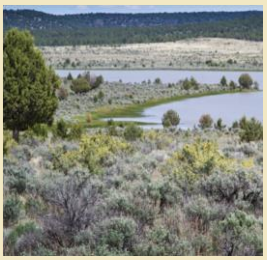



the OREGON SAGE-GROUSE ACTION PLAN



An Effort of the SageCon Partnership

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KATE BROWN
Governor

September 17, 2015

RE: Oregon Greater Sage-Grouse Action Plan and Executive Order

Dear SageCon Partners,

Recognizing nearly five years of collaboration, it is with great pride that I sign this Executive Order advancing the *Oregon Greater Sage-Grouse Action Plan*. Together, we have charted a clear path forward for our state built on science, partnership, and responsible wildlife conservation policies. I deeply appreciate the commitment and dedication the SageCon Partnership has advanced across agency, organizational and land ownership boundaries. I also appreciate the leadership of state agencies, federal and local partners, and the Oregon legislature in advancing meaningful funding, programs, as well as regulatory and voluntary commitments to ensure the Plan moves forward successfully.

With over 10 million acres of sage-grouse habitat within the stunning high-desert and working rangelands of eight counties that comprise two-thirds of our state, a lot is at stake not just for wildlife but for all Oregonians. At a critical time in federal decision-making under the Endangered Species Act, our Plan and my Executive Order advance increased coordination, commitment, and investment in a strong state-based approach to the threats and opportunities facing sage-grouse as well as rural community health.

Oregon's leadership around sage-grouse and sagebrush ecosystem conservation hinges upon the vitality and sustainability of our rural communities and economies. We lead the nation in the development of Rangeland Fire Protection Associations, our rural communities' "first responders" to wildfire. Thanks to local landowners, Soil & Water Conservation Districts, our agencies and other partners, we are also national leaders in the advancement of Candidate Conservation Agreements with Assurances, representing well over a million acres of new conservation actions and continued commitments to stewardship. Tied to this is our leadership in management-relevant research and partnerships around working lands conservation. Finally, Oregon's national leadership is represented through our historic land-use planning system and recent strengthening of components critical to sustaining rural communities, economies, and wildlife habitat.

There has never before been anything like this sage-grouse conservation effort across the West. In Oregon, over the past five years we have stayed at the table, recognizing the power of collaboration and partnership. Founded on the importance of strong rural communities and a strengthened commitment to our conservation heritage, I believe the State Action Plan and my Executive Order secure an Oregon-based approach to successful and robust sage-grouse conservation.

Thank you, SageCon Partners, for all you have done for Oregon.

Sincerely,

Kate Brown

Governor Kate Brown

KB/RW/ns

254 STATE CAPITOL, SALEM OR 97301-4047 (503) 378-3111 FAX (503) 378-8970
WWW.GOVERNOR.OREGON.GOV

EXECUTIVE ORDER NO. 15-18

ADOPTING THE OREGON SAGE-GROUSE ACTION PLAN AND DIRECTING STATE AGENCIES TO IMPLEMENT THE PLAN IN FULL

Whereas the U.S. Fish and Wildlife Service (USFWS) determined in 2010 that listing the greater sage-grouse (sage-grouse) under the federal Endangered Species Act (ESA) was "warranted but precluded";

Whereas the USFWS will make a new listing determination for sage-grouse in 11 western states later this year;

Whereas it is plainly in Oregon's best interests to ensure that the significant investments that Oregon ranchers, communities, tribes, non-governmental organizations, and others have made in sage-grouse conservation are supported, such that economic prosperity and a healthy environment occur hand-in-hand in Eastern Oregon;

Whereas the principal threats to sage-grouse habitat in Oregon are wildfire, invasive weeds, and the spread of juniper;

Whereas the Harney County Soil and Water Conservation District (Harney SWCD) and other SWCDs, local governments and landowners have developed candidate conservation agreements with assurances (CCAA), which provide for ranching operations on non-federal lands to continue in ways that provide for both long-term economic stability and sage-grouse conservation;

Whereas the Oregon Cattlemen's Association has developed a candidate conservation agreement (CCA) for grazing allotments on Bureau of Land Management (BLM) lands that supports the CCAAs developed for non-federal lands, and the federal Natural Resources Conservation Service (NRCS) has committed substantial funding for the conservation measures contained in CCAAs including strategic removal of juniper;

Whereas the CCAAs and the CCAs ensure that grazing operations in Oregon will be managed in a way that is consistent with sage-grouse conservation;

Whereas the Oregon Watershed Enhancement Board has committed to investing at least ten million dollars in priority Sage-Grouse conservation measures over the next ten years, including juniper management;

Whereas Oregon has a long-standing system of Rangeland Fire Protection Associations (RFPAs) that are often first responders to rangeland fires, and the

number, enrollment and geographic extent of RFPAs continues to grow and now covers most sage-grouse habitat;

Whereas the Oregon Legislature has appropriated new funding to improve the capacity and effectiveness of RFPAs, along with other investments that address wildfire in sage-grouse habitat;

Whereas the Oregon Legislature also has appropriated significant new funding to help manage invasive weeds and reduce juniper encroachment in sage-grouse habitat;

Whereas ranching is the major economic base for the area of Oregon occupied by sage-grouse, and mining and renewable energy development present important long-term opportunities for economic development and job creation in this area of Oregon;

Whereas significant outdoor recreation including hunting, wildlife viewing, and hiking occurs in and depends on high-quality habitat in the areas of Oregon occupied by sage-grouse, and these activities provide additional economic, social, and other public benefits to Oregonians;

Whereas a federal ESA listing of the sage-grouse in the absence of a state plan likely would interfere with opportunities for future economic development in Eastern Oregon and could threaten the ranching industry in ways that would have significant adverse economic and social effects on Oregon citizens, businesses, and communities;

Whereas the Oregon Department of Fish and Wildlife has established population and habitat goals for the sage-grouse in Oregon that include:

- A population goal to maintain or enhance sage-grouse abundance and distribution at the 2003 spring breeding population level, approximately 30,000 birds, over the next 50 years; and

- A habitat goal to retain at least 70% of sage-grouse range as sagebrush habitat in advanced structural stages—sagebrush class 3, 4, or 5, with an emphasis on classes 4 and;

Whereas the Oregon Department of Fish and Wildlife adopted an updated conservation strategy for sage-grouse in 2011;

Whereas the Oregon Fish and Wildlife Commission has adopted supplemental rules to guide sage-grouse conservation and compensatory mitigation for impacts to sage-grouse habitat;

Whereas the Oregon Land Conservation and Development Commission (LCDC), working closely with county governments and others, has adopted new rules designed to steer future development away from important sage-grouse habitat—supplementing Oregon's already strong land-use system that generally directs most development to urban areas;

Whereas the Oregon Sage-Grouse Action Plan has been developed collaboratively through the work of the SageCon Partnership over the last three years, involving landowners, non-governmental organizations, local governments, and state and federal agencies;

Whereas the State of Oregon has worked closely with the federal Bureau of Land Management (BLM) to align the Oregon Sage-Grouse Action Plan with many elements of the new Resource Management Plans for the five BLM districts within Oregon;

Whereas the Oregon Sage-Grouse Action Plan, the BLM Resource Management Plans, and the CCAAs and CCAs entered into by private landowners effectively align conservation strategies for sage-grouse and management of sagebrush habitats across private and public lands across all sage-grouse habitat in Oregon; and

Whereas, effective implementation of conservation strategies and actions associated with the Oregon Sage-Grouse Action Plan will require engagement, functional alignment, and coordination across state, federal, tribal and private land ownership boundaries among all stakeholders to realize the social, economic and ecological benefits of a comprehensive approach to sage-grouse conservation and rangeland health.

NOW THEREFORE, IT IS HEREBY DIRECTED AND ORDERED THAT:

1. The Oregon Sage-Grouse Action Plan is adopted as the plan for the conservation of sage-grouse in Oregon.

2. All state agencies shall carry out the actions described in the Oregon Sage-Grouse Action Plan to the full extent of their authorities and funding.

3. Specifically, and without limitation to the foregoing paragraph 2, the following actions shall be taken:

A. The Oregon Department of Forestry (ODF) shall provide technical and financial support to RFPAs to improve their capacity and effectiveness in controlling and limiting the adverse effects of rangeland fire on sage-grouse habitat on both federal and non-federal lands. Working collaboratively with RFPAs and the BLM, ODF shall develop a Memorandum of Agreement to assist in the coordination of rangeland firefighting and to protect the safety of those participating in such efforts.

B. The Oregon Department of Land Conservation and Development (DLCD) shall maintain a central registry of development on all lands within sage-grouse habitat in coordination with the BLM and county governments that both establishes the baseline level of development within each Priority Area for Conservation (PAC) and that tracks the location and geographic extent of new development in each PAC over time.

C. DLCD shall have the responsibility to coordinate the actions of Oregon agencies in implementing the Sage-Grouse Action Plan, under the supervision of my Natural Resources Office (GNRO).

D. All state agencies that carry out, fund, or permit actions within sage-grouse habitat—including but not limited to the Oregon Water Resources Department, the Oregon Department of Transportation, the Department of State Lands, the Department of Geology and Mineral Industries, the Oregon Department of Energy (ODOE) and the Energy Facility Siting Council, the Oregon Watershed Enhancement Board (OWEB), the Oregon Department of Agriculture, the Oregon Parks and Recreation Department, and the Department of Environmental Quality—shall adopt or update their state agency coordination plans and agreements with DLCD pursuant to ORS 197.180 and OAR Chapter 660, Division 30 to ensure that such actions comply with the LCDC Sage-Grouse Conservation Rules (OAR 660-023-0115) adopted to implement LCDC Goal 5 (Significant Natural Resources). State agency actions affecting land use also shall be consistent with the ODFW Sage-Grouse Mitigation Rules adopted at OAR 635-0140-0000 thru 635-140-0025. To the extent that an agency's regulatory program needs to be updated to be consistent with the LCDC and ODFW rules, the agency shall complete that updating by no later than July 1, 2016.

E. ODFW, working with the BLM and other federal, state, and local entities, shall have the responsibility to coordinate mitigation for impacts to sage-grouse and sage-grouse habitat in a manner consistent with the Sage-Grouse Action Plan and the agency's mitigation rules at OAR 635-140-0000 thru 635-140-0025. ODFW shall also work with ODOE, OWEB, Business Oregon, and other relevant state, federal, local, private and non-governmental entities to evaluate approaches and mechanisms for funding advance mitigation, with the intent of ensuring sage-grouse mitigation credits are available in the State's in-lieu fee program and facilitate responsible economic development in the range of the sage-grouse.

F. DLCD, in cooperation with ODFW local governments and the counties shall prepare a report on at least a biennial basis beginning on July 1, 2016, providing information regarding the status and trends of work to reduce threats to sage-grouse and sage-grouse habitat, including but not limited to work to reverse the spread of juniper and invasive plant species, work to improve pre- and post-fire resilience, the amount of direct development in each PAC over the preceding two years, the amount and types of compensatory mitigation, the results of surveys of sage-grouse population and habitat condition and trends, areas and/or elements where the Sage-Grouse Action Plan is and is not functioning as intended, and recommendations for improving the efficacy of the Sage-Grouse Action Plan. DLCD also shall include in the report an evaluation of the economic effects of implementation of the Sage-Grouse Action Plan on communities within sage-grouse habitat.

G. OWEB shall work with the NRCS, ODFW, and my Natural Resources Office to assure that its funding commitments are directed to supporting actions that reflect the priorities identified in the Sage-Grouse Action Plan, and that monitoring of the effectiveness of these investments is sufficient to evaluate overall Plan effectiveness and adapt the Plan as appropriate.

H. DLCD and ODFW, working with my Natural Resources Office, in cooperation with other participants, shall develop by July 1, 2016 one or more memoranda of agreement between federal agencies, state agencies, local governments, and other partners that establish:

i. How the BLM, DLCD and the counties will coordinate their administration of the central registry of large-scale development within sage-grouse habitat;

ii. How ODFW will coordinate administration of the landscape-level mitigation program for sage-grouse with the BLM, USFWS, counties, and other partners;

iii. How ODFW will ensure early, efficient and constructive participation of its staff in local permit reviews of projects subject to Oregon Administrative Rules, Chapter 660, Division 30, or other applicable local ordinances where a county has adopted its own land use regulations implementing that rule; and

iv. How state and federal agencies will align their conservation investment priorities and programs for sage-grouse in cooperation with local governments, tribes, landowners, conservation organizations, and other stakeholders.

I. Every two years, beginning in May of 2016, DLCD, ODFW and OWEB shall prepare a proposed budget for the coming biennium that identifies and prioritizes resources required to continue the successful implementation of the Oregon Sage-Grouse Action Plan.

J. In the event of any inter-agency disputes regarding the administration of the Sage-Grouse Action Plan or this executive order, the agencies involved shall first attempt to resolve the dispute at the line staff level. If line staff are unable to resolve the dispute, the matter shall be elevated to the directors of the agencies. If the agency directors are unable to resolve the dispute, the matter shall be elevated to my Natural Resources Policy Advisor for resolution.

K. In the event that the USFWS determines that a listing of sage-grouse as threatened under the ESA is warranted, ODFW, DLCD, and my Natural Resources Office shall work with the USFWS to develop and implement a federal protective regulation under section 4(d) of the ESA (16 U.S.C. § 1533(d)) such that the "take" prohibition of the ESA will not apply to the sage-grouse-related impacts in Oregon from specified activities addressed by the Oregon Sage-Grouse Action Plan so long as Oregon is fully implementing Action Plan provisions specific to those activities.

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This Executive Order shall remain in effect until it is otherwise modified, amended or terminated.

Done at Salem, Oregon, this 16th day of September, 2015.

Kate Brown
GOVERNOR

ATTEST:

Jeanne P. Atkins
SECRETARY OF STATE

Authors

Lead Content Developers

Brett Brownscombe, Oregon Department of Fish and Wildlife - Editor
Theresa Burcsu, Institute for Natural Resources - Editor
Jackie Cupples, Oregon Department of Fish and Wildlife - Editor

Richard Whitman, Governor's Natural Resources Office - Final Proof Review
Jamie Damon, Institute for Natural Resources - Final Proof Review

Mary Finnerty, The Nature Conservancy - Cartographer
Sara O'Brien, Willamette Partnership - Consistency Editor
Linda Rahm-Crites, The Nature Conservancy - Copy Editor
Robert Swingle, Oregon Department of Fish and Wildlife - Graphics and Cover
Lindsey Wise, Institute for Natural Resources - Formatting Editor

Contributing Authors

Julia Babcock, Oregon Solutions
Chad Boyd, Agricultural Research Service
Brett Brownscombe, Oregon Department of Fish and Wildlife
David Budeau, Oregon Department of Fish and Wildlife
Theresa Burcsu, Institute for Natural Resources
Jackie Cupples, Oregon Department of Fish and Wildlife
Jamie Damon, Institute for Natural Resources
Dawn Davis, Oregon Department of Fish and Wildlife
Jon Jinings, Department of Land Conservation and Development
Jay Kerby, The Nature Conservancy
Cathy Macdonald, The Nature Conservancy
Ken Mayer, Western Association of Fish and Wildlife Agencies
Holly Michael, Oregon Department of Fish and Wildlife
Sara O'Brien, Willamette Partnership
Eric Rickerson, Oregon Department of Fish and Wildlife
Tony Svejcar, Agricultural Research Service
Richard Whitman, Governor's Natural Resources Office

Technical Contributors

Joe Bernert, Institute for Natural Resources
Jon Bowers, Oregon Department of Fish and Wildlife
Steve Buttrick, The Nature Conservancy
Phil Carver, Oregon Department of Energy
Todd Cornett, Oregon Department of Energy
Dawn Davis, Oregon Department of Fish and Wildlife
Gordon Foster, Oregon Department of Forestry
Craig Goodell, Bureau of Land Management
Aaron Jones, The Nature Conservancy
Jimmy Kagan, Institute for Natural Resources
Jeff Kern, Oregon Department of Fish and Wildlife
Sara O'Brien, Willamette Partnership
Stephanie Page, Oregon Department of Agriculture
Brian Pew, Oregon Department of Forestry
Arthur Rodriguez, Oregon Department of Fish and Wildlife
Zola Ryan, Natural Resources Conservation Service

Michael Schindel, The Nature Conservancy
Marty Suter-Goold, Harney Soil and Water Conservation District
Diana Walker, Oregon Department of Agriculture

Lead Reviewers

Tim Butler, Oregon Department of Agriculture
Chip Dale, Oregon Department of Fish and Wildlife
Stacy Davies, Roaring Springs Ranch
Megan Decker, Renewable Northwest Project
Jeff Everett, U.S. Fish and Wildlife Service
Glenn Frederick, Bureau of Land Management
Brian Fritz, Pacificorp
Shauna Ginger, U.S. Fish and Wildlife Service
Judge Steve Grasty, Harney County
Christian Jilek, Oregon Department of Transportation
Commissioner Ken Kestner, Lake County
Meta Loftsgaarden, Oregon Watershed Enhancement Board
Cathy Macdonald, The Nature Conservancy
Jeremy Maestas, Natural Resources Conservation Service
Mary Anne Nash, Oregon Farm Bureau
Mark Nystrom, Association of Oregon Counties
Zola Ryan, Natural Resources Conservation Service
Lynn Sharp, Renewable Northwest Project
Andrew Shields, Roaring Springs Ranch
Marty Suter-Goold, Harney Soil and Water Conservation District
Joan Suther, Bureau of Land Management
Bruce Taylor, Oregon Joint Habitat Venture

Acknowledgements

Special Thanks for Partnership Efforts

The Sage Grouse Conservation Partnership has sustained through good faith efforts to come to the table, exchange information, share resources, build relationships, and problem solve collaboratively. Thank you to all of the SageCon partners and their staff who contributed to the many hours of planning, traveling, conference calls, meetings, presentations, reporting, discussions, field work, tours, technical analyses, and expertise that went into developing the Action Plan and subsequent investments and resources to secure the health and long-term viability of sage-grouse and the surrounding communities.

Special thanks to the conveners and staff of the Sage Grouse Conservation Partnership:
Richard Whitman and staff, Governor's Natural Resources Office - Convener
Mike Haske and staff, Bureau of Land Management - Convener
Ron Alvarado and staff, Natural Resources Conservation Service - Convener
Jamie Damon, Institute for Natural Resources - SageCon Partnership Project Manager
Julia Babcock, Oregon Solutions - SageCon Partnership Administrative Lead
Theresa Burcsu, Institute for Natural Resources – SageCon Partnership Technical Lead

For additional insights, contributions, and staffing, many thanks to:

Pete Dalke, Oregon Solutions
Garth Fuller, The Nature Conservancy
Shauna Ginger, U.S. Fish and Wildlife Service
Paul Henson, U.S Fish and Wildlife Service
Margi Hoffman, Governor's Office
Jon Jinings, Department of Land Conservation and Development
Cathy Macdonald, The Nature Conservancy
Tom Makowski, Natural Resources Conservation Service
Ken Mayer, Western Association of Fish and Wildlife Agencies
Sara O'Brien, Willamette Partnership
Turner Odell, Oregon Consensus
Bruce Taylor, Oregon Joint Habitat Venture
Richard Whitman, Governor's Office

A full list of participants in the Sage Grouse Conservation Partnership by affiliation is in Appendix 1

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List of Acronyms

AML	Appropriate Management Level
APHIS	Animal and Plant Health Inspection Service
ARS	Agricultural Research Service
AUM	Animal Unit Month
BLM	Bureau of Land Management
CCA	Candidate Conservation Agreement
CCAA	Candidate Conservation Agreement with Assurances
COT	Conservation Objectives Team
CHAT	Crucial Habitat Assessment Tool
CWMA	Cooperative Weed Management Area
DLCD	Department of Land Conservation and Development
DOGAMI	Oregon Department of Geological and Mining Industries
DSL	Department of State Lands
DSS	Decision Support System
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FIAT	Fire and Invasives Assessment Team
GIS	Geographic Information System
HMA	Herd Management Area
ILAP	Integrated Landscape Assessment Project
KCI	Key Conservation Issues
LANDFIRE	Landscape Fire and Resource Management Planning Tools
LCDC	Land Conservation and Development Commission
LIT	Local Implementation Team
NRCS	Natural Resources Conservation Service
OAR	Oregon Administrative Rule
ODA	Oregon Department of Agriculture
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife

ODOE	Oregon Department of Energy
ODOT	Oregon Department of Transportation
OHV	Off-Highway Vehicle (syn. ATV, All Terrain Vehicle)
ORS	Oregon Revised Statute
OSU	Oregon State University
OSWB	Oregon State Weed Board
OWEB	Oregon Watershed Enhancement Board
OWRD	Oregon Water Resources Department
PAC	Priority Areas for Conservation
R&R	Resistance and Resilience
REECon	Renewable Energy and Eastern Oregon Landscape Conservation Partnership
RFPA	Rangeland Fire Protection Association
RMP	Resource Management Plan
RPA	Rangeland Protection Association
SGI	Sage Grouse Initiative
SSP	Site Specific Plan
STM	State-and-Transition Model
SWCD	Soil and Water Conservation District
TNC	The Nature Conservancy
UGB	Urban Growth Boundary
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WAFWA	Western Association of Fish and Wildlife Agencies
WMU	Wildlife Management Unit
WNv	West Nile Virus

Executive Summary

Oregon's eastern landscape is one of rich ecological and cultural heritage. Working lands—including ranching and farming operations—are the primary economic driver of the region, and the nexus for communities that come together when faced with opportunities and challenges around natural resource management. These lands are composed of large, contiguous acres of habitat, spanning private and public land ownership boundaries within an extensive sagebrush ecosystem, known to some as the "Oregon outback" or the "sagebrush sea," and known to others as home.

There are more than 18 million acres of sagebrush habitat in Oregon, interwoven with playas, deep-cut river canyons, and forests. Conservation of this area, its open spaces, and its wildlife has long been part of Oregon's history, and while institutions, communities, and economies have changed over time, it remains so today.

With the U.S. Fish and Wildlife Service (USFWS) considering whether to list the greater sage-grouse under the federal Endangered Species Act (ESA), the State of Oregon has worked with a diverse set of partners over the past five years to advance a comprehensive approach to sage-grouse conservation. This document, *The Oregon Sage-Grouse Action Plan* (hereafter "Action Plan"), is intended to articulate and achieve Oregon's vision for the conservation of the sage-grouse and its habitat in Oregon. The Action Plan is based on an ecological approach promoting intact and functioning sagebrush landscapes that are important to a vast number of species in addition to the sage-grouse.

The Action Plan is a product of the Sage-Grouse Conservation (SageCon) Partnership, an Oregon-based collaborative effort jointly convened by the State of Oregon through the Governor's Natural Resources Office, the U.S. Bureau of Land Management (BLM), and the Natural Resources Conservation Service (NRCS). In developing the Plan, the SageCon Partnership engaged local counties, landowners, energy and other development interests, conservation and other nongovernmental organizations, the USFWS, and additional partners who, together, are essential to its success.

The sage-grouse is very sensitive to the effects of human development, so steering those activities away from the most important and sensitive areas in order to avoid habitat fragmentation and other impacts is critical. However, the greatest current threats to most sage-grouse populations in Oregon are large-scale ecological trends driven by such forces as wildfire, invasive plant species, and juniper encroachment.

Healthy rangelands are also important to livestock operations, hunting, and other drivers of the economic and cultural vitality of Oregon's sagebrush country. The habitat-based threats to the sage-grouse are the same threats that are facing the economic, recreational, and community values tied to healthy rangelands. By advancing sagebrush ecosystem health, sage-grouse

population recovery, and strategic, conservation-based approaches to rangeland uses and development, this Plan also seeks to promote the security, sustainability, and vitality of Oregon's rural communities and economic interests.

The Action Plan provides a coordinated framework for action and accountability among private, nongovernmental, local, State, and federal partners in advancing immediate and long-term efforts. To achieve sage-grouse population and habitat objectives, the Plan builds upon and enhances past and ongoing efforts, including the Oregon Department of Fish and Wildlife's (ODFW's) *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon* (2011).

The Action Plan is built on the premise that conservation strategies must be adaptable to local conditions and needs, and must be supported by long-term investments and regulatory commitments. With the backing of an executive order from Oregon Governor Kate Brown and the continued collaboration and sustained support of many stakeholders, the Action Plan provides commitment to and optimism for a signature species of Oregon's spectacular high desert and the American West.

The strength of this Plan lies in several key features, some of which are listed below.

- It puts forward a collaborative and integrative approach to planning and implementation—aligning State, federal, and local government programs and voluntary efforts undertaken by private landowners to focus efforts on the greatest threats and priorities.
- It focuses on maintaining and restoring high-quality, high-functioning sagebrush ecosystems and enhancing partnerships through the following:
    - Ongoing and major new State investments to address habitat threats from wildfire, invasive plant species, and juniper encroachment;
    - Additional regulatory protections for significant sage-grouse habitat under the State's already strong land-use laws; and
    - A science-based assessment of threats and a framework to steer conservation investments and actions to where they can be most effective, to monitor effectiveness against metrics for success, and to ensure adaptive management.
- It will implement a mitigation hierarchy and framework to ensure that any permitted habitat losses in sage-grouse habitat are offset so as to achieve a net conservation benefit, while also providing a science-based approach designed to increase flexibility and predictability for economic development.

The Plan's various sections and appendices describe these features in more detail. Section I: A Strategy for Action – Summary and First Steps is a summary of the Plan. Section II: Implementation and Coordination – Partnerships that Work presents the Plan's approach to implementation and coordination, including an overview of new and ongoing conservation measures. Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through

Strategic Efforts describes the Plan's ecological approach and foundation, including a summary of sage-grouse population and habitat trends; the State's Core Area approach and its related objectives; and the tools that are available to advance strategic implementation. And Section IV: Assessing and Addressing Threats to Sage-Grouse, the most detailed part of the Plan, presents an assessment of threats to the sage-grouse in Oregon, followed by subsections describing the Plan's approach to addressing those threats, based on both existing and new measures and strategic approaches. The appendices attached to the Plan include further detailed information related to Sections II, III, and IV.

Through the State's Action Plan and its associated actions—new State rules; the Governor's Executive Order; substantial existing and new State-based funding commitments; and continued expansion of strong partnerships, including those related to Candidate Conservation Agreements with Assurances (CCAAs) and Rangeland Fire Protection Associations—Oregon is advancing a robust and carefully designed program to address and ameliorate threats to the vitality of sage-grouse and their habitat. Oregon's approach has been crafted to stem and reverse the decline of the species.

True to Oregon's heritage and spirit of cooperation in overcoming challenges, it will take many people working together to reach our goals of long-term conservation of healthy sage-grouse habitat and populations coupled with promotion of healthy rural economies and communities. Many individuals and groups are already working hard to do so, and through this Plan, Oregon intends to grow our existing relationships so that our conservation and working-lands heritage and ethics are passed on for generations to come.

Sage-grouse displaying on a lek. Photo: Jeremy Roberts, Conservation Media.

Section I: A Strategy for Action – Summary and First Steps

i. A Call to Action

Sagebrush country in central and eastern Oregon is home to close-knit rural communities and an economy centered on agriculture and natural resources. It is also home to the greater sage-grouse (*Centrocercus urophasianus,* hereafter the "sage-grouse"), a species at risk and an important indicator of the overall health of sagebrush ecosystems. These ecosystems are increasingly threatened by large-scale drivers like wildfire and invasive species that affect not only wildlife, but also the human communities and economic systems that depend on healthy and productive lands.

With the U.S. Fish and Wildlife Service (USFWS) considering whether to list the sage-grouse as threatened or endangered under the federal Endangered Species Act (ESA),[1] the State of Oregon has worked with a diverse set of partners over the past five years to lay the foundation for a comprehensive approach to sage-grouse conservation by:

- Aligning State, federal, and local government programs and priorities, as well as voluntary efforts implemented by participating private landowners and nongovernment organizations, to focus investments on the highest priorities for sage-grouse conservation.
- Providing for major new state investments—that will also leverage additional investments from federal and local partners—to promote habitat health and resilience, including funds focused on the biggest drivers of habitat-based threats to sage-grouse in Oregon: wildfire, invasive weeds, and encroachment of juniper trees.
- Establishing additional protections for significant sage-grouse habitat under the State's already strong land-use laws.
- Creating a new policy framework to provide flexibility and mitigation for economic development in sage-grouse habitat and ensure that any permitted habitat losses are more than offset by other conservation actions.

