0	0	0	0
Upper Snake	0	0	0	0	0	0	0	0	0	0	0
West Central	107,120	0	0	151	0	0	0	255,399	26,333	0	389,003
West Magic Valley	38,120	0	0	0	0	0	0	3,895	2,414	0	44,429
Total	617,992	29,712	0	151	963	0	1115	292,231	55,966	0	998,130

[25] BLM: Bureau of Land Management; BLM NM: BLM-administered lands associated with Craters of the Moon National Monument; BIA: Bureau of Indian Affairs; USFS: U.S. Forest Service; Other: miscellaneous; MIL: Military; NPS: National Park Service; IDL: Idaho Department of Lands; USFWS: U.S. Fish and Wildlife Service. Acreages are approximate only and are reflective of the relatively broad nature of the 2004 SGHPM.

- **Degraded habitat quality including rangeland health**: 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.

- **Altered fuels and fire regimes**: Cheatgrass and medusahead rye 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 by these annuals 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.

4.3.3.3 Annual grassland conservation measures

Goal: To restore areas dominated or strongly influenced by annual grasses to a diverse mix of perennial native grasses, forbs, and shrubs, where feasible.

Issue Addressed	Rationale	Conservation Measure(s)
Spatial extent of annual grasslands on the landscape *AND* degraded habitat quality including rangeland health	Annual grasslands do not provide suitable habitat to meet the seasonal habitat needs of sage-grouse	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. 2. 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. 3. 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 Grassland

Issue Addressed	Rationale	Conservation Measure(s)
		Section 4.3.8, 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 non-native grasses, forbs and shrubs. 4. The eradication or control of noxious weeds posing a risk to sage-grouse habitats should also be aggressively pursued using a variety of chemical, mechanical, biological, or other means as appropriate. All seeding project designs should include measures for noxious weed control and monitoring for at least 3 years following implementation. 5. 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. 6. To discourage the spread of invasive annuals and noxious weeds, require the use 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. 7. On private lands, consider enrolling in incentive or other programs to improve or enhance sage-grouse/ sagebrush habitats. Current 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. Landowners are encouraged to discuss the various opportunities available with their local NRCS, IDFG, or BLM office. Support for Idaho projects may also be available through the North American Grouse Partnership's (NAGP) Grouse Habitat Restoration Fund. Interested parties should contact Mr. Kent Christopher at (208) 356-0079 or grouse@fretel.com. 8. 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-

Issue Addressed	Rationale	Conservation Measure(s)
		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	Annual grasses increase the risk of fire ignition and rate of spread.	1. 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. 2. 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). 3. To discourage the spread of invasive annuals and noxious weed seed, require the washing of fire vehicles (including undercarriage) prior to deployments and prior to demobilization from wildfire incidents. 4. Ensure annual grass restoration priority areas are incorporated into FMPs, updated annually, as priority fuels treatment and ESR project areas.

Research, monitoring or evaluation needs: Cooperate with the Great Basin Restoration Initiative, universities, local partners and others, as appropriate, in researching new plant materials and restoration methods. Develop a consistent approach for monitoring, evaluating and reporting restoration efforts.

4.3.4 Livestock impacts

4.3.4.1 Threat summary and background

Livestock grazing occurs on the vast majority of sagebrush lands range-wide (Knick et al. 2003, Connelly et al. 2004); however, there is little information directly linking livestock management practices to sage-grouse population levels (Braun 1987, Connelly and Braun 1997, Mosley 2001). Beck and Mitchell (2000) discuss various direct and indirect effects of livestock on sage-grouse. Only a few studies have addressed the impacts of livestock grazing on habitat use by sage-grouse (Crawford et al. 2004). Experimental research related to the impacts of specific grazing practices on sage-grouse habitat quality and sage-grouse productivity is warranted. Research currently underway in Idaho will help refine our understanding of sage-grouse nesting habitat in various areas across the state.

Historically, poor livestock grazing practices have negatively impacted some sage-grouse habitat. These impacts have included changes to the proportion of the shrub, grass, and forb functional groups; increased opportunities for invasion and dominance of introduced annuals; shortening of the growing season (e.g., through a shift from perennials which stay green longer into the growing season- toward annuals which go to seed and desiccate early in the growing season); and in some cases an overall decline in site potential through loss of topsoil (Miller and Eddleman 2001).

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.*

In situations where the current vegetation community controls successional pathways (e.g., cheatgrass-dominated areas), it can be expected that changes in livestock grazing management strategies or even the complete removal of grazing activity will not result in the improvement of some ecological states. Seral or post-settlement juniper stands or dense canopies of sagebrush that suppress both the shrub and herbaceous understory will not change in the short term without human intervention to restore or mimic historic disturbance regimes (e.g., wildfire). In such cases, the use of vegetation management tools including prescribed fire, mechanical removal, thinning, or other means will be necessary. Similarly, annual grasslands, often perpetuated by frequent wildfires in the more arid Wyoming big sagebrush ecological sites, are a stable state that typically require significant and often long-term human intervention to effect restoration. This intervention often requires the application of herbicides or other treatments to reduce or eliminate annuals, followed by the seeding of desired perennial species. While subsequent changes in livestock management may be appropriate to nurture and maintain the restored area, such changes alone in the absence of restoration activities would likely provide little if any progress.

In some arid areas of the west, measurable improvement of upland herbaceous vegetative conditions is a difficult process and represents a long-term management commitment. 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 in these areas should be to maintain the condition and geographical range of currently suitable sage-grouse habitat and sagebrush communities.

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 grazing program that fully considers key sage-grouse conservation needs.

4.3.4.2 Summary of 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. The following summary presents some of the key livestock related conservation issues that affect sage-grouse populations and sage-grouse habitat.

- **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.

  Idaho BLM, which has management responsibility for approximately 60% of sage-grouse habitat in the state, is in the process of evaluating rangeland health on each grazing allotment. As of the 2004 field season, Idaho BLM had completed evaluations of approximately 63% of its lands with the remaining 37% scheduled for completion in the next several years.

  Of 7,381,769 acres of Idaho BLM lands assessed (note: these lands are not exclusively sage-grouse habitat) between the 1999 field season and September 30, 2004, approximately 36% constituted lands that met all Idaho BLM standards or were making significant progress toward meeting standards (USDI-BLM 2004*j* Idaho Annual Rangeland Report). Another 47% of the acreage assessed during that timeframe was determined as not meeting all standards due to livestock grazing, or making significant progress at the time, however, appropriate action has been taken to ensure significant progress toward meeting the standards. Seven percent of the lands assessed were categorized as not meeting standards, and livestock is a significant factor, but actions needed to ensure significant progress towards meeting the standard(s) are pending implementation prior to the next grazing season. Ten percent of the area assessed did not meet all standards, or were not making significant progress toward meeting standards, however this was due to factors other than livestock grazing. Approximately 4,424,073 Idaho BLM acres have not yet been assessed.

- **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. 2000*b*). For example, in the Big Desert of southeastern Idaho, Wakkinen (1990) reported taller grasses occurred near nests compared to random locations. In southwestern Idaho's Owyhee County, Wik (2002) reported that successful nests had taller grass than did random plots. Such herbaceous cover may provide scent, visual, and physical barriers to potential predators (DeLong et al. 1995). In Idaho, overall sage-grouse nest success is not considered a widespread problem averaging over 49% (Connelly et al. 2004).

The degree of impact that livestock grazing has on herbaceous cover, in the context of sage-grouse breeding 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 pose a threat, although at this time the threat has not been quantified in Idaho. Also, the presence of sheep bands on or near leks during lek surveys, has been observed across the state and can interfere with sage-grouse breeding activities as well as hinder population monitoring efforts. Concentrations of sheep and the associated presence of herders and guard dogs in the vicinity of leks disturbs lek activity or hens nesting in the vicinity of leks (Patterson 1952).

- **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). Late brood habitats are generally characterized by relatively moist conditions with succulent forbs in or adjacent to sagebrush cover (Connelly et al. 2000*b*). Broods also have been documented to utilize wet meadows and irrigated farmlands adjacent to sagebrush habitats (Gates 1983, Connelly et al. 1988). On the Sheldon National Wildlife Refuge in Nevada, sage-grouse used grazed meadows significantly more during late summer than ungrazed meadows because grazing had stimulated the regrowth of forbs (Evans 1986). Increased forb availability may allow hens to remain in upland brood-rearing habitats longer, which could contribute to increased chick survival due to decreased brood movements (Coggins 1998). Certain livestock management practices or poor habitat conditions that reduce the availability of forbs are of potential concern.

- **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. In drought, forage production may be reduced by more than 50% compared to the annual average (Holechek et al. 2004). Therefore, during drought, the impacts of livestock grazing on upland herbaceous cover may be greater than usual due to already reduced vegetative productivity. Impacts to springs, seeps, and riparian habitats may also increase due to concentrations of livestock. Inadequate 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.

- **Placement of salt and mineral supplements:** The placement of salt and supplements may positively or negatively affect sage-grouse and sage-grouse habitat. Supplements and salt are regularly used to improve livestock distribution. Associated ground disturbances, however, can in some cases negatively impair nearby nesting habitat quality, or create opportunities for the establishment of invasive plants.

- **Placement of fences and other structures:** Sage-grouse are adapted to landscapes with few vertical obstructions or features but currently inhabit areas with many miles of fence (Connelly et al. 2004). Fences can influence predator movements or facilitate the spread of exotic plants (Connelly et al. 2004). Fences and other structures can also pose a hazard to sage-grouse, as they can provide perch sites (posts) for raptors, or grouse may be injured or killed as a result of collisions with wires (Connelly et al. 2004). 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.

  While fences 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. In grazed areas, fences may be used to enhance late brood habitat through exclusion of spring sources and creation of riparian pastures where grazing use can be more carefully controlled. Since the impact of individual fences has not been quantified, grazing managers should consider new or existing fences 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. 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. 2000*b*).

  Diminished water flows may also reduce available surface water for drinking, though the importance of this issue has been questioned. While some have suggested that access to water may also be important (Girard 1937, June 1963, Goebel 1980, Hanf et al. 1994 cited in Schroeder et al. 1999), others have contended that succulent vegetation may provide sufficient moisture (Batterson and Morse 1948, Trueblood 1954, Nelson 1955, Wallestad 1971, 1975).

Therefore, 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 systems. Water storage and conservation practices should be used to promote and retain the wetland characteristics of associated springs and other water sources.

- **Livestock management during rehabilitation and restoration efforts:** Substantial areas of Idaho are undergoing, or are in need of, restorative efforts to replace annual grasslands with desirable perennial grasses, forbs, and shrubs. It may also be desirable to diversify certain existing exotic perennial grass seedings (e.g., crested wheatgrass) by increasing the shrub, forb or perennial grass component or by conversion to a mix of native grasses and forbs. There are currently insufficient alternative forage reserves to support large restoration efforts during recovery periods. Therefore, forage reserves, economic incentives, or similar measures to help livestock operations remain viable while newly seeded areas are treated and rested from use will be necessary. These measures could also be used to facilitate other resource objectives such as riparian recovery or to provide rest to improve herbaceous cover in certain nesting or brood habitat areas.

  In addition, rest-requirements associated with burned area fire rehabilitation seedings often require livestock operators to seek forage elsewhere if alternative forage or other options are not available. Currently, the availability of forage reserves in Idaho is extremely limited. Without the development of additional reserves, economic incentives, or other processes, the restoration of Idaho's annual grasslands and diversification of exotic perennial grass seedings will proceed slowly, and both operators and sage-grouse will continue to remain at risk of wildfires and their associated after-effects.

4.3.4.3 Livestock impact conservation measures

Goal: Manage grazing to maintain soil conditions and ecological processes necessary to protect and maintain properly functioning sagebrush communities that meet the long-term needs of sage-grouse and other sagebrush associated species.

Issue Addressed	Rationale	Conservation Measure(s)
Livestock management and rangeland health	Some livestock management practices impair	1. Use established scientifically based agency protocols and procedures for evaluating rangeland health and sage-grouse habitats.

Issue Addressed	Rationale	Conservation Measure(s)
	rangeland health.	2. Establish specific habitat objectives and implement effective grazing management practices and/or vegetative manipulation to achieve those objectives and maintain or improve vegetation conditions or trends. 3. Provide private landowners with incentives 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.	1. If fine-scale habitat assessments or monitoring indicates that current livestock grazing practices are limiting sage-grouse nesting habitat quality and/or quantity (see Chapter 5) and/or reproductive success by limiting herbaceous understory characteristics - design and implement grazing management systems that maintain or enhance herbaceous understory cover, height, and species diversity that occurs during the spring nesting season. Grazing systems must be consistent with ecological site characteristics and potential. The primary objective is to provide desirable perennial grass and perennial forb cover during the spring nesting season (approximately April 1-June 15 in much of Idaho, see Chapter 5 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. The following is a list of management actions or strategies that should be considered and employed singly or in combination, where appropriate, in the development and implementation of grazing management programs: A. Reduce stocking rates or rest breeding habitat areas where appropriate. B. If the area is lacking or deficient in herbaceous cover, reduce livestock utilization, immediately prior to and during, the nesting season. C. Employ grazing management systems that ensure adequate nesting habitat within the breeding landscape. D. When use pattern mapping or monitoring shows opportunity to adjust grazing use distribution to benefit occupied sage-grouse breeding habitat, include as appropriate herding, salting and water source management (e.g., turning troughs/pipelines

Issue Addressed	Rationale	Conservation Measure(s)
		on/off, extending pipelines/moving troughs) in grazing management programs. E. When available and feasible, utilize exotic perennial grass seedings and/or annual grasslands to avoid breeding season use of occupied sage-grouse habitat. F. When alternative forage is available and/or other incentives can facilitate changes, delay spring turnout to reduce grazing use of occupied breeding habitat. G. Use NRCS incentive programs as related to private lands and sage-grouse/sagebrush habitats. Current programs that may provide some opportunities for economic offset of certain conservation measures include the CSP, WHIP, and EQIP programs. Landowners are encouraged to discuss the various opportunities available with their local NRCS district conservationist. H. Develop strategically located forage reserves (seedings) to shift early season livestock-use. (Note: the establishment of such forage reserves may be particularly relevant in areas that have minimal or no potential for sage-grouse habitat restoration.) I. Where circumstances allow (e.g., existence of suitable alternate spring grazing sites, specific livestock management schemes, economic incentives, etc.) consider eliminating spring grazing in sage-grouse habitat. J. Permanently exclude livestock from certain important sage-grouse nesting areas through fencing (i.e., to protect native ranges within exotic seedings). K. Where appropriate maintain residual herbaceous vegetation at the end of the grazing season to contribute to nesting and brood-rearing habitat during the coming nesting season.
Livestock management and leks.	Bedding of sheep bands on or near leks can disturb breeding grouse and interfere	1. Use lek route or other relevant information to identify leks where the placement of sheep camps, bed grounds, herding or related activities is repeatedly disturbing displaying birds on active leks. Dates of concern are from March 15 through May 1 in lower elevation

Issue Addressed	Rationale	Conservation Measure(s)
	with lek/ population monitoring.	habitats and March 25 through May 15 in higher elevation habitats. Once such leks are identified, land management agencies should work closely with sheep ranchers, LWGs and the IDFG to identify mutually agreed upon alternative sites or herding routes that eliminate or reduce disturbance. In selecting such alternative sites/routes, focus on areas away from leks and that do not provide breeding habitat characteristics, where feasible. If such lek-specific conservation measures cannot be developed (due to time or logistical constraints), domestic sheep grazing activities described above will be avoided within the lesser of 0.5 mile or direct line of sight of any such lek during the lekking periods. 2. Ensure that sheep operators and herders are aware of the location of occupied leks. Show operators/herders these locations in the field, provide maps, or mark the perimeter of occupied leks, etc. as appropriate).
Livestock management and late brood-rearing habitat.	Livestock grazing may reduce the availability of suitable late brood-rearing habitat.	1. Due to the preference of forbs by domestic sheep, manage sheep allotments using grazing management techniques that promote and maintain a diversity of desirable annual and perennial forbs. Suggestions include: A. Alternate or rotate areas for spring turnout. B. Promote light, once-over use of vegetation, as opposed to repeated use during the same season by the same band or successive bands of sheep. C. Ensure that permittees, foremen, herders and sheep camp tenders are informed of management and movement requirements, such as related to the avoidance of recent burns, burned area rehabilitation seedings or other restoration sites. D. Employ open (loose) herding of sheep as opposed to tightly bunched sheep. 2. Manage grazing of riparian areas, meadows, springs, and seeps in a manner that promotes vegetation structure and composition appropriate to the site. In some cases enclosure fencing may be a viable option. However, in some cases, (e.g., enclosed meadows), the availability and quality of herbaceous species may be improved by periodic grazing use of enclosure and should be considered in the grazing management program.