Partners contributing to these efforts recognize that success depends on the health of the broader sagebrush ecosystem and the human communities and economies it supports. This document, The Oregon Sage-Grouse Action Plan (hereafter "Action Plan"), is intended to

[1] In 2010, the U.S. Fish and Wildlife Service (USFWS) determined the greater sage-grouse is "warranted but precluded" from listing as threatened or endangered under the federal Endangered Species Act (16 U.S. C. §§ 1531 *et seq.*) Pursuant to a court-ordered schedule, the USFWS is set to review and make a final determination in 2015 as to the ESA listing status of the sage-grouse across its range in 11 western states, including Oregon. See U.S. Fish and Wildlife Service, Species Profile: Greater Sage-Grouse (*Centrocercus urophasianus*), http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06W (2014).

articulate and achieve Oregon's vision for the conservation of the sage-grouse and its habitat in Oregon. By advancing sagebrush ecosystem health; recovering viable sage-grouse populations; and promoting strategic, conservation-based approaches to rangeland uses and development, the Action Plan also seeks to promote the sustainability and vitality of Oregon's rural communities and economic interests.

The Action Plan is built on the premise that conservation strategies need to be adaptable to local conditions and needs and backed up with long-term investments, partnerships, and regulatory commitments. With continued collaboration and the sustained support of its many stakeholders, the State's Action Plan provides commitment to and optimism for the conservation and recovery of this signature species of Oregon's spectacular high desert and the American West.

A federal ESA listing of the sage-grouse would remove the primacy of State and local management jurisdictions and have significant implications for Oregon citizens, businesses, and institutions in shaping economic development, rural community health, and habitat management. Thus, this Action Plan also works proactively to advance the ability of Oregonians to shape our own future. The Action Plan and its component parts represent Oregon's case for why a future listing of the sage-grouse under the ESA is unnecessary. However, the State's commitment to sage-grouse conservation and addressing threats to the vitality of Oregon's sagebrush ecosystem is strong and long-standing; it exists and will persist apart from the outcome of the upcoming federal listing determination. As such, this Action Plan will be implemented regardless of the ESA listing status determination.

The Action Plan provides a coordinated framework for action and accountability among private, nongovernmental, local, State, and federal partners in advancing immediate and long-term efforts. To achieve the State's sage-grouse population and habitat objectives, the Action Plan builds upon and enhances past and ongoing efforts, including the Oregon Department of Fish and Wildlife's (ODFW's) *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon* (hereafter "2011 Strategy").

The Action Plan has been developed through the Sage-Grouse Conservation (SageCon) Partnership, an Oregon-based collaborative effort jointly convened by the State of Oregon through the Governor's Natural Resources Office, the U.S. Bureau of Land Management (BLM), and the Natural Resources Conservation Service (NRCS). In developing the Action Plan, SageCon engaged local counties, landowners, energy and other development interests, conservation and other nongovernmental organizations, the USFWS, and additional partners who, together, are essential to its success. The SageCon Partnership also provided an opportunity to build upon and bring together other key efforts that are important components of this Action Plan, such as the work of ranchers and other local interests to develop conservation agreements on federal and nonfederal rangelands, as well as the effort of diverse partners to advance new rules

related to mitigation and large-scale development activities. This Action Plan documents those important conservation efforts and other existing and planned actions in Oregon.

By working across land ownership boundaries, engaging multiple partners, and addressing identified threats to sage-grouse habitat, as well as to rangeland-associated communities and economies, the Action Plan not only conserves the sage-grouse and multiple other species, it also protects human interests dependent on the same land in a manner compatible with traditional farm and ranch economies. Further, the Action Plan works to align incentives for existing landowners and future economic development pathways for industries such as mining and renewable energy with net conservation gains for the sage-grouse and its habitat.

This Action Plan is thus a call to action. It recognizes that the sage-grouse and its habitat need attention now, as does the welfare of rural Oregon communities and economies. It recognizes that the vitality of both eastern Oregon communities and the bird are inextricably linked to a healthy sagebrush ecosystem, and that sage-grouse conservation will succeed only if the species is viewed as an asset that will benefit communities and landowners as populations become more robust.

The strength of the Action Plan lies in several key features, including the following:

- A collaborative and integrative approach to planning and implementation;
- A focus on maintaining and restoring functioning sagebrush ecosystems and steering conservation investments to where they can be most effective; and
- A science-based assessment of threats, the establishment of goals and objectives for addressing threats, and a framework for adaptive management.

The remainder of this section provides a brief overview of these features, and the sections that follow describe each in greater detail.

ii. Implementation and Coordination—Partnerships That Work

Oregon's eastern landscape is one of rich ecological and cultural heritage. Working lands—including ranching and farming operations—are the primary economic driver of the region, and the nexus for communities that come together when faced with opportunities and challenges around resource management.

These working lands are composed of large, contiguous acres of sagebrush habitat and are dependent upon coordinated management across both private and public land ownership boundaries. There are more than 18 million acres of sagebrush habitat in Oregon, interwoven with playas, deep-cut river canyons, and forests. In addition to the greater sage-grouse, pronghorn, elk, raptors, shorebirds and songbirds, trout, and kit fox all call this place home, along with cattle, sheep and free-roaming horses. Rich stories of Euro-American settlers, stock

growers, and Native Americans depict the area's history in our schools, books, and museums. Basque shepherds, alfalfa growers, cowboys, hunters, naturalists and wildland enthusiasts, and tribal hunters and gatherers are among those who have had and continue to have their own unique relationship with the land and its plants and wildlife. Conservation of this area, its open spaces, and its wildlife has long been part of this history, and while institutions, communities, and economies have changed over time, it remains so today.

Today there is new evidence of this spirit of partnership between working lands and conservation. Soil and Water Conservation Districts (SWCDs), led by the Harney County SWCD; State agencies; livestock operators; and organizations like the Oregon Cattlemen's Association are working together with federal agencies to develop innovative agreements that support responsible livestock grazing in sage-grouse habitat. Other entities such as the Burns Agricultural Research Station, organizations such as The Nature Conservancy, and local ranches are working to advance mutually supportive working lands and conservation objectives through the integration of research and management practices. Likewise, Oregon's land-use planning system and related local-level planning efforts are working to steer development impacts away from high-value agricultural lands and important sage-grouse habitat. Oregon has a long history of supporting local communities whose livelihoods depend on the health of diverse ecological systems in order to sustain the unique human heritage imprinted on the land.

The SageCon Partnership itself is part of that trend. In 2010, the Oregon Governor's office and the BLM's Oregon office began convening meetings in response to growth in renewable energy development and sagebrush conservation, as well as the USFWS's "warranted but precluded" federal ESA finding for the sage-grouse. The partners were driven by the need to develop a coordinated picture of ongoing and projected efforts, both regulatory and voluntary, to address threats not just to sage-grouse conservation but to rangeland and rural community health. This recognition and vision led to the initiation of the SageCon Partnership in September 2012 and the collaborative effort to build agreement and partnership around the approaches represented in this Action Plan.

At the regional and national levels, 2012 was also the year U.S. Secretary of the Interior Ken Salazar and Wyoming Governor Matt Mead convened a meeting of western states in the range of the sage-grouse, which led to the formation of the Sage-Grouse Task Force. Staffed by the Western Governors' Association, engagement in the Task Force since its inception has included leaders from the USFWS, BLM, NRCS, and the U.S. Forest Service (USFS) as well as each of the western states in the range of the sage-grouse, including Oregon. It has served to coordinate and collaborate on State-level planning efforts and to facilitate discussions between sage-grouse states and the federal government in advance of the pending 2015 ESA listing determination by the USFWS. While this Action Plan is Oregon's effort, it nests within a larger context that includes an 11-state planning effort, BLM and USFS federal land-management plan

revisions, and the NRCS's ongoing positive advancement of the Sage Grouse Initiative (SGI) and related programs with State and local partners.

This Action Plan is a coordinated product of the SageCon Partnership's effort, which has worked to take a more integrative, holistic approach across management boundaries to set forth prioritized strategies and future actions for the conservation of the sage-grouse and its habitat in Oregon. The ultimate success of these strategies and actions depends on local implementation, coordination across the area, and tracking effectiveness through monitoring and reporting. Implementation and tracking of the Plan's actions will require the sustained work of many people and organizations, which will continue to be a collaborative effort between the State, local governments, landowners and managers, conservation and other nongovernmental organizations, and federal partners including the BLM and NRCS.

The work outlined in this Plan will be implemented and coordinated through a number of significant new efforts. These measures, and the roles and coordination efforts needed to implement them, are described in more detail in Section II: Implementation and Coordination – Partnerships that Work and Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts and include the following:

- Significant changes to the State's land-use rules and mitigation policy through State agency rulemaking
- A coordinated set of new investments to implement conservation actions to address key threats
- Voluntary conservation agreements between federal agencies and State and private landowners
- A memorandum of agreement among state, federal, and local partners
- The Governor's Executive Order that directs implementation of this Plan and coordination across relevant levels of Oregon government entities

iii. An Ecological Approach—Healthy Landscapes and Wildlife Through Strategic Efforts

The sage-grouse is a wide-ranging, sagebrush-obligate species, meaning that, without sagebrush, the bird cannot meet its fundamental forage needs and will not survive. Within the sagebrush ecosystem, however, the sage-grouse requires a variety of plant community types to meet the needs of its annual life cycle. Thus, this Action Plan, while focused on the habitat needs of sage-grouse, is driven by and addresses the overall health of the sagebrush ecosystem and its habitats.

From an ecological perspective, this Action Plan works to promote intact and functioning sagebrush landscapes, which are important to a number of other species besides the sage-grouse (Maser et al. 1984; Rowland et al. 2005; Hanser and Knick 2011). The Plan considered

and assessed the relative benefits to multiple species besides the sage-grouse in developing its conservation actions. While the Plan has a species-specific focus and title based on the USFWS's pending ESA listing review, its overall ecosystem-based approach should assist managers in advancing opportunities to benefit other species as well. As such, the Action Plan is consistent with the underlying ecosystem-based policy purpose of the Endangered Species Act: "… to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved …"[2]

The sage-grouse is very sensitive to the effects of human development, and while this Plan proactively addresses this concern, the greatest current threats to most sage-grouse populations in Oregon are landscape-scale ecological trends such as wildfire, invasive species, and encroachment by native conifers (Boyd et al. 2014). Because these threats function on such large scales, and because there are limited resources available to address them, a strategic approach to conservation implementation is imperative, utilizing the best available science to target actions where sage-grouse benefits can be maximized. The Plan draws on several key resources to achieve this strategic, ecological approach, as discussed further in Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts. These include the following:

- The sage-grouse populations and habitat objectives established in ODFW's 2011 Strategy and related administrative rules;
- The State's Core Area approach[3] for identifying and conserving the highest-priority sage-grouse habitat, as established in the ODFW 2011 Strategy and related rules; and
- Spatial tools and data to help guide strategic investments.

a. Population and Habitat Objectives

Consistent with state statutes, its administrative rules, and its mission, ODFW adopted and maintains the 2011 Strategy, which describes population and habitat goals and objectives for the sage-grouse. In brief, pursuant to the Strategy and recently updated administrative rules, they are:

- Population: The overall policy is to maintain or enhance sage-grouse abundance and distribution at the 2003 spring breeding population level, approximately 30,000 birds, over the next 50 years. Regional population objectives also exist for five implementation areas.
- Habitat: The overarching habitat goal is to maintain or enhance the distribution of sagebrush habitats in Oregon with the objective to retain greater than 70% of sage-grouse range as sagebrush habitat in advanced structural stages and to manage the

[2] 16 U.S.C. § 1531 (b)

[3] In Oregon, Core Areas are equivalent to Priority Areas for Conservation (PACs), as referenced in subsequent sections of this Plan.

remaining 30% (areas of juniper encroachment, non-sagebrush shrubland, and grassland) to increase available habitat within the range of the sage-grouse.

Since ODFW owns relatively little land and the State does not have direct management jurisdiction over most sage-grouse habitat, conservation success relies upon effective partnerships. It is imperative to incentivize and enlist the help of land managers from federal and state agencies, nongovernmental organizations, and private entities in addressing the habitat threats to sage-grouse as well as other rangeland interests. This Action Plan recognizes and works to positively address this reality.

Together, habitat actions on private and public ground have been and continue to be considerable; however, realizing successful results from habitat restoration work requires time and sustained effort (including monitoring and adaptive management) and has a far from certain outcome (Davies et al. 2011, Arkle et al. 2014, Avirmed et al. 2015). As this Plan documents, additional actions that are strategically planned, located, and implemented are needed to meaningfully address continuing threats to habitat health, such as wildfire, juniper encroachment, invasive non-native plant species, and other noxious weeds.

b. Core Area Approach

The ODFW 2011 Strategy identified sage-grouse Core Areas[3], providing a strong ecological foundation for focusing threat reduction efforts where sage-grouse are most likely to benefit. This approach identifies the most productive habitat for sage-grouse and directs the highest level of conservation effort there. Core Area designations in Oregon address approximately 90% of the state's breeding populations of sage-grouse within just 38% of the species' current range statewide. Identification of core habitat areas to maintain a viable set of connected populations is an ecologically-based conservation strategy (Doherty et al. 2011).

Although designated Core Areas and their protection are at the center of this approach, other areas of occupied habitat remain important—including for connectivity values that help address population isolation and genetic diversity. For example, the 2011 Strategy identified low-density habitat areas outside core that represent a lower priority for conservation action but in some cases will be important for improved connectivity or seasonal habitats that are essential to meeting the year-round needs of sage-grouse. The Core Area approach implies that negative impacts in areas outside of core habitat create less risk to the long-term persistence and conservation of the sage-grouse, as compared to impacts within Core Areas, and, conversely, that focusing protection and habitat restoration strategies within core habitat is more likely to provide a greater return on investment. As further described in Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts, this Action Plan is founded upon this Core Area approach.

c. Tools for Strategic Investment

With this Action Plan, Oregon is building on the existing Core Area approach to identify sage-grouse conservation priorities at two scales. At the landscape scale, spatial data have been compiled and developed to identify priority areas for different conservation actions and help guide resources to areas with the greatest need or potential return. At the site scale, state-and-transition models and other tools are used to verify priorities identified at the landscape scale and to tailor actions to site-specific conditions. These models provide a key method for linking site-level actions to the ecological approach described above. Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts of this Action Plan, and appendices referenced therein, further describes the strategic framework and supporting spatial data, models, and decision support systems.

iv. Assessing and Addressing Threats to Sage-Grouse

This Action Plan utilizes several sources of information in identifying threats to sage-grouse in Oregon, including the 2011 Strategy, the *Conservation Objectives Team: Final Report* (COT Report) (USFWS 2013), and the USFWS's "warranted but precluded" determination under the federal ESA.[4] In issuing its range-wide "warranted but precluded" finding for the sage-grouse in 2010, the USFWS relied upon two primary factors relevant to the ESA:

- Present or threatened destruction, modification, or curtailment of habitat or range
- Inadequacy of existing regulatory mechanisms

These factors and related threats are further documented and discussed in the COT Report, which the USFWS released in 2013 as a review of the current science, conservation challenges, and opportunities facing the sage-grouse, as compiled by state and federal biologists. In Oregon, the COT Report identifies wildfire, conifers, and annual weeds and grasses as widespread threats to the sustainability of the sage-grouse.

These three habitat-based factors—wildfire, juniper encroachment, and invasive annual grasses—create a vicious cycle that changes natural fire patterns and reduces the likelihood of the re-establishment of sagebrush. To a large extent, detrimental impacts from these threats vary spatially along a biophysical gradient. Encroaching juniper and other conifers primarily affect mid-to-upper elevations where sufficient precipitation allows tree establishment, while altered fire regimes and annual grasses are of most concern at low-elevation, warm and dry sites, where ecosystem resilience to disturbance and resistance to invasion are low (Chambers et al. 2014). The conservation objectives and actions identified in Section IV: Assessing and Addressing Threats to Sage-Grouse of this plan (as well as in Appendix 3) prioritize actions that address juniper encroachment, exotic annual-grass invasion, and wildfire.

[4] 75 Fed. Reg. 13910 (March 23, 2010)

Cheat grass invading sagebrush-steppe habitat.
Photo: Jeremy Roberts, Conservation Media.

The COT Report also identifies other important threats as drivers of habitat loss, disturbance, and fragmentation in Oregon but at a more localized level of presence and scale. This Action Plan addresses these as secondary threats, while treating the widespread issues of wildfire, juniper encroachment, and invasive annual grasses as primary threats. Secondary threats to sage-grouse are more relevant to the adequacy of existing regulatory mechanisms and ESA-listing factors, and include impacts from human development and infrastructure (fences, roads, and electrical lines) and associated noise and predation.

Some of these threats (e.g., conversion to cultivated agriculture) have substantially reduced the extent of sagebrush habitat in Oregon in the past but are not expected to expand significantly into sagebrush areas in the future. Others (e.g., renewable energy development, mining) are currently at a low level of activity, and their relative potential significance as a threat to occupied sage-grouse habitat in Oregon depends on changes in markets, infrastructure, and related future development proposals. The threats table in Section IV: Assessing and Addressing Threats to Sage-Grouse of this Action Plan describes the full range of threats in Oregon. Additional threats that are not focal points of the COT Report (e.g., drought, West Nile virus, predation) but which may have localized or shorter-term negative impacts on sage-grouse are also considered in this Plan.

To assist with conservation planning efforts, Section IV: Assessing and Addressing Threats to Sage-Grouse of this Plan identifies conservation objectives and actions relevant to each of the identified threats in Oregon, indicating where the state already has adequate measures in place and where additional actions are being advanced to ensure that threats are contained and ameliorated. New actions include regulatory mechanisms, an improved approach to prioritizing

and implementing habitat management actions, sources of funding for on-the-ground work, and monitoring and adaptive management. Successful implementation of these measures will address threats to the sage-grouse and its habitat, reverse negative habitat and bird population trends in priority locations, and advance the long-term conservation and recovery of the species in Oregon.

By taking a landscape-level view that spans land ownership boundaries and speaks to the various threats facing sage-grouse in Oregon, this Action Plan represents a comprehensive approach to conservation. Oregon recognizes that the BLM is advancing its own planning effort and related actions for the federal public lands that make up the majority of sage-grouse habitat in Oregon, and that federal regulatory approaches may differ from those of the State in various areas. However, considerable effort has been made to align the BLM and the State's plans.

The State also recognizes that private landowners will remain engaged in their own management planning efforts and practices, based on a landowner's own objectives and authorities, independent of this Action Plan. That said, coordination between the State and BLM has been and remains ongoing, as have efforts with private landowners and local governments. Private, tribal, and state lands within the range of the sage-grouse in Oregon are often ecologically connected to federal public lands and, in many cases, contain habitats (e.g., wet meadows) that are comparatively under-represented on BLM lands and are specifically important to the bird during certain life stages. Strategic and landscape-level work across land ownerships is essential, and this Action Plan is based on an effort to align mapping and prioritization of habitat-based actions, and to develop a coordinated approach to the implementation and tracking of voluntary and regulatory approaches across those land ownership boundaries.

v. First Steps and Next Steps

SageCon partners have already completed many of the key first steps in advancing this Action Plan. The sections that follow document those actions and outline next steps. By demonstrating the work that Oregonians have already conducted, the State provides evidence of a solid foundation in the form of partners whose past actions demonstrate a commitment to continuing efforts to make this Action Plan successful. By outlining a clear path forward with specific roles, actions, funding sources, and structures for adaptive management, this Plan demonstrates the commitment and capacity to maintain and advance healthy ecosystems and communities in Oregon's sagebrush country.

True to Oregon's heritage and spirit of cooperation in overcoming challenges, it will take many people working together to reach our goals of long-term conservation of healthy sage-grouse habitat and populations along with healthy rural economies and communities. Ranchers, tribes,

SWCDs, local governments, federal agency partners, and nongovernmental organizations such as The Nature Conservancy, the Oregon Cattlemen's Association, the Oregon Natural Desert Association, the Mule Deer Foundation, the Oregon Hunters Association, and others are already working hard to conserve the sage-grouse and its habitat in Oregon. Through this Plan, Oregon and its partners hope to maintain and enhance our working relationships so that our heritage and conservation ethics are passed on for generations to come.

The remaining sections of this Action Plan provide much greater detail on the subject matter summarized in this overview section and address the following questions:

- Section II: Implementation and Coordination – Partnerships that Work: How will the Action Plan be implemented, and with what resources? What roles will the State and its partners play to ensure a coordinated, collaborative, and integrated approach?
- Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts: What specific population and habitat objectives does the Plan aim to meet relative to where we are now, and how will implementation resources be targeted at different scales to meet those objectives as effectively and efficiently as possible?
- Section IV: Assessing and Addressing Threats to Sage-Grouse: What are the threats facing the species and its habitat in Oregon, and what past, ongoing, and future actions will address those threats in a strategic and prioritized manner?

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Section II: Implementation and Coordination – Partnerships that Work

i. Introduction

Since the 2010 U.S. Fish and Wildlife Service's (USFWS's) "warranted but precluded" finding and in anticipation of its 2015 Endangered Species Act (ESA) listing determination, federal land management agencies, state and local governments, landowners, and other partners across the sage-grouse's range in Oregon have been working to evaluate and address gaps in the sufficiency of existing approaches to support the long-term viability of the bird and its habitat. Through this effort, Oregon has determined which policies and conservation measures have been or are most likely to be successful and where policies and measures can be strengthened. It has built upon and strengthened existing effective approaches as well as identified and advanced new measures and sources of implementation funding, including the establishment of new statewide rules to ensure regulatory certainty. Collectively, these efforts demonstrate the State's commitment to addressing the threats to sage-grouse and their habitat in Oregon.

In 2010, the Oregon Governor's office and the U.S. Bureau of Land Management's (BLM's) Oregon office began convening meetings in response to growth in renewable energy development and the related conflict, as well as the "warranted but precluded" finding. Facilitated by Oregon Solutions, these meetings advanced information and policy discussion related to renewable energy development and habitat conservation across eastern Oregon and led to the formation of the Renewable Energy and Eastern Oregon Landscape Conservation Partnership (REECon Partnership).

However, with the 2015 deadline for listing status review growing near, and because renewable energy was only one amongst many issues relevant to eastern Oregon's ecosystem health, rural communities, and economic future, the REECon Partnership recognized a need to broaden its focus. Central to this was the inclusion of a wider range of development and other human activities as well as landscape-scale threats to habitat such as wildfire and invasive species. Partners were also driven by the need to develop a coordinated picture of ongoing and projected efforts, both regulatory and voluntary, to address threats not just to sage-grouse conservation but to rangeland health and the vitality of rural communities. Building on two years of the REECon Partnership's efforts, this recognition and vision led to the initiation of the SageCon Partnership in September 2012. The number and diversity of stakeholders at the table grew, the Natural Resource Conservation Service (NRCS) joined the Governor's office and BLM in co-convening the effort, and the SageCon Partnership advanced a collaborative effort to build agreement and partnership around the approaches represented in this Action Plan.

Oregon's collaborative approach to sage-grouse conservation builds on the strength of existing partnerships and programs, using nationally-recognized scientific research together with science specific to Oregon's landscapes and major threats (see Section III: An Ecological

Approach – Healthy Landscapes and Wildlife Through Strategic Efforts and Section IV: Assessing and Addressing Threats to Sage-Grouse). The Action Plan provides a framework for the protection, restoration, maintenance, and enhancement of sage-grouse populations and their habitats in Oregon, in collaboration with local landowners, local government, conservation and other non-governmental organizations, and federal partners. The Action Plan has been developed in close coordination with the BLM, NRCS and its Sage Grouse Initiative, and the USFWS in order to promote consistency in approaches and partnership across land ownership boundaries, including sharing methodologies for defining and monitoring disturbance and working toward a common mitigation and monitoring system.

On federal public lands, Oregon recognizes that the BLM is advancing its own planning effort and related actions, and that federal regulatory approaches may differ from that of the State's in various areas. That said, coordination between the State and BLM has been and remains ongoing. For state-owned and managed land, and for state-led projects, the Action Plan and related Executive Order provides assurance that the State will coordinate across agencies, will remain responsible for implementing its share of conservation actions, and will strategically advance conservation using the plan's approach to prioritizing investments and coordinating with federal and private actors. On private land, the Action Plan provides a framework for the coordination of voluntary actions through Candidate Conservation Agreements with Assurances (CCAAs) and other conservation efforts. The State recognizes that private landowners will remain engaged in their own management planning efforts and practices, based on landowner objectives and authorities independent of this plan. That said, the Action Plan's strategic framework for habitat restoration and protection approaches will inform land owners and managers on effective advancement of actions; will promote coordinated planning, monitoring, and tracking of actions; and, through the plan's related funding investments in these strategic approaches, will incent effective actions and support landowners, local Soil and Water Conservation Districts (SWCDs), Rangeland Fire Protection Associations (RFPAs), and others in leveraging federal, state, and private investments in conservation.

True to Oregon's heritage and spirit of cooperation in overcoming challenges, it will take many people and organizations working together to reach our goals of long-term conservation of healthy sage-grouse habitat and populations along with healthy rural economies and communities. In Oregon, the majority of sage-grouse and their habitat is on federal lands. The BLM manages 75% of the core area of sage-grouse habitat, containing 74% of sage-grouse leks. These lands are publicly owned and managed for the benefit of a wide-ranging set of public interests under the BLM's multiple-use mandate. Private, tribal, and state lands within the range of the bird are often ecologically connected to these public lands and, in many cases, contain habitats (e.g., wet meadows) that are comparatively under-represented on BLM lands and specifically important during certain sage-grouse life stages. Strategic and landscape-level work across land ownerships is thus essential. Many are already working hard to advance this approach and related projects, and through this plan, Oregon and its partners will enhance

these and new efforts to improve sagebrush ecosystem health, ameliorate threats to sage-grouse habitat and population recovery, and promote conservation-based working landscapes.

This section provides an overview of new state-based conservation measures and funding sources, existing state-based funding and related programs that will continue, and the intended integrated approach to Action Plan implementation and responsibilities. While continued partnership and collaboration at the local and landscape levels form the foundation for implementing this Action Plan, the information presented below is intended to provide summary-level clarity and certainty related to the question of how the State will mechanize plan implementation as a matter of law, funding, and governance structure. Communication across state, federal, and local partners is under way and ongoing to secure this plan's coordinated approach to implementation and related commitments through memoranda of understanding and state agency coordination agreements.

ii. New Conservation Measures

As summarized below, the State and SageCon partners have taken several significant actions to enhance the certainty that key threats to the sage-grouse in Oregon will be ameliorated in a way that conserves the bird and its habitat and promotes the recovery and enhancement of both. As compared to 2010—the date of the USFWS's previous review of the bird's status under the federal ESA—Oregon has, through this plan and related actions, provided enhanced certainty related to regulatory mechanisms, capacity (i.e., funding and human resources), and effectiveness (i.e., strategic, prioritized direction).

By adopting new administrative rules, Oregon has advanced a strong legal mechanism atop existing regulatory mechanisms that, when combined and as measured against the pre-Action Plan status quo, will result in conservation benefits that were either not available or less certain to occur. The new rules advance a development permitting process that provides more clarity, predictability, and certainty for project proponents while maximizing the conservation benefits for sage-grouse, including habitat protections and a strengthened mitigation approach that will advance a new funding mechanism to address invasive annual grasses, juniper encroachment, wildfire, and other threats. Furthermore, Oregon Governor Kate Brown's Executive Order adopting this Action Plan ensures the State's approach to addressing threats will be coordinated and implemented across the network of state agencies and related partners.

As a result of the leadership and significant work by SageCon partners in advancing Candidate Conservation Agreements (CCAs) and Candidate Conservation Agreements with Assurances (CCAAs), Oregon has secured additional conservation measures related to private, state, and federal public lands. The nature of these agreements and associated plans provide an additional mechanism for enhancing certainty around implementation and effectiveness of actions addressing threats to sage-grouse in Oregon. Landowner and permittee engagement in these

agreements and related management plans is ongoing and will result in the advancement of conservation measures tied to addressing key habitat-based threats and preventing habitat conversion to incompatible uses. Funding of these measures will be significantly enhanced through new state, federal, and local investments. Substantial new state revenue investments will further enhance certainty around Oregon's ability to implement the plan's strategic approach to conservation actions. These new revenues will supplement continued investments in existing state agency programs that benefit sage-grouse and conservation of their habitats. New and existing-ongoing investments tied to this Action Plan are documented below.

a. Land-Use Rules and LCDC Rulemaking

Since 1973, Oregon has maintained a visionary statewide program for land-use planning, the first of its kind in the nation. The foundation of the program is a set of 19 Statewide Planning Goals (adopted in administrative rules at OAR Chapter 660, division 15). The goals express the State's policies on land use and its economy, including natural resources, and set direction for implementation of the State's land use system as well as related legal accountability. This statewide policy framework, together with local government implementation and private landowner stewardship, has contributed to the quantity and quality of the sage-grouse habitat Oregon has today. The State's existing land use system, related laws and approach to implementation will continue to serve as the foundation for addressing several land-use/development-based threats, as documented in Section IV: Assessing and Addressing Threats to Sage-Grouse of this plan. This foundation, however, has been strengthened with new rules addressing impacts from other potential development activities.

To ensure that any future large-scale development does not threaten the viability and conservation of the sage-grouse and its habitat, the SageCon effort brought partners together to review and revise state and local programs to limit habitat fragmentation and other direct and indirect impacts. Specifically, the Land Conservation and Development Commission (LCDC) convened a Rules Advisory Committee composed of state, local, nongovernmental (NGO) and other representatives, which met from March 2015 to July 2015 to build agreement around how to apply a mitigation hierarchy of avoid, minimize, mitigate (compensatory) to the state and local development review process in order to address future potential development impacts in a manner consistent with sage-grouse protection and conservation. The resulting administrative rule—adopted by the LCDC at its July 24, 2015 meeting in Burns, Oregon and codified at OAR 660-023-0115—advances this intent and strengthens existing land-use rules and policies by directing development away from sensitive habitat. Section IV: Assessing and Addressing Threats to Sage-Grouse of the plan describes the new rule in further detail as applied to specific development-based threats to sage-grouse, and the final rule itself is contained in Appendix 17. The core elements of the rule are:

- Establishment of an avoidance requirement for proposed large-scale development in PACs / core areas, whereby impacts would be allowed only through an analysis that demonstrates (1) the project is dependent on unique geographic or physical features that cannot be found elsewhere, *or* (2) it is not technically feasible to locate the project elsewhere based on accepted engineering practices (and financial costs cannot be the only basis considered); *and* (3) the project provides important economic opportunity, needed infrastructure, or other public health or safety benefits;
- Establishment of a similar avoidance test for low-density sage-grouse habitat, and protective measures for other occupied habitat in proximity to leks. Further, regardless of whether an avoidance test is satisfied, minimization of impacts is required (in PACs, low-density, and general habitat in proximity to leks), along with compensatory mitigation for direct and indirect impacts to sage-grouse pursuant to ODFW's revised mitigation rules (see below).
- Establishment of a backstop threshold and metered approach for future allowable development impacts in PACs. These protections limit total development-based direct impacts to no more than 3% of the total acreage in any PAC, with increases over current baseline development levels not to exceed 1% in a 10-year period.
- Direction to document baseline calculations of current development-based direct impact levels in PACs as well as track future impacts through a central registry. Although the mitigation hierarchy requirements in the rule apply to "large-scale", non-farm development proposals (as defined in the rule), the 3% limitation on direct impacts and 1% protective threshold would apply to direct impacts from the larger suite of government-permitted development in core areas.
- An approach to incorporating the rule into local land-use programs, addressing especially unique local economic development opportunities and coordinating across state agency programs.

b. ODFW Mitigation Policy and FWC Rulemaking

In a joint effort with LCDC and as part of the SageCon effort, the Oregon Fish and Wildlife Commission (FWC) also formed a Rules Advisory Committee to advance a corresponding rule related to mitigation for development in sage-grouse habitat. The intent was to update existing ODFW mitigation policy, in the context of a science-based approach and in recognition of the State's habitat and population objectives, in order to provide more flexibility and certainty around pathways for mitigation of development-based impacts in core (PACs), low-density, and general habitat. The resulting administrative rule—adopted by the FWC at its July 27, 2015 meeting in Salem—advances this intent and strengthens Oregon's approach to ensuring mitigation follows a science-based approach and achieves a net conservation benefit for the bird while also providing development interests with more flexibility and certainty than under previous policy. Section IV: Assessing and Addressing Threats to Sage-Grouse of this plan

describes the new rule in further detail, and the final rule itself is contained in Appendix 19. The core elements of rule are:

- Reaffirmation of the State's sage-grouse population and habitat management objectives as well as core area approach, which are all relevant to ongoing and future sage-grouse protection, habitat restoration, and management actions. In addition, the habitat provisions of the rule incorporate the 3% backstop threshold and 1% metering approach for development impacts in PACs, as discussed in the LCDC rule subsection above.
- Application of the mitigation hierarchy requirements (avoidance, minimization, compensatory mitigation)—as presented in the LCDC rule discussion above—as a core component of ODFW's mitigation policy.
- A requirement that compensatory mitigation must be designed and implemented to achieve a net conservation benefit for sage-grouse by ensuring development-based habitat impacts are offset by a level of habitat functionality capable of supporting greater sage-grouse numbers than the functionality lost.

ODFW's previous mitigation policy required the agency to recommend against any development impacts in core habitat. Therefore the avoidance, minimization, and compensatory mitigation approach in the revised ODFW rules presents a more flexible approach. The previous policy, however, relied on recommendations, that were not binding in many cases and that often did not get implemented in various decision-making and permitting venues. Through their connection to the new LCDC rules and local land-use decisions, as well as their applicability across state agencies and where state authorities apply to federal land decisions, the State now has a stronger approach in place to addressing development-based impacts to sage-grouse and ensuring net-conservation benefits through mitigation.

c. Governor's Executive Order

In September 2015, Oregon Governor Kate Brown issued an Executive Order adopting the Oregon Sage Grouse Action Plan and directing state agencies to implement it. The Executive Order serves to bind and coordinate all relevant Oregon executive branch agencies, providing enhanced certainty that the Action Plan will not only be implemented but that implementation will occur in an integrated and effective manner. In addition to general direction to align and implement agency programs consistent with the plan, the Order provides direction to specific state agencies regarding their roles in addressing wildfire, invasive plant species, habitat resilience and quality, human development impacts, and mitigation. It also emphasizes monitoring, reporting and adaptive management in order to track progress and effectiveness of plan implementation.

The Executive Order recognizes that engagement and coordination across government entities and land ownerships is necessary to ensuring meaningful and effective advancement of sage-grouse conservation as well as rangeland health strategies and actions in Oregon. Based on this

reality, the Order speaks to coordination of state executive branch agencies with federal, private, and other partners, which has direct relevance to advancement of the structure for implementation and coordination of the Action Plan as depicted and described in Coordinated Agency Response and Management below. Specifically, the Executive Order directs the development of an agreement between the State and federal and local governments as well as other partners. As further described in Section IV.ii.a, the agreement(s) will ensure coordination in administration of the central registry related to human development impacts, permitting and landscape-level mitigation, and conservation investment strategies.

Finally, building upon the positive new investments advanced by the 2015 Oregon Legislature described below in Section II.ii.e, the Order requires development of future biennial state budget proposals related to implementing the Action Plan. This and other provisions of the Order would occur regardless of the outcome of the USFWS's pending federal ESA listing determination for sage-grouse, but if the USFWS lists the bird, the Executive Order directs the State to engage the USFWS in development of an ESA Section (4)(d) rule with related coverages and protections for Oregon so long as the State is fully implementing its Action Plan.

d. Candidate Conservation Agreements (CCAs) and Candidate Conservation Agreements with Assurances (CCAAs)

With more than 4 million acres[5] of land covered under CCAs and CCAAs, these agreements have become a hallmark of Oregon's commitment to sage-grouse conservation efforts across land ownerships. CCAs and CCAAs are a proactive, voluntary approach for private and public landowners to advance management plans and conservation measures that address current and future threats to sage-grouse (and/or other potentially listed species) as well as rangeland health on their land. The Department of State Lands (DSL) has entered into a CCAA with USFWS covering approximately 614,000 acres of state-owned lands containing sage-grouse habitat. On private lands, eastern Oregon counties, in partnership with SWCDs, private landowners, and members of the Oregon Cattlemen's Association and the Oregon Farm Bureau, have taken a leadership role in developing CCAAs with technical support from USFWS. These CCAAs relate not only to addressing threats to sage-grouse and their habitat posed by livestock grazing and other management activities on private land, but they also address secondary threats (e.g., fence collisions, construction of towers/perch structures) as well as key biological threats to habitat health. Many of the private lands and ranches associated with CCAAs also hold grazing permits on surrounding BLM lands, where conservation benefits will be advanced through a CCA and engagement by permittees. By combining regulatory assurances for landowners with management plans that require attainment of rangeland health and funding for those actions, the CCAA approach creates the right mix of incentives and disincentives to address not just

[5] http://www.capitalpress.com/Livestock/20150317/oregon-expands-sage-grouse-conservation-agreements

livestock-based impacts but also to advance habitat protections as well as improvements related to invasive annual grasses, juniper, and wildfire resilience.

e. Investments to Address Key Threats

The State recognizes the importance of dedicated funding to ensure implementation of the Action Plan. Given that the major threats in Oregon exist across land ownerships and rely upon coordinated partnership efforts to address them, funding and implementation support needs to remain a shared responsibility. State-based efforts to ensure meaningful commitments and enhanced certainty around needed funding levels are described below. Funding commitments tied to BLM lands are not summarized here, as they are a matter specific to the agency's Resource Management Plan (RMP) revision effort and subject to agency budgeting pursuant to congressional appropriation of funds. In addition, landowners and other private interests have contributed and can be expected to contribute both direct and in-kind funding for implementation of the conservation actions described in this plan, especially where actions are tied to CCAAs. The same past and continued commitment of implementation funding and action also exists from conservation NGOs, hunting, and other organizations, with enhanced engagement likely as a result of this Action Plan and the ability of state funding to leverage dollars. Further, as noted earlier, the plan's proposed approach to mitigation will add a new funding source relevant to addressing threats to sage-grouse habitat while ensuring a net conservation gain for the bird.

Commitments of new state funding directed at implementing the actions and prioritized approach contained in the Action Plan relate primarily to the threats of juniper encroachment, exotic annual-grass invasion, and wildfire risk, as well as components of advancing the State's new regulatory framework and achieving conservation benefit. These commitments are presented in Table II-1.

Table II-1. 2015-17 General Fund Investments in the *Oregon Sage-Grouse Action Plan.* Policy Option Packages (POP) advanced by the Governor's Budget and approved by the 2015 Oregon Legislature in the Legislatively Approved Budget (LAB) as "sage-grouse habitat protection and improvement" items. (HB = House bill; SB = Senate Bill)

Agency Package	Description	LAB Amount	FTE / new positions	Budget Location / Mechanics of Adoption
ODFW - 801	ODFW / Mitigation: administration of State Action Plan's all-lands mitigation program pursuant to new ODFW rules (and related new DLCD rules and other existing legal authorities).	$286,000	1	Oregon Dept. of Fish & Wildlife POP 801; adopted in SB 5511
DLCD - 108	DLCD / Disturbance Framework: Coordinator position established to administer State Action Plan's approach to limiting human disturbance in sage-grouse habitats pursuant to new DLCD rule, coordination with local governments, federal and state land managers, and other partners.	$300,000	1	Dept. Land Conservation & Development POP 108; adopted as part of agency budget in HB 5027 via SB 5507 Sec. 72
ODF –	ODF / Wildfire: funding to address State Action Plan's	$1,590,377	1.5	Oregon Dept. Forestry

Agency Package	Description	LAB Amount	FTE / new positions	Budget Location / Mechanics of Adoption
119 and 120	approach to fire response and operations within the range of sage-grouse. This includes some funding for agency staff capacity, with the bulk of the funding to support local / on-the-ground efforts of Rangeland Fire Protection Associations and other-related activities to address the threat of wildfire. POP 119—offsets loss of federal $ for RFPA-related staffing. POP 120—funds local capacity (incl. RFPA's), supplies / equipment, contracts to advance on-the-ground work			POPs 119 and 120; adopted as part of Agency budget in SB 5019 with supplementation via SB 5507 Sec. 120
ODFW - 840	Habitat Resilience – funding to implement on-the-ground pre- and post-wildfire actions to promote and restore habitat resilience (incl. re-seeding / planting; invasives work; etc.) in partnership with landowners, managers, and other partners.	$500,000	1	Oregon Dept. Fish & Wildlife POP 840; adopted in SB 5507 Sec. 121
ODFW 105	Sage Grouse / Working Lands Joint-funded positions—matching funds to leverage federal funds in continuing existing field positions that advance conservation practices with landowners to alleviate threats to sage-grouse while improving sustainability of working ranches.	$90,000	2 (when combined w/ NRCS match $)	Oregon Dept. Fish & Wildlife POP 105; adopted via HB 5544
ODA - 320	Oregon Invasive Species Council (Sage-Grouse) - Improves Oregon's overall response to invasive species including restoration and protection of sage-grouse habitat.	$100,000	0	Oregon Dept. of Agriculture POP 320; adopted via HB 5002
TOTAL =		$2,866,377		

The above new state General Fund commitments are in addition to other new state funding commitments—including a significant new State Lottery Funds commitment advanced by the Oregon Watershed Enhancement Board of at least $10 million over 10 years (incorporated into Table II-2)—as well as recent federal commitments to the State and SageCon partners, as described further below. Importantly, these new funding commitments build upon a foundation of existing state agency program funding for work in sage-grouse habitat, which is expected to continue and is summarized below in Table II-2. Private landowners, NGO partners, and others also contribute significant direct funding as well as in-kind (time, labor, materials, etc.) contributions to efforts that advance sage-grouse habitat protection and restoration. While this section focuses on state-based funding commitments—with a full accounting of these diverse and varied private contributions being an exhaustive task beyond the work completed for this plan—these private contributions are expected to not only continue but increase as a result of this Action Plan, CCAA commitments, and other positive partnership efforts including NRCS's SGI.

Table II-2. Existing, ongoing, and future Oregon sage-grouse funding: selected relevant programs.

Agency Program—brief description	Relevant Funding in Sage-Grouse Habitat (most recent biennium)	Is Baseline / Current-level Expected to Continue in Future Years?	Additions / Other Notes
Oregon Department of Fish & Wildlife (ODFW) - Wildlife Division and related programs: as part of ODFW's base staff structure and program, a minimum of 16 biologists spend a significant portion of their time on sage-grouse work within 6 wildlife districts that regularly engage in sage-grouse work. Work includes the following activities: lek and brood surveys, database management, working with landowners to implement projects, training/coordinating volunteers, responding to information requests, inter-agency coordination / planning, state planning, research / bird capture; participation in wing bee, hunt regulations, commenting on proposed development actions, commenting on Scientific Take Permits, commenting on CCAA or CCAs, etc.	2013-15 biennium: ODFW spent over $1 million on sage-grouse work. Of this total amount: $382,244 = state Upland Bird Stamp funds (approx. 50% of total Upland Bird Stamp revenues); $469,000 = Other Funds (state hunting license and Pittman-Robertson / state-awarded federal excise tax funds); and Approx. $200,000 = grant funds from the Oregon Hunters Association, Oregon Wildlife Heritage Foundation, BLM (habitat inventory grant), and USFWS (Recovery Grant) to support surveys (helicopter time, Infrared flights, AAL) and research. The Upland-Bird Stamp and Other Funds (O.F.) (hunting license and Pittman-Robertson) supported the following sage-grouse specific positions and activities: Sage-grouse Research ($146K Up.Bird Stamp; $45K O.F.) Sage-grouse Coordinator: salary, vehicle, travel ($134,967 Up.Bird Stamp; $72K O.F.) Upland Bird Coordinator (40% time sage-grouse) ($50K Up.Bird Stamp; $30K O.F.) Sagebrush seeding ($29,877 Up.Bird Stamp) Sage-grouse wing data collection / analysis (Wing Bee, mailing, consultant work) ($4,400 Up.Bird. Stamp; $4K O.F.) "Adopt-a-lek" Coordinator and volunteer re-imbursement ($17K Up.Bird Stamp) District Bio lek Surveys ($80K O.F.) District Bio brood Surveys ($30K O.F.) 2 SGI Bios (jointly funded w/ NRCS) ($208K O.F.)	Yes The information in the adjacent column is an absolute minimum estimate of expenditures; it does not include considerable time spent on sage-grouse issues by ODFW's Habitat Resources Program (e.g., on energy-project consultation), Conservation Program Staff, regional or district managers, and others.	Will be enhanced by 2015 LAB/new funds (see Table II-1) In addition to the direct-fund information noted in the adjacent columns, the ODFW's annual spring lek surveys (an effort with a budget value over $900,000, comprised of direct and in-kind contributions from various sources) includes an "in-kind" contribution of over $180,000 from ODFW. This is also expected to continue.

Agency Program—brief description	Relevant Funding in Sage-Grouse Habitat (most recent biennium)	Is Baseline / Current-level Expected to Continue in Future Years?	Additions / Other Notes
Oregon Watershed Enhancement Board (OWEB) Open Solicitation grant program: provides funding for watershed restoration and protection projects, including in the sagebrush/sage-steppe habitats relevant to greater sage-grouse. OWEB offers two Open Solicitation grant cycles per year, resulting in grants awarded to SWCDs, watershed councils, non-profits, schools, universities, local governments and other entities.	2011-2015 biennium: $4,446,639 in OWEB funding spent on sagebrush/sage-steppe habitat restoration projects, $524.000 of which occurred in the most recent OWEB Open Solicitation grant cycle (April 2015). (**Note: these are projects reported in 2011-2015; some of the grant awards occurred before 2011; also this figure does not include OWEB outreach or technical assistance grants completed in sagebrush/sage-steppe habitat during that timeframe).		2015-2025: The OWEB Board has committed at least $10 million this grant program over the next 10 years in direct support of projects located in the sage-steppe ecosystem to improve sage grouse habitat consistent with the State Action Plan.
Oregon Dept. of Forestry (ODF) Fire Protection Division: functions as the state-level point of contact for Rangeland Fire Protection Associations (RFPA's) who play a key role in helping suppress and prevent range fires in sage grouse habitat.	2013-15 biennium: approx. $200,000 of dedicated funding to support RFPA's in sage-grouse habitat. Of this amount: $30,000 General Fund Remainder was federal dollars ODF received to implement fire protection efforts. Additional support in 2013-15 biennium: Staff time and supplies provided through the ODF Eastern Oregon Area Office. ODF provision of firefighting equipment to RFPA's through Federal Excess Property Program. Biennial operating budgets for RFPA's provided an additional $300,000 for base-level operations, which does not include "in-kind" time and supplies that ranches / RFPA members provide when a fire breaks outs.	Yes Yes	Will be enhanced by 2015 LAB / new funds (see Table II-1)
Oregon Department of Agriculture (ODA) Noxious Weed Control Program—works to protect Oregon's natural resources and agricultural economy from the invasion and proliferation of invasive noxious weeds. This	2013-15 biennium: $314,000 implemented by Noxious Weed Control Program staff in support of integrated weed control projects that target state listed noxious weeds in sage-grouse habitat; and	Yes	

Agency Program—brief description	Relevant Funding in Sage-Grouse Habitat (most recent biennium)	Is Baseline / Current-level Expected to Continue in Future Years?	Additions / Other Notes
Program implements projects related to sage grouse habitat protection and enhancement using two primary delivery vehicles funded through state Lottery Funds and General Funds: ODA Noxious Weed Control Program staff implement integrated noxious weed control projects that protect and/or enhance core sage grouse habitat areas. Oregon State Weed Board (OSWB)—ODA administers the OSWB Grant Program, which distributes weed control grant funds to on-the-ground projects (must be OSWB-listed noxious weeds; must restore, enhance or protect fish and wildlife habitat, watershed function, and native salmonid or water quality).	$1,570,216 awarded to 55 separate OSWB grants in core sage grouse habitat counties. Those grants protected or enhanced sage grouse habitat from invasive noxious weeds. (**Note: OSWB funding source is state Lottery Funds, which are housed in the OWEB budget but administered by ODA).	Yes	
Oregon Dept. of Agriculture (ODA) Soil and Water Conservation District (SWCD) Program—provides services to SWCDs throughout Oregon, including technical support to address habitat protection and restoration.	2013-15 biennium: $255,500 allocated to sage grouse related work with SWCDs in the following 7 sage-grouse counties: Baker, Crook, Deschutes, Lake, Grant, Harney, and Malheur. Funds advanced the following activities: Landowner technical assistance with CCAA development, site-specific plan development, and conservation measure review. Sage-grouse Planning—Landowner workshops, local sage-grouse forums and tours including presentations on sage grouse CCAA and invasive species. (incl. NRCS, ODFW, OSU Extension) Project work to address sage-grouse habitat: Western Juniper treatment (and mapping), and wildfire and invasive species management	Yes	SWCD efforts will be significantly enhanced by NRCS Regional Conservation Partnership Program Award (as described in Section II.ii.e)

Agency Program—brief description	Relevant Funding in Sage-Grouse Habitat (most recent biennium)	Is Baseline / Current-level Expected to Continue in Future Years?	Additions / Other Notes
	(including invasives mapping, fuel reduction. Technical Assistance: Regional Conservation Partnership Proposal engagement and development.		
Dept. of State Lands (DSL) Common School Fund – Real Property – Rangelands: DSL manages state-owned Common School Fund (CSF) Trust rangelands primarily through forage and agricultural leasing. Approx. 540,000 of the approx. 611,000 acres of CSF lands in the range of greater sage-grouse in Oregon are in Core / PPH and Low-density / PGH habitats. Pending final approval by USFWS in 2015, DSL will be implementing a Candidate Conservation Agreement with Assurances (CCAA) for CSF rangelands in sage-grouse habitat, and related work is touched upon below. Contribution of DSL's CSF land work related to greater sage-grouse habitat generally falls into the following categories: <u>Range Improvements</u> -- funded by a 12.5% allocation of grazing receipts (same as BLM allotments). <u>Wildfire Risk</u> – Suppression and Post-Fire Rehabilitation -- suppression and fire rehab costs are requested as needed / additional expenditures (limitation) from the CSF.	<u>Range Improvements:</u> Noxious Weeds: 2011-13 -- $44,700 2013-15 -- $59,400 Juniper removal: 2011-13 -- $9,900 2013-15 -- ODFW applied Mule Deer Initiative $$ to DSL CSF lands; CSF grazing lessees incorporated State Lands in NRCS SGI-funded juniper removal projects. <u>Wildfire Risk – Suppression and Post-Fire Rehab.</u> BLM Suppression Agreement: DSL is billed for Services provided: 2011-13 -- $535,550 2013-15-- $2,415,876 Post-Fire Rehabilitation: (noxious weed prevention and re-seeding – figures do not including funds spent on fence repair and replacement): 2011-13 -- $424,700 2013-15 -- $176,900 ($64,000 of which will be spent as carryover into current biennium based on work associated w/ 2014 fires) RFPA Membership and support: Dues vary by Association – total approximately $1,000 per year, additional support for 13-15 (Buzzard Complex Fire) $4,500.	Yes: 2015-17 (projected) -- $60,000 Yes: 2015-17 -- ongoing inclusion in SGI projects as opportunity arises, two projects currently ongoing Yes (funding to continue 2015-forward for all bulleted areas in adjacent column based on level of need / requests to CSF) Yes Yes	As part of DSL CCAA implementation, conservation measures such as fence marking and escape ramps are being added to the DSL range improvement plans and will be ongoing. Fence Marking: beginning 2015-17 (material purchase complete--$1,000--with installation to be through DSL crew) Escape Ramps: beginning 2015-17 (material purchase complete--$1,000—with installation to be through DSL crew or lessee installation)

In addition to funds made available through state executive-branch and legislative efforts, Oregon recently received an award of $9 million from USDA's Regional Conservation Partnership Program (RCPP) to help advance the ongoing statewide effort of implementing

habitat actions associated with CCAAs. The habitat actions to be funded will occur on private lands and correspond to actions identified in this Action Plan for addressing juniper encroachment, annual-grass invasion, and wildfire risk. This award is in addition to the ongoing NRCS SGI funding in Oregon, which has been substantial since 2010 (Table IV-2) and is expected to remain so, based on the strong relationship that has developed between SGI partners in Oregon, including the NRCS staff, local landowners, SWDC's, and practitioners. The state funds identified in Table II-1 and Table II-2 will also assist local partners in leveraging the RCPP award and other federal and private conservation investments. For example, the RCPP award is being leveraged with SWCD funds for implementation of CCAAs, including 3 FTE positions, totaling an investment of $15.4 million in conservation activities.

As a state plan, this Action Plan does not attempt to exhaustively document new or pending federal fund commitments, which remain subject to presidential budgeting and/or congressional appropriations. That said, additional funding from federal sources has been committed to sage-grouse work in Oregon or is anticipated to occur. These funds, while associated with federal agencies or lands, are tied to advancing actions prioritized by this Action Plan. Some examples of relevance to Oregon include:

- $1.5 million awarded to USFWS for habitat improvements on Hart Mountain National Wildlife Refuge[6]
- $2.7 million appropriated to BLM for habitat improvements in south Warner Mountains (1 FTE position)[7]

With almost $3 million of new funding from state General Funds, a 10-year/$10 million new commitment of state Lottery Funds, and additional funding tied to ongoing state agency program work that is advancing the conservation of sage-grouse and their habitats, Oregon has advanced a substantial state-based effort to ensure certainty exists in the implementation of this Action Plan. In addition, continued and enhanced commitments from federal, private, and NGO partners exist to bolster successful conservation outcomes in Oregon.

iii. Coordinated Agency Response and Management

Development of this Action Plan has been achieved through dedicated partners working together in a rangewide collaborative effort across Oregon. Implementing the plan will require continued coordination among federal, state, and local government as well as tribes, NGOs, and private landowners. As directed by the Governor's Executive Order, a memorandum of agreement (MOA) is being crafted to address the roles and responsibilities of the key implementing partners across local, state, and federal agencies. The MOA (pending), entered into by the State of Oregon, local governments, the BLM, and USFWS, will address shared

[6] DOI Resilient Landscapes project funds
[7] Combined DOI Resilient Landscapes project funds ($1.56M), FIAT funds ($935K), and District funds

governance and coordination through participation in a statewide coordinating council and statewide technical team. The MOA will include agreed-upon performance measures for population and habitat; administration of and participation in a coordinated mitigation program; and administration of and participation in coordinated monitoring, reporting, and adaptive management related to human disturbance and habitat actions across federal, state, private or other lands. The MOA is intended to ensure high-level coordination occurs across land ownership boundaries to address threats and opportunities related to the sage-grouse in as effective, efficient, equitable, and responsive a manner as possible. This Oregon MOA effort is intended to synch with larger, range-wide implementation and coordination efforts across western states.

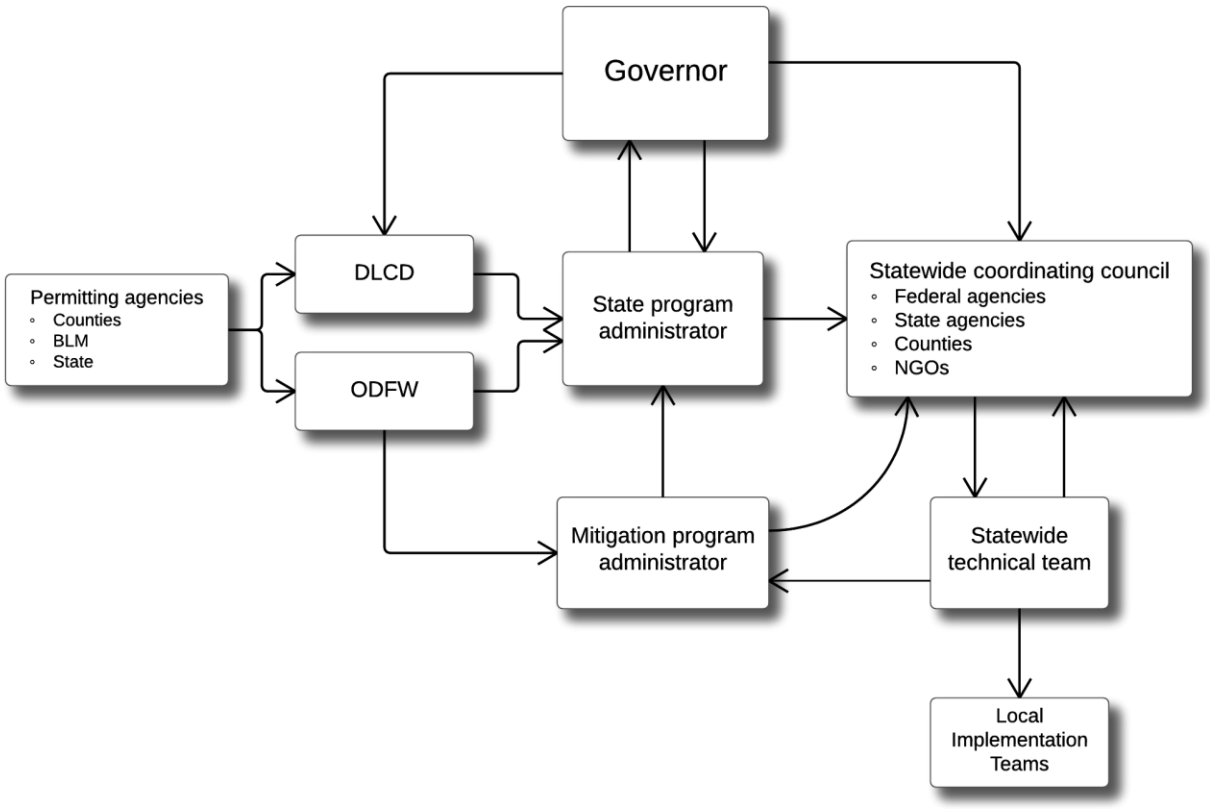

Figure II-1. Implementation and coordination of the Oregon Sage-Grouse Action Plan

a. Statewide Sage-Grouse Coordinating Council

An overarching, statewide coordinating council—comprising representatives from key state and federal agencies, local governments, Local Implementation Teams (LITs), private landowners, tribes, and NGOs—will be responsible for directing high-level implementation and adaptive management of this Action Plan. Representation from federal, state, and local level land managers and decision-making entities will promote integration across various relevant levels

of government and will also advance landscape-level coordination across land ownership boundaries. The council's roles include making programmatic recommendations on allocation and coordination of resources (funds and personnel), including mitigation and adaptive management; identifying and addressing statutory, administrative, or regulatory barriers to plan implementation and effectiveness; providing a hub for aggregating ongoing monitoring of disturbance and conservation action information relevant to plan effectiveness and adaptive management; and coordinating with other regional sage-grouse efforts, including those of the BLM and neighboring states.