Issue Addressed	Rationale	Conservation Measure(s)
		3. In agricultural fields where sage-grouse use has been documented or is likely, willing landowners may wish to avoid or limit use of alfalfa by livestock after the last cutting, to provide residual alfalfa for use by sage-grouse broods.
Livestock management during periods of drought.	Drought conditions can intensify the effects of livestock grazing on upland and riparian vegetation.	1. In sage-grouse nesting and brood-rearing habitats, adjust livestock use (season, utilization, stocking, intensity, and/or duration) during drought to minimize the additional stress placed on herbaceous species. This is anticipated to reduce impacts on perennial herbaceous cover, plant species diversity, and plant vigor. 2. Foster the coordination of drought management activities and outreach through the Idaho Rangeland Drought Subcommittee.
Placement of salt and mineral supplements.	The placement of salt and mineral supplements can affect sage-grouse habitat quality.	1. When using salt or mineral supplements: a) place them in existing disturbed sites, areas with reduced sagebrush cover, seedings, or cheatgrass sites (for example) to reduce impacts to sage-grouse breeding habitat, b) 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.	1. Biologists, in cooperation with LWGs and willing landowners, are encouraged to use existing knowledge, allotment/pasture maps and lek distribution maps, to determine which fences may pose the greatest risk for collision mortality. 2. If sage-grouse mortality due to collision with fences is documented, or if collisions are likely to occur due to new fence placement, implement appropriate actions to mitigate impact. Such actions might include marking key sections of fences with permanent flagging or other suitable means. Field personnel and landowners should use their best judgment in determining where fence marking is required to lessen the impacts to sage-grouse. 3. Placement of new fences and structures should include consideration of their impact on sage-grouse. In general, avoid constructing new fences within 1 km (0.6 mi) of occupied leks (adopted from Connelly et al. 2000*b*). 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

Issue Addressed	Rationale	Conservation Measure(s)
		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.	1. 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. 2. Ensure that new and existing livestock troughs and open water storage tanks are fitted with ramps to facilitate the use of and escape from troughs by sage-grouse and other wildlife. Do not use floating boards or similar objects, as these are too unstable and are ineffective. See Wildlife Watering and Escape Ramps on Livestock Water Developments (Sherrets 1989) for suggestions for ramp designs. 3. When placing new water developments in sage-grouse breeding habitat, choose sites and designs that will provide the greatest enhancement for sage-grouse and sage-grouse habitat. 4. 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 dependent upon adequate plant establishment time (rest) before grazing resumes.	1. 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[26]. 2. Identify and utilize economic incentive programs to assist private landowners in implementation of appropriate sage-grouse habitat conservation actions on private lands.

[26] This concept may be particularly relevant in portions of Idaho where large-scale restoration efforts are anticipated (e.g., East Magic Valley, Big Desert).

Research, monitoring or evaluation needs: Research is needed to better understand the impacts of livestock management (systems and individual practices) on sage-grouse populations, and habitat. Monitoring and evaluation is also necessary to better identify and determine the impacts of current grazing management practices on sage-grouse populations, and habitat. Document the extent of sage-grouse collision with fences and conduct effectiveness monitoring of flagged or tagged fences.

4.3.5 Human disturbance

4.3.5.1 Threat summary and background

Human disturbance encompasses several distinct issues, for which varying levels of concern have been expressed. 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 nonconsumptive use, nonetheless 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).

4.3.5.2 Summary of key conservation issues

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

  The use of certain types of OHVs in Idaho is increasing dramatically, statewide (Figure 4-12). Although, some of this increase may be due to improved compliance with registration (Idaho Department of Parks and Recreation 2004). Idaho Department of Parks and Recreation (IDPR) statistics for southwest, southcentral, southeast and eastern Idaho, representing portions of the state most relevant to sage-grouse managers, indicate that motorbike and ATV registrations overall have nearly doubled between 1999 and 2003 (Figure 4-13). Eastern Idaho exhibited the greatest increase of registrations (141.6%) during that timeframe, followed by southeast (93.2%), south-central (85.6%) and southwest (80.8%).

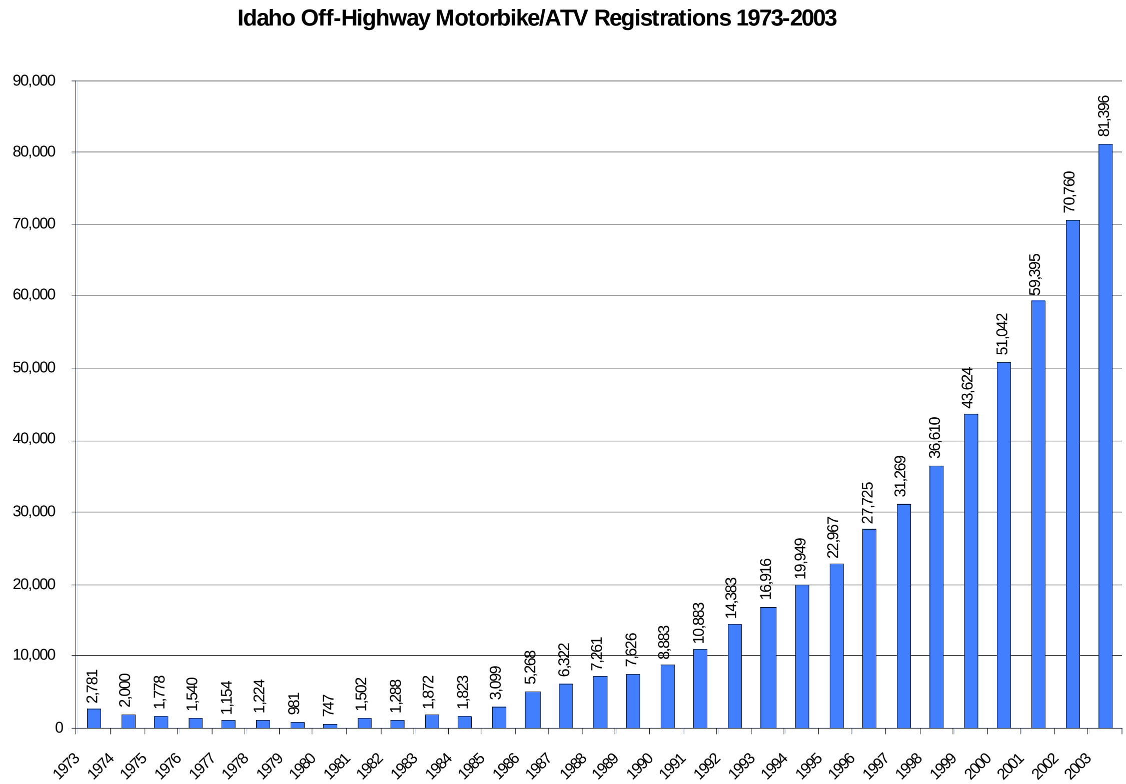

Figure 4-12 Idaho Off-Highway Motorbike/ATV Registrations 1973-2003[27]

[27] Figure courtesy IDPR (2004). Numbers are not definitive, as they reflect only registered motorcycles and ATVs. Additionally, part of the increase may be due to improved compliance with registration.

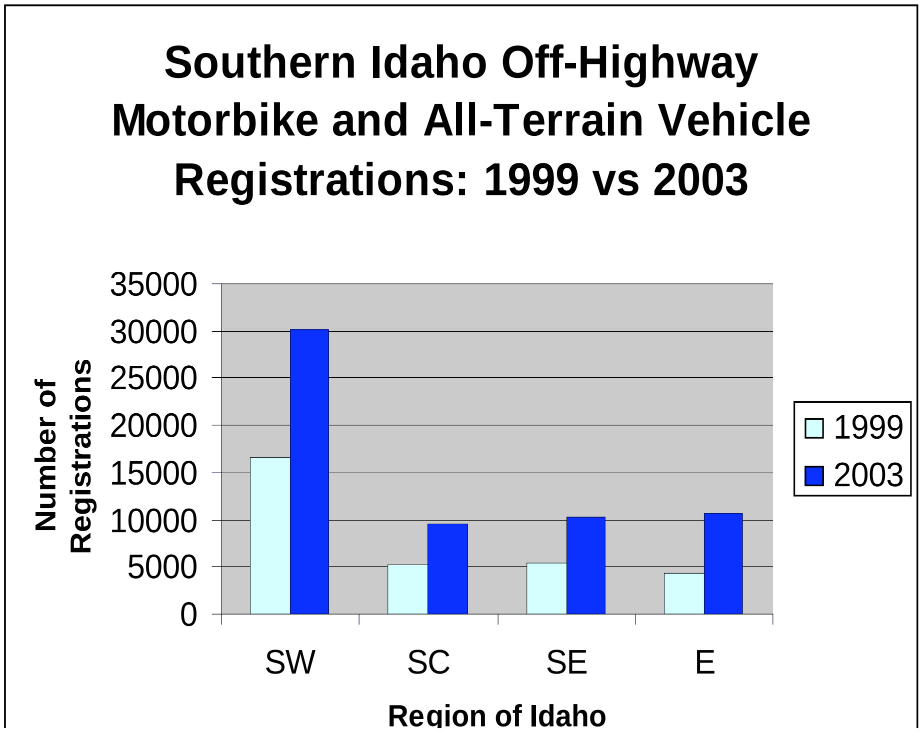

Figure 4-13 Southern Idaho ATV and Off-Highway Motorbike Registrations 1999 VS 2003[28]

- **Military training:** Many military exercises are destructive by their nature (Connelly et al. 2004). 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). Direct and indirect affects of access roads, noise and human disturbance associated with emitter sites are also of concern.

  Habitat fragmentation and loss of native shrubs on broader spatial scales is also of concern. Knick and Rotenberry (1997) reported that military training activities with tracked vehicles was associated with a landscape characterized by small, closely spaced shrub patches.

[28] SW=Southwestern Idaho, SC=Southcentral Idaho, SE=Southeastern Idaho, E=Eastern Idaho. Southern Idaho data summarized from IDPR (2004). Numbers are not definitive, as they reflect only registered motorcycles and ATVs. Additionally, part of the increase may be due to improved compliance with registration.

In 2004, an Integrated Resources Management Plan (IRMP) was completed for the Mountain Home Air Force Base including affiliated training ranges (U.S. Air Force 2004). The IRMP, in part, addresses fish and wildlife management issues related to Mountain Home Air Force Base and affiliated training ranges including Saylor Creek, Juniper Butte and other sites. Goals include the restoration and enhancement of wildlife habitats to increase biological diversity and to avoid disturbance to special status species. Specific objectives, depending on the site, include the seeding of sagebrush and native species where practical, restoration of native or fire-resistant vegetation, control of fine fuels and weeds, fire prevention and management, off-road restrictions, consideration of seasonal restrictions and awareness training for training range users. The IRMP also commits to continued coordination with the Owyhee sage-grouse LWG. Progress is reported during annual meetings with IDFG and other cooperators.

- **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 4.3.2), 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. Connelly et al. (2000*b*), in the context of human disturbance associated with energy exploration, recommended minimizing human activities within view of or <0.5 km (0.3 miles) of active leks. Stinson et al. (2004) and Utah Division of Wildlife Resources (2002) recommend a 1 km buffer.

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

- **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).

4.3.5.3 Human disturbance conservation measures

Goal: To eliminate, reduce or minimize human-related disturbance to sage-grouse on important seasonal habitats.

Issue Addressed	Rationale	Conservation Measure(s)
OHV disturbance	OHV activity can disturb sage-grouse, adversely impact vegetation and soils, and increase fire risk.	1. Limit OHV use to existing designated roads and trails to eliminate or minimize disturbance to sage-grouse and reduce the risk of wildfire and other habitat disturbances associated with cross-country travel. 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 OHV trails are near occupied leks, apply use-restrictions where needed and appropriate, to minimize nonessential activity between 6:00 PM to 9:00 AM. In general this guideline should be applied from approximately March 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 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.	1. Continue cooperating with the military (e.g., Mountain Home Air Force Base Integrated Resources Management Plan) in designing and improving measures to reduce or mitigate the effects of military training activities on sage-grouse and sage-grouse habitat. 2. Foster further communication and collaboration between the military, land management agencies and landowners via the Idaho Sage-grouse Advisory Committee and Local Working Groups. 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-	1. 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

	grouse.	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	1. Avoid creating unnecessary disturbances related to livestock management activities near occupied leks whenever possible (see also Livestock Impacts Section 4.3.4). 2. Sheep camps and related issues. Please see Livestock management and leks Conservation Measure No. 1 in the Livestock Impacts section.
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.	1. 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. 2. 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. 3. Camping on occupied leks should not be allowed, to eliminate sustained disturbance. 4. 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. 5. Monitoring of leks should be done in a manner that minimizes disturbance to sage-grouse. Follow the established protocol described in Section 5.2.1.1 and 5.2.1.2.

Research, monitoring or evaluation needs: Evaluation is needed to document areas where general recreation, and especially OHV activity may be causing unacceptable disturbances to leks or damage to important seasonal habitats and to aid in the planning or zoning of trails and closure restrictions. Coordination with the Rangewide Conservation Strategy team in developing or refining suggested disturbance buffers is recommended. In addition, there is a need to identify and map areas where potential conflicts may be occurring with human activities related to sheep bedding and leks.

4.3.6 West Nile Virus

4.3.6.1 Threat summary and background

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 (Centers for Disease Control and Prevention 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. 2004*a*). 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. 2004*b*). 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. 2004*a*).