As part of its resource allocation and coordination role, the coordinating council will approve mitigation crediting projects and the allocation of in-lieu fee funds, based on recommendations by the mitigation program administrator (and input from the statewide technical team). The council will also approve changes to the mitigation program identified through the adaptive management process.

b. Statewide Technical Team

The statewide technical team's role is to provide technical and scientific advice and support for implementation of the Action Plan. This includes a direct connection to the coordinating council, to whom the statewide technical team will provide support that includes the following roles:

- Identifies, synthesizes, and makes recommendations to the coordinating council regarding management priorities and trends in threats to help inform funding and implementation of Action Plan approaches.
- Identifies, synthesizes, and updates information on the benefits and risks associated with different management practices and conservation actions, and on the results of project- and program-level monitoring to inform changes in prioritizing or conducting conservation work, including eligible practices and crediting protocols related to mitigation.
- Recommends research needed to address relevant questions, develop new management practices or improve implementation of the mitigation program.
- Provides scientific support and review on selected mitigation proposals associated with complex or large-scale permits or crediting projects to ODFW and the mitigation program administrator.
- Assists with evaluation of program effectiveness and provides recommendations for adaptive management.

c. Oregon Department of Fish and Wildlife

ODFW is responsible for tracking and monitoring the greater sage-grouse populations in Oregon, including data collection, analysis, and reporting; advising on the impact of

conservation measures and investments; monitoring habitat function; and consulting on project proposals and/or approaches with local governments, project proponents, permitting entities, private landowners, BLM, NGOs, tribes, state agencies and others. ODFW will collect and analyze data relevant to plan implementation and effectiveness in addressing sage-grouse population and habitat health, which along with information from other entities (i.e., BLM, NGOs), will be shared with the state coordinating council and the statewide technical team. In addition, ODFW will continue to engage in the advancement of on-the-ground conservation actions and research, both directly and through partners. Pursuant to its revised rules, ODFW is also responsible for implementation of mitigation rule provisions.

d. Department of Land Conservation and Development

DLCD is responsible for tracking and monitoring human disturbance and the administration of the disturbance approach associated with this Action Plan and DLCD's administrative rules. DLCD will collect and analyze data from local government and state and federal agencies, in conjunction with the state coordinating council and the statewide technical team. Additional responsibilities are defined in the Governor's Executive Order above.

e. Local Implementation Teams

The Local Implementation Teams (LITs), initially established in connection with the ODFW 2011 Strategy, will play a renewed role in implementation of this Action Plan. LITs will serve as the local venue to assist with identifying local-level opportunities for mitigation crediting projects; advancing opportunities for project-level application and implementation of the plan's higher-level approach to prioritizing conservation actions on-the ground, including partnerships for advancing such opportunities; and advising the statewide technical team and coordinating council on implementation-related local priorities, issues, or concerns, which will be part of shaping adaptive management of this plan. It is anticipated that work related to the above efforts will benefit from engagement of an on-the-ground resource such as the LITs, with that work including refinement of maps; engagement with private landowners to implement site-specific plans tied to CCAAs; and providing ongoing coordination to address area-specific threats. The LITs will include the local SWCDs, local government, private landowners, relevant local agency staff, and conservation and other NGO representation.

f. Permitting Agencies

For the purposes of this plan and implementation of the approaches therein, permitting agencies are agencies that hold the authority to approve, shape, or deny permits or project requests for development-related activities that may affect sage-grouse or their habitats in Oregon. These agencies include the following:

- County governments

- Bureau of Land Management
- U.S. Fish and Wildlife Service
- Oregon Department of Land Conservation and Development
- Oregon Department of Energy (and Oregon Energy Facility Siting Council)
- Oregon Department of Fish and Wildlife
- Oregon Department of State Lands
- Oregon Department of Geology and Mineral Industries
- Oregon Department of Transportation
- Oregon Water Resources Department
- Oregon Department of Environmental Quality
- Any other government or agency with authority over a permit or project affecting sage-grouse habitat.

During the permit review process, these agencies ensure that permits or projects anticipated to impact sage-grouse habitat are consistent with new land-use and mitigation rules and other relevant agreements and authorities. Permitting agencies are vested with this responsibility and authority by statutes, regulations, ordinances, executive orders, or formal agreements. Permitting agencies will report to a central registry administered by the state coordinating council as part of tracking and monitoring development activity in sage-grouse habitat.

g. Permittees

Permittees are entities that request permission from permitting agencies to conduct development activities that impact sage-grouse habitat and therefore may be required to demonstrate compliance with new or existing statutes, regulations, ordinances, and/or formal agreements related to avoidance, minimization, and mitigation of sage-grouse habitat. Permittees may also be enrolled in CCAAs. Permitting agencies may also incur mitigation or other legal responsibilities for development-related activities they fund or directly implement, in which case they would also be considered permittees.

h. State Program Administrator

The state program administrator will oversee and coordinate the implementation of the Action Plan, which will include convening and staffing the state coordinating council, developing and managing reporting and data analysis across agencies, and adaptive management of the plan and its components. Some program administration roles may also be assigned to specific state agencies, to private/nonprofit entities, or to trained and certified contractors.

i. Mitigation Program Administrator

The mitigation program administrator will manage the mitigation program and is responsible for the operation of its associated debiting and crediting system, including facilitating and

overseeing credit generation and transaction activities.[8] The mitigation program administrator performs functions including the following:

- Ensures consistent application of program processes and rules;
- Requests and reviews proposals for crediting projects based on spatial and management priorities identified in conjunction with entities including the statewide technical team and LITs;
- Verifies, issues, and registers credits;
- Assesses the accuracy of credit and debit calculations;
- Tracks program outcomes and reports results of the mitigation program to the coordinating council; and
- Adaptively manages the program.

[8] The State anticipates development of a memorandum of agreement (see Coordinated Agency Response and Management) with the BLM and USFWS to confirm their participation in the debiting and crediting system in order to appropriately manage sage-grouse populations and habitat across land ownership boundaries. However, the federal agencies will retain discretion in fulfilling their legal mandates and authorities.

Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts

i. Introduction

The sage-grouse is a wide-ranging, sagebrush-obligate species and relies on sagebrush habitat types year-round to meet the needs of its annual life cycle. Breeding behavior, called *lekking*, occurs in open areas to allow for conspicuous communal breeding displays, but *leks* (breeding sites) are located within larger patches of sagebrush and other vegetation that afford hiding cover. In addition, areas with dense sagebrush and perennial bunchgrasses are essential to hide sage-grouse nests from predators, while moist, forb- and insect-rich communities are needed during brood rearing to provide a protein-rich diet to chicks. Finally, relatively dense stands of sagebrush are required during winter months, when sage-grouse diets consist almost exclusively of sagebrush buds and leaves. Thus, this Action Plan, while focused on the habitat needs of sage-grouse, is driven by and addresses the overall health of the sagebrush ecosystem and all of its habitats.

Because the sage-grouse is very sensitive to disturbance associated with human activity and development, steering those activities away from essential sage-grouse habitat areas is critical to long-term population viability. Sage-grouse populations in Oregon, however, are most at risk from habitat loss resulting from large-scale wildfire, invasive exotic weeds and annual grasses, and encroachment by native juniper (Boyd et al. 2014). Because sage-grouse are so dependent on sagebrush, declining population trends mirror those of the overall health and abundance of sagebrush habitats (Davies et al. 2011).

Further, because there are limited resources available to address the widespread, primary threats to sage-grouse in Oregon (wildfire, invasive annual grasses, and juniper encroachment), a science-based strategic approach is essential to prioritizing conservation and management in areas where sage-grouse benefits can be maximized. This kind of strategic, prioritized approach is in keeping with spatial analyses of both sage-grouse population data and key threats, which show that neither is randomly distributed across the landscape (Oregon Department of Fish and Wildlife [ODFW] 2011). Oregon's strategic approach to these threats combines a diversity of spatial information at different scales to help focus conservation actions in the right places.

Maintaining connectivity and reducing fragmentation of sagebrush habitats is key to the long-term welfare of all sagebrush-associated species (Connelly et al. 2004; Hanser and Knick 2011). Thus, this Action Plan takes a landscape-scale ecological approach, because, by protecting and enhancing the function of sagebrush ecosystems overall, a number of other species in addition to sage-grouse stand to benefit (Maser et al. 1984; Rowland et al. 2005; Hanser and Knick 2011). While specifically addressing the conservation of the sage-grouse, the Plan recognizes that the bird's geographic range also overlaps the ranges of many other Oregon species, some

of which are federally listed as threatened or endangered under the Endangered Species Act (ESA), are candidates for listing, or are sensitive due to their close association with sagebrush communities. Consequently, this Action Plan considered the habitat requirements of multiple species and assessed the relative benefits to species in addition to the sage-grouse in developing its conservation actions. This overall ecosystem-based approach should thus identify management opportunities that will benefit a myriad of species common to sagebrush steppe habitat types. Further, the ecosystem-based concepts and approach underpinning the actions identified in this plan align well with the federal ESA's policy intent: "… to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved …"[9]

This section provides a detailed description of Oregon's framework for identifying and prioritizing conservation actions within sage-grouse habitat. It outlines the State's sage-grouse population and habitat objectives, which drive the development of specific conservation actions, and it describes the methods and technical tools the State and the Sage-Grouse Conservation (SageCon) partners will use to (a) identify high-priority sites for conservation investment and (b) determine which particular actions are most likely to be effective on a given site. These include science-based objectives for sage-grouse population numbers and habitat, implementation of the State's Core Area approach for identifying and conserving the highest-priority sage-grouse habitat, and the development of supporting spatial data and information.

Sagebrush-steppe landscape. Photo: Jeremy Roberts, Conservation Media.

[9] 16 U.S.C. § 1531(b)

ii. Sage-Grouse Population and Habitat Objectives and Trends

The occupied range of the sage-grouse currently covers most of eastern and central Oregon, containing more than 18 million acres across portions of Crook, Deschutes, Lake, Harney, Malheur, and Baker Counties, as well as small portions of Grant and Union Counties. From a rangewide perspective, Oregon sage-grouse are considered part of two distinct management zones across the West (Western Association of Fish and Wildlife Agencies Management Zones IV and V) and have been categorized into five populations based on probable natural and anthropogenic habitat barriers: Baker, Central Oregon, Northern Great Basin, Western Great Basin, and Klamath (Schroeder et al. 2004; Stiver et al. 2006). The Klamath population is considered extirpated in Oregon, and no priority locations or conservation actions were identified for it in this Action Plan.

Wildlife species and their management are typically matters of state legal jurisdiction and responsibility. By statute (ORS 496.012), the State of Oregon is required to manage wildlife to "prevent serious depletion of any indigenous species." Accordingly, the mission of the ODFW is to protect and enhance Oregon's fish and wildlife and their habitats, both for their own benefit and for the use and enjoyment of present and future generations.

Consistent with State statutes, its administrative rules, and its mission, ODFW adopted and maintains the 2011 *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon* (2011 Strategy), which describes population and habitat goals for the sage-grouse.

- Population: The overall statewide policy direction is to maintain or enhance sage-grouse abundance and distribution at approximately 30,000 birds over the next 50 years. Regional population objectives are also established for five implementation areas, which generally track BLM district boundaries.

- Habitat: The overarching habitat goal is to maintain or enhance the current range and distribution of sagebrush habitats in Oregon, doing so in structural stages that benefit sage-grouse while reducing or minimizing habitat threats and promoting resilience. Attaining the population objectives is largely dependent upon achieving habitat objectives; therefore, the following direction exists:
    - Avoid development actions in sage-grouse habitat that adversely impact such habitat or the bird's use of it, and limit the extent, location, and negative impacts to no more than 3% of any Priority Area of Conservation (separately defined in OAR 635-140-0002) and at a rate not to exceed 1% over a 10-year period.
    - Ensure that compensatory mitigation exists for development-based direct and indirect impacts to sage-grouse habitat, and that it achieves a net conservation benefit to the bird according to a habitat functionality standard.

- Focus management to meet an objective of retaining ≥70% of sage-grouse range as sagebrush habitat in advanced structural stages (sagebrush class 3, 4, or 5, with an emphasis on classes 4 and 5). The remaining 30% could include areas of juniper encroachment, non-sagebrush shrubland, and grassland (from either natural or human-caused disturbance) that potentially can be enhanced. Five regional habitat objectives also exist for areas that generally track BLM district boundaries, with direction to achieve a habitat-based net conservation gain within them. The "70/30" goal is based on a multiscale habitat assessment developed by Karl and Sadowski (2005).

This population and habitat direction is codified in ODFW's administrative rules at OAR 635-140-0005 and -0010, respectively, which specifically note that achievement of the objectives depends on programs and factors beyond ODFW's own authorities. Specifically, since ODFW owns relatively little land and the State does not have direct management jurisdiction over most sage-grouse habitat, conservation success relies upon effective partnerships. It is imperative to incentivize and enlist the help of land managers from federal and state agencies, nongovernmental organizations, and private entities in addressing the habitat threats to sage-grouse as well as other rangeland interests. This Action Plan recognizes and works to positively address this reality.

a. Current Trends: Population

Utilizing the work of the Western Association of Fish and Wildlife Agencies (WAFWA), the U.S. Fish and Wildlife Service (USFWS) has identified two population management zones for sage-grouse that are relevant to Oregon: the Snake River Plain (Management Zone IV) and the Northern Great Basin (Management Zone V)[10]. The population in the Snake River Plain is estimated to be in long-term decline (1965–2003), while in the Northern Great Basin, there is no statistically detectible trend in population[11].

ODFW's population objective was established based on a 2003 population benchmark determined by assessing data from between 1980 and 2003.[12] Since 1980, Oregon's statewide minimum sage-grouse spring breeding (adult) population estimate has generally increased during favorable climatic conditions and decreased during drought. Currently, sage-grouse numbers in Oregon are below ODFW's population benchmark, and the overall trend in the minimum spring population estimate over the 30-year period from 1980 to 2015 is declining. As shown in Figure III-1, the 10-year average for 2005-2014 = 23,025 ± 4,893 birds (range: 15,803 to 36,405); the 10-year average for 2006-2015 = 21,331 ± 3585 birds (range: 15,803 to 31,840).

[10] 75 Fed. Reg. 13910, 13919 (March 23, 2010)
[11] Id. at 13922
[12] See ODFW 2011 Strategy Appendix I for a more detailed description of the methods used to calculate spring breeding population size.

In 2014, the minimum statewide population estimate was 17,520 breeding birds, down 27% since 2010.

That said, because of natural fluctuations in populations, it is anticipated that, at various points in time, population numbers may drop below or extend above the 2003 benchmark, possibly by as much as 50%, as indicated by the historic record. While the minimum estimated population trend shows a downward trajectory over the above-referenced 30-year period, there are several caveats when interpreting the underlying data and resulting trends. First, the number of leks surveyed and methods used to survey them have changed since the 1980s. For example, spring breeding population estimates from the 1980s were based on fewer than 100 inventoried leks, but, since then, the survey effort has expanded to include data for more than 450 leks and lek complexes. The leks surveyed in the 1980s were generally larger breeding sites and may have inflated the population size estimates for that period, negatively biasing the population trend over time. Most methods used to estimate trends are prone to a negative bias when sample size (number of leks surveyed) increases over time (ODFW 2011, p. 21). Another consideration is that the minimum population size estimate is derived from indices of population size (see ODFW 2011, pp. 168-169 for indices), and there is uncertainty about the relationship among the population size and indices (Walsh et al. 2004; ODFW 2011, p. 28).

A final caveat is that annual fluctuations in population size are expected, due to the tight relationship between bird population dynamics and annual environmental and resource variation. Given the fluctuations, it is useful to use a five-year moving average in interpreting population size estimates. For example, annual population increases were observed in most areas from the mid-1990s through 2005 (Figure III-1). This upward trend was likely related to a similar trend in the quality of habitat conditions during that timeframe. In 2007, a severe drought negatively affected habitat quality, and a declining trend in the population size until 2008 was also observed. From 2009 forward, the population size appeared to increase, then decrease, then increase again to 2014, when the annual minimum estimated spring population size was estimated to be 17,500. Based on the preliminary minimum estimated spring population size for 2015 of approximately 20,000 breeding adult birds (males and females), an upward swing in the spring population trend appears to be continuing, as shown by the five-year moving average in Figure III-1. While the current population estimate is below the ODFW population objective and conservation actions remain needed to improve population health, this estimate is considered to be within the range of natural variation.

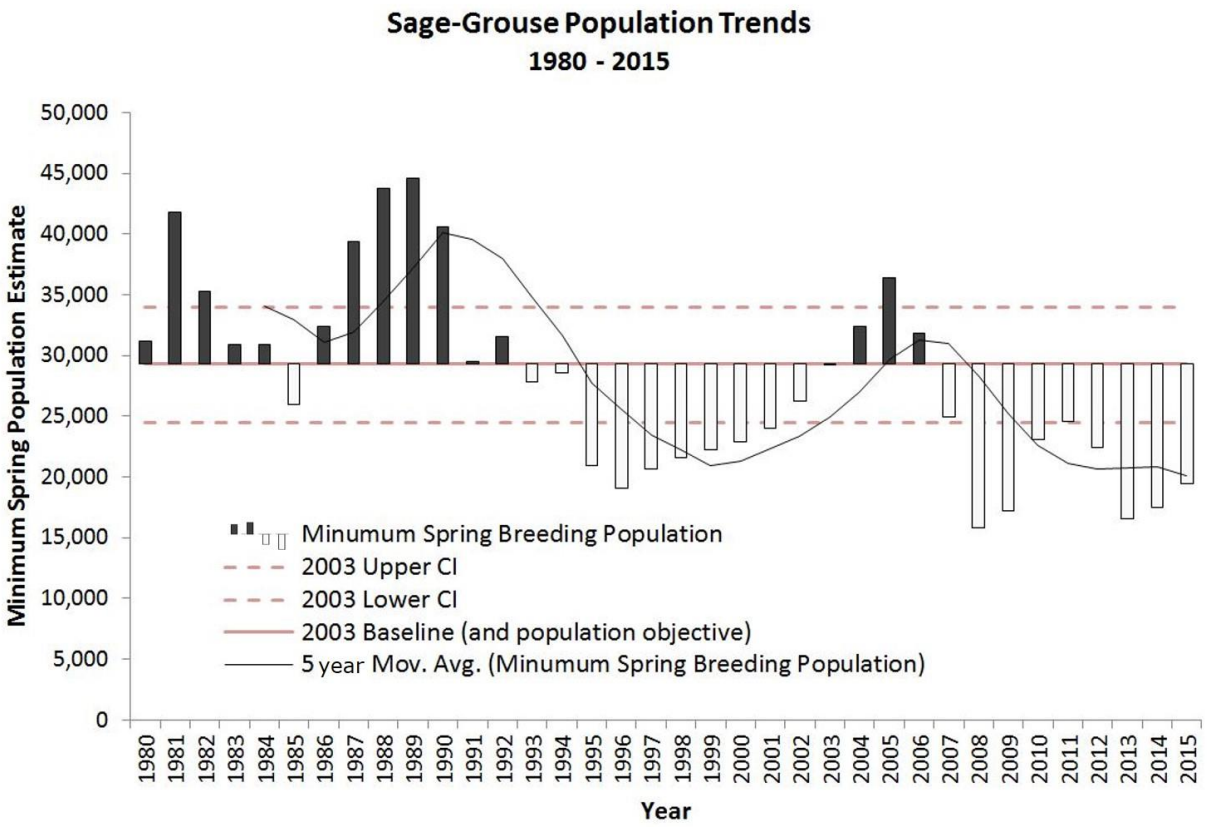

Figure III-1.Sage-grouse minimum spring population trends are represented here by 5-year moving averages (solid line). The annual minimum spring population estimates fluctuate over time, as illustrated by the bars and the solid line. The Oregon spring population benchmark is 30,000 breeding adults (males and females), illustrated by the solid horizontal line. The 95% confidence intervals around the baseline value are represented by the dashed horizontal lines.

b. Current Trends: Habitat

In terms of habitat, it is estimated that, historically, up to 89 million hectares (220 million acres) of sagebrush steppe vegetation (McArthur and Ott 1996) existed across western North America. Today, more than half of that has been lost or converted (Miller et al. 2011). Relative to the historic range and today's conditions across western states, Oregon contains a relatively intact, large, and contiguous amount of sage-grouse habitat, with an estimated 35% remaining as historic sagebrush steppe (ODFW 2011). The major factors impacting degradation of sagebrush habitat in Oregon today are wildfire and invasive vegetation. Since 2005, there has been a gross decrease of nearly 3% in sagebrush, due primarily to wildfire. However, even though the total number of acres lost is noteworthy, the net loss, when offset by the acres of juniper removed by wildfire, is approximately 1% (see Table IV-2). While not to dismiss the ongoing need for priority work related to habitat protection, restoration, and resilience, this indicates that the statewide habitat goal is being maintained, or is at least within a margin of measurement error.

In 2009, ODFW and the Natural Resources Conservation Service (NRCS) embarked on a strategic plan to more effectively target Farm Bill Program funding (the Environmental Quality Incentives Program and the Wildlife Habitat Improvement Program). This effort was led by the NRCS's national Sage Grouse Initiative (SGI). Through the SGI, as well as on their own, landowners and managers, Soil and Water Conservation Districts (SWCDs), conservation organizations, and other interests have implemented habitat restoration actions across thousands of acres of private land in Oregon. In addition, the Bureau of Land Management (BLM) has also undertaken concerted habitat improvement work on federal public lands since 2010.

Together, habitat actions on private and public ground have been and continue to be considerable. Realizing successful results from habitat restoration work, however, requires time and sustained effort (including monitoring and adaptive management) and has a far from certain outcome (Davies et al. 2011; Arkle et al. 2014; Avirmed et al. 2015). As this Plan documents, additional actions that are strategically planned, located, and implemented are needed to meaningfully address continuing threats to habitat health, such as wildfire, juniper encroachment, invasive non-native plant species, and other noxious weeds.

iii. Core Area Approach

In 2011, ODFW used a prioritization approach to identify landscapes of the greatest biological importance to the long-term persistence of sage-grouse populations in Oregon (Doherty et al. 2011; ODFW 2011). Based on that analysis and associated map designations, more than 90% of the breeding populations of sage-grouse were represented on only a fraction (approximately 38%) of the occupied range in Oregon (ODFW 2011). As part of the adoption of its 2011 Strategy and related administrative rules, ODFW (through a vote of the Oregon Fish and Wildlife Commission) designated this 38% of the range as Core Area habitat, making it a conservation priority for focusing habitat protection and restoration efforts. [13] As part of the same analysis and rulemaking, ODFW designated low-density habitats to account for areas identified as significant to sage-grouse population viability, but of lower significance than Core Areas. These are areas where negative habitat impacts pose a lesser risk to the bird than in Core Areas, but have greater significance than in other occupied habitat outside of Core Area.

This Core Area approach provides a strong ecological foundation to direct threat reduction efforts where sage-grouse are most likely to benefit. Identification of core habitat areas to

[13] Core Area boundaries were adopted by both the BLM and the USFWS. BLM referred to the boundaries as Preliminary Priority Habitat in its *Oregon Greater Sage-Grouse Proposed Resource Management Plan Amendment and Final Environmental Impact Statement* (BLM 2015). USFWS referred to the boundaries as Priority Areas for Conservation in the *Conservation Objectives Team Report* (USFWS 2013). In addition, Oregon has organized Core Area polygons into rational groups and named the resulting groups to facilitate discussion and reporting related to them. These are referred to as "Oregon Priority Areas for Conservation" (http://oe.oregonexplorer.info/ExternalContent/SageCon/Metadata/OR_sagegrouse_PAC_named_FGDC.xml).

maintain a viable set of connected populations is an ecologically based conservation strategy (Doherty et al. 2011). The USFWS has indicated its support for the Core Area strategy by explicitly calling for Priority Areas for Conservation (PACs) (i.e., Core Areas) to be the primary focus of targeted conservation efforts (USFWS 2013). PACs are key habitats identified by state sage-grouse conservation plans or through other sage-grouse conservation efforts; in Oregon, PACs correspond to Core Areas.

Other areas of occupied habitat remain important—including for connectivity values that help to address population isolation and genetic diversity—and the Core Area approach advanced by this Action Plan is not intended to imply that such areas do not merit investment. For example, the 2011 Strategy identified low-density habitat areas outside core that represent a lower priority for conservation action but in some cases will be important for improved connectivity between Core Areas/PACs (e.g., genetic and habitat linkages), as seasonal habitats that are essential to meeting the year-round needs of sage-grouse or as places where potential opportunities may exist for targeting habitat restoration work and/or mitigation for loss of habitat function elsewhere.

The Core Area approach implies that negative impacts in areas outside of core habitat create less risk to the long-term persistence and conservation of the sage-grouse as compared to impacts within Core Areas, and, conversely, that focusing protection and habitat restoration strategies within core habitat is more likely to provide a greater return on investment. Stated another way, the Core Area approach and associated maps provide the ecological basis for land-use planners, land managers, and the public to direct conservation actions to the areas of greatest biological value to the persistence of sage-grouse, while steering actions with negative impacts away from these areas. One underlying premise behind the Core Area approach is that preventing damaging ecological thresholds from being crossed is more likely to be effective, and less costly, in achieving sage-grouse conservation than reacting to negative impacts and trying to perpetually restore degraded sites (Davies et al. 2011; Arkle et al. 2014).

iv. Tools for Strategic Investment

a. A Strategic Framework for Action

Conservation success will be achieved in Oregon by removing or reducing threats to sage-grouse and sagebrush steppe habitats and stabilizing or improving sage-grouse population trends. At present, the greatest threats to sage-grouse populations in Oregon are driven by dysfunction within the sagebrush steppe ecosystem (Knick and Connelly 2011; ODFW 2011). Given the combination of impaired ecosystem function, the status of the sage-grouse population, the vastness and variation of local conditions within the bird's range, and the fact that available resources are finite, conservation efforts in Oregon must be strategic in order to provide the highest returns to the sage-grouse and its habitat. To overcome the conservation

and management challenges at hand, the Action Plan makes use of a hierarchical strategic framework to address issues from rangewide to local levels. The framework includes two strategic levels. Strategy Level I (Large-Scale/Landscape-Level Planning) identifies priority areas for conservation actions[14] and directs conservation resources to areas with the highest conservation return. Strategy Level II (Site-Specific Management) verifies priorities identified in Strategy Level I and tailors actions to site-specific conditions.

Hierarchical approaches, such as this framework, reflect current scientific knowledge about complex systems that span multiple interacting, functional scales and produce complex feedbacks and patterns (Knick and Connelly 2011). Hierarchical approaches have been incorporated into a wide variety of strategies, plans, and frameworks (e.g., the BLM Fire and Invasives Assessment Tool [FIAT], the Habitat Assessment Framework). The framework presented here was constructed from two important building blocks: (1) the foundation provided by analyses and management objectives described in ODFW's 2011 Strategy, and (2) collaborative work with scientists, natural resource managers, and planners. The outcome is a framework that supports decision making at multiple spatial scales, while providing scientific direction and allowing for local decision making and adaptive management by resource managers.

b. Strategy Level I (Large-Scale/Landscape-Level Planning)

As stated above, Strategy Level I (Large-Scale/Landscape-Level Planning) will be used to identify priority areas for different conservation actions (restoration, rehabilitation, protection, preservation) and to direct conservation resources to areas with the greatest need and/or with the potential for the highest conservation return. It facilitates cooperative planning—which will evolve during this Plan's implementation—among agencies and stakeholders across ownerships and jurisdictions to implement and achieve the conservation and management objectives identified in this Action Plan. Strategy Level I activities will emphasize the use of landscape-scale data and tools and may be supplemented with finer-scale scientific knowledge and data as needed.

Data. Data used in this Action Plan for implementation of Level I planning include, but are not limited to: sage-grouse population (e.g., survey data, breeding bird density); priority habitats (PACs); other identified habitats (low-density, general habitat); habitat types, distributions, and trends; threat types, distributions, and trends; environmental gradients and settings (e.g., topography); and habitat use and connectivity.[15]

[14] Conservation actions, as used here, refers to any activity or action which, when implemented or continued to be implemented, will reduce or remove threats to sage-grouse and/or will improve or maintain sage-grouse populations and/or healthy sagebrush steppe habitat.

[15] Threat assessments conducted for the Action Plan that used or developed these data are described briefly in Threat Assessments Completed by the SageCon Partnership "Threat Assessments Completed by the SageCon Partnership." A complete list of datasets is available at http://oregonexplorer.info/content/SageCon-Data.

Several data elements are fundamental to the successful implementation of Strategy Level I. The first is priority habitat or PACs (identified as Core Areas in the 2011 Strategy; ODFW 2011).[16] Knowledge of priority habitats and spatial representation of them in maps and GIS provides the primary "filter" for prioritizing areas for conservation actions and makes this information readily available for communication and decision making related to planning. The second data element is tied to information about the large, landscape-scale habitat requirements of the sage-grouse. Habitat conditions that support sage-grouse have been shown to relate to the proportion of sagebrush land cover[17] and relative dominance of invasive conifers and exotic annual grasses in the area surrounding breeding grounds (Hagen et al. 2007; Baruch-Mordo et al. 2013; Knick et al. 2013; Fedy et al. 2014). Areas exceeding 65% sagebrush land cover generally provide good sage-grouse habitat, while areas with 25-65% sagebrush land cover provide moderately good sage-grouse habitat, and those with <25% sagebrush land cover are the least valuable to sage-grouse. Sagebrush land cover has been mapped and analyzed within the planning area Figure III-2; Appendix 15).

The third data element focuses on threats to sage-grouse. Since 2011, the State of Oregon has worked in partnership with BLM, USFWS, and others to map, analyze, and interpret *current and past* habitat conditions and land use, as well as *potential threats* from future expansion of annual grasses (Figure IV-3); conifer encroachment (Figure IV-1); wildfire potential (Figure IV-6); and potential for land-use conversions (Figure IV-9, Figure IV-10, and Figure IV-11). Knowledge and spatial data related to current and potential threats will help decision makers know where to implement key actions to abate threats.

The fourth data element is defined by land ownership and management allocations. Responsible parties and relevant actions may be identified by mapping ownership and management allocations in relation to priority habitat, habitat conditions, and current and potential patterns of threats. Coordination strategies that engage the appropriate entities are one of several base elements leading to successful, long-term conservation when large- and landscape-scale ecosystem dysfunction is a primary driver of species' decline (Goldman et al. 2007; Ostrom 2008).

Tools. Tools recommended for implementation of Level I planning include, but are not limited to: the Resistance and Resilience Matrix (Chambers et al. 2014); the Oregon Decision Support System (ORDSS) for sagebrush steppe; and ODFW's Compass (Centralized Oregon Mapping Products and Analysis Support System).[18]

[16] For this Action Plan, we grouped Core Areas into biologically meaningful units that represent key habitat areas as determined by breeding bird densities, winter habitat use, and connective habitat use for future management and monitoring.

[17] Land cover indicates the physical land types of Earth's surface, such as forest, shrubland, or water. Shrubland land covers can be separated into a variety of vegetation types found in sagebrush steppe.

[18] These tools are described in Appendix 8.

The Resistance and Resilience Matrix is based on considerable research (Chambers et al. 2013) and has been developed to provide a tool to managers that matches the scale of the invasive annual-grass species/wildfire feedback loop threatening sage-grouse (Chambers et al. 2014). The basic tenet for this tool is that management of and treatments for invasive annual grasses and altered fire regimes can be guided by the capacity of an ecosystem to *retain* its structure and dynamics, in spite of stresses like fire and exotic plant invasion ("resistance"), and to *recover* from a disturbance to its previous state ("resilience") (Holling 1973; Folke et al. 2004).[19] The Resistance and Resilience Matrix will be used at Strategy Level I for identifying high-priority areas where actions to reduce the combination of wildfire and invasive annual-grass threats are most likely to be effective and/or have high conservation benefit.

The ORDSS was developed by the SageCon Partnership to support the planning process that produced this Action Plan and to support its implementation. It is a repository of the large- and landscape-scale data used and developed during the SageCon planning process. It also contains tools such as the resistance and resilience data layer linked to the aforementioned management matrix and includes tools such as pre-established queries, processes for running custom queries, and ranked data products (themes).[20] The primary purpose of the ORDSS is to provide the structure for collecting and using large-/landscape-scale data and spatially explicit information to develop the priorities for conservation actions under the broad headings of restoration, rehabilitation, protection, and preservation.

ODFW's Compass provides an existing informational and spatial framework into which the ORDSS has the potential to nest its data and products. Compass itself is nested in the Crucial Habitat Assessment Tool (CHAT), an effort launched by the Western Governors' Association now overseen and managed by WAFWA, which maps crucial habitat for high-priority fish and wildlife species across the entire western United States.[21] Both the ORDSS and Compass contain a variety of simple and complex data layers with limited overlap in the topics covered. The systems were developed separately and likely diverge in some of the underlying scientific assumptions; however, they share the objective of providing information to guide decision making through prioritization. Because of the shared objective, results from one system can be compared and contrasted with the results from the other, providing a deeper understanding and increasing the robustness of the results, especially when they corroborate each other. In addition, data can be exchanged between the ORDSS and Compass due to their common spatial framework, which can leverage the two distinct tools and processes used in identifying the highest priorities for conservation.

[19] Please refer to Appendix 8 for more information on the resistance and resilience concept and matrix.
[20] Please refer to Appendix 8 for more information on the ORegon Decision Support System for Sagebrush Steppe.
[21] Please refer to Appendix 8 for more information on ODFW's Compass.

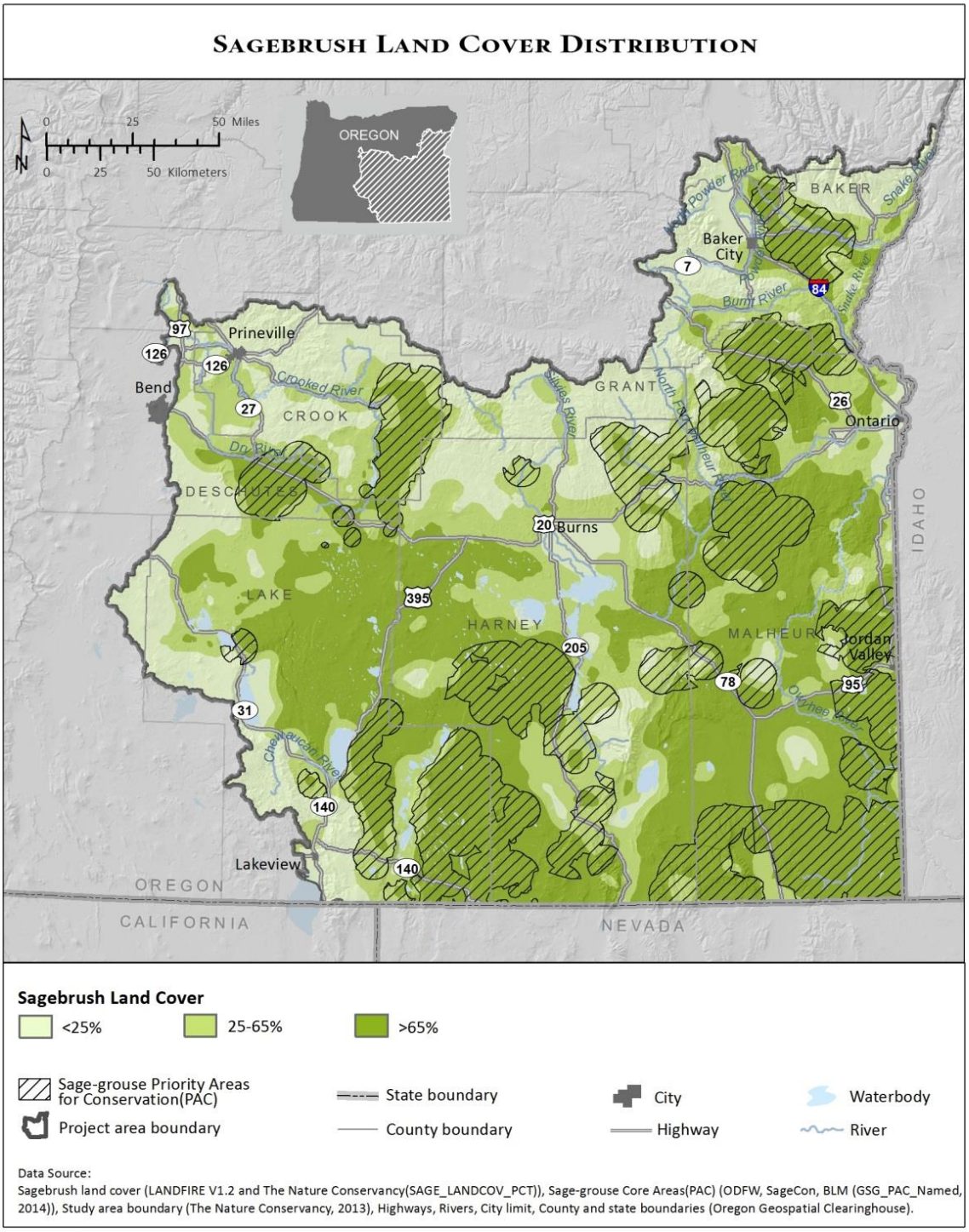

Figure III-2. Sagebrush land cover across the extent of the SageCon planning area. Areas with >65% land cover provide optimal habitat for sage-grouse, followed by areas with 25-65% land cover. Areas with less than 25% land cover of sagebrush are the least valuable to sage-grouse.

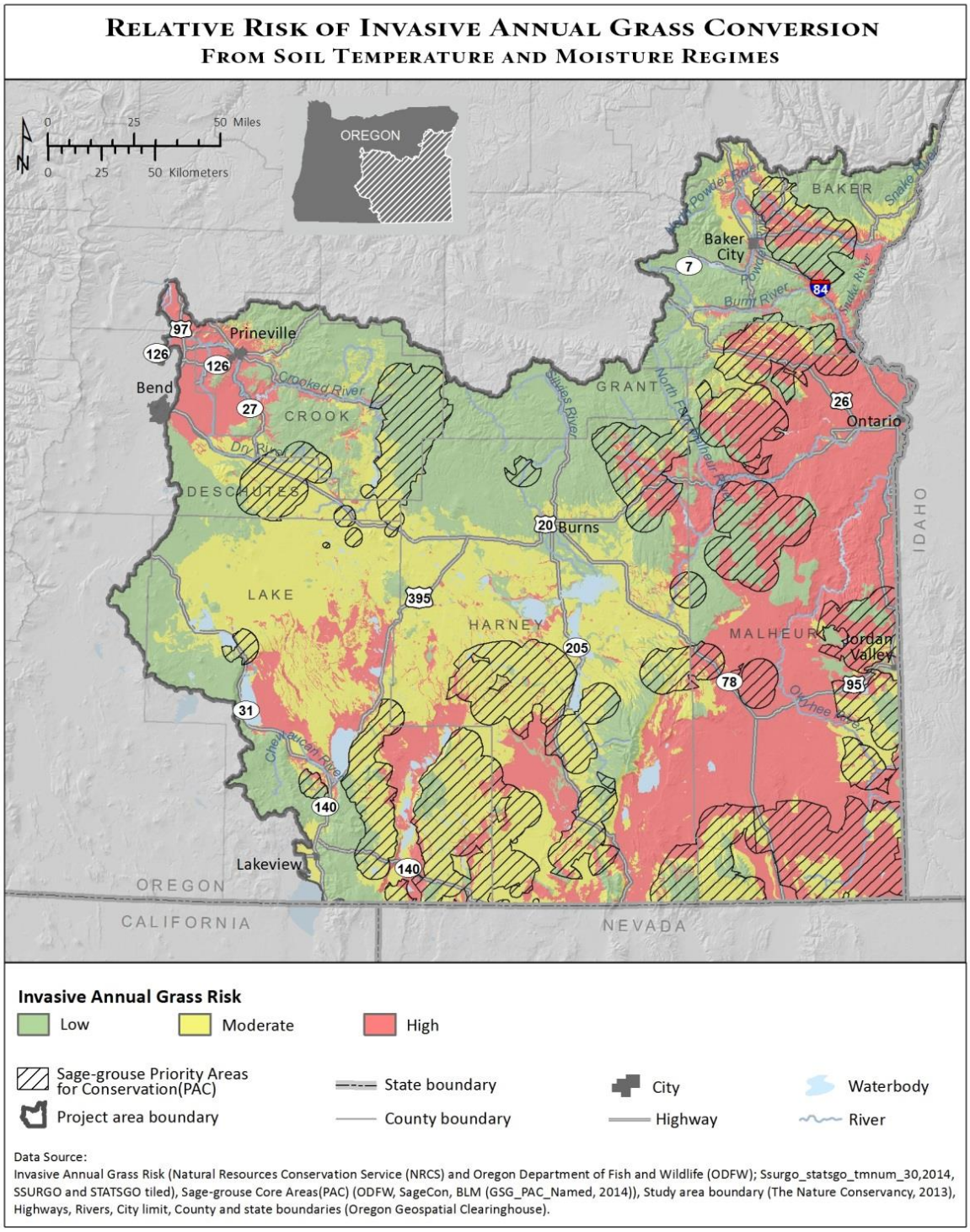

Figure III-3. Relative risk of invasive grass conversion, as determined by the resistance and resilience framework. See Appendix 8 for more information on resistance and resilience concepts.

Success on the Ground: Applying the framework to conservation actions: Habitat conservation based on sagebrush land cover and threat from wildfire and invasive annual grasses

The Strategic Framework contains two distinct levels that are tied to spatial scale. Planning activities will utilize both levels to, first, determine priority locations across the full sage-grouse planning area, and then, to develop specifics required to successfully implement conservation and management projects.

Level I

At Strategic Level I, we are interested in examining the range of the sage-grouse and setting priorities at this level. Using the data compiled for the Action Plan and contained in the ORDSS, we can perform an array of simple and complex queries. For this example, our goal is to use the best available data to identify candidate locations within priority habitat (PACs), where sagebrush land cover proportions associated with high probabilities of lek persistence are at risk of wildfire, and where recovery and/or retention of the plant communities following fire would be challenging. To achieve this goal, we can use a set of relatively simple criteria to identify locations for management and protection:

1. In priority habitat
2. High sagebrush land cover (>65%)
3. Average or greater wildfire hazard potential
4. Low resistance and resilience

The first criterion establishes a finite set of locations to begin to examine habitat conditions. Criterion 2 is based on the ODFW habitat goal of maintaining 70% sagebrush in management areas. Because the sagebrush land cover data contains some error, we lowered the threshold to 65% to reduce the chances of missing important locations. Criterion 3 uses the wildfire hazard to identify areas where wildfire potential is average or higher than average. Criterion 4 uses the resistance and resilience concept as a means to search out locations with little capacity to recover and/or retain the original plant community structures, should a wildfire occur on landscapes with higher than average wildfire hazard potential. The areas that meet these criteria are considered to be at great risk from loss or severe degradation following a wildfire.

Using the Level I criteria and the ORDSS, we found that there are 659 locations (one-square-mile hexagons) that meet our criteria and, of these, 121 include private land (Figure III-4).

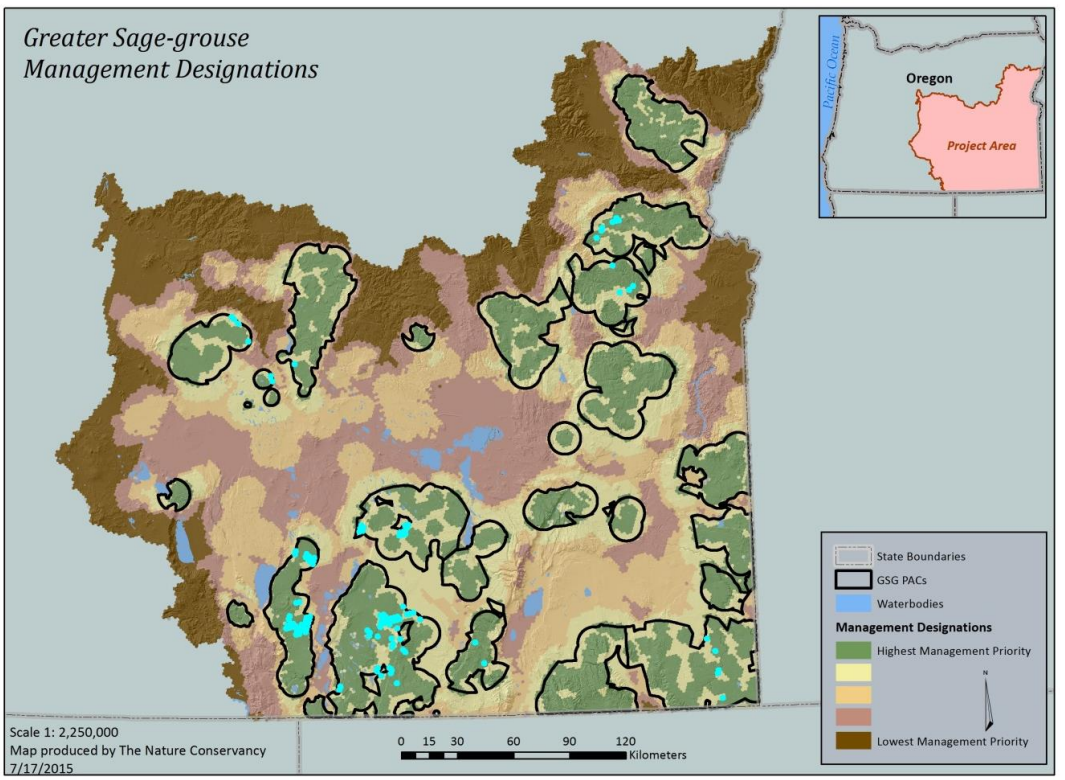

Figure III-4. Example Level 1 Priorities. Bright blue dots are 1-sq.-mile areas (hexagons) that meet the Level I criteria and contain private land. The analysis was performed using the ORegon Decision Support System (ORDSS) for Sagebrush-Steppe.

Level II

At this level, we seek to verify the high-priority areas identified using the Level I query and, once they are verified, tailor site-specific measures, actions, and practices to manage these areas. More specifically, the Level II goal is to use the best available ecological knowledge to determine management practices that maintain or restore sage-grouse habitat at local scales. At this level, we will work through a triage-like process to achieve our goal. Process steps for this example, in order of completion, are as follows:

1. Work with local-scale entities to determine areas of management concern within the areas identified in Level I.
2. Create a spatial overlay of existing management activities within those areas.
3. Use the difference between the two preceding steps to identify areas in need of additional management activity.
4. Use state-and-transition models (STMs) to identify appropriate management practices for locations identified in the preceding step.

The process will result in several outcomes. Steps 1–3 will result in a refined set of sites where management and conservation activities should be implemented, based on maps that indicate where management is occurring and where it is not occurring but needs to be implemented. Step 4 will result in the site-specific set of management and conservation practices. Step 5 will address practical funding and capacity issues of implementation.

c. Strategy Level II (Site-Specific Management)

Strategy Level II (Site-Specific Management) will be used to verify priority areas identified by Strategy Level I, using finer-scale assessments, and to tailor site-specific conservation measures, actions, and practices to achieve conservation objective(s). The strategy at Level II emphasizes consideration of local conditions and the right actions to achieve the desired vegetation conditions based on sage-grouse habitat needs.

Data and Tools. Level II relies on data and scientific knowledge relevant to the specifics of any site identified as a priority through the Level I analysis. Data includes, but is not limited to: current and potential vegetation, distributions, and conditions; local environmental characteristics, conditions, and trends; and site-assessment data, where available, that can be linked to metrics and describe complex characteristics such as habitat quality. This level uses tools such as the series of state-and-transition models (STMs) as well as conservation practices and expected outcomes such as those compiled in the rangeland practices database (Connell et al. 2015) and *Western Sagebrush-Steppe Plant Communities: A Manager's Guide to Assessing Sage-Grouse Habitat* (SageSHARE Project Team, *in progress*).

Keys to advancing the Strategy Level II approach are the confirmation of Level I recommendations using the STMs and other tools,[22] and using the STMs to inform the selection of practices that will generate desired outcomes for sage-grouse habitat and help predict habitat response to management and conservation practices. To guide the Level II process, this Action Plan relies on the STMs to tie site-level vegetation conditions to management objectives and practices. These models capture current scientific understanding of drivers and associated indicators of ecosystem change in response to natural and anthropogenic factors.

There are several advantages to using STMs:

1. They provide a simple classification tool for categorizing sites and even landscapes.
2. By representing low, mid-to-high, and high elevation plant communities in a general way, the models serve as communication tools among the various stakeholders involved in sage-grouse conservation.
3. The models can be used to prioritize and gauge the success of various conservation practices.
4. The models focus on restoring and maintaining vegetation with known potential to support sage-grouse, by using current knowledge of plant community ecology to determine appropriate management actions to shift or maintain plant community composition and structure.

[22] BLM has indicated that, for federal public lands, it will rely on the Habitat Assessment Framework (Stiver et al. 2015) to evaluate site condition and assess habitat quality adequacy for sage-grouse; conservation practices will be selected using STMs. CCAAs use a combination of the STMs and site assessments to determine specific treatments and where to apply them.

The Harney County Soil and Water Conservation District Candidate Conservation Agreement with Assurances (CCAA; USFWS 2014), along with the Oregon multicounty CCAAs and Department of State Lands CCAAs, all contain a similar STM approach, with a low-elevation sagebrush model, a high-elevation model, and a method for assessing riparian systems. The basic building blocks for the STM approach are vegetation "states"—ranging from desired to undesired states or conditions—and drivers of change between states, called "transitions," such as management actions, wildfire, invasions, grazing, etc. (Figure III-5). For all STMs used in this Action Plan, the most desirable vegetation state provides potential year-round habitat for sage-grouse (green), followed in desirability or value-ranking by vegetation that is sufficient for seasonal use by sage-grouse (yellow), and then by undesirable state(s), in which vegetation is unusable by sage-grouse and is considered non-habitat (red). It should be noted that the states within these models should not be taken as an exact match for the compositional and structural characteristics of plant communities on the ground. States within these models are meant to characterize common management or habitat problems within an elevation and climatic range. The STM framework presented here pairs each of the vegetation states with management practices necessary to maintain a desired state or to transition the plant community toward a more desirable state. Movement between states can represent either desired or undesired change, depending on a site's initial conditions and the direction of change.

By focusing on restoring or maintaining habitat for sage-grouse according to generalized vegetation community structure and dynamics, conservation success using the STMs is measured by shifting—or transitioning—acreage from undesirable or less desirable states to preferable states (red to yellow, or yellow to green), or ensuring that sites in more desirable states (yellow or green sites) do not shift to undesirable or non-habitat (red). It is important to note that vegetation structure and dynamics provide only a generalized model of sagebrush vegetation and, as such, only provide a generalized potential representation of sage-grouse habitat. Additional assessment methods may be required to provide detailed site-specific habitat quality data, such as sagebrush height and proximity to human disturbances. Ultimately, the specific restoration or protection actions that should be applied at a given site will be informed by the highest-quality site-specific data available on the current plant community conditions, the desired plant composition based on the habitat needs of sage-grouse, and other available site-specific information.

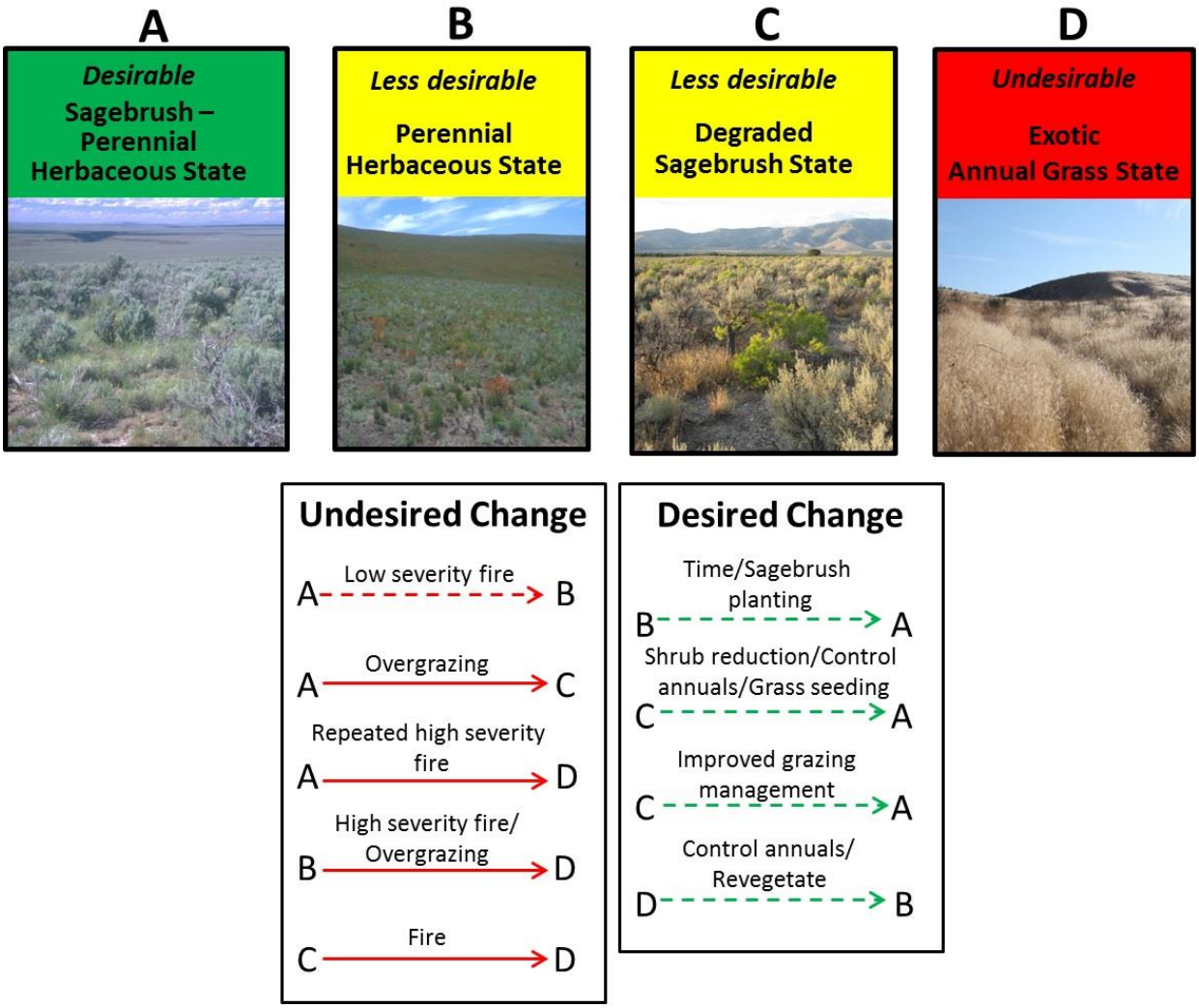

Figure III-5. Simple state-and-transition model showing vegetation states (boxes), qualified and ranked from desirable to undesirable.Vegetation states change or transition to other states in response to stressors, actions, or processes. Arrows represent the drivers that transition vegetation among the possible states at a low-elevation site. Adapted from Boyd et al. (2014).

v. Looking Forward

It is anticipated that, during the course of implementing this Action Plan, data and tools will require maintenance, revisions, and updates, and that new products will become available. Efforts in Oregon will not occur in isolation, and by linking the strategic framework advanced by this Action Plan to broader decision support systems and frameworks like Compass, CHAT (via Compass), and others, Oregon will be positioned to integrate information from those efforts. It is also anticipated that Level II planning will present opportunities to incorporate emerging site-specific information gathered locally into the strategic framework of this Action Plan. Work is under way to create these linkages. Data and tools used to construct the strategic framework of this Action Plan are the best Oregon-specific approaches available at the time of Plan

development. By anticipating linkages across scales from regional to state to local, the Action Plan positions Oregon to maintain a high standard of information and, in so doing, maintain and improve the processes used to achieve strategic investment of resources to achieve desired conservation and management outcomes.

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Displaying male sage-grouse. Photo: Jeremy Roberts, Conservation Media.