In greater sage-grouse, WNV was first detected in northeast Wyoming, eastern Montana, and southeast Alberta in summer 2003 (Naugle 2004*a*). 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. 2004*a*). 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. 2004*b*). 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, personal communication 8/31/05; Casper Star-Tribune 8/25/2005).

In Idaho, the first probable human case was reported in November 2003 (Idaho Department of Health and Welfare 2005). In August 2004, the first infected bird, a magpie from Gooding County, tested positive (Idaho Department of Health and Welfare 2004). Infected sage-grouse had not been detected in Idaho as of July 2005. (For additional information see http://www.westnile.idaho.gov).

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.

4.3.6.2 Summary of 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

4.3.6.3 West Nile Virus conservation measures

Goal: Ensure that WNV is detected as early as possible.

Issue Addressed	Rationale	Conservation Measure(s)
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).	1. Continue cooperating with regional and state-level WNV monitoring and/or surveillance efforts.
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	1. Cooperate with research efforts to evaluate habitat conditions that contribute to WNV and conservation measures to reduce risk. 2. Identify effective conservation measures to manage potential WNV vectors.

Research, monitoring or evaluation needs: Continued testing for immunity. Research and testing of potential conservation measures.

4.3.7 Prescribed fire

4.3.7.1 Threat summary and background

In this section, the discussion of prescribed fire and related conservation measures also encompasses other "sagebrush control" activities, such as mechanical treatments. To minimize redundancy in this plan, 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 invasives, 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, facilitate growth of grasses and forbs, and control juniper and pinyon expansion into sagebrush habitats (Connelly et al. 2004). For example, it can be an effective tool in reducing mountain big sagebrush cover and density and increasing herbaceous productivity on more mesic rangelands, and in reducing heavier fuel loadings in certain strategic areas. Prescribed fire 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. Prescribed fire is also a potential tool for maintaining forage reserves that provide alternative livestock foraging areas during restoration efforts; it may also be used in maintaining certain grass seedings that were installed 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 on Idaho's Big Desert, Connelly et al. (1994, 2000*c*) reported that prescribed burning of Wyoming big sagebrush during a drought period resulted in a large decline of a sage-grouse breeding population. In a study of twenty wildfires and prescribed fires in eastern Idaho, Nelle et al. (2000) reported mean canopy cover for mountain big sagebrush 14 years post-burn was less than half that of the unburned sites (8% vs. 18%). 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. In general, prescribed burn programs in mountain big sagebrush should be planned to avoid creating a landscape of adjacent young burns (Nelle et al. 2000). For additional discussion of the effects of fire on sagebrush and/or sage-grouse, see the Wildfire section 4.3.1, and Chapter 2, Sagebrush Ecology.

Prescribed fire acreages and associated details are difficult to summarize statewide, due to agency variations in project documentation methods and lack of centralized reporting. Some coarse data are available however: BLM Public Land Statistics reported 93,724 acres of prescribed fire occurred on Idaho BLM lands between 1997 and 2002.[29] While annual acreages of prescribed fire are reported across 7 categories including forestry, range, wildlife, hazard reduction, watershed, ecosystem health, and other, it is impossible to infer from this data the extent to which prescribed burns may have had adverse impacts, or provided benefits, to sage-grouse.

Other techniques are also often used to manage vegetation, such as mowing, brush beating, chaining, harrow, and herbicides. However, due to differences in project documentation procedures and a lack of centralized reporting, acreages by vegetation type are not readily available. BLM Public Land Statistics 1999-2002[30] indicate that from 1999 (the first year data were reported in this manner) through 2002, approximately 209,628 acres of "non-fire fuels treatments" occurred on Idaho BLM Lands.

To effectively monitor the spatial and temporal extent of prescribed fire and other vegetation treatments as related to sage-grouse habitats, there is a pressing need for more consistent and detailed project reporting, across all agency jurisdictions. See Chapter 5.3 for discussion of processes for consolidating project reporting across Idaho.

4.3.7.2 Summary of key conservation issues

Prescribed fire and other 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. In the context of this Plan, the primary threats from prescribed fire are (1) the elimination or reduction of sagebrush cover in situations where breeding or winter habitat may be already limited or fragmented on the landscape, and (2) risk of expansion by invasive plant species. In general, there is more treatment flexibility in situations where breeding or winter habitats are extensive on the landscape; invasives are uncommon

[29] Prescribed fire and non-fire fuels data as reported in PLS are not available beyond 2002.

[30] 1999 was the first year non-fire fuels treatment acreages were reported in PLS.

or are controllable; or in more resilient, higher elevation, mesic landscapes used primarily as late brood habitat.

- **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:** Prescribed fire and sagebrush management treatments can pose a risk to sage-grouse if applied in areas prone to proliferation of exotic annuals (Connelly et al. 2000*b*). 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. 2000*b*).

- **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.

4.3.7.3 Prescribed fire conservation measures

While the following list of conservation measures is focused most specifically on prescribed fire, the identified measures are also intended to address other sagebrush control conservation issues.

Goal: Plan and carry out prescribed burns and other sagebrush management projects in a manner that promotes ecosystem health and sustainability and that ensures the retention of sagebrush cover on a scale sufficient to meet the seasonal habitat needs of sage-grouse populations. Private landowners are encouraged to work closely with IDFG, NRCS, adjacent landowners and other partners, as appropriate.

Issue Addressed	Rationale	Conservation Measure(s)
Reduction of already limited or fragmented habitat	Inadequate planning and implementation of prescribed burns, or other sagebrush treatment projects, may adversely impact sage-grouse seasonal habitats and/or sage-grouse populations.	1. Prior to planning prescribed burns, or other vegetation management treatments in sagebrush communities, ensure that sage-grouse seasonal habitats have been mapped (see 5.3.2 for additional discussion of mapping). 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.(See 5.3.2). 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: A. Where prescribed burning, or other treatments, in sage-grouse habitats may be warranted (e.g., sagebrush cover exceeds desired breeding or winter habitat characteristics; understory does not meet seasonal habitat characteristics and restoration is desired; there is a need to restore ecological processes; or a proposed treatment site is in an exotic seeding being managed for overall sage-grouse benefits on the surrounding landscape): ▪ Project design should be done with interdisciplinary input, and in cooperation with IDFG. ▪ Ensure that any proposed sagebrush treatment acreage is 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 2000 for additional discussion). ▪ Leave adequate untreated sagebrush areas for loafing/hiding cover near leks for sage-grouse. 4. Evaluate and monitor prescribed burns, and other treatments, as soon as possible after treatment and periodically thereafter to determine whether the project

Issue Addressed	Rationale	Conservation Measure(s)
		was successful and is meeting or trending toward desired objectives.
Expansion of exotic plant species	Inadequate planning, implementation and follow-up of prescribed burns or other sagebrush treatments may result in the expansion of cheatgrass or other invasive plant species.	1. Avoid the use of prescribed fire or other sagebrush treatments in habitats prone to the expansion or invasion of cheatgrass or other invasives unless adequate measures are taken to control the invasives and ensure subsequent dominance by desirable perennial species. In many if not most cases, this will likely require chemical treatments and reseeding.
Risk of escaped prescribed fire	Escaped prescribed fires can threaten surrounding habitats.	1. Prescribed fires must be planned, executed and monitored in a manner that provides for adequate control and provision for contingency resources. 2. Ensure burn plans address the importance of preventing escaped fires when prescription fires are planned in the vicinity of stronghold and key habitat.

Research, monitoring or evaluation needs: There is need for a more effective and consistent approach for the periodic mapping and classification of sagebrush habitats and cover classes using remote imagery. Research sage-grouse response to prescribed fire in the Mountain Big Sagebrush ecosystem.

4.3.8 Seeded perennial grassland

4.3.8.1 Threat summary and background

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.

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. For a detailed discussion on this subject, see Pellant and Lysne (2005). 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 in southern Idaho have been established for purposes of watershed stabilization following large rangeland wildfires; to provide competition from weeds such as *Halogeton*; 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. Specifically, Presidential Executive Order 13112 on Invasive Species (Clinton 1999) directs Federal Agencies to use native species where feasible, and BLM's Great Basin Restoration Initiative favors the use of native species, "pending seed availability, cost and chance for success"(USDI-BLM 2000b). 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 are warranted in some areas.

4.3.8.2 Summary of key conservation issues

- **Spatial extent of perennial grasslands on the landscape:** The extent of perennial grasslands in Idaho varies by SGPA (Figure 4-14). 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/) may be useful in preliminarily delineating annual and perennial grasslands.

  Broad-scale spatial analysis of the 2004 Idaho Sage-grouse Habitat Planning Map indicates that perennial grasslands (all types combined) comprise approximately 2,933,439 acres within Idaho SGPAs (Table 4-11). The most extensive grasslands are associated with SGPAs in south-central Idaho including the Big Desert, East Magic Valley, West Magic Valley, and Jarbidge. Most current perennial grasslands are administered by the BLM but private, state, and Department of Energy lands harbor relatively substantial acreages as well (Table 4-11).

Figure 4-14 Idaho Sage-grouse Habitat Planning Map. Green areas indicate perennial grasslands.

Table 4-11 Perennial grasslands by Idaho Sage-grouse Planning Area and land-ownership status (USDI-BLM 2004*a*).

	Land-ownership status[31]										
SGPA	**BLM**	**BLM NM**	**BIA**	**USFS**	**DOE**	**MIL**	**NPS**	**Private**	**IDL**	**USFWS**	**Total**
Big Desert	281,747	44,951	0	0	25,224	0	1,038	20,552	56,828	0	430,340
Challis	4,519	0	0	34	0	0	0	979	47	0	5,579
Curlew	53,775	0	0	7,466	0	0	0	39,354	2,087	0	102,682
East Idaho Uplands	5,928	0	2,246	0	0	0	0	6,927	719	2	15,822
East Magic Valley	399,026	34,609	0	0	0	0	1,933	37,912	19,886	10,551	503,917
Jarbidge	524,267	0	0	0	0	26,046	0	27,273	31,077	0	608,663
Mountain Home	21,012	0	0	0	0	0	0	7,191	396	0	28,599
Owyhee	274,294	0	0	0	0	5	0	9,795	15,800	0	299,894
Shoshone Basin	10,698	0	0	42	0	0	0	11,078	2,062	0	23,880
South Magic Valley	102,540	0	0	24,955	0	0	1,064	46,227	7,348	0	182,134
Upper Snake	84,804	0	0	1,078	113,936	0	0	27,197	6,105	8,131	241,251
West Central	103,408	0	0	1,015	0	0	0	95,009	15,511	0	214,943
West Magic Valley	214,520	0	0	0	0	0	0	39,087	22,128	0	275,735
Total	**2,080,538**	**79,560**	**2,246**	**34,590**	**139,160**	**26,051**	**4,035**	**368,581**	**179,994**	**18,684**	**2,933,439**

[31] BLM: Bureau of Land Management; BLM NM: BLM-administered lands associated with Craters of the Moon National Monument; BIA: Bureau of Indian Affairs; USFS: U.S. Forest Service; DOE: Department of Energy, INEEL; MIL: Military; NPS: National Park Service; IDL: Idaho Department of Lands; USFWS: U.S. Fish and Wildlife Service. Acreages are approximate only and are reflective of the relatively broad nature of the 2004 SGHPM.

- **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.

  The diversification of large, seeded grasslands to a structural and compositional state that contributes to sage-grouse conservation requires a long-term commitment. Several research projects underway in conjunction with the Great Basin Restoration Initiative will contribute to a better understanding of how to 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.

4.3.8.3 Seeded perennial grassland conservation measures

Goal: To restore sagebrush and/or native grasses and forbs in seeded large perennial grasslands.

Issue Addressed	Rationale	Conservation Measure(s)
All	Lack of sagebrush on the landscape and lack of plant species diversity hinders the recovery of sage-grouse.	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.

Issue Addressed	Rationale	Conservation Measure(s)
		2. When seeding sagebrush, use source-identified, tested seed adapted to local conditions. 3. 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): A. Use of the “Oyer” compact row seeder, which compacts soil and presses seed onto the surface. B. Use of the Brillion cultipacker seeder, where seed is broadcast over the surface followed by cultipacking. C. Transplant bare-root or containerized stock in small, critical areas to establish a seed source. D. Use the “mother plant” technique, and transplant bare-root or containerized stock in select locations throughout the area to establish a seed source. E. 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. 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: A. 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. B. Introduce desired, site-adapted species through drill seeding, aerial seeding followed by

Issue Addressed	Rationale	Conservation Measure(s)
		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. C. 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. 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 EQIP Local Working Group. Another potential source of project funding for private lands are Idaho Office of Species Conservation 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. Interested parties should contact Mr. Kent Christopher at (208) 356-0079 or grouse@fretel.com.

Research, monitoring or evaluation needs: Cooperate with the Great Basin Restoration Initiative research projects. Develop a consistent approach for monitoring, evaluating and reporting restoration efforts.

4.3.9 Climate change

4.3.9.1 Threat summary and background

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.) is likely to 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, personal communication, 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 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 carbon dioxide (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).

Enterprises that extract a good or service from rangelands can be degrading if they do not reduce pressure on the resource in periods of unusual climatic events. 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).

4.3.9.2 Summary of 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:

- **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 noxious 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 noxious 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.

4.3.9.3 Climate change conservation measures

Goal: Maintain resilience of sagebrush steppe vegetation communities as global climate changes increase the environmental stress on the community's ecological viability.

Issue Addressed	Rationale	Conservation Measure(s)
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.	1. Support efforts by the Society for Range Management, and others to inform constituents of the seriousness of global climate change expectations. 2. Factor climate change needs and philosophy into current management of arid and semi-arid rangelands.
Maintenance of ecosystem resiliency	Conservative use and management will be necessary to allow plant communities to combat on-going environmental stress from climate change.	1. Avoid degradation of current vegetation communities. 2. Reduce pressure on the resource in periods of unusual climatic events such as drought. 3. 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.	1. Increase knowledge and awareness of invasive species problems on native ecosystems. 2. Reduce impacts of land uses that increase the rate of spread of invasive species. 3. 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. 4. 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 noxious and invasive weeds.
Restoration with suitable plant materials	Restore plant communities that have the potential of	1. Include seed from the warmer part of a species' range in mixes that are used to restore degraded sites.

Issue Addressed	Rationale	Conservation Measure(s)
	surviving and adapting to climate change expectations.	2. 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 (See related discussion in Section 4.3.8.3). 3. Use local, native seed stock (where feasible and desirable) to reseed disturbed areas. 4. 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.	As opportunities permit, cooperate with Universities and other partners to: 1. Define the capability of ecosystems and vegetation communities to withstand stress and/or disturbance and maintain capability of full recovery. 2. Develop high quality, consistent, and accessible soil and vegetation data and models that describe how changes occur in response to stress and disturbance. 3. Develop a system that identifies the effects of global change in the very early stages and identifies appropriate management responses. 4. Develop new concepts of landscape scale management of rangelands to provide for adaptive management in response to climate change. 5. Develop monitoring systems that track and predict how changes in land use and cover affect ecosystem function across spatial scales on rangelands. 6. Acquire quantitative knowledge of ecological thresholds, indicators of change, and key decision points in the framework of comprehensive monitoring systems. 7. Improve coordination and communication links between researchers and land managers.

Research, monitoring or evaluation needs: 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 the commercial availability and supply of native grasses and forbs suitable for restoration in arid and semi-arid environments.

4.3.10 Conifer encroachment

4.3.10.1 Threat summary and background

The accelerated post-settlement expansion of conifer woodlands (mainly juniper species) occurred synchronously with the introduction of livestock, changes in mean fire-return intervals, and optimal climatic conditions (Tausch et al. 1981, Miller and Rose 1999, Miller and Tausch 2001). Juniper and pinyon woodlands have increased tenfold in extent since the late 1880s, and currently occupy 189,000 km^2 in the Intermountain region Miller and Tausch (2001). Connelly et al. (2004) estimated that 35% of sagebrush habitats in the Great Basin (Utah, Nevada) are at high risk of displacement by pinyon-juniper within the next 30 years, and summarizes the mechanisms by which encroachment occurs. Climate models suggest that expansion of juniper will continue throughout the 21st century (USFS-PNW 2004). 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. Miller et al. (2005) provide a detailed discussion on the biology, ecology and management of western juniper, and is recommended reading.

The projected encroachment of conifers into sagebrush communities and other important habitats constitutes a tangible, visible threat to sage-grouse in portions of several Idaho SGPAs, and is therefore of concern to several LWGs (Figure 4-15). Depending on the locality, conifer encroachment into breeding, late brood-rearing, fall, or winter habitat may be occurring, and should be addressed depending on local needs and priorities. Species such as western juniper (*Juniperus occidentalis*), Utah juniper (*Juniperus osteosperma*), and Douglas-fir (*Pseudotsuga menziesii*) are the species of primary interest depending on locality and elevation. To a lesser extent, encroachment by single-leaf pinyon pine (*Pinus monophylla*) and Rocky Mountain juniper (*Juniperus scopulorum*), or other species may also be of concern in certain situations.

Figure 4-15 Idaho Sage-grouse Planning Areas and conifer encroachment. Blue areas indicate conifer encroachment.

4.3.10.2 Summary of key conservation issues

- **Spatial extent of conifer encroachment on the landscape:** Spatial analysis of the 2004 Idaho Sage-grouse Habitat Planning Map indicates approximately 355,004 acres of conifer encroachment in SGPAs (Table 4-12). BLM lands constitute 69% of the total, followed by private (22%), state (9%), and USFS (0.1%). Acres primarily reflect western juniper (Owyhee SGPA) or Utah juniper (Curlew, South Magic Valley SGPA) encroachment. Douglas-fir or other species may constitute an encroachment risk in portions of the Challis and Upper Snake SGPAs, or elsewhere, but encroachment zones have not been mapped or quantified to date. As mapping technologies and field inventory efforts improve, additional refinements will be incorporated. Again, while the extent of juniper encroachment on the southern Idaho landscape is relatively minor in comparison with seeded perennial grasslands or annual grasslands, its influence locally is of significant concern.

Table 4-12 Conifer encroachment acres by Idaho SGPA and land-ownership status (USDI-BLM 2004*a*).

	Acres[32]				
SGPA	**BLM**	**USFS**	**IDL**	**Private**	**Total**
Curlew	9,293	0	0	294	9,587
Owyhee	165,138	0	26,897	69,284	261,319
South Magic Valley	69,014	431	6,690	7,963	84,098
Total	**243,445**	**431**	**33,587**	**77,541**	**355,004**

- **Reduction of habitat quality:** Conifer encroachment typically occurs along or near the sagebrush-woodland interface due to the lack of wildfire or other disturbance. Over time, as juniper or other conifer cover increases, sagebrush cover and other understory species decline (Miller and Eddleman 2001, Miller et al. 2005). Consequently, over time, sage-grouse breeding, and brood and winter habitat declines both in quantity and quality. In some areas, particularly at higher elevations, the encroachment of conifers, including Douglas-fir, into wet meadows or riparian areas reduces brood habitat suitability. Pinyon pines, junipers or other trees or structures in the vicinity of leks provide potential perches for avian predators and appear to increase the risk of predation of males. Removal of trees within 100 m of leks doubled attendance by males two and three years post-treatment (Commons et al. 1998). It is assumed that removing

[32] BLM: Bureau of Land Management; USFS: U.S. Forest Service; IDL: Idaho Department of Lands. Acreages are approximate only and are reflective of the relatively broad nature of the 2004 Sage-Grouse Habitat Planning Map.

additional encroaching trees that occur beyond 100 m of leks is also beneficial, particularly if trees are relatively numerous or scattered, though the exact distance is unknown. Management of encroaching trees should be done carefully though, as other species of concern that utilize junipers, most notably the ferruginous hawk, may occupy the same habitats as sage-grouse.

4.3.10.3 Conifer encroachment conservation measures

Goal: To reduce the influence of conifer encroachment on sage-grouse and sage-grouse habitat.

Issue Addressed	Rationale	Conservation Measure(s)
All	Conifer encroachment into sagebrush communities reduces sage-grouse habitat quality and availability	1. LWGs, land management agencies, IDFG and other partners should work closely together to identify and prioritize conifer encroachment areas for further management action. Work cooperatively to identify options, schedules and funding opportunities for specific projects. For western juniper, Miller et al. (2005) provide *Guidelines for Selecting the Most Appropriate Management Actions*, on pages 54-57. 2. IDFG, land management agencies, LWGs and other partners should work closely together to identify leks where conifer encroachment may be affecting lek attendance or nearby habitat quality. 3. Remove Douglas-fir or other conifers where they are encroaching on wet meadows, riparian areas or sagebrush stands that provide potential sage-grouse habitat. 4. Remove juniper, Douglas-fir, pinyon pine, or other trees within at least 100 m (330 ft or 8-acre area) of occupied sage-grouse leks. The purpose of this procedure is to reduce perching opportunity for raptors or other avian predators within view of leks. Techniques could include chainsaw, chipper, or other suitable mechanical means. Ensure cutting and slash disposal is completed between approximately July 15 and January 30 to minimize disturbance to grouse that may be in the vicinity (e.g., males at leks, nesting females, young broods). This practice serves to reduce predation on sage-grouse by raptors by eliminating potential perches, thereby improving survival, recruitment, and productivity. It may be particularly valuable where avian predation may be of greater concern such as in areas with fragmented habitat, nearby infrastructure features, and/or in the

Issue Addressed	Rationale	Conservation Measure(s)
		case of small, isolated sage-grouse populations. 5. Where juniper or other conifer species have encroached upon sagebrush communities at larger scales, employ prescribed fire, chemical, mechanical (e.g., chaining, chipper, chainsaw, commercial sale) or other suitable methods to reduce or eliminate juniper. Priority should be given to areas where there is a strong likelihood for recovery of perennial herbaceous vegetation or where preparatory and follow-up actions (e.g., control of invasives, seeding) are likely to be successful. Whenever possible, but especially if sagebrush habitat is limited locally, use juniper control techniques that are least disruptive to the affected stand of sagebrush. For example, if junipers are only scattered, and the associated sagebrush community is otherwise relatively healthy, cutting junipers with chainsaws will remove the encroachment threat, while allowing for immediate use of the sagebrush by sage-grouse. In all cases, control efforts should be planned using interdisciplinary expertise. 6. On private lands, apply for OSC sage-grouse grant funds, or enroll in NRCS incentive programs 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. Support for Idaho projects may also be available through the North American Grouse Partnership's (NAGP) Grouse Habitat Restoration Fund. Interested parties should contact Mr. Kent Christopher at (208) 356-0079 or grouse@fretel.com. 7. Where juniper control around leks is planned, monitor leks for at least 3 consecutive years post-treatment to document effects on lek attendance. Ideally, 2 to 3 years of pre-treatment monitoring is also recommended, but this may not always be feasible. 8. Plan wildfire suppression strategies to support this goal.

Research, monitoring or evaluation needs: Document and refine our understanding of how the reduction of conifer encroachment affects sage grouse populations or lek attendance.

4.3.11 Isolated populations

4.3.11.1 Threat summary and background

Most sage-grouse habitats and "populations" in Idaho are relatively contiguous and not isolated (2004 Idaho Sage-grouse Habitat Planning Map). However, of seven geographic areas in Idaho evaluated by the Panel, the West Central SGPA and southeastern Idaho area (East Idaho Uplands and Curlew SGPAs combined) were considered at greatest risk of sage-grouse extirpation. In particular, the West Central SGPA is separated from others by relatively large distances, and contains substantial annual grasslands and private lands. A portion of the South Magic Valley SGPA also includes what is assumed at this time to be a relatively isolated population inhabiting the Cotterel and Jim Sage Mountains. A small population existed historically in the Sawtooth Valley south of Stanley, but its current status is unknown.

4.3.11.2 Summary of key conservation issues

- **Need for better information related to population status and trends:** Little is known regarding population demographics of the isolated populations described above. Specifically, information on dispersal, genetic interchange, survival, and nest success is largely unknown. Monitoring underway in the West Central and Cotterel areas will help refine our understanding of these two areas.

- **Need for evaluation and monitoring of threats to isolated populations:** Isolated populations are of concern in that they are considerably more vulnerable to extirpation in the event of large wildfires, disease outbreaks (e.g., West Nile virus), predation influences, over-hunting, or other factors. Infrastructure features also may affect isolated populations to a greater extent, due to their small scale. Small, isolated habitats can also become occupied by invasive plant species in a short timeframe.

- **Need to improve or restore habitat associated with isolated populations:** The West Central SGPA and Cotterel/Jim Sage portion of the South Magic Valley SGPA include areas of annuals and/or conifer encroachment. In the latter area, cheatgrass control/restoration, burned area rehabilitation, and juniper management projects in the latter have been underway for several years.

4.3.11.3 Isolated populations conservation measures

Goal: To ensure that isolated sage-grouse populations remain viable.

Issue Addressed	Rationale	Conservation Measure(s)
Need for better information related to population status and trends	Status, survival and trend data relative to isolated populations is lacking	1. See Population Monitoring Section 5.2. 2. LWGs and agencies should coordinate in further refining and delineating sage-grouse populations, to the extent feasible.
Need for evaluation and monitoring of threats to isolated populations	The nature and extent of threats to isolated populations is unknown in some areas.	1. LWGs and agencies should work together to identify and quantify threats within isolated population areas.
Need to protect, improve or restore habitat associated with isolated populations	Some isolated population areas have substantial areas of habitat in need of restoration. See Idaho Sage-grouse Habitat Planning Map.	1. Ensure that vegetation prescriptions, hunting regulations, and permitted land-use activities are consistent with maintaining isolated populations and with maintaining or improving associated habitat. See conservation measures for specific threats.

Research, monitoring or evaluation needs: Better information on sage-grouse populations in priority areas is needed.

4.3.12 Predation

The majority of reported mortalities for grouse species, including sage-grouse, are due to predation (Bergerud 1988). However, predation plays a role in the ecology of every animal species, and is a natural process in all ecosystems. Prey species, including sage-grouse, play an important role in energy flow between trophic levels. In most prey species mortality is greatest during the early stages of development and decreases after young reach adult size, with relatively few of the young surviving to breed (Northeastern Nevada Stewardship Group 2004).

Sage-grouse are an important prey species commonly fed upon by a number of predators in Idaho. Coyotes, ravens and various raptors have also been noted to disturb or harass sage-grouse on leks (Bradbury et al. 1989). Sage-grouse appear especially wary of the presence of golden eagles (Hartzler 1974). While some level of predation should be expected in all sage-grouse populations, in certain situations predator/prey relationships may become disrupted, resulting in excessive predation. For example, the establishment of non-native predator species or an unusually high number of one or more predator species, may be cause for concern. Isolated or poor habitat conditions may also lead to increased predation. In general, predation has the potential to affect sage-grouse populations by reducing nest success, reducing the survival of juveniles, and/or reducing the survival of adult birds (Connelly et al. 2004). Some people assert that predation does not appear to be a widespread factor controlling sage-grouse populations (Connelly et al. 2004). However, others contend that predation may comprise a significant limiting factor to sage-grouse in some areas depending on localized variations in predator/prey relationships and local habitat conditions. Some Idaho LWG members believe predation is a serious limiting factor in their local SGPAs.

4.3.12.1 Threat summary and background

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, personal communication 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). Other trend data are not available at this time. 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)[33].

  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). 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). In northern Nevada, videography has documented raven depredation of sage-grouse eggs (Pete Coates, personal communication, November 3, 2005).

  Patterson (1952) implicated Richardson's (*Spermophilus richardsonii*) and thirteen-lined ground squirrels (*S. tridecemlineatus*) in 42% of depredated sage-grouse nests across two study areas in Wyoming. However, Holloran (1999) documented visits to sage-grouse nests by Richardson's and thirteen-lined

[33] See Section 2.1 for more detailed discussion of sage-grouse ecology.

ground-squirrels with the aid of concealed motion-sensitive cameras, but concluded these species were not responsible for predation. While neither Richardson's nor thirteen-lined ground squirrels occur in Idaho, several species of ground squirrel are present (Yensen and Sherman 2003). Thus, the risk and magnitude of nest predation or egg disturbance by ground squirrels in Idaho remains uncertain.

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). Nest success across 16 radio-telemetry studies across 7 states and provinces (n=1,225 nests) averaged 47.7% (Connelly et al. 2004). Nest success for sage-grouse in Idaho, across three radio telemetry studies averaged over 49% (Connelly et al. 2004).

Habitat loss or reduction may concentrate nesting female sage-grouse, reducing the size of area predators need to search (Bergerud 1988). Man-made features, such as those that provide avian perch sites, travel lanes or dens, may also lead to nest predation, by facilitating predator access to nesting habitats (Bergerud 1988). In general, the canopy cover of tall grasses and medium height sagebrush is inversely related to the probability of nest predation (Connelly et al. 1991, DeLong et al. 1995, Sveum et al. 1998 cited in Crawford et al. 2004).

Connelly et al. (2004) cite several more recent studies that documented sage-grouse survival and nest success (Gregg 1991, Robertson 1991, Connelly et al. 1993, Gregg et al. 1994, Holloran 1999, Lyon 2000, Wik 2002). Among these seven studies, only Gregg (1991) and Gregg et al. (1994) reported that predation was limiting sage-grouse populations by limiting nest success; and in these cases the relationship was linked to poor nesting habitat. Connelly et al. (2004) suggest that since most studies report nest success rates exceeding 40%, nest predation is not a widespread problem. 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).

- **Predation of juveniles:** Young birds may be killed by the common raven, northern harrier (*Circus cyaneus*), and weasel (Schroeder et al. 1999). Red-tailed hawks and ferruginous hawks (*Buteo regalis*) have also been noted to prey upon juvenile sage-grouse (Patterson 1952 cited in Autenrieth 1981). Carhart (1942) cited in Autenrieth (1981) reported juvenile sage-grouse remains in 55% of Swainson's hawk nests visited. Available information suggests that juvenile survival is low, but this factor has been difficult to document in the field (Crawford et al. 2004). Predation of juveniles may be particularly important during the first few weeks after hatch (Connelly et al. 2004). In Montana, survival of sage-grouse chicks during the first three weeks after hatching was 37% (Wallestad 1975 cited in Schroeder and Baydack 2001). From 1999-2002, research was conducted on chick survival in the Upper Snake SGPA (N. Burkpile, University of Idaho, in progress). Information forthcoming in the near future from this study should contribute useful new information regarding juvenile survival.