Section IV: Assessing and Addressing Threats to Sage-Grouse

i. Assessment of Threats

A number of legal, policy, biological, and technical assessments underlie this Action Plan's content. Of these, four different assessments of threats to sage-grouse were particularly important for the Oregon planning process and are discussed below. The first assessment (Section IV.i.a) covers the U.S. Fish and Wildlife Service (USFWS) 2010 "warranted but precluded" determination, which was conducted on a rangewide scale across the West. The second assessment (Section IV.i.b) covers the Conservation Objectives Team (COT) Draft Report (USFWS 2012) and the COT Final Report (USFWS 2013), which examined threats at the scale of rangewide management units, two of which are partially located within Oregon. The third assessment (Section IV.i.c) summarizes the Oregon Department of Fish and Wildlife's 2011 *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon* (ODFW 2011), which addresses sage-grouse threats in the specific context of Oregon. The fourth and final assessment (Section IV.i.d) lists and summarizes relevant data compilation and assessment efforts specific to Oregon's sage-grouse habitat, which were prepared in conjunction with the State's SageCon planning effort.

a. USFWS 2010 Determination

The federal Endangered Species Act (ESA) and its implementing regulations require that any listing or reclassification of a species as threatened or endangered be made on the basis of the best scientific and commercial data available. The law further requires consideration of five listing factors as part of this process[23]:

> Factor A: The Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range
> Factor B: Overutilization for Commercial, Recreational, Scientific, or Educational Purposes
> Factor C: Disease and Predation
> Factor D: Inadequacy of Existing Regulatory Mechanisms
> Factor E: Other Natural or Manmade Factors Affecting the Species' Continued Existence

The USFWS is responsible for evaluating each of these factors and making findings on the status of the species under consideration with regard to each. The 2010 finding by USFWS that the greater sage-grouse is "warranted but precluded" from listing under the ESA identified two of the five listing factors (A: habitat loss, and D: inadequate regulatory mechanisms) as significant threats for the persistence of the species.[24] While conducted at and applicable to the western

[23] 16 U.S.C. § 1531, 1533(a) - (b); 50 C.F.R. § 424.11.
[24] 75 Fed. Reg. 13910 – 14014 (March 23, 2010).

rangewide level, the 2010 findings related to these two factors are relevant to Oregon's conservation of the sage-grouse and have shaped this Action Plan's approach.

In discussing Factor A, the 2010 finding focused heavily on the issue of habitat fragmentation and the importance of large, intact blocks of quality sagebrush habitat to the viability of the sage-grouse. It documented the various human land uses and non-anthropogenic threats affecting sagebrush habitat quality and fragmentation, many of which are relevant to Oregon and are discussed further in this Plan. But the 2010 finding clearly noted that certain threats are more or less relevant, depending on which portion of the Westwide range of the bird is being examined. Given the variation in the nature and scale of threats from region to region, addressing these threats to the sage-grouse and the bird's viability across the West is not a matter of adopting a uniform approach. This is an important recognition and is relevant to shaping the focus of State plans, which vary in their content and approach based on the relative significance of a given threat to sage-grouse habitat within its borders. Related to this, the following are specific relevant excerpts from the 2010 USFWS findings with respect to Factor A.

> Fragmentation of sagebrush habitats is a key cause, if not the primary cause, of the decline of sage-grouse populations. Fragmentation can make otherwise suitable habitat either too small or isolated to be of use to greater sage-grouse (i.e., functional habitat destruction), or the abundance of sage-grouse that can be supported in an area is diminished. Fire, invasive plants, energy development, various types of infrastructure, and agricultural conversion have resulted in habitat fragmentation, and additional fragmentation is expected to continue for the foreseeable future in some areas.[25]
>
> Several recent studies have demonstrated that sagebrush area is one of the best landscape predictors of greater sage-grouse persistence (Aldridge et al. 2008, p. 987; Doherty et al. 2008, p. 191; Wisdom et al., in press, p. 17). Sagebrush habitats are becoming increasingly degraded and fragmented due to the impacts of multiple threats.[26]
>
> In our evaluation of Factor A, we found that although many of the habitat impacts we analyzed (e.g., fire, urbanization, invasive species) are present throughout the range, they are not at a level that is causing a threat to greater sage-grouse everywhere within its range. Some threats are of high intensity in some areas but are low or nonexistent in other areas. Fire and invasive plants, and the interaction between them, is more pervasive in the western part of the range than in the eastern. Oil and gas development is having a high impact on habitat in many areas in the eastern part of the range, but a low impact further to the west. The impact of pinyon-juniper encroachment generally is greater in western areas of the range, but is of less concern in more eastern areas such as Wyoming and Montana. Agricultural development is high in the Columbia Basin, Snake River Plain, and eastern Montana, but low elsewhere. Infrastructure of various types is present throughout

[25] Id. at 13962.
[26] Id. at 13924.

> most of the range of the greater sage-grouse, as is livestock grazing, but the degree of impact varies depending on grazing management practices and local ecological conditions. The degree of urbanization and exurban development varies across the range, with some areas having relatively low impact to habitat.[27]

The 2010 USFWS finding was also clear that, while habitat fragmentation and related threats are of significant ongoing concern, the story is far from entirely bleak. Significant areas of quality habitat persist across the West and remain very important in the context of sage-grouse conservation, with areas in Oregon being of particular relevance:

> While sage-grouse habitat has been lost or altered in many portions of the species' range, habitat still remains to support the species in many areas of its range (Connelly et al., in press, p. 23), such as higher-elevation sagebrush, and areas with a low human footprint (activities sustaining human development) such as the Northern and Southern Great Basin (Leu and Hanser, in press, p. 14), indicating that the threat of destruction, modification or curtailment of the greater sage-grouse is moderate in these areas. In addition, two strongholds of contiguous sagebrush habitat (the southwest Wyoming Basin and the Great Basin area straddling the States of Oregon, Nevada, and Idaho) contain the highest densities of males in the range of the species (Wisdom et al., in press, pp. 24-25; Knick and Hanser, in press, p. 17).[28]

But despite these strongholds and the persistence of high densities of birds there in the face of various threats, the USFWS determined that, without ameliorating threats across its range, the greater sage-grouse warranted listing under the ESA. The Factor A analysis highlighted wildfire, invasive annual grasses, and conifer encroachment as particularly significant, ongoing threats. These are primary threats in Oregon and are a focal point of this Action Plan. The 2010 finding also recognized that it is not just these and other threats in isolation but "their synergistic effects" that served as a basis for a "warranted but precluded" determination.[29] The inter-relationship between these threats is also something this Plan highlights as fundamentally important and addresses in its conservation approach.

> Fire is one of the primary factors linked to population declines of greater sage-grouse because of long-term loss of sagebrush and conversion to monocultures of exotic grasses (Connelly and Braun 1997, p. 7; Johnson et al., in press, p. 12; Knick and Hanser, in press, pp. 29-30). Loss of sagebrush habitat to wildfire has been increasing in western areas of the greater sage-grouse range for the past three decades. The change in fire frequency has

[27] Id. at 13962.
[28] Id.
[29] Id.

> been strongly influenced by the presence of exotic annual grasses and significantly deviates from extrapolated historical regimes.[30]
>
> Invasive plants negatively impact sage grouse primarily by reducing or eliminating native vegetation that sage-grouse require for food and cover, resulting in habitat loss and fragmentation. … Nonnative invasives, including annual grasses and other noxious weeds, continue to expand their range, facilitated by ground disturbances such as wildfire, grazing, and infrastructure. Pinyon and juniper and some other native conifers are expanding and infilling their current range mainly due to decreased fire return intervals, livestock grazing, and increases in global carbon dioxide concentrations associated with climate change, among other factors.[31]

The 2010 finding's Factor A analysis identified livestock grazing as the predominant land use in sagebrush-steppe habitat and identified its inter-connection with the wildfire and invasive species threats. The USFWS found that the best scientific evidence indicated negative as well as some positive effects of livestock grazing, also noting that impacts may depend more on specific grazing practices than on stocking levels.[32] Further, the USFWS included free-roaming horses as among the negative potential impacts associated with grazing.[33]

With respect to the USFWS 2010 finding's analysis of Factor D, the focal point was anthropogenic threats tied to development activities. The Factor D analysis built on the Factor A findings that identified energy development as a "significant risk" in the eastern portion of the range of the sage-grouse and also discussed renewable energy development in areas including southeastern Oregon, noting concerns over impacts such as reduced connectivity in relatively unfragmented habitat.[34] The Factor D analysis concluded that these and other development-based threats were not adequately addressed by existing regulatory mechanisms at the federal, state, and local levels. The findings highlighted the value of state and local land-use regulations where they exist but noted the relative scarcity of regulations that specifically address sage grouse[35]. This is relevant to Oregon because of the solid foundation of the State's land-use planning system and its partnership with local counties, which this Action Plan builds upon.

Finally, the 2010 findings reviewed the U.S. Bureau of Land Management's (BLM's) Resource Management Plans across the west-wide range and concluded that they did not adequately meet the conservation needs of sage-grouse and in many cases exacerbated the threats

[30] Id. at 13935–36.
[31] Id. at 13939.
[32] Id. at 13939-13941.
[33] Id.
[34] Id. at 13954.
[35] Id. at 13973, 13975

discussed under Factor A.[36] Overall, the USFWS 2010 "warranted but precluded" finding reflected a rangewide review and recognized that the occurrence, extent, intensity, and severity of threats to sage-grouse under each of the relevant ESA listing factors vary across the species' western range. While it is not an Oregon-specific assessment, the 2010 USFWS finding centered on the threats posed by two primary factors relevant to Oregon and elsewhere. Additional assessments, discussed in the subsections below, provide further refinement of the analysis and the applicability of these threats to Oregon in particular.

b. The Conservation Objectives Team (COT) Report (2013)

In 2012, in response to an earlier meeting cohosted by Wyoming Governor Mead and then–Secretary of the Interior Ken Salazar, western states within the range of the sage-grouse formed the Sage Grouse Task Force in order to work together on how to best coordinate and advance a rangewide effort to conserve the bird. In early 2013, with the backing of the Task Force and building upon the 2010 USFWS "warranted but precluded" finding and the ESA listing factors therein, the USFWS published the *Greater Sage-Grouse (Centrocercus urophasianus) Conservation Objectives: Final Report* (hereafter, "COT Report") (USFWS 2013). The COT Report was prepared by a team of USFWS and state biologists for the purpose of evaluating and consolidating current science, delineating rangewide conservation objectives, and defining the degree to which threats need to be reduced in order to conserve the sage-grouse.

The COT Report helps to distill the rangewide threats associated with the listing factors in the 2010 "warranted but precluded" finding for a more regional scale. It does so by portraying information relevant to sage-grouse population health and extinction risk as well as specific threats according to management zones previously identified by the Western Association of Fish and Wildlife Agencies (WAFWA) and their component population designations. The report contains a coarse-scale evaluation of threats across a continuum: (a) present and widespread, (b) present but localized, (c) not known to be present, and (d) unknown. It also contains more detailed discussion of populations and applicable threats.

Thus, the COT Report contains more detailed and current information than the USFWS 2010 "warranted but precluded" determination regarding the threats facing the sage-grouse, including population-specific information relevant to Oregon. While the COT Report is self-described as "guidance," the document provides an important source of information concerning how conservation efforts should be focused in reducing threats in advance of the USFWS's 2015 ESA listing-status review, with the BLM and state plans providing the direction for how threats will be addressed and what actions will be taken.

Sage-grouse populations in Oregon exist within two of the seven WAFWA management zones (zones IV and V) and four component population designations (Baker, Northern Great Basin,

[36] Id. at 13979

Western Great Basin, and Central Oregon) discussed in the COT Report. The population group components of these management zones are large in scale and should not be confused with a connotation of the term "population" that represents groupings of sage-grouse that inhabit a particular watershed, county, or BLM district. Individual population designations for purposes of the COT Report often span multiple states. The COT Report's listing of management zones and populations of relevance to Oregon, as well as the report's ranking of specific threats to these populations, is reproduced below.

Wildfire, juniper (*Juniper occidentalis*) encroachment, and weed/annual-grass invasion stand out in the COT Report table's rankings (Table IV-1) as "present and widespread" threats across sage-grouse populations in Oregon and other Great Basin states. These habitat-based threats represent the primary challenges facing the sage-grouse and habitat vitality in Oregon. The COT Report also identifies anthropogenic threats as present but localized with respect to the management zones relevant to Oregon and other Great Basin states, with some, including mining and grazing, ranked as widespread for certain populations.

The COT Report is organized to address threats to sage-grouse populations at the management zone scale. Because the populations set forth in the COT Report typically span several state boundaries, and because the report ranks threats at the population rather than the state level, its rankings mask variations in the extent and degree of specific threats on a statewide level. A particular threat may be ranked as present and widespread across a population level, but that threat may be more widespread in one state than in another, depending on differences in geographic or ecological conditions, or in the regulatory mechanisms and actions in place to address that threat in a given state.

Prior to the Final COT Report, the state fish and wildlife agencies and the USFWS completed a draft report that contains somewhat more detailed information concerning specific threats to sage-grouse populations in particular management zones (USFWS 2012). That information is summarized below with respect to the Oregon-specific populations and management zones.

Baker Population (Management Zone IV)

The Draft COT Report identifies the principal threats to sage-grouse in this area as renewable energy development, transmission, invasive weeds, off-highway vehicle (OHV) recreation, and juniper encroachment. This population is highly dependent on private lands (USFWS 2012; p. 59).

Table IV-1. Threats by sage-grouse population, adapted from the COT Report (U.S. Fish and Wildlife Service 2013, Table 2). Threats are considered as: present and widespread (Y); not known to be present (N); present, but localized (L); or unknown (U).

Population	Management Zone	Threats												
		Isolated/ Small Size	Sagebrush Elimination	Agriculture Conversion	Fire	Conifers	Weeds/ Annual Grasses	Energy	Mining	Infrastructure	Grazing	Free-Roaming Equids	Recreation	Urbanization
Baker (OR)	IV	Y	Y	Y	Y	L	Y	L	Y	L	U	N	L	L
Northern Great Basin (OR, ID, NV portion)	IV	N	L	L	Y	Y	Y	L	L	Y	Y	L	Y	Y
Central Oregon (OR)	V	N	L	L	Y	Y	Y	L	Y	L	Y	U	L	L
Klamath (OR, CA)	V	Y	U	U	Y	Y	Y	L	N	U	U	U	U	U
Western Great Basin (OR, CA, NV)	V	N	L	L	Y	Y	Y	L	L	L	Y	Y	U	N

Northern Great Basin Population (Management Zone IV)

Historically, a large area of sagebrush habitat for this population was seeded to crested wheatgrass. Wildfire has exacerbated the problems with invasive weeds and grasses. Other threats include mining, renewable energy development, transmission, and juniper encroachment at higher elevations (USFWS 2012; p. 62) .

Central Oregon Population (Management Zone V)

There has been a large amount of habitat loss affecting this population, and the proportion of habitat in private ownership is relatively high. Principal threats include renewable energy (wind and geothermal) development, residential development, roads, and transmission (USFWS 2012; p. 63).

Western Great Basin Population (Management Zone V)

A large proportion of the habitat for this population is in federal ownership, and the population is the most resilient of the populations in Oregon. Invasive weeds and juniper encroachment are principal threats. Fire, renewable energy development (wind and geothermal), and free-roaming horses also are threats to this population (USFWS 2012; p. 65-66).

In sum, the Draft COT Report identifies two of the four main populations in Oregon—Baker and Central Oregon—as having a relatively high degree of private land ownership. In these areas, a

variety of development-related activities, along with invasive grasses and juniper encroachment, pose the principal threats to sage-grouse. In the other two areas, which have large amounts of federal lands, the principal threats tend to be more related to invasive weeds/grasses, juniper encroachment, and wildfire.

c. Greater Sage-Grouse Conservation Assessment and Strategy for Oregon

The *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon* (2011 Strategy) was first crafted in 2005 by ODFW and was subsequently updated and adopted by the Oregon Fish and Wildlife Commission in April 2011 (ODFW 2011). The ODFW 2011 Strategy is tied to the life histories of sage-grouse, uses the best available science as applied to Oregon, describes ODFW's management of sage-grouse, and provides sage-grouse conservation guidance for public and private land managers. The 2011 Strategy and its supporting background information are intended to promote the conservation of sage-grouse and intact, functioning sagebrush communities in Oregon. Key portions of the 2011 Strategy have been incorporated into Oregon's Administrative Rules (OARs) pursuant to Oregon Revised Statute (ORS) 496.012 (also known as the statewide Wildlife Policy), which states, "[i]t is the policy of the State of Oregon that wildlife should be managed to prevent serious depletion of indigenous species. …" These relevant OAR provisions, housed at OAR Chapter 635 Division 140, remain applicable to ongoing sage-grouse management and conservation, as discussed in Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts and in this section as well as in the context of individual threats discussed in the subsections below.

The 2011 Strategy was supported by the USFWS and addresses many of the threats identified in the 2010 USFWS "warranted but precluded" determination as well as in the COT Report. For example, it focuses on the interaction of wildfire and cheatgrass, juniper encroachment, and invasive weeds.[37] However, as noted previously, because ODFW does not have management or regulatory jurisdiction over the vast majority of sage-grouse habitat in Oregon, public, state, and private landowners, managers, or permitting agencies are generally not obligated to implement the threat-abatement guidance in the 2011 Strategy.

Since 2011 and the Strategy's adoption, significant additional information and data regarding habitat factors, biological requirements, and potential threats to and opportunities for sage-grouse conservation have been documented and released. This Action Plan builds upon the 2011 Strategy in many ways, including by incorporating new data and information into the existing information in order to create the most effective plan for the conservation of sage-grouse in Oregon. The OARs associated with the 2011 Strategy's population and habitat objectives, Core Area habitat approach, and mitigation provisions were also recently revisited and revised by the Commission's July 2015 rulemaking and adoption of new ODFW mitigation rules.

[37] ODFW 2011 Strategy, pp. 100, 105, and 107, respectively.

d. Threat Assessments Completed by the SageCon Partnership

The development of this Action Plan through the SageCon Partnership revealed a variety of data and assessment needs that went beyond information previously compiled as part of the 2011 Strategy, the COT Report, or other efforts. Generally speaking, these needs were driven by the desire to extend and refine the information relevant to assessing the extent and significance of current and future threats as well as opportunities related to sage-grouse conservation, economic development, and rural community health in Oregon. Through the efforts of various SageCon partners, the following datasets and assessments have been developed in association with this Action Plan.

Wildfire Threat. Early in the planning process, Monitoring Trends in Burn Severity (MTBS) data from 1980 to 2014 were analyzed for patterns relative to sage-grouse habitat in Oregon. MTBS data are derived from satellite imagery and include fires 1,000 acres and greater in the western United States; the data are developed and managed by the U.S. Department of Agriculture (USDA) Forest Service Remote Sensing Applications Center and the U.S. Geological Survey (USGS) National Center for Earth Resources Observation and Science. The main objective for the MTBS mapping effort is to provide a consistent summary of the location, extent, and magnitude of burn severity for all lands in the United States. MTBS fire perimeter data were used to explore the intersection between sage-grouse habitat and recent fires in Oregon (Figure IV-7) and to understand how much habitat (or Priority Area for Conservation [PAC] acreage) had been impacted by fires (Figure IV-6). MTBS also maps fire severity within fire perimeters. These data were used for exploratory purposes only. Ultimately, the SageCon effort assessed the "2014 Wildfire Hazard Potential"[38] to examine the potential for wildfire. This dataset is current to 2010 and based on LANDFIRE 2010 (LF 1.2.0), among other data sources (Figure IV-8). In addition, Oregon collaborated with federal and state agencies to incorporate the most current knowledge and information (e.g. Mayer et al. 2013; Havlina et al. 2015). See Appendix 9 for the methods used to calculate acres burned.

Invasive Annual Grasses. Mapping of invasive annual grasses is challenging due to the nature of annual-grass physiology and dependence on environmental conditions. However, the SageCon effort compiled several products for use in assessing the extent and severity of annual-grass invasion in Oregon. First, the Resistance and Resilience layer (R&R) is a product developed by Chambers et al. (2013) that has been accepted nationally by BLM through the Fire and Invasives Assessment Tool (FIAT) and the U.S. Department of the Interior Secretarial Order 3336. The R&R layer provides a science-based tool for addressing the fire and invasives threats to sage-grouse (Chambers et al. 2014b). It is founded on experimental and field studies that link these plant community functions to ecological regimes of soil moisture and temperature. Second, through the SageCon data assessment and compilation effort, Oregon's Institute for Natural Resources updated the Integrated Landscape Assessment Project's (ILAP's) Current Vegetation

[38] http://www.firelab.org/project/wildfire-hazard-potential.

dataset in 2013 to include improved estimates of rangeland vegetation and to reflect recent wildfires. These data are specific to Oregon and use remote sensing, environmental gradients (e.g., elevation, maximum summer temperature), and field plot data to develop a continuous, 30-m spatial resolution dataset in which every cell contains plant species abundances and other plant community summaries and metrics. Invasive annual-grass species extent was estimated by identifying where these species were the most or second-most abundant for all cells in the planning area (Figure IV-3). Third, the Oregon Department of Agriculture (ODA) produced continuous, 270-m resolution habitat suitability datasets for multiple invasive grasses, including cheatgrass and medusahead. Data from all three of these sources have been incorporated into the ORegon Decision Support System for Sagebrush Steppe (ORDSS), as discussed in Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts of the Plan.

Juniper Distribution and Abundance. The Institute for Natural Resources also mapped woody vegetation greater than or equal to seven feet in height for the planning area (Nielsen and Noone 2014). These data were used to calculate the area of juniper in PACs (Table IV-2). The data are continuous and were mapped at 30-m and 10-m spatial resolutions. The dataset includes use of National Agriculture Imagery Program imagery, LANDSAT imagery, field plots, and imagery-derived metrics to generate percentage canopy cover of the woody vegetation. The objective of the data is to best identify juniper and other conifers and minimize detections of sagebrush species. The Institute for Natural Resources' 2013 Current Vegetation dataset also describes juniper and other conifer percentage canopy cover, but with less accuracy. Both of these datasets have been incorporated into the ORDSS for query. Appendix 8 briefly describes how these data were used to support the Plan.

Human (Urban and Exurban) Development). Counties in eastern and central Oregon, in collaboration with the Oregon Department of Land Conservation and Development (DLCD), compiled and summarized permitted development activities in their counties for the 10-year period from 2003 through 2013 (Harney County et al. 2013). The counties compiled this information into a report titled *Central and Eastern Oregon Land Use Planning Assessment: Sage-Grouse Habitat*. The Report informs readers of the county-specific land-use programs and summarizes development trends on nonfederal lands within sage-grouse habitat areas. The resulting information documents existing developments such as housing, mining sites, and infrastructure within sage-grouse habitat and lists county permitting decisions. The Report's analysis is based on county planning geospatial data, county permitting records, and traditional information. See Appendix 5 for the full Report.

Potential for Agriculture Conversion. Data were developed describing the potential for future conversion of sagebrush habitat to agriculture in central and eastern Oregon and where soils data have been mapped to a fine enough detail (Figure IV-14). These data were developed by The Nature Conservancy (TNC) and used the NRCS's Soil Survey Geographic Database (SSURGO), climate, and topographic variables to estimate whether currently untilled ground

could be or has the potential to be tilled. The model did not consider water availability or current and potential infrastructure, and thus did not estimate the *probability* or *likelihood* of tillage. Appendix 10 contains the full TNC report. In an earlier analysis of agriculture conversion, the ODA, the Oregon Water Resources Department (OWRD), and the Institute for Natural Resources examined water permitting and agriculture trends in Oregon.

Water Rights Permitting. During the SageCon data assessment process, staff from the NRCS, the OWRD, and ODA identified irrigated agriculture as the most likely type of agricultural conversion that would occur on privately owned rangeland but noted that conversions of this sort were relatively unlikely due to the extremely limited availability of water rights. Irrigated agriculture is dependent on access to water through surface- and ground-water permits. The prediction described by the NRCS, OWRD, and ODA in late 2013 was confirmed by (i) a follow-up inquiry into water rights permits and availability led by the Farm Bureau in spring 2015 and (ii) a groundwater permit closure for the Harney Valley by OWRD in summer 2015. See Appendix 11 for the draft report.

Renewable Energy Potential. The Oregon Department of Energy (ODOE) developed two sets of information for consideration during the SageCon planning process. One set consists of criteria to identify areas for potential development, compiled in coordination with energy providers and cooperatives. These criteria were used to map areas where renewable energy resources and infrastructure could support future energy development. ODFW GIS personnel completed the mapping, which was then reviewed by energy-related stakeholders. The second set of ODOE information consists of an analysis of the future energy market and added context to the mapped extent and distribution of land with potential for energy development. Appendices 12 and 13 contain the briefing documents and maps associated with these analyses. In addition, TNC compiled a data layer depicting areas where renewable energy development was excluded, current to October 2014 and based on the Protected Areas Database for the United States (USGS GAP 2012).[39]

Habitat Connectivity. TNC and the BLM completed an analysis to develop information describing connectivity of sage-grouse habitat and populations, with input from other partners. The analysis used circuit theory methods to model several aspects of connectivity, including the following: highly valuable areas for connectivity, areas that could be restored for connectivity, and areas where barriers to connectivity exist. When examined together, these datasets can be

[39] TNC created an energy exclusion data layer for use with modeled renewable energy feasibility data for southeast Oregon. An effort was made to map all lands excluded from geothermal and/or wind and solar projects due to their protection as GAP1 or 2 lands in USGS's National Gap Analysis Program Protected Areas data and/or being identified by the Energy Facility Siting Council for State permitting in Oregon's Administrative Rule 345-022-0040 as "Protected Areas," with additional location information such as federal lands within the Steens Mountain Cooperative Management and Protection Area and the Steens Mineral Withdrawal Area.

used to inform and prioritize conservation and management actions related to restoring, maintaining, and protecting connectivity. See Appendix 14 for the full report.

Habitat and Development Change Since 2001. The SageCon data assessment and compilation effort used LANDFIRE Existing Vegetation Type data to assess changes in habitat conditions between 2001 (LF 1.0.5) and 2010 (LF 1.2.0). These data are 30-m spatial resolution data that were developed for analyzing change over time and will be updated periodically. Land cover types were used to indicate change in habitat and developed land area over the assessed timeframe. The variables analyzed include sagebrush, conifer, juniper, exotic annual grasses, all grasses, crop-pasture-hay, and developed land. See Appendix 15 for the full report.

Habitat Baseline Conditions. The SageCon effort also used LANDFIRE Existing Vegetation Type data (LF 1.2.0) to examine habitat conditions in relation to lek occupancy and provide information to stakeholders about the current conditions of sagebrush and other vegetation in Oregon, including information relative to regional studies (i.e., Knick et al. 2013). In particular, the analysis informed conversations about the use of a development cap in Oregon and the unit over which it might be applied. Using the same variables analyzed for the analysis of Habitat and Development Change Since 2001, the analysis relied on land cover types to summarize baseline habitat conditions. Habitat conditions were summarized for the 5-km area surrounding leks, PACs, ODFW Action Areas, BLM districts, modified sage-grouse population areas, and the planning area. The analysis included a preliminary examination of the scaling relationship among these units. See Appendix 15 for the report.

ii. Addressing Threats in Oregon

To assist with conservation planning efforts, this Action Plan identifies conservation objectives and actions relevant to each of the threats to sage-grouse and their habitats identified in the 2010 USFWS "warranted but precluded" finding as well as in the Draft and Final COT Reports (2012, 2013). For the purposes of this Action Plan, a conservation action is defined as any activity or action which, when implemented or continued to be implemented, will reduce or remove threats to sage-grouse and/or will improve or maintain sage-grouse populations and/or healthy sagebrush-steppe habitat. Appendix 3 describes the metrics to be measured and reported for purposes of tracking and accounting for these actions. Appendix 4 provides select implementation recommendations and guidelines related to conservation actions and sources for additional information or planning resources. The conservation actions set forth in this Plan have been developed based upon the best available science, professional experience, and biological or management judgment.

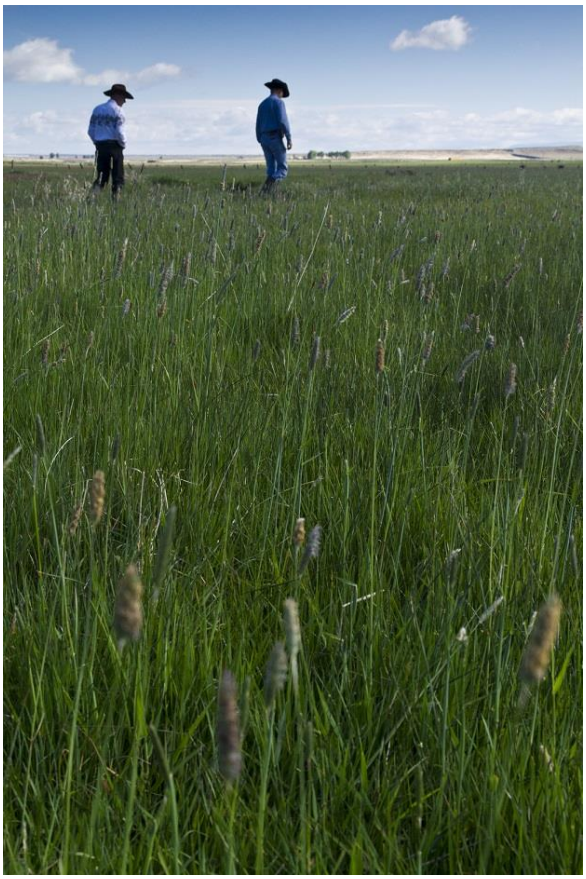

Photo: Jeremy Roberts, Conservation Media.