4.3.12.2 Summary of 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.

4.3.12.2.1 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.

Local Working Groups 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 LWG members discuss these questions and document conditions prior to proposing predator control actions. Such a systematic approach will help guide their 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 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?

4.3.12.3 Predation conservation measures

Goal: Manage excessive predation to enhance sage-grouse survival and production as appropriate to local conditions.

Issue Addressed	Rationale	Conservation Measure(s)
Excessive levels of predation can be detrimental to sage-grouse populations	The scale, quality or configuration of habitat; infrastructure; non-indigenous predator species or artificially high predator populations may contribute to excessive predation.	1. Evaluate local conditions using the systematic approach presented above in Section 4.3.12.2.1. 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.

Issue Addressed	Rationale	Conservation Measure(s)
		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).

Research, monitoring or evaluation needs: There is a need for additional research, as well as monitoring and evaluation activities to investigate: the behavior of predator species, the intra- and inter-specific relationships of predator populations, the impact of predators and other mortality factors on specific sage-grouse populations of concern, and on sex/age classes. Need to develop better methodologies to assist in identification of predator species linked to sage-grouse predation. Research is needed to determine the factors that affect habitat quality as it relates to the level of predation. Research is needed to determine the effect of habitat fragmentation as it relates to the level of predation. Finally, there is a need to experimentally implement and evaluate predator control measures in areas where predation is suspected to be limiting sage-grouse, to gain a greater understanding of the effects of this management approach on sage-grouse, specific predators, and the relationship between predator species.

4.3.13 Urban/exurban development

4.3.13.1 Threat summary and background

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. Ada and Canyon counties meet these criteria as densely populated areas in Idaho. In the Columbia River Basin, 58% of the area is classed as low urban/rural area with approximately 23% as high or very high. Twenty-one percent has high or very high risk of ecological impacts (see Quigley et al. 1996).

Urban areas themselves remove habitat and present inhospitable environments for sage-grouse. However, the connecting roads, power lines and 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 has more than doubled during the past fifty years, increasing from 588,637 to 1,293,594 in 2000 (U.S. Census Bureau statistics).[34] Areas surrounding Idaho Falls, Pocatello, and the lower Big Wood River Valley have development expanding into sagebrush habitat. While much of the actual footprint of recent urban/exurban expansion in Idaho is probably occurring outside of SGPA boundaries, in association with communities along I-84/I-15 corridors, 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

[34] http://www.census.gov/dmd/www/resapport/states/idaho.pdf

change, thus the direct and indirect influences of urban/exurban expansion are quite complex and far-reaching.

4.3.13.2 Summary of 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, cited in Connelly et al. 2004**).** 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.

4.3.13.3 Urban/exurban conservation measures

Goal: Protect sagebrush/sage-grouse habitats from losses caused by urban expansion and related human caused impacts.

Issue Addressed	Rationale	Conservation Measure(s)
Direct loss of sagebrush habitat to development of homes and ranchettes	Maintain habitat in what is often critical seasonal habitat areas.	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. Acquire 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: A. Identify important parcels of habitat;

Issue Addressed	Rationale	Conservation Measure(s)
		B. Work with landowners to identify willing sellers; C. 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	Maintain maximum amount of suitable habitat in conditions acceptable to sage-grouse and other sagebrush dependent species.	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. Acquire easements when owners are willing to negotiate conservation agreements. 4. 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	Maintain maximum amount of suitable habitat in conditions acceptable to sage-grouse and other sagebrush dependent species.	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. Acquire easements when owners are willing to negotiate conservation agreements.

Research, monitoring or evaluation needs: Parcels of private land suitable as sage-grouse habitat or related habitat values (e.g., potential for restoration) that are susceptible to loss to development or to uses related to new developments need to be identified for potential land exchange, conservation easements or related actions. Identify potential impacts to public lands from human occupancy and related factors (e.g., infrastructure) on adjacent private lands.

4.3.14 Sagebrush control

Due to similarities in management objectives the discussion of sagebrush control was combined with the discussion of prescribed fire presented in Section 4.3.7. This combination is not intended to elevate the threat of sagebrush control to that of prescribed fire, but to clarify the inter-relationships of the techniques to manage sagebrush habitat. Section 4.3.7 contains the presentation of threat summary and background, summary of key conservation issues, and conservation measures, associated with both prescribed fire and other methods of sagebrush control.

4.3.15 *Insecticides*

4.3.15.1 Threat summary and background

Sage-grouse using agricultural areas for brood-rearing can be exposed to pesticides (Connelly et al. 2000*b*). 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 2004*a,b*). Since young sage-grouse hatch in the spring approximately the same time as Mormon cricket and grasshopper populations begin to mature (USDA-APHIS-PPQ 2004*a*,*b*), 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 2004*a*).

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 cited in USDA-APHIS 2002), suggest that while grasshopper densities can approach 60/m^2 during outbreaks, treatments that have a 90-95% mortality rate (of grasshoppers) still leave a density of grasshoppers (3-6/m^2) that is greater than an average density found on rangelands, such as Wyoming, in a normal year (Schell and Lockwood 1997 cited in USDA-APHIS 2002).

Up to five million acres of federal rangeland in Idaho were anticipated to be infested by Mormon crickets and grasshoppers in 2005 (USDA APHIS-PPQ 2005). 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 personal communication 1/2006). 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 personal communication 1/2006).

Table 4-13 Acres of federal Idaho rangelands treated for Mormon crickets and grasshoppers.

	Federal Acres Treated in Idaho	
Year	**Mormon Crickets**	**Grasshoppers**
2005	68,520	2,394
2004	18,945	2,520
2003	13,585	11,705
2002	340	250
2001	--	420
2000	--	1100

4.3.15.2 Summary of 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.

4.3.15.3 Insecticide conservation measures

Goal: Reduce the direct and indirect mortality of insecticides on sage-grouse while still providing for adequate control of insects.

Issue Addressed	Rationale	Conservation Measure(s)
Impacts of agricultural pesticides on sage-grouse	Some agricultural chemicals can cause direct or indirect mortality	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

Issue Addressed	Rationale	Conservation Measure(s)
	of sage-grouse foraging in farm fields.	to farmers may be available through NRCS CSP or other 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 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.	1. LWGs, land management agencies, landowners, IDFG, IDA, and APHIS-PPQ should continue to collaborate closely to ensure annual control efforts focus on key problem areas, better delineate treatment avoidance areas, determine the treatment of least risk to sage-grouse, and monitor results.

Research, monitoring or evaluation needs: Document mortalities of sage-grouse resulting from pesticide-use to improve our understanding of the extent of this threat. Monitor the impacts of Mormon cricket and rangeland grasshopper control efforts on sage-grouse food (insect) availability in control versus treatment areas. Monitor the effects of Mormon cricket and rangeland grasshopper control with respect to herbaceous and shrub cover in treated and untreated areas.

4.3.16 Agricultural expansion

4.3.16.1 Threat summary and background

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. 2000). Prime areas for growing crops (e.g. areas with deeper, fertile soils) were claimed first during settlement (Connelly et al. 2004).

4.3.16.2 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. 2000). 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.)

- **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 cited in Connelly et al. 2004). (See discussion in Predation Section 4.3.12.)

4.3.16.3 Agricultural expansion conservation measures

Goal: Manage existing and future agricultural lands in a manner that minimizes or reduces direct and indirect impacts to sage-grouse.

Issue Addressed	Rationale	Conservation Measure(s)
Habitat loss and fragmentation	Conversion of additional sagebrush lands to agriculture	1. Utilize the Conservation Reserve Program, Wetland Reserve Program, Grasslands Reserve Program, Farmland Protection Program or similar

	may adversely affect sage-grouse.	USDA incentives programs to recover habitat for sage-grouse where feasible. 2. Where possible, avoid additional agricultural expansion into 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. Within LWGs, and 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.
Insecticides	Certain insecticides can cause direct or indirect impacts to sage-grouse	See Insecticides Section 4.3.15.
Predation	Agricultural expansion can increase certain types of predation	See Predation Section 4.3.12.

Research monitoring or evaluation needs: Identify sagebrush communities and potential restoration areas that are susceptible to agricultural development for targeted acquisition, conservation easements or related actions. Document and report sagebrush acreage converted to agriculture at periodic intervals (to be determined) by county.

4.3.17 Sport hunting

4.3.17.1 Threat summary and background

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. (2000*a*, 2003*a*) 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.

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 Department 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 sage-grouse has averaged about 7,800 birds taken by about 6,000 hunters. This is less than 25% of the hunter and harvest estimates made before 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 Idaho 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 2004, sage-grouse hunter check stations were conducted on opening weekend at 16 locations throughout southern Idaho (Figure 4-16). Wings collected at check stations and wing barrels placed at 27 sites across the state provide information on the age and sex composition of harvested birds. Using these methods, over 3,000 hunters were interviewed at check stations in 2004 to document hunter activities and about 2,000 wings were collected and aged to document production.

Figure 4-16 Sage-grouse wing barrel and check station locations

Data from wing barrels in the Southwest Region indicate that in an area with a 23-day season, 55% of the total wings (n=665) are collected during opening weekend, 24% the second weekend, 17% the third weekend, and 4% the fourth weekend (2004 data).

Because of concerns over the effect of harvest on sage-grouse, IDFG biologists are actively evaluating the effects of hunting on Idaho sage-grouse. Existing data support the conclusion that the current Idaho sage-grouse season structure is well within suggested hunting guidelines (Connelly et al. 2000*b*, Wambolt et al. 2002).

4.3.17.1.1 Falconry

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.

4.3.17.2 Summary of 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.

4.3.17.2.1 Hunting season and bag-limit guidelines

Table 4-14 outlines hunting season and bag-limit guidelines, these are referenced in the following conservation measures.

Table 4-14 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

4.3.17.3 Sport hunting conservation measures

Goal: Manage hunting to support the increase of sage-grouse populations in Idaho and for the sustainability of smaller, more isolated populations that may be more vulnerable to overharvest.

Issue Addressed	Rationale	Conservation Measure(s)
Need for better hunter effort and success information	To ensure seasons and bag-limits are set using the best-available information and are consistent with ensuring sustainability of sage-grouse	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.

Issue Addressed	Rationale	Conservation Measure(s)
	populations in Idaho.	3. Evaluate accuracy of current harvest estimate data and implement needed changes. 4. Consider the feasibility and potential value of implementing a permit system with mandatory reporting by all hunters.
Need for juvenile production data.	Juvenile production data are crucial to sage-grouse management and wing collection from hunters is currently the only feasible way to collect these data.	1. Conduct opening weekend hunter check stations at strategic locations statewide (Figure 4-16) to collect harvest information and wings from harvested birds. 2. Place wing barrels at strategic locations to increase the sample of wings from harvested birds. 3. Send voluntary wing envelopes to some Idaho sage-grouse hunters before the hunting season to test whether voluntary return of wings can increase the proportion of wings collected from harvested birds. 4. Annually analyze all sage-grouse wings collected to determine age, sex, and molt pattern of harvested birds. 5. 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.
Need for season and harvest criteria.	Uniform criteria will ensure seasons and bag-limits are established using a consistent process.	1. Identify sage-grouse populations where overharvest is a risk because of (1) isolated or fragmented habitat, or (2) small numbers of birds. Develop appropriate 2006 hunting season recommendations to reduce risk. 2. The following guidelines should be considered by the Idaho Fish and Game Department when making sage-grouse season recommendations to the Idaho Fish and Game Commission: 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.

Issue Addressed	Rationale	Conservation Measure(s)
		C. Use the criteria identified in Table 4-14 when setting hunting seasons for each population. LWGs should evaluate how well these guidelines apply to their areas and provide recommendations to the IDFG by May 1, of each year.

Research, monitoring or evaluation needs: Complete geographic delineation of sage-grouse populations. Conduct monitoring activities to refine understanding of harvest effects on populations, age, and sex-classes. Monitor impact of spring hunting on leks.

4.3.18 Mines, landfills, and gravel pits

4.3.18.1 Threat summary and background

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). Broad-scale graphics prepared by Connelly et al. (2004) indicate a clustering of landfills associated with the East, West, and South Magic Valley; Upper Snake; and Challis SGPAs. The extent and distribution of mines and gravel pits was neither quantified nor mapped for this plan due to limited available information. LWGs are encouraged to do so in the development of their plans, to the extent that these factors are of concern locally.

4.3.18.2 Summary of 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 4.3.12 and Infrastructure Section 4.3.2 for additional discussion).

4.3.18.3 Mines, landfills, and gravel pits, conservation measure

Goal: Design and operate mines, landfills and gravel pits in a manner that minimizes or reduces habitat loss or disturbance to sage-grouse.

Issue Addressed	Rationale	Conservation Measure(s)
Habitat loss	The footprint associated with mines, gravel pits and landfills results in habitat loss until such	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. 200*b*, and Stinson et al. 2004).

Issue Addressed	Rationale	Conservation Measure(s)
	areas are suitably rehabilitated.	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. 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.	1. Apply seasonal-use restrictions (see Human Disturbance Section 4.3.5.) on activities associated with the exploration, operations, and maintenance of mines, gravel pits, or landfills, including those associated with supporting infrastructure.
Predation	Landfills have been associated with increased presence of corvids	See Predation Section 4.3.12.

Research, monitoring or evaluation needs: Improve upon and standardize disturbance buffers. Monitor the effectiveness of recommended disturbance buffers.

4.3.19 Falconry

4.3.19.1 Threat summary and background

The discussion of falconry was combined with hunting in Section 4.3.17. No unique falconry conservation measures were identified.

Chapter 5 – Research, Monitoring and Evaluation

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5 Research, Monitoring and Evaluation

The following chapter includes a discussion of research, monitoring and evaluation needs; guidelines and protocols for sage-grouse population monitoring; guidelines and protocols for sage-grouse habitat evaluation and monitoring and; related adaptive management recommendations. Since this Plan is a living document, users should check the web site at http://fishandgame.idaho.gov/cms/hunt/grouse/ periodically for updates to protocols and other pertinent information.

5.1 Research, monitoring and evaluation needs

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

5.1.1 Summary of needs by threat category

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

Research, monitoring and evaluation takes place at multiple spatial and temporal scales. Much, although not all, of the research, monitoring and evaluation needs identified in the following discussion would occur at the mid- or fine-scale (e.g., SGPA or project scale).

5.1.1.1 Wildfire

- Identify and prioritize specific areas for habitat restoration and fuels modification (e.g., cheatgrass).
- Identify and prioritize areas bordering roads, railroads, farmlands or other areas where cheatgrass or other vegetation poses a high fire risk.
- Develop research methods to improve the establishment and survival of sagebrush seeding efforts.
- Expand efforts to improve the commercial supply of native grasses and forbs suitable for Idaho rangelands.

5.1.1.2 Infrastructure

- Research and monitoring of the effects of wind energy development in sage-grouse habitats with respect to sage-grouse survival, habitat-use and behavior including: abandonment of leks, nesting, brood rearing or winter habitat and the distance from the wind turbines that effects are experienced.
- Of additional interest are the effects of low frequency noise, shadow flicker, presence of tall structures etc.
- Map and quantify secondary and other roads (e.g., paved county, gravel, two-tracks), smaller power distribution lines (<138 kv), telephone lines in SGPAs. Identify specific potential problem areas.
- Identify utility, railroad, road rights of way where invasive plants increase fire risk.
- Research or model the synergistic effects of multiple infrastructure features on sage-grouse survival, habitat use, and behavior.
- Document the incidence and extent of avian predation on sage-grouse nest success, juvenile and adult survival in areas with extensive infrastructure and areas without extensive infrastructure.

- Evaluate sage-grouse response to new and existing power lines as associated with habitat conditions and avian predator densities.

5.1.1.3 Annual Grassland

- Cooperate with the Great Basin Restoration Initiative research projects. This need is also closely linked with research needs associated with climate change.

- Develop a consistent approach for monitoring, evaluating and reporting restoration efforts.

5.1.1.4 Livestock impacts

- Identify the impacts of livestock management (systems and individual practices) on sage-grouse populations, and habitat.

- Monitoring and evaluation is also necessary to better identify and determine the impacts of current grazing management practices on sage-grouse populations, and habitat.

- Document the extent of sage-grouse collision with fences and conduct effectiveness monitoring of flagged or tagged fences.

5.1.1.5 Human disturbance

- Evaluation is needed to document areas where general recreation, and especially, OHV activity may be causing unacceptable disturbances to leks or damage to important seasonal habitats and to aid in the planning or zoning of trails and closure restrictions. Coordination with the Rangewide Conservation Strategy team in developing or refining suggested disturbance buffers is recommended.

- Identify and map areas where potential conflicts may be occurring with human activities related to sheep bedding and leks.

5.1.1.6 West Nile Virus

- Continued testing for immunity.

- Research and testing of potential conservation measures.

5.1.1.7 Prescribed Fire (and sagebrush control)

- Develop a more effective and consistent approach to periodic mapping and classification of sagebrush habitats and cover classes using remote imagery.

- Research sage-grouse response to prescribed fire in the Mountain Big Sagebrush ecosystem.

5.1.1.8 Seeded perennial grassland

- Cooperate with the Great Basin Restoration Initiative research projects.

- Develop a consistent approach for monitoring, evaluating and reporting restoration efforts.

5.1.1.9 Climate change

- 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 the commercial availability and supply of native grasses and forbs suitable for restoration in arid and semi-arid environments.

5.1.1.10 Conifer encroachment

- Document and refine our understanding of how the reduction of conifer encroachment affects sage grouse populations or lek attendance.

5.1.1.11 Isolated populations

- Develop a more effective approach to determine sage-grouse populations in isolated areas.

5.1.1.12 Predation

- Research, monitoring and evaluation activities to investigate: the behavior of predator species, the intra- and inter-specific relationships of predator populations, the impact of predators and other mortality factors on specific sage-grouse populations of concern, and on sex/age classes.

- Develop better methodologies to assist in identification of predator species linked to sage-grouse predation.

- Determine the factors that affect habitat quality as it relates to the level of predation.

- Determine the effect of habitat fragmentation as it relates to the level of predation.

- Experimentally implement and evaluate predator control measures in areas where predation is suspected to be limiting sage-grouse, to gain a greater understanding of the effects of this management approach on sage-grouse, specific predators, and the relationship between predator species.

5.1.1.13 Urban/exurban development

- Identify parcels of private land suitable as sage-grouse habitat or other sagebrush habitat values that are susceptible to loss to development or uses related to new developments

5.1.1.14 Sagebrush control

- See discussion in prescribed fire Section 5.1.1.7.

5.1.1.15 Insecticides

- Document mortalities of sage-grouse resulting from pesticide-use to improve our understanding of the extent of this threat.

- Monitor the impacts of Mormon cricket and rangeland grasshopper control efforts on sage-grouse food (insect) availability in control versus treatment areas.

- Monitor the effects of Mormon cricket and rangeland grasshopper control with respect to herbaceous and shrub cover in treated and untreated areas.

5.1.1.16 Agricultural expansion

- Sagebrush communities and potential restoration areas that are susceptible to agricultural development should be identified for potential land exchange, conservation easements or related actions.

- Document and report sagebrush acreage converted to agriculture at periodic intervals (to be determined) by county.

5.1.1.17 Sport hunting

- Identify all sage-grouse sub-populations to better understand the potential impacts of hunting.

- Conduct monitoring activities to refine our understanding of harvest effects on populations, age, and sex-classes.

- Monitor impact of spring hunting on leks.

5.1.1.18 Mines, landfills, and gravel pits

- Improve upon and standardize disturbance buffers.
- Monitor the effectiveness of recommended disturbance buffers.

5.1.1.19 Falconry

- See hunting Section 5.1.1.17.

5.1.2 Data gaps identified by U.S. Fish and Wildlife Service

In the discussion of the factors contributing to the greater sage-grouse not warranted Finding, participants in the USFWS structured range-wide science panel identified a number of data gaps that if resolved, could reduce uncertainty in their assessment of the likelihood of extinction within a certain time frame or even change their estimates (USDI-FWS 2005).

This information is included in this Plan because it provides an important window into some of the uncertainties and research, monitoring and evaluation needs that exist at the broad-scale (e.g., state or range-wide) and that might factor into future decisions regarding potential listing of the species.

The areas of uncertainty identified by the USFWS experts included:

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

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

5.2 Sage-grouse population monitoring

5.2.1 Monitoring breeding populations

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

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

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

Due to funding and manpower limitations, sampling intensity (e.g., the number of lek routes that should be run in a given year in a given area) will vary across the state. The minimum number of lek routes run in a planning area will vary depending on size of the area and accessibility. Of the 13 planning areas currently identified, two (15%) have no lek routes while one planning area has 13 (Table 5-1). A suggested minimum number of primary lek routes for each planning unit and an overall sampling strategy are provided in Table 5-1. Final lek monitoring goals will be determined by IDFG Regions by December 31, 2006. Generally, lek routes should be well distributed throughout a planning unit and should sample all or most major known breeding populations. Secondary routes should be used to support and enhance data on breeding populations, or track changes in habitats that are being rehabilitated. Secondary routes should be run a minimum of every four years. This approach should stabilize annual workloads of management biologists while still maintaining a quality database.

Table 5-1 Minimum number of lek routes suggested for each planning unit and an overall sampling strategy for monitoring breeding populations.

Planning unit	Current number of routes	Minimum number of primary routes suggested	Potential secondary routes
Big Desert	5[1]	5	3
Challis	5	4	1
Curlew	2	2	0
East Idaho Uplands	0	2	0
East Magic Valley	4	2	2
Jarbidge	1	1	0
Mountain Home	0	1	0
Owyhee	5[2]	6	3
Shoshone Basin	1	1	0
South Magic Valley	1	2	0
Upper Snake	13	8	5
West Central	4	1	3
West Magic Valley	3	2	1
Total	44	37	18

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

[1] Two routes (INL and Tractor Flats) represent Big Desert populations but are presently included in the Upper Snake SGPA totals.

[2] At least two routes appear to be lek counts. These could be continued as secondary routes but should not be included as lek routes.

5.2.1.1 General instructions for conducting a lek route

1. All new lek route participants must take lek route training available at IDFG regional offices.

2. Run each route four times per spring (four replicates for each route). This will ensure that peak male attendance is encountered at some point during the 4 route replicates.

3. All leks along a route during a particular replicate must be censused on the same morning.

4. Run each lek route from ½ hour before sunrise to one hour after sunrise.

5. All four route replicates should be run by the same observer.

6. Space route replicates roughly ten days apart.

7. Begin March 25 and run through April 30 for low elevation areas.

8. Begin April 5 and run through May 10 for high elevation areas.

9. Conduct lek routes only during good weather. Clear to partly cloudy, winds <10 knots (<12 mi) per hour).

10. Drive <25 mph along route between leks.

11. Count all males observed along the lek route and all males and females at a particular lek.

12. If weather conditions deteriorate outside the accepted parameters during the running of a lek route, the route should nonetheless be completed that day if possible, but subsequently run again in its entirety under acceptable weather conditions. While data from the initial attempt would not be useable for trend monitoring purposes, they may nonetheless be of some value in documenting occupancy of certain leks, especially if for some reason the route cannot be re-run that year.

13. Submit completed lek route forms to the appropriate regional IDFG contact by June 1 of each year.

5.2.1.2 Instructions for monitoring a specific lek

1. Locate a spot that provides good visibility of the entire lek. Two or three observation points may be necessary for a large lek.

2. If a lek does not appear to be occupied, turn off the engine, step out of the vehicle and listen for displaying birds.

3. Record the time the count begins and ends as well as other pertinent information on the standardized form (observer name, lek name/number, weather conditions, etc.). Do not record data on scrap paper or non-standardized forms. This will ensure that all participants consistently account for all necessary information.

4. First, count birds from right to left, wait 1-2 minutes. Second, count birds from left to right, wait 1-2 minutes. Finally, count birds from right to left again.

5. Record the highest number of males and females separately. If no birds are present, it is very important that you record a zero. Do not leave a space blank.

6. Proceed to the next lek and repeat steps 1-5. Watch carefully for new leks. If new leks are encountered along the way, stop and do a count following steps 1-5. Make a note on the form regarding the new lek.

7. Obtain GPS positions of all lek locations if this has not been done previously. Obtain a new GPS position if a lek moves greater than 0.25 mile.

8. If a new lek has been discovered, be certain to coordinate with the appropriate IDFG wildlife manager or data steward in assigning the appropriate lek identification number to the new lek.

5.2.1.3 Breeding population data administration

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

5.2.2 Production monitoring

Currently, the only practical way to monitor sage-grouse chick production is by classifying wings from hunter-harvested birds. The wing from a sage-grouse can provide information on the age (juvenile, yearling, or adult), gender, and reproductive status (for yearling and adult females successful or unsuccessful at nesting). Wings are collected at hunter check stations and from wing barrels distributed throughout southern Idaho. In late fall or early winter, the wings are classified by IDFG biologists and other trained volunteers during annual “wing bees”. Future wing bees will provide opportunities for participation by members of LWGs. Data collected during the wing bees is recorded by harvest unit, however, data can also be grouped by Sage-grouse Planning Areas.

5.2.3 Harvest monitoring

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

5.2.4 The future of population monitoring

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

The National Wildlife Federation in Montana has developed an "Adopt-a-Lek" Program to encourage private landowners, sportsmen and others to assist agencies in monitoring leks. IDFG will explore this concept and develop a recommendation by December 31, 2006.

5.2.5 Summary of SGPA population monitoring goals

Following is a summary of suggested population monitoring goals by SGPA, based on the current status of routes, knowledge of data gaps and local conditions.

5.2.5.1 Big Desert SGPA

- Continue to monitor existing lek routes.
- Periodically check for activity along 2 historical routes.

5.2.5.2 Challis SGPA

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

5.2.5.3 Curlew SGPA

- Maintain lek route counts and increase monitoring efforts through aerial surveys and ground counts.
- Work with private landowners to obtain access to private lands, to enhance lek survey and monitoring efforts.

5.2.5.4 East Idaho Uplands SGPA

- Increase efforts to identify active leks in Caribou, Bingham, and Power (Deep Creek Mountains) Counties through ground counts and aerial surveys.

- Develop lek routes or trend counts to identify changes in activity.

5.2.5.5 East Magic Valley SGPA

- Continue monitoring current lek routes for long-term trends.

5.2.5.6 Jarbidge SGPA

- Maintain lek route counts and increase monitoring efforts in the Inside Desert and Grassy Hills area through aerial surveys and ground counts.

5.2.5.7 Mountain Home SGPA

- Increase lek counts through ground counts and aerial surveys.

5.2.5.8 Owyhee SGPA

- Continue to increase monitoring efforts through aerial surveys and ground counts.

- Develop additional methods to count leks in isolated areas such as infrared sensing.

5.2.5.9 Shoshone Basin SGPA

- Continue to monitor all leks along the lek route for changes in population trends.

5.2.5.10 South Magic Valley SGPA

- Increase efforts to identify active leks through ground counts and aerial surveys, and create new lek routes or trend counts on individual leks.

5.2.5.11 Upper Snake SGPA

- Continue to monitor lek routes for long-term trends, modify routes counted to maximize efficiency (if there are some routes that cannot be counted annually due to lack of personnel, consider counting every 5 years to determine activity). Expand efforts in the Upper Big Lost drainage.

5.2.5.12 West Central SGPA

- Maintain or increase current monitoring efforts through ground counts and aerial surveys.

- Need to work closely with private landowners to obtain access on private lands, to enhance lek survey and monitoring efforts.

5.2.5.13 West Magic Valley SGPA

- Continue to conduct lek route counts to identify changes in population trends.

5.3 Sage-grouse habitat evaluation and monitoring

The evaluation and monitoring of sage-grouse habitats and selected threats are crucial components in the implementation of this Plan. Standardized approaches for the collection and aggregation of spatial and tabular data across multiple scales are presented in this chapter along with specific tasks, timelines, and responsible parties. In some cases processes or protocols still need to be developed; in these cases suggested tasks and timelines are identified to facilitate further action.

The general approach presented in this chapter is to address monitoring needs and tasks first at the broad-scale (e.g., state of Idaho; 1:500,000 scale) and mid-scale (e.g., Sage-grouse Planning Area; 1:100,000 scale), followed by fine-scale (e.g., watershed, specific habitat restoration project; 1:24,000 USGS quad scale). In general, tasks related to data acquisition and management for broad and mid-scales will be accomplished at the state-office level, and tasks at the fine scale will be the responsibility of land-management agency field offices and the IDFG Regional-level offices. Private landowners who wish to contribute information are encouraged to work closely with their respective IDFG Region and/or NRCS offices. Because of the hierarchical, multi-scale nature of habitat data, it is essential for agency field and state office level entities to coordinate closely. More specific discussion and details are provided in the following sections.

5.3.1 Broad- and mid-scale monitoring

5.3.1.1 Idaho sage-grouse habitat planning map

The monitoring of trends in acreage of Key Habitat, Perennial Grasslands, Annual Grasslands and Conifer Encroachment Areas at the mid- and broad scales is crucial in determining progress toward meeting the goals and objectives in the Idaho Sage-grouse Conservation Plan. To that end, the Idaho Sage-grouse Habitat Planning Map will be updated annually, based on the past year's wildfire, habitat restoration, sagebrush/fuels management and related activities occurring on federal, state and private (volunteer landowner) lands. Updates will be disseminated and/or made available to Local Working Groups (LWGs) and partners. In addition, non-sensitive data will be made available to the public through the Internet. See Section 5.3.4.2 for additional discussion. As mapping technology and the resolution and accuracy of digital map products improve, they will be considered for use in refining or replacing the habitat planning map.