The Action Plan indicates where Oregon already has adequate measures (regulatory mechanisms or on-the-ground management actions) in place to ensure that threats are contained and ameliorated. This includes highlights of accomplishments and conservation actions implemented since 2010, which are tied to, and in some cases supplement, an extensive documentation of actions that have been submitted to and collated in the USFWS Conservation Efforts Database.[40] A summary of these conservation efforts appears in Appendix 16. Of particular importance, the Action Plan also sets forth new conservation measures, including regulatory mechanisms and an enhanced approach to prioritizing and advancing habitat management actions, as well as associated funding. Successful implementation of these measures will ameliorate threats to the sage-grouse and its habitat in Oregon, reverse negative habitat and bird population trends in priority locations, and advance the long-term conservation of the species.

The Action Plan takes a unified, all-lands approach to sage-grouse conservation and is meant to supplement, not replace, the ODFW 2011 Strategy, the Local Implementation Teams (LITs) associated with that Strategy, or the locally driven process that created them. The Action Plan is also crafted to advance coordination and strategic implementation of conservation actions, mitigation, and monitoring across land ownerships, including BLM lands.

a. Implementation Overview

Actions identified in this plan will be implemented in different ways, depending on land ownership.

- BLM lands make up the majority of land ownership across Oregon's sage-grouse habitat. Implementation of the Action Plan on these lands will be guided by the BLM's Resource Management Plan Amendment for Oregon (BLM 2015a) and laws specific to federal lands. During the development of this plan, an effort was made to align conservation actions across federal, state, and private land ownership. Proposed development on

[40] https://conservationefforts.org.

federal lands that triggers state or county review or permitting will be subject to the new LCDC and ODFW rules governing development and mitigation (OARs 660-023-0115 and 635-140-0025, respectively; see Section II: Implementation and Coordination – Partnerships that Work, Section IV: Assessing and Addressing Threats to Sage-Grouse, Appendix 17, and Appendix 19). Development on federal lands will be included in tracking and calculating the development metering and limitation thresholds as described in OAR 660-023-0115.

- Oregon has authority to ensure that the conservation actions in this plan are implemented on state-owned lands and by relevant state agencies. This authority is supported by Governor Kate Brown's Executive Order as well as through the LCDC and ODFW rules governing development and mitigation in significant sage-grouse habitat (see the full text of the Executive Order at the beginning of the Action Plan). Development on state lands will be included in tracking and calculating the development metering and limitation thresholds as described in OAR 660-023-0115. Additionally, lands managed by the Oregon Department of State Lands (DSL) have been enrolled in a Candidate Conservation Agreement with Assurances (CCAA), with site-specific plans to direct implementation of conservation measures on these lands.

On privately owned lands, nonfarm-use development requiring county or state permits will be governed by the LCDC and ODFW rules referenced above. Development on private lands will be included in tracking and calculating the development metering and limitation thresholds as described in OAR 660-023-0115. Additional conservation actions related to habitat and land management will be implemented by landowners enrolled in the programmatic CCAAs for private lands or those engaged in other federal or state incentive programs designed to reduce the threats to sage-grouse in private lands

In the remainder of this section, the Action Plan sets forth conservation actions that have been identified to ameliorate Oregon-specific threats, with the individual subsections that follow describing particular threats and listing associated conservation actions. Actions are designed to be specific, measurable, and achievable. The Plan identifies entities responsible for advancing a given conservation action; in many cases, multiple parties will be responsible for implementing actions collaboratively across land ownership jurisdictions. Pursuant to the Governor's Executive Order (see beginning of this Plan) and as part of the Memorandum of Agreement development discussed in Section II: Implementation and Coordination – Partnerships that Work, the implementation phase of this Plan will further refine lead agency roles related to coordination of efforts across the species' range, in accordance with annual priorities, goals, funds, and other resources identified by the SageCon coordinating council. Appendix 3 contains a metrics table that organizes this Plan's conservation actions and provides further details, including the following:

- Strategy level of a given action (large-scale planning and prioritization and site-specific management)
- Performance measures by which progress toward accomplishing actions will be measured
- Responsible parties
- Timelines by which actions are anticipated to be completed
- Funding and other resources identified to implement actions.

Implementation Guidelines and Recommendations for select conservation actions are also described in Appendix 4. Because many materials and resources are available describing the best scientific approaches to implementing various conservation actions, these guidelines are not intended to be exhaustive. Some of these resources which land managers and practitioners can draw upon are identified in Appendix 4. It is also important to note that sage-grouse habitat characteristics vary across the range of the bird (depending on elevation, soil type, and moisture, for example), making a one-size-fits-all approach unadvisable or impractical. Thus, the implementation guidelines included in Appendix 4 are not intended to be prescriptive across the entire SageCon planning landscape. Rather, they provide general guidelines supported by science and intended to be customized and implemented adaptively according to the site-specific characteristics within project boundaries.

b. Monitoring and Adaptive Management

Monitoring is an essential feature of this Action Plan and is critical to successful implementation of an adaptive management approach designed to benefit sage-grouse populations. This Plan outlines five broad categories for which monitoring is required:

1. sage-grouse biological data;
2. human development within sage-grouse habitat;
3. conservation and mitigation actions;
4. landscape-level habitat quantity and quality; and
5. site-specific habitat condition.

The monitoring component of this Plan is designed to complement the monitoring objectives of the amended BLM RMP and Final Environmental Impact Statement for Oregon (hereafter "BLM RMP FEIS") {BLM, 2015 #11}. Specifically, readers will also find it helpful to review the BLM RMP FEIS Appendices D ("Adaptive Management Strategy"), G ("Monitoring Framework"), and I ("Disturbance Cap Calculation Method").

Sage-grouse Biological Data

Monitoring actions associated with sage-grouse biological data relate to population inventories that track sage-grouse population trends and sage-grouse habitat utilization in response to conservation actions or habitat degradation. The actions listed below describe ongoing

monitoring efforts that will be continued and/or enhanced under this Plan. For instance, ODFW, in cooperation with federal biologists and volunteers, has been monitoring sage-grouse populations and lek attendance since the 1940s at three geographic scales (statewide, BLM district, and wildlife management unit). This data will remain relevant to determining whether the State is meeting or trending toward meeting population objectives defined in the ODFW 2011 Strategy and codified at OAR 635-140-0005. Beginning in 2015, ODFW partnered with the BLM to expand population monitoring and trend assessments at the PAC scale, which will assist in tracking trends and progress at that level as well as informing management responses at the PAC level, including determination of whether the following adaptive management triggers outlined in the BLM RMP Amendment have been activated (see Appendix D: "Adaptive Management Strategy," p. D5 [(BLM 2015a)]):

Soft Population Trigger (All PACs):

- Annual population drops by 40% or more in a single year, OR
- Annual population drops by 10% or more for three consecutive years, OR
- The five-year running mean population drops below the lower 95% confidence interval value.

Hard Population Trigger:

- For PACs with adequate population data, the five-year running mean population drops below the lower standard deviation value.
- For PACs with inadequate population data (Louse Canyon and Trout Creeks), the annual population declines by a total of 60% or more over two consecutive years.
- Soft triggers for both population and habitat at the Oregon PAC scale are reached.

Monitoring actions in this category also include ongoing and/or new research to understand sage-grouse response to conservation actions (e.g., juniper removal) and habitat degradation (e.g., wildfire). Currently, long-term research is under way in the South Warner and Trout Creek areas to investigate sage-grouse utilization of habitat altered by juniper removal and wildfire, respectively. Because the level of habitat restoration work is expected to increase significantly in the next five to 10 years, this Action Plan advances initiation of new monitoring efforts to assess sage-grouse response to conservation actions included in this Plan. Detailed monitoring plans of this nature are beyond the scope of this document and would be developed in consultation with scientific experts associated with regional universities and organizations.

Action MON-1: Monitor sage-grouse population trends at four geographic scales: (1) statewide; (2) BLM district; (3) wildlife management unit (WMU); and (4) Priority Area for Conservation (PAC).

MON-1-1: Assess sage-grouse population trends in the context of State population objectives (2011 ODFW Strategy; OAR 635-140-0005).

MON-1-2: Assess sage-grouse population trends within PACs to determine if "hard" or "soft" thresholds (per BLM Resource Management Plan) have been triggered.

Action MON-2: Monitor sage-grouse habitat utilization in response to conservation actions or habitat degradation.

MON-2-1: Employ new research to monitor sage-grouse response to conservation actions related to habitat improvement that will be implemented under this Plan and through the efforts of partner organizations.

Development and Agriculture Conversion

Development within counties with sage-grouse habitat will be monitored to ensure that the direct footprint of development does not exceed 3% of the total acreage of individual PACs, as per the new LCDC rules (OAR 660-023-0115), related local or other state laws (e.g., ODFW mitigation rule, OAR 635-140-0000 et seq.; Governor's Executive Order), and the BLM's RMP Amendment. This includes establishment of baseline levels of existing development impacts in PACs. Monitoring will also exist to ensure that the rate of development does not exceed the metering threshold of no more than 1% of the acreage in any PAC across a 10-year period, as per the above-referenced authorities.

The development monitoring action below will require (1) creation of a central registry to which counties and other relevant permitting entities must report all new development; (2) ongoing and up-to-date analyses and calculation of development percentages for each PAC; and (3) creation and maintenance of a development spatial layer to be utilized for the monitoring purposes described here as well as within the ORDSS described in Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts of this Plan and the Habitat Quantification Tool for calculating mitigation debits and credits referenced in the Mitigation Manual located at Appendix 6. While agricultural development will not be counted as new development in calculations relevant to the 3% or 1% thresholds pursuant to the State regulatory framework referenced above, the issue of agriculture conversion will be monitored and tracked in the central registry through OWRD's reporting of proposed or new water rights to DLCD, along with an estimate of the direct impact of the agriculture conversion potentially associated with new water rights (see Section IV.v.c for further discussion).

Action MON-3: Monitor and report direct footprint impacts from current and new human development and cultivated agriculture (approved and completed) within PACs.

Conservation and Mitigation Actions

A central registry—as directed by the Governor's Executive Order (see beginning of this Plan)—is also important in tracking (a) conservation actions implemented for the benefit of the sage-grouse, and (b) mitigation actions taken to offset development impacts or create advance mitigation credits. Such monitoring is important to detailing the quantity (e.g., acres of juniper removal, acres of invasive annual grass treated, miles of fence marked); the spatial arrangement (e.g., determining whether prioritized areas are receiving conservation attention); and the effectiveness of targeted conservation and mitigation work relevant to this Plan. The registry and related monitoring data will be useful for planning future conservation work and mitigation-crediting programs that spatially expand upon prior efforts. Further, the input into this registry will provide an understanding of whether conservation and mitigation efforts are ameliorating the threats described in this Action Plan or whether shifts in approaches under adaptive management are warranted. As part of this monitoring effort, a spatial GIS layer will be created and incorporated into the ORDSS described in Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts.

Action MON-4: Monitor and report conservation and mitigation actions advanced by a variety of stakeholders, including but not limited to the following, while ensuring that the relevant data captures the actual actions implemented and not simply what was funded:

1. Natural Resources Conservation Service (NRCS), Sage-Grouse Initiative (SGI)
2. ODFW habitat programs (Mule Deer Initiative, Upland Game Bird–funded projects, the Oregon Access and Habitat Program)
3. BLM, USFWS, and USFS habitat projects on federal lands
4. Mitigation creditors (habitat projects implemented for mitigation credits)
5. Soil and Water Conservation Districts
6. Private landowners (e.g., CCAA conservation measures)
7. Department of State Lands (e.g., CCAA conservation measures) and other agencies (e.g., ODA, ODWD, ODF)
8. Conservation and other nongovernmental organization partners
9. Cooperative weed management areas

Landscape-Level Habitat Quantity and Quality

The actions in this category encompass two types of landscape-level habitat monitoring. Action MON-5 below relates to monitoring activities necessary to determine if habitat objectives are being met (e.g., ODFW 2011 Strategy; OAR 635-140-0010) or if habitat thresholds are being triggered, such as those described in the BLM RMP Amendment (BLM 2015a), which are tied to the habitat objective identified in ODFW's 2011 Strategy. This objective is to maintain 70% of the greater sage-grouse range as sagebrush habitat in advanced structural stages (sagebrush classes 3, 4, or 5), with the remaining 30% of sage-grouse range (which includes areas of juniper encroachment, non-sagebrush shrubland, and grasslands) managed to increase available

habitat. The BLM's PAC-level habitat "hard" and "soft" triggers (BLM RMP Amendment, Appendix D: "Adaptive Management Strategy" [BLM 2015]) are:

> Soft Trigger. When the area with at least 5% sagebrush canopy cover and less than 5% tree canopy cover (Baruch-Mordo et al. 2013) drops below 65% of the sagebrush-capable area within an individual Oregon PAC but remains above 30%.
>
> Hard Trigger. When the area with at least 5% sagebrush canopy cover and less than 5% tree cover drops below 30% of the sagebrush-capable area within an individual Oregon PAC, or when the area supporting at least 5% sagebrush canopy cover and less than 5% tree cover drops 5% or more in one year in the sagebrush-capable area of an Oregon PAC (BLM 2015a).

The second action (Action MON-6) included in this monitoring category recognizes the need to develop and utilize new remote sensing and environmental gradient–based tools to map and assess habitat quality in relation to the states described in this Plan's state-and-transition model approach (see Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts). This endeavor would utilize plot-level data to train and validate predictive models of habitat that could be used across the complete landscape associated with sage-grouse habitat.

Action MON-5: Assess sage-grouse habitat trends within PACs to determine if the State's habitat objectives (ODFW 2011 Strategy) are being met and if "hard" or "soft" thresholds (per the BLM Resource Management Plan) have been triggered.

Action MON-6: Monitor sage-grouse habitat quality according to vegetation states, using predictive models trained and validated by plot data.

Site-specific habitat condition

Site-specific monitoring of habitat condition is important to ensure that the conservation actions and measures associated with the Action Plan, CCAAs, mitigation credits, and other programs are having the desired effect. Further, monitoring is a necessary component of adaptive management to inform land managers when conservation actions should be modified in order to better meet the desired habitat objectives. The scale for this level of monitoring is defined as the "map unit." Map units are delineated during site-specific planning and may be informed by pasture or allotment boundaries, geographic features, ecological site conditions, or other spatial boundaries. The methodologies and tools for assessing habitat condition may vary depending on the project, land ownership, or other factors. For instance, CCAAs utilize the state-and-transition model approach described in Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts of this Plan. In contrast, site-specific habitat monitoring on BLM lands may rely upon Rangeland Health Indicators and/or the Habitat

Assessment Framework (Stiver et al. 2015); see BLM RMP Appendix D, "Adaptive Management Strategy" for additional detail on habitat monitoring on BLM lands. Efforts should be made to reconcile differences among data based on the above factors in order to produce a coherent dataset and monitoring picture across the landscape. At a minimum, the following management action is intended to ensure monitoring at the site-specific scale.

Action MON-7: Conduct site-specific monitoring of habitat quality according to vegetation states at the map-unit level. Map units are geographic areas delineated during CCAA site-specific planning, mitigation credit planning, or other habitat improvement planning.

iii. Addressing Key Threats: Juniper Encroachment, Exotic Annual Grasses, and Wildfire

The three primary, widespread, and large-scale threats to the sage-grouse and its habitat in Oregon are juniper encroachment, invasive annual grasses, and wildfire. These three threats are interrelated, and the threat they ultimately pose to sage-grouse translates into habitat loss and fragmentation. The relationship between these three threats is detailed in the state-and-transition models for low, mid, and high elevations (see Figures 2–4 in Appendix 8).

It is important to note that fire and juniper have always existed on the Oregon landscape at some level and degree of intensity, and sage-grouse have evolved with these natural elements. What is different today is the severity and scale of their impacts, the introduction of exotic invasive plant species, and the interrelationship between these forces in shaping the resilience of habitat and how it responds in their presence. Along with other factors, society's approach to wildfire over the past century (mainly suppression) has allowed for expansion of juniper populations especially in mid- and high-elevation areas (Miller et al. 2005; Miller et al. 2008), while the introduction of invasive annual grasses at low-to-mid elevations has in turn fueled fires and outcompeted native species. These factors have led to unprecedented change in fire regimes, including shortened fire return intervals in annual-grass–prone areas, increased fire intensity, and larger fires that impact vast portions of sage-grouse habitat.

Historically, juniper persisted mainly in fire-resistant areas, such as rocky outcroppings or areas with limited fine fuels (Miller et al. 2005; Miller et al. 2008). Over the past 145 years, juniper has expanded and continues to expand in association with reduced fire in higher-elevation sage-grouse habitat. Juniper outcompetes understory shrubs, grasses, and forbs for water, leaving a depleted understory that functions marginally or not at all as sage-grouse habitat. Juniper also contributes significantly to the fuel load leading to more-severe fires capable of negatively impacting remaining desired understory perennial vegetation (Miller and Tausch 2000). Annual grasses may invade after the burning of woodland plant communities and may persist at mid elevations; higher-elevation sites are more resistant to the invasion and persistence of exotic annual grasses (Chambers et al. 2014a). At low-to-mid elevations, invasive annual grasses outcompete native perennial bunchgrasses for water and nutrients. And they

senesce early, leaving large areas of dry, fine fuels that are prime for ignition during severe wildfire conditions. Because areas dominated by cheatgrass or other invasive annual grasses are more conducive to fire ignition, they are more likely to re-burn and are associated with increased fire size (Balch et al. 2013). When fire does occur, particularly in low-elevation sites that are less resistant to the invasion of annual grass and less resilient in terms of recovery from wildfire, sagebrush and bunchgrasses can be eliminated over time, resulting in a plant community dominated by annual grasses.

The existence of this feedback loop among these three threats, particularly at mid-to-low elevations, means areas that have burned and transitioned to a more degraded state are subsequently at a greater risk of re-burning, thus perpetuating the cycle. As this cycle repeats, healthy sagebrush habitat upon which sage-grouse depend is increasingly degraded into invasive monocultures that have little habitat value to sage-grouse.

Economic and Social Benefits Tied to Actions Addressing Key Threats

Undertaking actions to address threats to sagebrush and sage-grouse has begun to produce substantial economic and social benefits for Oregon and its rural landowners, land managers, and communities. Incentivizing and advancing markets, business development, and job and partnership opportunities associated with implementing these actions amplify economic and social benefits as well as provide greater certainty and capacity to ensure that conservation benefits will results from active management. This feature box discusses the economic and social advantages tied to implementing the actions described in this Action Plan for addressing juniper encroachment, annual-grass invasion, and wildfire risk as well as business and partnership opportunities worthy of further support and investment.

The active management that is needed on the ground to achieve the habitat improvements sought by this and other plans to conserve sage-grouse depends on the existence of local skilled labor and jobs that support rangeland health and habitat management goals, as well as the advancement of markets to support product utilization. Habitat work entails various job skills and opportunities that complement the existing cultural and community values of eastern Oregon. While not a "conservation action" in the traditional sense, this Action Plan seeks to incentivize and invest in the development of these jobs and skills (as well as related markets) because they serve the ultimate end of advancing actions that will benefit sage-grouse and their habitat.

Below are examples of efforts under way that demonstrate the positive relationships between local investments in reducing threats to sage-grouse habitat and supporting economic opportunity across the landscape.

Rangeland Fire Protection. Oregon has a strong reputation for its rural capacity to respond to wildfires in eastern Oregon and protect economic interests related to livestock grazing operations and community infrastructure. RFPA's are central to this, and while past budgets and contributions have been relatively small ($30,000 annually[41]), federal grants and fees have helped maintain an impressive

[41] http://www.oregon.gov/odf/fire/fpfc/rfawhite.pdf

345 voluntary firefighters in southeast Oregon. In 2015, the State, through the Oregon Department of Forestry, substantially increased its contribution, with a nearly $1.6 million policy option package to bolster existing efforts, including capital funding made available to purchase equipment. BLM has been a critical partner in that effort and has made significant investment in proactive approaches to fire management, including a recently announced Comprehensive Rangeland Fire Strategy from Secretary Jewell to accelerate preventive measures to protect rural communities and landscapes.[42]

Juniper Removal. The abundance of juniper across eastern Oregon, though a nuisance to rangeland ecosystems, has proved a strategic resource for investment. During the 2015 legislative session, public, nongovernmental, and private sector partners such as ranchers and small sawmills (formerly known as the Western Juniper Alliance) came together and successfully advocated for funding to increase the scale of juniper utilization through House Bills 2997 and 2998, as outlined below.

HB 2997 secured $250,000 in funding to accelerate the collaborative efforts already under way to increase the utilization of juniper products in local and regional agricultural and green building industries and to expand the supply chain and market opportunities.

HB 2998 makes available a total of $900,000 to support existing juniper removal and utilization efforts as well as the formation of new jobs to build economic opportunities across various roles in the supply chain. $100,000 is allocated for data and mapping analysis to ensure that future investments are made efficiently, based on resource location and availability. A loan and grant program leverages $500,000 to increase the number of workers and the capital available for tools and machinery for processors, including local sawmills, businesses, and distributors. $200,000 is available in the form of technical assistance to enhance the business model for existing and new businesses.[43]

The NRCS Sage-Grouse Initiative has similarly built partnerships on the predication of removing juniper for triple bottom-line benefits. As an early leader, NRCS has demonstrated the return on investments.

> *In Oregon, the NRCS has invested $18.4 million through SGI in on-the-ground restoration, helping more than 100 ranchers remove conifers from 200,000 acres of key nesting, brood-rearing and wintering habitats, addressing 68 percent of the conifer threat to Oregon's sage-grouse population on priority private land. These efforts focused on eliminating the encroachment of conifer trees on grasslands not only benefit the sage-grouse, but also improve the forage available on grazing lands.*[44]

Sagebrush Seedlings and Research Initiatives. A key component of supporting the sustained sagebrush health is understanding the success rate and condition factors that support the life cycle from seed to maturity. In order to increase the availability of locally adapted native seed, Oregon is working through research partnerships to create incentives and dedicated funding sources for business and/or partnership opportunities tied to the production and storage of local, native seed sources. Research is under way from Oregon State University and the associated Agricultural Research Service, Eastern Oregon Agricultural Research Center in Burns, Oregon, to enhance understanding around the conditions

[42] http://www.doi.gov/news/pressreleases/secretary-jewell-announces-comprehensive-rangeland-fire-strategy-to-restore-and-protect-sagebrush-lands.cfm

[43] http://www.sustainablenorthwest.org/blog/posts/juniper-bills-signed-into-law

[44] http://www.sagegrouseinitiative.com/usda-report-demonstrates-positive-impact-300-million-investment-sage-grouse-conservation-working-lands-west/

and technology of seedlings; this understanding will inform future investments in vetted approaches to restoration from the beginning of the sagebrush life cycle.[45] This foundational research has provided the basis of many of the conservation measures in the CCAAs for private and state entities. Further, this research has led to a $9 million dollar investment from NRCS through its Regional Conservation Partnership Program (RCPP) to implement the "Oregon Model to Protect Sage Grouse," which projects that it can enroll up to 40% of the producers with sagebrush on their lands.[46]

Employment and Ecology Sagebrush Partnerships in Prisons. The Oregon Department of Corrections (ODOC) has locations that have proven strategic for ecological restoration and fieldwork in and around sage-grouse country. The Institute for Applied Ecology[47] is working with the Snake River Correctional Facility to grow sagebrush on their grounds, employing inmates in a full range of activities from soil mixing to planting, furthering their knowledge in the basics of horticulture. Overall, an average of 60,000 plants are cultivated annually and planted back in sagebrush habitat.[48] Most recently, sagebrush from Snake River was utilized to restore degraded sagebrush after a wildfire.[49]

a. Juniper Encroachment

Nature and Extent of the Threat

Sage-grouse are negatively impacted by the expansion of juniper in sagebrush-steppe habitats, even if the underlying sagebrush habitat remains (Freese 2009). Sage-grouse avoid these areas of expansion (Casazza et al. 2011) because of increased predation risk and because, as juniper increases in abundance and size, the underlying habitat quality for sage-grouse diminishes. Sage-grouse appear to abandon breeding areas around leks when as little as 4% tree cover exists on the landscape (Baruch-Mordo et al. 2013), so early action is essential to prevent population-level impacts.

Understanding the nuances of the juniper encroachment process is essential to implementing a targeted approach to this problem. Miller et al. (2005) characterized three stages of juniper woodland succession.

- Phase I (early): Trees are present, but shrubs and herbs are the dominant vegetation that influences ecological processes (hydrologic, nutrient, and energy cycles) on the site.
- Phase II (mid): Trees are co-dominant with shrubs and herbs, and all three vegetation layers influence ecological processes on the site.
- Phase III (late): Trees are the dominant vegetation and the primary plant layer influencing local ecological processes.

[45] http://oregonstate.edu/dept/eoarc/sites/default/files/publication/785.pdf
[46] http://www.nrcs.usda.gov/wps/portal/nrcs/detail/in/home/?cid=stelprdb1267257
[47] https://www.youtube.com/watch?v=MmFtbTKmx3M
[48] http://sustainabilityinprisons.org/wp-content/uploads/2015/02/kaye-et-al-2015-Conservation-Projects-in-Prison.pdf
[49] http://appliedeco.org/five-things-you-didnt-know-about-sagebrush/

It is important to distinguish pre-settlement trees (those that are typically more than 155 years old) that have persisted in areas where environmental conditions offer protection from wildfire. Pre-settlement trees are important to retain on the landscape for the wildlife habitat they provide and for their cultural significance (Miller et al. 2007).

ODFW's 2011 Strategy estimated that approximately 2.4 million acres of sage-grouse habitat is affected by juniper encroachment in Oregon. A recent analysis conducted during the SageCon assessment of threats estimated that early conifer encroachment (Phases I and II, <10% canopy cover) occurs across 730,600 acres within Oregon's PACs (Figure IV-1, Table IV-2).[50] An additional estimated 408,600 acres in PACs is Phase III (>10% canopy cover). The majority (estimated 495,980 acres) of conifer encroachment (Phases I and II) in PACs occurs on federal lands, followed by private (estimated 281,658 acres) and state or local lands (estimated 14,473 acres) (see Table IV-2). However, these estimates are based on 2012 imagery and do not account for juniper removal that has occurred since 2012. Further, it is difficult to interpret the earliest stages of Phase I conifers using available mapping techniques because the small trees are often intermingled with, and are the size of, shrubs.

Although significant juniper reduction has already occurred in several areas, future treatments to address juniper encroachment should be prioritized in those areas where sage-grouse are most likely to benefit. Sites in Phase I or II successional stages often retain a significant understory of sagebrush, grasses, and forbs compared to Phase III sites, where understory plant layers are reduced or absent. Removal of juniper on sites in Phase I or II can prevent loss of key plants and produce immediate habitat benefits for sage-grouse. Treatment of Phase III sites, although beneficial, can take significantly more resources and time to recover the understory vegetation required to support sage-grouse.

In Oregon, most encroached sites are still in a state of transition. It is estimated that 80% of juniper encroachment is still in Phase I or II, and, if unaddressed, the amount of Phase III juniper woodland is expected to increase to 75% of the total encroachment over the next 30 to 50 years (Miller et al. 2008). This emphasizes the urgency of action now, before sites transition from phases where juniper treatments are relatively more effective for sage-grouse habitat conservation and less expensive compared to Phase III conditions.

50 Note: the term "conifer" is used here because the remote-sensing and modeling techniques available cannot effectively distinguish between species of conifers. Efforts were made in development of the model to distinguish riparian species, such as aspen, from conifers. However, the dominant tree cover within the SageCon planning area is western juniper.