The Sage-grouse Advisory Committee (SAC) will establish a SAC Technical Assistance Team (TAT) by August 31, 2006, to facilitate the characterization, tracking and reporting of general status and trends in sage-grouse habitat characteristics and populations statewide. The SAC- TAT will include representatives from the Bureau of Land Management, U.S. Forest Service, Idaho Department of Fish and Game, Idaho Department of Lands, Idaho Department of Agriculture, and NRCS. Tasks assigned to the SAC TAT will include:

- Develop and disseminate a template for LWG annual accomplishment reports by October 31, 2006. Establish a database and/or spreadsheet to summarize habitat accomplishments from LWG annual reports, and habitat accomplishments from other agency and private projects by December 31, 2006. Also develop a format for producing a summary suitable for a statewide progress report.

- Serve as an information conduit between LWGs, SAC, and agencies, to provide habitat and population data as needed, and to ensure that information needed for annual updates to the Sage-grouse Habitat Planning Map and related reports is acquired in a timely manner. Note: site-specific fine-scale data will be maintained by the individual agencies.

- Review adequacy of 2005 USGS Shrubmap or other vegetation map products, by December 31, 2007 to help refine or replace the Sage-grouse Habitat Planning Map.

5.3.1.2 Habitat fragmentation monitoring

Graphics of selected habitat fragmentation metrics are illustrated in Chapter 3. These products were generated via GIS and FRAGSTATS (a computer program for analyzing fragmentation), based on the 2005 USGS Shrubmap digital landcover dataset and reflect conditions during approximately 1999-2003. As partnerships are developed and/or as new, updated imagery becomes available (e.g., approximately every 5-10 years), the status and/or trends in habitat fragmentation will be re-evaluated or refined.

- SAC-TAT will coordinate with USGS, Universities and other appropriate partners in further evaluating landscape and habitat fragmentation at multiple scales. Since technology and analytical approaches are anticipated to change, and since approaches to quantifying or modeling fragmentation vary depending on the metric, specific methods or software are not prescribed here.

5.3.1.3 Infrastructure monitoring

Baseline infrastructure, maps and statistics for major paved roads (state, federal, interstate), major power lines (>138 kv), active railroads, oil/gas pipelines, communications towers, and wind energy development/monitoring sites, by SGPA, have been incorporated into Chapter 4 using data available as of late 2004. Infrastructure metrics, including linear distance (miles), linear density (e.g., feet/acre), acres of buffer, and percentage of SGPA potentially influenced by buffers have been calculated for each SGPA but periodic updates will be necessary due to anticipated increases of these features on the landscape. Infrastructure data compiled at the local level will be aggregated to the broad- and mid-scale as needed (see Section 5.3.3 for additional discussion).

5.3.2 Fine-scale monitoring

5.3.2.1 Monitoring sage-grouse habitat characteristics

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

There currently is no universally adopted methodology or process in place for evaluating and monitoring habitat characteristics across agency jurisdictional boundaries. While some land-management agencies (BLM, USFS, IDL, IDFG-Wildlife Management Areas) have varying protocols or partnering capabilities in place, the resulting data are not readily comparable or consistently available. Moreover, in many cases, existing data are not readily accessible for broader-scale applications or reporting. The standardization of field data collection protocols and/or the establishment of a centralized data storage system would facilitate analyses and foster closer coordination.

A national interagency group, the Sage-grouse Habitat Assessment Framework Technical Working Group, has been formed to develop a standardized approach for measuring greater sage-grouse habitat characteristics. Until this or a similar standardized approach for assessing habitats across jurisdictional boundaries has been adopted:

- Land management agencies will use existing habitat evaluation approaches, subject to modification as deemed appropriate by the respective agencies; and

- Other partners are encouraged to use Monitoring of Greater Sage-grouse Habitats and Populations (Connelly et al. 2003*b,* see Appendix H).

Regardless of the specific method used to collect habitat data, when interpreting the data, other information such as evaluations of rangeland health, long-term vegetation trend monitoring data, soil and ecological site information, aerial photographs, satellite imagery, and local knowledge of land management practices, should also be taken into consideration, to the extent such information is pertinent and available. It is also important that the interpretation of habitat data be made in the context of historic and recent disturbance events and recent weather patterns, such as drought or wet-cycles. For example, grass and forb cover can increase or decrease measurably depending on seasonal moisture conditions, irrespective of current management.

The following sections and accompanying tables describe sage-grouse habitat preferences based on research rangewide. It is important to note that the vegetative preferences described, such as height and canopy coverage, are likely to occur as different-sized patches in sagebrush/grassland communities. Specific measurements, such as grass canopy height at nest sites, do not imply a uniform landscape-wide measurement, but instead are a microsite measurement of vegetation at a specific site.

For instance, within a functional sagebrush community, under average growing conditions, the mosaic of varying vegetative characteristics should provide for many potential nesting sites across the landscape. If not, nesting cover could be a limiting factor, which may show up in the form of lower rates of nest success (Connelly et al. 2000*b*). Also, in some parts of Idaho, vegetation may not be capable of achieving the desired height or cover characteristics. Connelly et al. (2000*b*) suggested, "…in all these cases, local biologists and range ecologists should develop height and cover requirements that are reasonable and ecologically defensible."

In describing these general habitat characteristics, the intention is to identify habitat needs of sage-grouse and to help managers determine possible limiting factors associated with sagebrush communities. Sage-grouse do not use their habitat randomly, but select habitat based on their needs at a particular time. Similarly, the habitat descriptors that follow cannot be applied randomly. Their application requires discretion and must recognize the natural patchwork of variability that exists in a functional sagebrush community and the potential of the site to produce and maintain wood shrub and herbaceous cover.

5.3.2.2 General sage-grouse habitat use periods

Table 5-2: Generalized habitat use periods and descriptions (see Table 5-3 for fine-scale habitat descriptions)[3]

Habitats	General use period [a]	General description [b]
Breeding	March 1 - June 30	Variety of sagebrush communities in close proximity to big sagebrush communities
Leks	March 1 - May 15	Open areas near sagebrush where males traditionally display and breeding occurs.
Nesting	April 1 - June 15	Primarily big sagebrush communities, 15-25% canopy cover in close proximity to leks. Also includes habitat for pre-laying hens.
Early brood-rearing	From hatch - June 30	Sagebrush communities including low sagebrush in proximity of nest sites.
Summer - Late brood-rearing	July 1 - August 31	Variety of mesic or moist habitats in close proximity to sagebrush communities.
Fall	Sept 1 - Nov 30	Shift from summer habitats to winter habitats with timing variable.
Winter	Dec 1 - Feb 28	Variety of sagebrush communities that have sagebrush exposed over the snow.

5.3.2.2.1 Breeding habitat

The breeding period spans a very important time frame for sage-grouse, from lek attendance, through early brood-rearing. During this period, the hen and chicks are dependent on cover and food that sagebrush communities provide. Generalized habitat indicators for breeding habitat are summarized in Table 5-2.

In many areas, cover and food requirements during this critical period are provided by large expanses of mostly big sagebrush communities. However, in other areas, community mosaics of big and low sagebrush together provide the important life requisites. Often, inclusions or fingers of big sagebrush or other tall-statured sagebrush species (e.g., *A. tripartita*) provide the structure for protective nesting

[3] Information in this table was compiled from Connelly et al. 2000*b*; Connelly et al. 2004; and J. Connelly personal communication October 2004.

[a] Use periods may vary based on elevation, location, and annual weather conditions.

[b] General descriptions are for Idaho statewide; primary vegetation communities may vary based on local conditions and availability.

cover, while the more extensive adjacent low sagebrush communities provide an abundance of forbs and insects.

Average distances between nests and the nearest leks vary from 1.1 to 6.2 km (0.68 to 3.85 miles) (Autenrieth 1981, Wakkinen et al. 1992, Fischer 1994, Hanf et al. 1994, Lyon 2000 cited in Connelly et al. 2000*b*). The distribution of nest sites in relation to leks can vary considerably, complicating efforts to map breeding habitat, and depends on whether populations are migratory or non-migratory, the habitat quality, and whether habitats are continuous or fragmented. Most sage-grouse populations in Idaho are thought to be migratory (Idaho Sage-grouse Science Panel discussion, February 1-2, 2005). For those migratory populations, leks generally are associated with nesting habitats, however, migratory grouse may move more than 18 km (11 miles) from leks to nest sites (Connelly et al. 2000*b*).

Mapping procedure: To provide some level of consistency in approach to initially delineating breeding habitat, use of the following sequential mapping process is suggested (adopted from information provided in Connelly et al. 2000*b*), unless breeding habitat has already been identified locally through research, monitoring of radioed hens or other means. The suggested mapping procedure should also be useful in establishing a baseline for the analysis of the cumulative effects of disturbances (e.g., wildfire), and completed/planned vegetation management projects within SGPAs or other geographic areas. It is important to note that while the term "radius" is used in the mapping protocol, the intent is not to imply that all breeding habitats occur uniformly within a circle around specific leks or that the circle would delineate a rigid boundary. Rather the intent of this approach is to provide a methodology that can be easily used via routine GIS procedures to initially describe a polygon within which breeding habitat likely occurs. By describing "circles" around occupied leks, the resulting irregular polygon, created by overlapping circles (since many leks occur in proximity to each other) should include most of the potential breeding habitat, and thereby provide an area within which further analyses can be completed. Common sense and local site-specific knowledge of habitat conditions, directional movements of sage-grouse, and other factors are important complements to effectively utilizing this methodology.

> *Step 1 purpose: Identify the initial broad analysis area for the sage-grouse "population" of interest.*

<u>Step 1.</u> Select the desired landscape of interest, such as SGPA, appropriate Hydrologic Unit(s) (i.e., HUC), agency administrative unit, or other appropriate geographic area.

Step 2 purpose: Identify the area within which breeding habitat most likely occurs.

Step 2. Acquire the most recent IDFG sage-grouse lek coverage. Using a Geographic Information System (GIS), show all leks. Buffer each occupied lek with the appropriate distance (3.2 km, 5 km, or 18 km radius), depending on the migratory status of the sage-grouse population. (An occupied lek is defined as a lek where at least two or more male sage-grouse have attended in two or more of the previous five years.) This exercise will refine the initial breeding habitat analysis area determined in Step 1, in relation to leks. At this point, it is assumed that, for the population in question, most breeding, nesting and early brood rearing activity will occur in sagebrush communities within this defined area.

Step 3 purpose: Identify areas within the analysis area that have generally suitable sagebrush cover for breeding habitat.

Step 3. Using available vegetation maps, query for sagebrush areas within the analysis area described in Step 2. Ideally, identify areas of 15-25% sagebrush canopy cover. In the absence of recent field-level or other more accurate vegetation maps, it is recommended that the 2005 USGS Shrubmap landcover dataset (http://sagemap.wr.usgs.gov/) be used in the interim, to provide consistency statewide, until such time as Shrubmap is updated, refined or replaced. Sagebrush polygons in Shrubmap reflect areas approximately 10% total shrub cover or greater, with sagebrush being dominant. It may also be useful at this point to combine areas of big sagebrush subspecies and areas of low/black subspecies separately.

Step 4 purpose: Refine the map described in Step 3, based on herbaceous understory conditions.

Step 4. Separately identify areas within the suitable (15-25% canopy cover) sagebrush communities that provide suitable or unsuitable herbaceous understory conditions. This will necessitate additional field-level mapping/verification or use of recent vegetation maps. Areas determined to provide suitable breeding habitat in terms of both sagebrush cover and understory structure and composition should be exempt from vegetation manipulations in most cases. Areas determined to be unsuitable or marginal breeding habitat, based on understory conditions, should be considered for habitat improvement efforts or other management actions, depending on local needs and scale.

Step 5 purpose: Identify areas of marginal (less than 15%) or high (greater than 25%) sagebrush cover within the analysis area.

Step 5. The use of National Agriculture Imagery Program (NAIP) data, aerial photographs, field-level maps or similar products will be necessary, until such time as the resolution of satellite imagery is refined. Areas with marginal sagebrush cover are anticipated to provide suitable breeding habitat sagebrush cover in the future. Areas with sagebrush cover exceeding 25% may warrant consideration for vegetation management actions, depending on local conditions, objectives, and scale.

Step 6 purpose: Identify or refine potential restoration areas within the analysis area.

Step 6. Query for annual grassland, perennial grassland, and conifer encroachment areas. Although the Idaho Sage-grouse habitat Planning Map identifies these areas on a coarse scale, doing so with more refined digital imagery (e.g., 2005 USGS Shrubmap, NAIP, or similar products), or field-level mapping is recommended.
In general, when planning and prioritizing areas for sage-grouse breeding habitat improvement or restoration, exclude sites that, due to topographic or other factors, are of questionable value or that place sage-grouse at further risk. Such sites might include (a) areas in excess of 40% slope, (b) areas within deep canyons, (c) areas outside of any SGPA boundary (i.e., not within an Idaho SGPA), (d) areas near human habitation or (e) areas where other factors such as proximity to roads, recreation areas, infrastructure features or other considerations are likely to compromise sage-grouse use.

Step 7 purpose: Model landscape dynamics, vegetation succession or management options.

Step 7. Where vegetation modeling tools and expertise are available, (e.g., LANDFIRE, VDDT-Vegetation Dynamics Development Tool, others), model vegetation changes under different management/treatment scenarios to identify optimal treatment approaches and identify risks.

Table 5-3: General characteristics of sagebrush rangeland needed for productive (suitable) sage-grouse breeding habitat[4]

Habitat features	Habitat indicators	Recommended habitat characteristics	
		Arid sites [c]	Mesic sites [c]
Protective cover	Sagebrush canopy cover	15-25%	15-25%
	Sagebrush height	12-31" (30-80 cm)	16-31" (40-80 cm)
	Sagebrush growth form [a]	Spreading	Spreading
	Perennial grass/forb heights	>7" (>18 cm)	>7" (>18 cm)
	Perennial grass canopy cover	Not specified	≥15%
Protective cover and food	Forb canopy cover	Not specified	≥10%
	Total Grass/forb cover	>=15%	>=25%
Food	Forb availability	Good abundance & availability relative to ecological site potential	Good abundance & availability relative to ecological site potential
Area [b]		>80%	[b]

5.3.2.2.2 Late brood-rearing habitat

Numerous moist or mesic vegetation communities provide late-brood-rearing habitat (Table 5-4). In most areas of Idaho, these habitats are not thought to be limiting for sage-grouse (J. Connelly personal communication 10/2004). However, the distribution of these sites is important, and may change over time due to losses or deterioration as a result of climate change, or development of agriculture, irrigation or hydropower/water sources. Sage-grouse generally will move to higher elevations or

[4] Modified from Connelly et al. 2000*b*.

[a]Sagebrush plants that are more tree or columnar-shaped do not provide the protective cover of sagebrush with a spreading shape. Sagebrush communities with the more columnar shape would require more herbaceous cover to provide good protection for nesting sage-grouse and young broods.

[b] Percentage of seasonal habitat needed with indicated conditions. Connelly et al. 2000b also suggest >80% for mesic areas, but some SAC members believe additional research is needed.

[c] Mesic and arid sites should be defined on a local basis, depending on annual precipitation, herbaceous understory and soil conditions (Tisdale and Hironaka 1981 and Hironaka et al. 1983 cited in Connelly et al. 2000*b*). As a starting point, sites with less than or equal to 12 inches average annual precipitation should be considered arid; and sites greater than 12 inches as mesic.

to wet areas as summer progresses (Schroeder et al. 1999). For some areas, this elevational movement can be fairly dramatic (Connelly et al. 1988, Connelly et al. 2000*b*). For other areas where nesting is occurring at higher elevations or near wet meadow complexes, this movement may be rather limited (Connelly et al. 1988).

Mapping procedure: It is important to delineate those brood-rearing areas that are potentially significant, at the fine-scale. The characteristics presented in Table 5-4 provide general guidelines for productive late brood-rearing habitat.

Several information sources could be helpful for delineating these areas at this scale:

- Observations by local residents, biologists or Local Working Groups
- Historic observation records available in BLM, USFS or state agency files
- National Wetland Inventory (NWI) maps
- Riparian Proper Functioning Condition assessments and maps
- Aerial photography (particularly color infra-red)
- Query for appropriate mesic upland and forb-rich vegetation covertypes, using the 2005 USGS Shrubmap regional landcover dataset (see SAGEMAP website, http://sagemap.wr.usgs.gov/).

Table 5-4: General characteristics of sagebrush rangeland needed for productive late brood-rearing habitat [5]

Habitat features	Habitat indicators	Recommended habitat characteristics [a]	
		Upland sagebrush communities	Riparian and wet meadow communities
Protective cover	Sagebrush canopy cover	10-25%	N/A
	Sagebrush height	16-31” (40-80 cm)	N/A
	Sagebrush proximity		Protective sagebrush cover as described above, under habitat indicators, is within 300 m of riparian or wet meadow feeding area
Protective cover and food	Grass/forb canopy cover	>15%	N/A
Food	Forb availability	Succulent forbs are available during the summer. Generally applies to higher elevations, such as mountain big sagebrush sites.	Riparian and wet meadow conditions are such that succulent forbs are available during the summer

5.3.2.3 Winter habitat

Sagebrush must be exposed above the snow to be available for sage-grouse use, and this situation is most commonly provided at lower-elevation sagebrush areas and on wind-swept ridges. It is important at this scale to identify and map these traditional use areas, particularly those that are crucial habitat for large numbers of birds.

Mapping procedure: Focus on identifying and mapping known sage-grouse winter-use areas based on local knowledge, winter surveys or observations by LWG members, landowners, biologists or others. In the absence of local information, the use of GIS and appropriate spatial data, such as the 2005 USGS Shrubmap regional landcover dataset (http://sagemap.wr.usgs.gov/), may be of help in initially identifying potential wintering areas based on sagebrush cover. However, due to potential local or seasonal variations in weather patterns, snow depth, topography,

[5] Adopted from Connelly et al. *2000b*.

[a] In areas where agricultural fields provide the food resources, the habitat indicators for protective cover also apply.

aspect and the migratory status of the sage-grouse population, on-the ground verification of sage-grouse use of these areas should be completed, especially during winters of above average snow. Determining sage-grouse use during years of above average snow will identify critical wintering areas.

Table 5-5: Characteristics of sagebrush rangeland needed for productive sage-grouse winter habitat [6]

Habitat features	Habitat indicators	Recommended habitat characteristics
Protective cover and food	Sagebrush canopy cover	10-30% exposed above the snow
	Sagebrush height	10-14” (25-35 cm) exposed above the snow

5.3.2.4 Mapping and monitoring of seasonal habitats

The location and status of breeding and winter habitats across Idaho is not well documented. The mapping and evaluation of these habitats will help facilitate conservation planning at the LWG and finer scale.

- Task 1. The IDFG Regions, in cooperation with land-management agency biologists, and LWGs, will delineate all known sage-grouse breeding and winter habitats at 1:100,000 (or 1:24,000 if possible) by December 31, 2007, using the best available information. Areas providing particularly important late-brood rearing habitat (e.g., certain meadows or riparian areas; agricultural-shrubsteppe interfaces where brood use has been documented), should also be delineated. Spatial and tabular data will be maintained and archived by the IDFG. The IDFG Regions will coordinate closely with land-management agencies SAC TAT, and LWGs, as appropriate. The purpose of this mapping effort is to provide a tool to help LWGs and land management agencies in identifying and prioritizing areas for more detailed habitat evaluations or monitoring, fire management planning, and/or restoration efforts.

5.3.2.5 Monitoring selected geographic areas

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

[6] Adopted from Connelly et al. 2000*b*.

priority SGPAs as identified by the SAC, or (4) Certain unique areas of particular local or regional importance.

- *Task 1.* The concept described above will be evaluated by IDFG Research Biologists and LWGs, as appropriate, by December 31, 2006, with at least partial implementation anticipated during 2007. Sampling methodologies and analytical approaches will be designed in collaboration with a qualified statistician, and in general will likely incorporate stratified random sampling with permanent plots.

5.3.3 Mapping and monitoring projects and infrastructure

The careful documentation of vegetation management and restoration projects, wildfires, infrastructure and other factors affecting sage-grouse habitat is vitally important. Specifically, this information will serve as the foundation for updates to the Idaho Sage-grouse Habitat Planning map, and for tracking progress toward the elimination, reduction or mitigation of threats locally and at broader scales.

- *Task 1.* SAC-TAT and IDFG will coordinate with appropriate agency contacts (e.g. BLM, FS, IDFG, IDL, NRCS) and LWGs to update the statewide sage-grouse habitat planning map annually.
    - The annual statewide map update will be completed and made available by approximately March 1 of each year.

- *Task 2.* The SAC-TAT will coordinate with IDFG to acquire spatial data relative to new infrastructure features (e.g., paved state, federal, interstate roads, major power lines, wind energy development sites, communications towers, oil/gas pipelines, geothermal sites, etc.) as needed.

- *Task 3.* LWGs are encouraged to utilize the baseline infrastructure maps and metrics provided in the Plan to aid in prioritizing threats locally, in the short term. In the longer term, it is recommended that LWGs collaborate with agencies, rural utility companies and other entities or partners in mapping and quantifying infrastructure features not available in the Plan, such as local power distribution lines, minor roads (e.g., gravel, county, 2-track, OHV trails, etc.), or other features to establish a more refined baseline.

5.3.4 Data dissemination and archiving

5.3.4.1 Archiving

The data described above (Sections 5.3.1 through 5.3.3) will be permanently archived, and updated annually, by IDFG.

5.3.4.2 Dissemination

The data described above are generally intended for use by agency specialists, LWGs, or NGO partners, in conservation planning for sage-grouse. However, the data are considered Category 1 public data, and will be made available to the public via the Idaho FGDC Geospatial One Stop Clearinghouse node at the University of Idaho, USGS Sagemap website, and the Department of Interior Geography Network. Private lands information will only be available as public information when individual landowners voluntarily provide information.

5.4 Adaptive management

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

Given the multitude of temporal and spatial variables, in many cases, determining the specific effects of individual conservation actions on sage-grouse populations will be very difficult. However, over time the knowledge gained by trying to assess the effectiveness of various actions will contribute new knowledge about sage-grouse populations and about the utility of conservation actions.

Adaptive management is a method for examining alternative strategies for meeting measurable biological goals and objectives, and then, if necessary, adjusting future conservation management actions according to what is learned. As knowledge about Idaho sage-grouse populations increases, and as a better understanding of the effectiveness of various conservation measures (at both local and regional scales) is gained, it will be possible and desirable to review the effectiveness of various actions and adapt those responses where it is deemed appropriate.

The degree to which conservation measures (or strategies) meet their stated objectives can only be determined by monitoring. It is thus the intent of this Plan to ensure that: (1) the implementation of conservation measures be documented by the appropriate agency or landowner, (2) the success or effectiveness of conservation measures be monitored periodically using the most appropriate method, and (3) information exchange occurs between parties to the Plan to facilitate the learning from our various management actions. Suggested processes and mechanisms for documentation and information transfer necessary to implement adaptive management are identified in Table 5-6.

Table 5-6 Process and documentation necessary to implement adaptive management

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

Chapter 6 – Implementation Milestones

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6 Implementation Milestones

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

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

Certain elements of this Plan, including fine-, mid- and broad-scale habitat goals and objectives, habitat and population management conservation measures, LWG processes, and habitat and population monitoring techniques will be implemented immediately, where possible. However, implementation of some measures will occur as they are evaluated and incorporated into other plans or processes. For example, mid-scale habitat objectives described in this Plan may not be consistent with agency Land-Use Plans, necessitating further analysis during scheduled Land-Use Plan revision or amendment processes.

6.1 Local Working Group process related milestones

Category/Task	Responsible Party	Target Deadline
Identify funding needs and funding sources to implement the State Conservation Plan and LWG plans, including support for LWG facilitators.	SAC, cooperating agencies	December 31, 2006, incorporate new facilitators as soon as possible after funding is secured
Existing LWGs with draft plans (Shoshone Basin, Jarbidge), should complete and finalize their plans.	LWGs and facilitators	December 31, 2006
Existing LWGs that currently do not have draft plans (Challis, West Central) should complete and finalize their plans.	LWGs and facilitators	December 31, 2007
Initiate formal LWGs in the South, East and West Magic Valley, Big Desert, East Idaho Uplands and Mountain Home SGPAs. Opportunities may exist for combining some SGPAs into a single LWG, as determined locally.	IDFG Regions	December 31, 2006
LWGs provide annual report to SAC.	LWG facilitators or designated lead	Start December 31, 2006, annually thereafter

6.2 Conservation measure related milestones

Following are specific conservation measure related milestones identified in this Plan. At present this state Plan does not identify specific milestones for a number of the statewide threats including: infrastructure, livestock impacts, human disturbance, West Nile Virus, prescribed fire, seeded perennial grassland, climate change, conifer encroachment, isolated populations, predation, urban/exurban development, sagebrush control, insecticides, agricultural expansion, Mines, landfills, and gravel pits, and falconry.

6.2.1Wildfire

Category/Task	Responsible Party	Target Deadline
Ensure the BLM/FS Fire Management Plans, Fire Management Unit Databases and related tools are updated annually, based on the most recent Sage-Grouse Habitat Planning Map.	BLM, FS	Annual, before the ensuing fire season
Require the washing of the undercarriage of fire vehicles and equipment prior to deployment and prior to demobilization from fires, to reduce spread of seeds of invasive species. This item will require additional analysis at the agency level.	BLM, FS	Initiate during 2007 fire season or before.
Require the use of knowledgeable resource advisors for fires within or threatening sage-grouse habitats. This item will require additional analysis at the agency level.	BLM, FS	Initiate during 2007 fire season or before.
Initiate the incorporation of overview training in sage-grouse habitat and related conservation issues, and suppression priorities during annual agency (including RFDs) firefighter training throughout southern Idaho (including Salmon/Challis). This item will require additional analysis at the agency level.	BLM, FS	Initiate during 2007 fire season training, annually thereafter.
Via instruction memorandum or other appropriate process, clarify the use of burn-out tactics in sage-grouse habitat. This item will require additional analysis at the agency level.	BLM, FS	Provide direction prior to the 2007 fire season or before.
Identify access roads where the installation of additional fire danger signs may be warranted. Install new signs as needed.	BLM, FS in cooperation with LWGs	Ongoing, but desirable to establish new signs in priority areas during the 2006 fire season, if warranted.

6.2.2 Annual grasslands

Category/Task	Responsible Party	Target Deadline
Require the washing of the undercarriage of fire vehicles and equipment prior to deployment and prior to demobilization from fires, to reduce spread of seeds of invasive species. This item will require additional analysis at the agency level.	BLM, FS	Initiate during 2007 fire season or before.
Explore means to require casual users of public/IDL lands to utilize certified weed-free forage. This item will require additional analysis at the agency level.	BLM, IDL	October 1, 2006

6.2.3 Sport hunting

Category/Task	Responsible Party	Target Deadline
Analyze existing wing data to determine the differences in sex and age of the harvest during opening weekend, compared to later in the season, and summarize other long-term trends.	IDFG	December 31, 2006
Identify sage-grouse populations where overharvest is a risk because of isolated or fragmented habitat or small numbers of birds. Develop appropriate 2006 hunting season recommendations to reduce risk.	IDFG	December 31, 2006

6.3 Monitoring related milestones

6.3.1 Population Monitoring

Category/Task	Responsible Party	Target Deadline
Identify lek monitoring goals (and primary and secondary lek routes) for SGPAs.	IDFG Regions	December 31, 2006
Explore the potential for initiating the "Adopt a Lek" program for Idaho, to increase monitoring of leks.	IDFG	December 31, 2006
Agency partners, volunteers submit completed lek monitoring forms to the appropriate IDFG Wildlife Manager or data steward for inclusion into the	BLM, FS, volunteers conducting lek surveys	No later than June 1 annually

Category/Task	Responsible Party	Target Deadline
statewide lek database.		

6.3.2 Habitat Monitoring

Category/Task	Responsible Party	Target Deadline
Establish SAC Technical Assistance Team (TAT), to aid in habitat, population, and data management/ analysis tasks.	IDFG HQ, SAC	August 31, 2006
SAC TAT and IDFG coordinate with agency contacts and LWGs during the fall/early winter each year to acquire spatial and related data needed for the annual update of the Sage-grouse Habitat Planning Map.	SAC TAT, IDFG	Acquire data from agency field-level offices and other partners by February 1 annually
Complete annual update of the Sage-grouse Habitat Planning Map including acreage summary (of key perennial grasslands, annual grasslands, conifer encroachment, by SGPA). Post on the FGDC Geospatial One Stop Clearinghouse node (Univ. Idaho), Sagemap, and DOI Geography Network.	IDFG HQ GIS	By March 1, annually
Review adequacy of the 2005 USGS Shrubmap to use as a tool to refine or replace the Sage-grouse Habitat Planning Map.	SAC TAT	December 31, 2007
Acquire updated infrastructure spatial data (e.g., new major paved roads, major power lines, communication towers, wind energy towers and related, oil/gas pipelines, geothermal sites etc.). Ensure updated infrastructure GIS product is made available to cooperators via web sites noted above.	SAC TAT, IDFG-HQ GIS	As needed
Delineate all known sage-grouse breeding and winter habitat at 1:100,000 (or 1:24,000 if possible), using best available information.	IDFG Regions in cooperation with land management agency biologists and LWGs	December 31, 2007
Evaluate the feasibility and appropriateness of establishing long-term habitat monitoring plots in specific areas such as: areas of priority to LWGs; habitats associated with priority lek routes; priority SGPAs; unique areas of local or regional importance.	IDFG research biologists, in cooperation with LWGs and SAC TAT	December 31, 2006

Category/Task	Responsible Party	Target Deadline
Establish a standardized template for LWG annual reports.	SAC TAT	October 31, 2006
Establish a database or spreadsheet for summarizing and reporting habitat accomplishments and related information from LWG annual reports and other agency/private projects.	SAC TAT	December 31, 2006

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