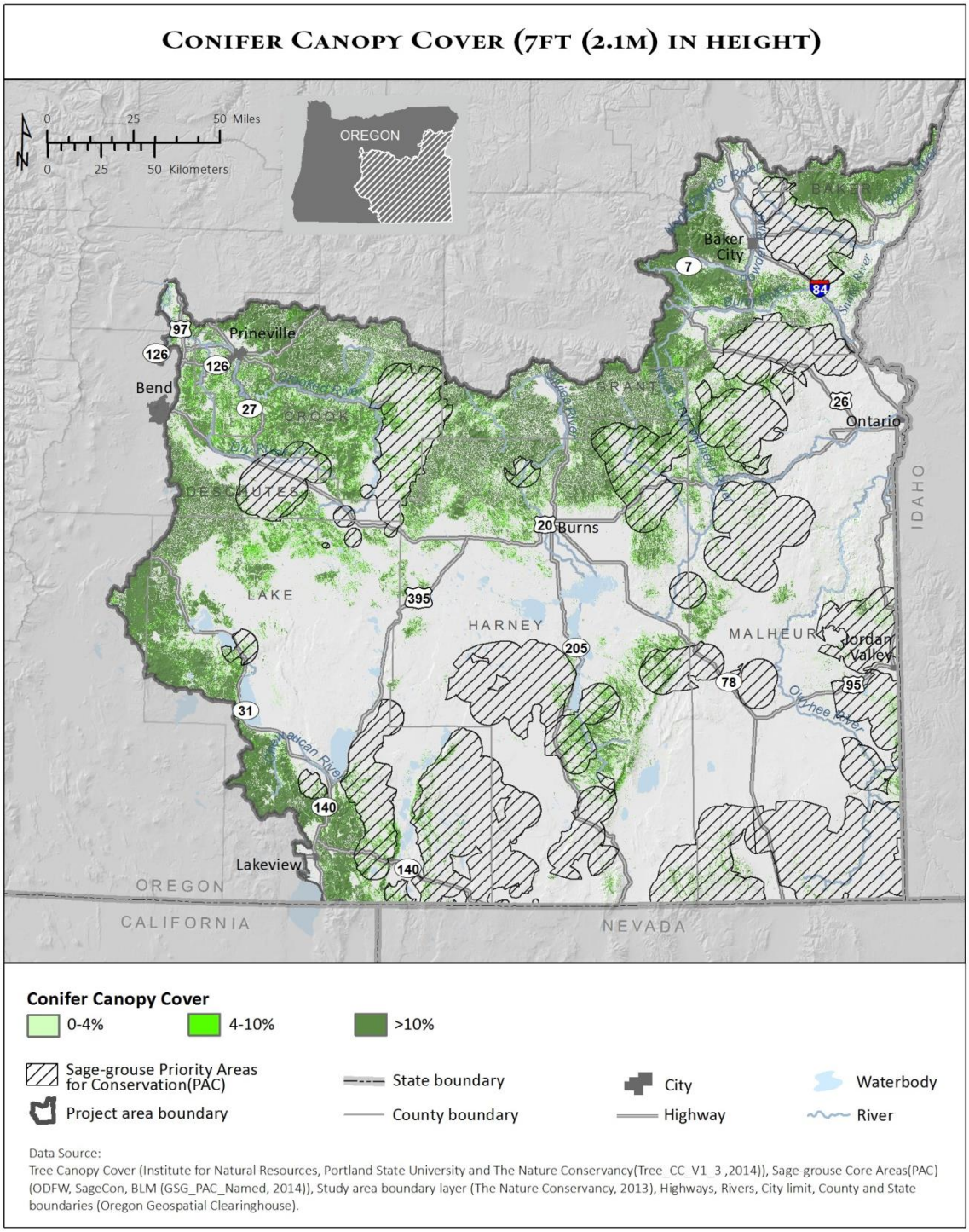

Figure IV-1. Conifer canopy cover across the extent of the SageCon planning area. Areas with 0–10% and >10% canopy cover are considered Phases I and II (combined), and Phase III, respectively.

Table IV-2. The estimated extent of juniper encroachment into sagebrush land cover types within PACs by land ownership (reported as rounded values of acres), total SGI-funded and BLM juniper removal within PACs (2010–2014). Canopy cover is ≤ 10% and >10% for Phases I and II (combined) and Phase III, respectively.[1] Federal ownership includes tribal lands.[2] An additional 74,249 acres have been treated by SGI in low-density habitat adjacent to PACs. Data sources: Areas of juniper encroachment were identified using the INR NTM Tree Cover (Version 2.0) layer.

PAC	Federal[1]		Private		State and Local		Total Phases I & II	Total Phase III	SGI-funded[2]	BLM juniper removal
	Phases I & II	Phase III	Phases I & II	Phase III	Phases I & II	Phase III				
Baker	9,300	4,300	17,500	9,000	-	-	26,800	13,300	4,971	1,494
Beatys	46,500	20,800	2,400	1,500	100	-	49,000	22,300	933	2,288
Brothers/N Wagontire	19,800	18,700	10,000	11,500	1,100	500	30,900	30,700	878	3,374
Bully Creek	46,600	19,300	18,200	8,300	100	100	64,800	27,700	9,362	22,933
Burns	7,900	7,700	2,900	2,300	-	-	10,800	10,100	--	163
Cow Lakes	21,100	3,400	8,300	6,200	-	-	29,400	9,700	4,367	--
Cow Valley	8,400	2,000	22,900	6,300	500	100	31,800	8,500	10,311	1,379
Crowley	33,900	7,300	6,100	1,900	1,000	100	41,100	9,300	--	--
Drewsey	63,600	69,500	34,300	27,100	500	300	98,500	96,900	17,534	3,823
Dry Valley/Jack Mt.	13,200	2,600	1,200	300	-	-	14,400	2,900	--	2,286
Folly Farm/Saddle Butte	17,200	13,000	4,500	4,100	1,100	400	22,800	17,500	--	10,463
Louse Canyon	23,600	6,000	700	300	1,500	800	25,800	7,100	1,013	--
Paulina/12 Mile/Misery Flat	35,200	25,900	60,000	27,000	1,700	1,200	96,900	54,100	66,477	815
Picture Rock	9,400	4,500	700	200	200	-	10,300	4,700	--	2,129
Pueblos/S Steens	5,700	1,200	5,300	1,600	-	-	11,000	2,800	--	--
Soldier Creek	27,200	5,300	3,600	1,000	6,400	1,300	37,200	7,600	392	6,057
Steens	41,200	35,500	2,800	2,400	-	-	44,000	37,900	1,054	19,195
Trout Creeks	30,400	12,400	2,300	1,800	-	-	32,700	14,200	--	--
Tucker Hills	3,000	1,800	3,600	2,700	-	-	6,500	4,500	4,930	--
Warners	32,800	20,200	12,800	6,400	300	100	45,900	26,800	9,640	14,817
Grand Total	**495,980**	**281,658**	**219,963**	**121,907**	**14,473**	**4,995**	**730,600**	**408,600**	131,861	91,215

Conservation Objective

Prevent further sagebrush habitat loss and promote sagebrush recolonization of former habitats by removing juniper from areas that are most likely to support sage-grouse in and around PACs, with particular emphasis on early-phase encroachment.

Conservation Actions

Juniper treatment should be prioritized in areas of known sage-grouse use, particularly lekking and nesting areas that are at high risk of being abandoned in the near future due to increased juniper cover. Phases I and II juniper invasions within priority sage-grouse habitat (PACs) should have the highest priority for treatment. However, additional prioritization should be applied first to areas within four miles of known leks (active or pending), particularly in those areas where the canopy cover will likely result in local lek abandonment or extirpation in the near future.

Action JPR-1: Promote education and outreach through Soil and Water Conservation Districts (SWCDs) and other partner organizations to encourage participation in efforts to reduce juniper encroachment through the NRCS Sage-Grouse Initiative and CCAAs.

Action JPR-2: Enlist Local Implementation Teams (LITs) to apply local knowledge in conjunction with the spatial decision support tools to identify priority areas to address juniper encroachment.

Action JPR-2-1: Develop GIS layers with polygons spatially representing priority areas for juniper removal. (Note: Coarse layers have already been created by FIAT, coordinated by the BLM for focal habitat and planning areas specific to that process.)

Action JPR-2-2: Develop regional LIT work plans identifying priority areas to address juniper encroachment, timelines, and responsible parties.

Action JPR-3: Reduce Phases I and II juniper encroachment (<10% canopy cover) in PACs and important areas of connectivity in Oregon to a rate greater than the rate of encroachment.

Action JPR-3-1: Prioritize juniper removal within four miles of known leks (with an active or pending status on federal, private, and state lands.

Action JPR-3-2: Within one mile of known leks, completely remove juniper. Beyond the one-mile buffer and within four miles of leks, completely remove juniper where feasible; where complete juniper removal is not feasible, reduce juniper canopy cover to less than 4%.

Action JPR-3-3: After treatments within lek buffers are complete, prioritize Phases I and II juniper removal in additional priority areas that provide adequate sage-grouse habitat (e.g., sagebrush land cover >25%), have the potential to improve connectivity, and particularly have medium-to-high resistance and resilience. Prioritize removal of juniper encroaching into riparian zones.

Action JPR-4: Strategically treat Phase III juniper encroachment (>10% canopy cover) as needed in sage-grouse priority habitats where the greatest opportunities exist to restore connectivity, reduce risk of catastrophic wildfire, and create future sage-grouse habitat opportunities.

Action JPR-4-1: Prioritize Phase III juniper removal after Phases I and II have been addressed. Prioritize Phase III areas in or adjacent to priority areas that provide adequate sage-grouse habitat (e.g., sagebrush land cover >25%), particularly in areas with medium-to-high resistance and resilience.

Action JPR-5: Conduct long-term (>30 years) monitoring and evaluation of vegetation responses to treatments. Use an adaptive management approach to maintain the benefit of juniper removal within sage-grouse habitats, including re-treatment as necessary.

Action JPR-6: Monitor sage-grouse habitat utilization and/or population response in select areas where junipers have been removed. (See related monitoring actions **MON-2** and **MON-4**.)

Responsible Parties:

BLM, DSL, LITs, NRCS, OWEB, ODFW, private landowners, SWCDs, USFS, ODF/RFPA's

Success on the Ground: Private Partnerships to Remove Juniper

Oregon's conservation ethic has been demonstrated through many habitat improvement projects to enhance populations of sage-grouse and other wildlife in these areas. A diverse partnership in Oregon has been aggressively implementing the actions needed to reduce the threat of juniper encroachment for several decades in sage-grouse range. Many of these projects were collaborative efforts between private landowners, federal and state agencies, and nongovernmental organizations. For example, from 1996 to 2002, extensive juniper cutting and prescribed burning occurred on the south end of Steens Mountain on both private and BLM-managed land. Additionally, the Five Creeks project on the north end of Steens Mountain occurred from 2008 to 2013, and approximately 25,000 acres of juniper were treated through cutting and prescribed fire. Other juniper treatment projects on private lands in Oregon sage-grouse range in recent decades were not funded by state or federal programs, so specific acreages may not have been recorded.

Many early projects implemented by SWCDs were funded by Oregon's Watershed Enhancement Board and ODFW. Early (pre-2010) juniper removal efforts were often completed opportunistically in cooperation with both large and small landowners and resulted in a mosaic of small areas for improved wildlife and sage-grouse habitat. For example, the Malheur SWCD completed 7,000 acres of juniper

treatment prior to 2010. This laid important groundwork with "early adopter land owners" and thus paved the way for the successful implementation of larger-scale efforts conducted by the NRCS.

Since 2010, partners have been dedicating significant technical and financial resources to strategically scale up juniper removal efforts to benefit sage-grouse. From 2010 to 2014, NRCS and its partners through the Sage-Grouse Initiative (SGI) invested more than $18.5 million to help ranchers mechanically remove early-phase juniper encroachment in priority sage-grouse habitats on private lands, resulting in 146,348 acres (229 square miles) of habitat improvement. These actions occurred on private lands across 20 PACs (Table IV-2).

SGI accelerated the annual rate of NRCS-funded juniper removal 10-fold during this time period, while continuing to hone treatments in priority landscapes to maximize benefits for sage-grouse (Figure IV-2). Another $4.5 million is anticipated for SGI for 2015.

Furthermore, similar efforts to address juniper encroachment have been completed or are under way at large scales on public lands in the Lakeview, Burns, and Prineville BLM Districts, ensuring that treatments are contiguous across land ownership boundaries and achieve landscape-level benefits. Since 2010, more than 91,000 acres have been treated for juniper encroachment on BLM lands within PACs, and approximately 7,600 additional acres of juniper have been treated on U.S. Forest Service (USFS) land (within and outside PACs). All of these efforts have the added value of benefiting local communities. See "Economic and Social Benefits Tied to Actions Addressing Key Threats" for more information.

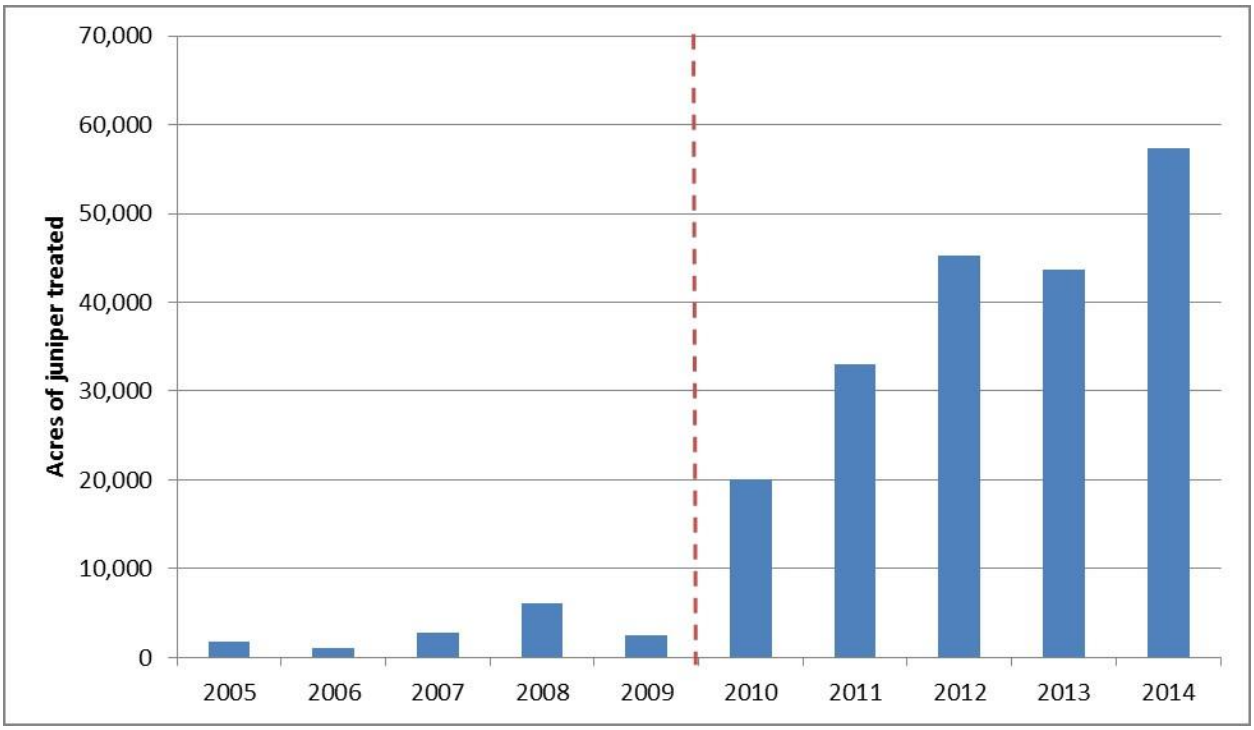

Figure IV-2. Cumulative amount of NRCS-funded juniper removal in sage-grouse range in Oregon prior to (before 2010) and during the Sage-Grouse Initiative (2005–2014).

b. Non-Native Annual-Grass Invasion

Nature and Extent of the Threat

While a method does not currently exist to precisely measure the extent of non-native annual grasses in Oregon, models from the Integrated Landscape Assessment Project (ILAP) provide a coarse estimate of the extent of annual-grass dominance (Halofsky et al. 2013). In 2013, annual grasses were estimated to be the dominant or subdominant herbaceous vegetation across nearly 1 million acres (15 %) of sage-grouse PACs in Oregon (Table IV-3, Figure IV-3). While the actual extent of annual grasses is likely much larger and annual grass invasion levels vary across PACs, this estimate and Table IV-3 below illustrate the relative scale and distribution of the problem. Site inventories remain needed to assess the actual extent of annual grasses and the adequacy of desired vegetation at the project scale, and to identify opportunities to implement conservation actions.

Exotic annual grasses (primarily cheatgrass and medusahead) alter habitat suitability for sage-grouse by reducing or eliminating native forbs and grasses essential for food and cover. Establishment of plant communities that do not provide suitable habitat (e.g., introductions and monocultures of non-native, invasive plants) is reducing sage-grouse habitat quality and quantity in Oregon. Early detection and prevention are needed. Invasive annual grasses and other weeds continue to expand from borders of large infestations. Many sagebrush-steppe plant communities have crossed a threshold after which they are no longer recoverable using currently available control methods.

Table IV-3. Estimated extent of lands (in acres) where invasive annual grasses are predicted to be the dominant herbaceous vegetation (Source: 2013 INR Exotic Annual Grasses derived from 2013 ILAP Current Vegetation data).

PAC	Federal	State/Local	Private	Total	% of PAC Area
Baker	24,001		45,341	69,342	21%
Beatys	93,817	4,728	5,330	103,876	12%
Brothers/N Wagontire	2,896	228	2,918	6,043	2%
Bully Creek	32,121	77	9,949	42,147	15%
Burns	1,221		420	1,641	5%
Cow Lakes	30,257	165	9,038	39,460	16%
Cow Valley	23,880	2,670	50,460	77,010	21%
Crowley	74,069	5,472	16,366	95,907	20%
Drewsey	30,228	315	18,677	49,220	13%
Dry Valley/Jack Mountain	33,428	1,104	4,043	38,575	9%
Folly Farm/Saddle Butte	58,175	3,640	2,722	64,537	26%
Louse Canyon	103,307	419	2,204	105,931	16%
Paulina/12 Mile/Misery Flat	15,175	1,341	23,963	40,479	9%
Picture Rock	3,501	145	706	4,352	10%
Pueblos/S Steens	18,206		10,162	28,368	14%

PAC	Federal	State/Local	Private	Total	% of PAC Area
Soldier Creek	35,586	7,237	4,103	46,927	16%
Steens	8,496	184	8,675	17,355	9%
Trout Creeks	82,157	6	9,298	91,460	23%
Tucker Hill	1,593		1,469	3,062	10%
Warners	11,747	955	2,308	15,010	5%
TOTAL	683,860	28,687	228,151	940,698	14%

Invasive annual grasses also increase fire frequency, which directly threatens sage-grouse habitat and further promotes the establishment of invasive annual grasses (Balch et al. 2013). This annual grass and fire feedback loop can result in conversion from sagebrush-steppe communities to annual grasslands (Davies et al. 2011; Miller et al. 2011).

Effective management of this threat is two-fold:

1. Control or stop the spread of invasive annual grasses.
2. Reduce or eliminate the establishment of invasive annual grasses.

Thus, invasive plant management activities and the priority conservation actions set forth in this Plan occur along a continuum from prevention activities to restoration activities. Given the nature and extent of this threat, the conservation actions in this Plan are intended to provide managers a framework within which to prioritize prevention and restoration work for annual-grass management. Three important considerations exist and need to be addressed up front in shaping any approach to whether, where, and what kind of actions to take when investing time and money to manage invasive annual grasses.

- Annual Grass Occupancy—Do annual grasses occupy the site, and if so, to what extent?
- Resistance and Resilience—How resistant is the site to annual-grass invasion? How likely is the site to support a healthy native plant community following disturbance (resilience)?
- Proximity to Key Sage-Grouse Habitat—Is the site within or adjacent to areas of known sage-grouse use with an adequate to optimal sagebrush component (land cover >25% and >65%, respectively)?

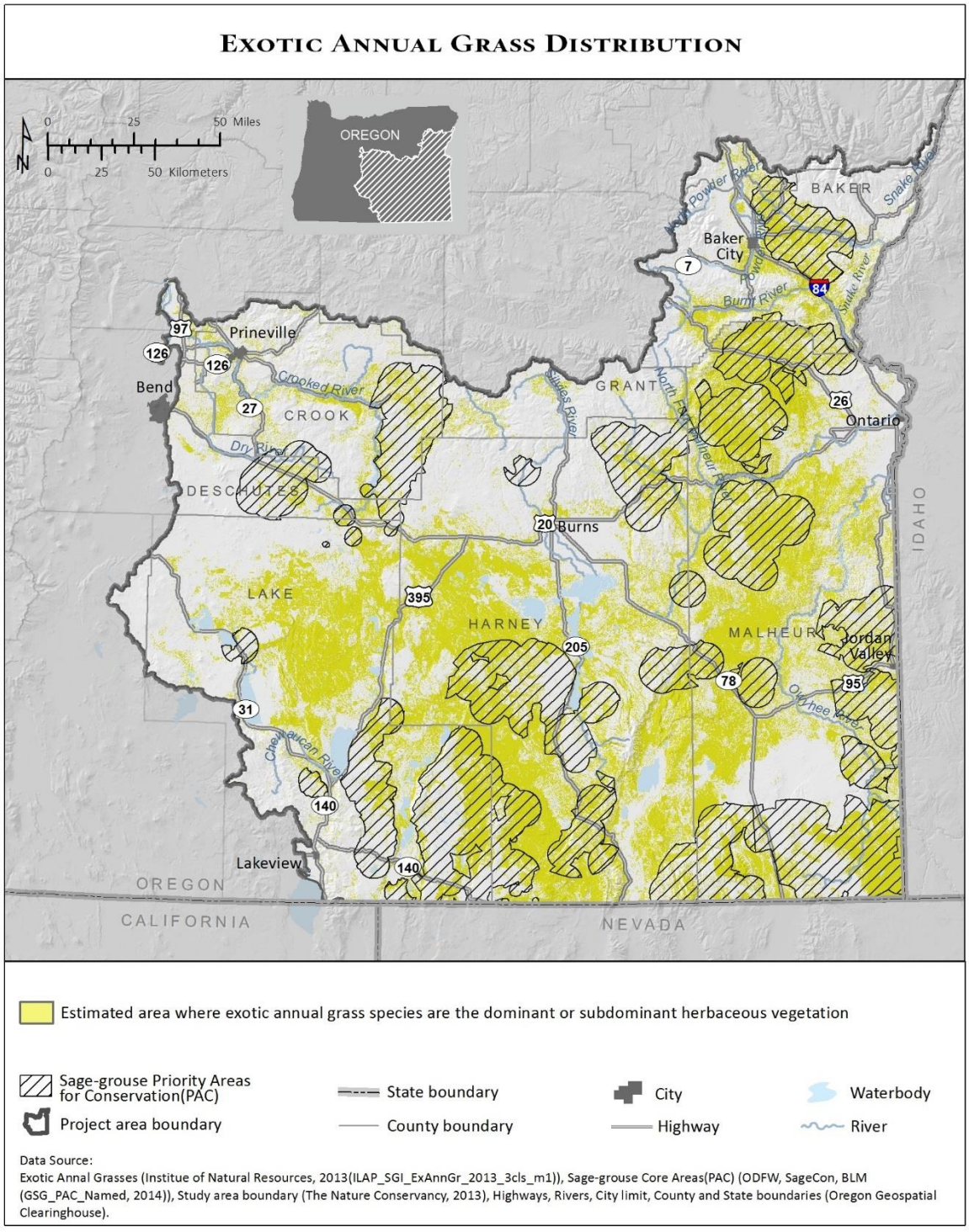

Figure IV-3. Estimated extent of exotic annual grasses. The extent was determined by mapping locations where exotic annual grass species were the dominant or subdominant herbaceous vegetation. (Source: 2013 INR Exotic Annual Grass layer derived from 2013 ILAP Current Vegetation data). The Oregon Department of Agriculture produced continuous, 270-m resolution habitat suitability datasets for multiple invasive grasses, including cheatgrass and medusahead. Data from all three of these sources have been incorporated into the ORDSS.

Furthermore, successfully addressing this threat will rely upon inventories, prevention, and treatment actions that occur strategically on a landscape level rather than on an ad-hoc or acre-by-acre basis. This Action Plan prioritizes the development of invasive plant management plans that proactively identify (i.e., inventory) current annual-grass occupancy and priority areas for prevention and restoration actions; this planning and subsequent implementation of actions will be based on the following prioritization approach.

Prevention Actions: Areas should be prioritized for prevention activities based on the risk of invasion, with priority given to sites with low annual-grass occupancy and low resistance and resilience, because annual grasses are highly competitive in these ecological sites once they are established (Figure IV-4a).

Restoration Actions: Restoration sites should be prioritized based on the probability of success, including the likelihood that areas will naturally resist infestation post-treatment or have the resilience needed to restore habitat conditions without intervention. Priority should be given to sites with mid-high resistance and resilience and moderate annual-grass occupancy, particularly if native species are seeded or planted (Figure IV-4b).

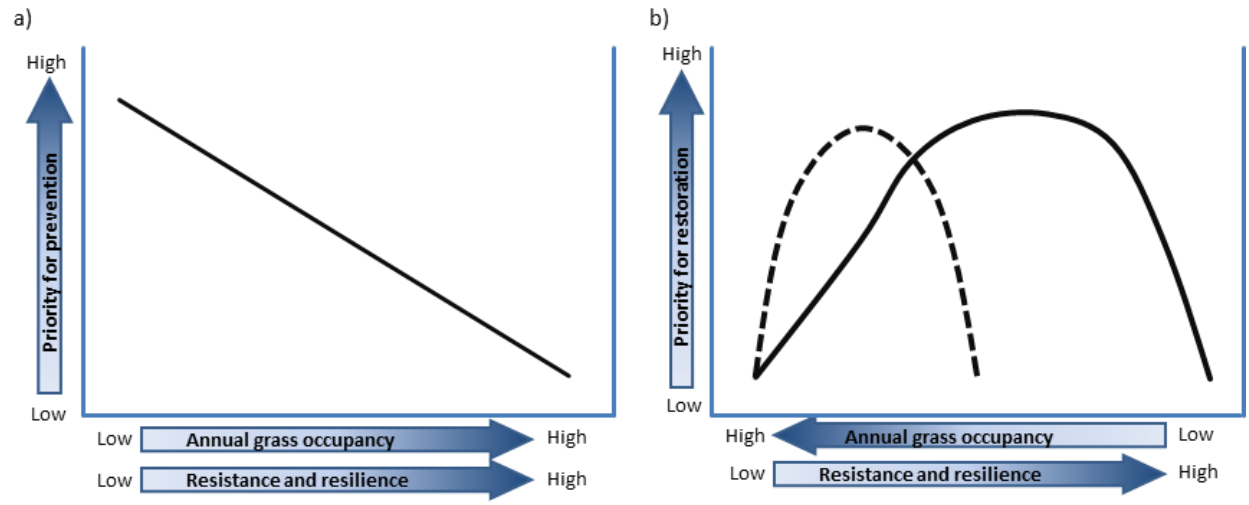

Figure IV-4. Using annual-grass occupancy and site resistance and resilience to prioritize areas for preventing the spread of annual grasses and for restoration. (a) In prioritizing prevention activities, annual-grass occupancy should be considered first, followed by resistance/resilience. (b) In prioritizing restoration activities, site resistance and resilience should be considered first, followed by annual-grass occupancy. The dotted and solid lines represent how the use of non-native perennials and native species, respectively, may be considered and prioritized in restoration work.

Areas with high annual-grass infestation and low resistance and resilience have a lower aptitude for successful restoration and/or will likely require multiple interventions (Davies et al. 2011; Chambers et al. 2014b). Restoration with native species in these zones is unlikely to be successful. In some situations, however, native plant restoration in these areas may merit

attention, and/or use of non-native perennial species that are competitive with annual grasses may be appropriate. For instance, reseeding with non-native perennial species may in certain circumstances result in more successful plant establishment and, thus, competition with invasive annual grasses at sites with low resistance and resilience that have a high degree of existing exotic annual-grass infestation (Figure IV-4b). Areas with low annual-grass occupancy and high resistance and resilience are far less likely to require restoration because they have the potential to resist further infestation and/or restore naturally (Davies et al. 2011; Chambers et al. 2014b). Once annual grass occupancy and resistance and resilience properties have been analyzed as a first step in prioritization, potential prevention and restoration sites should be further identified and prioritized on the basis of the proximity of sites to key sage-grouse habitat.

Success on the Ground: Collaborative Effort to Prevent Invasive Annual Grasses Post-Fire in Harney County

During the fall of 2014, Harney County Weed Control and the Harney County Cooperative Weed Management Area (CWMA) coordinated and managed the application of herbicide to thousands of private and state land acres for medusahead rye. Every year, the CWMA and Harney County Weed Control coordinate these activities with several other agencies across the county. This year, the CWMA coordinated treatments on private lands with funds from the NRCS, the Harney SWCD, Harney County Watershed Council, and OWEB. The CWMA also coordinated treatment on Department of State lands. All told, this effort resulted in the treatment of just over 11,000 acres on private lands and almost 4,000 acres of state-managed lands.

The CWMA also assisted the BLM with their 2014 treatments, which totaled nearly 17,000 acres with the addition of the cheatgrass treatment in re-seeded areas impacted by wildfires in 2012. The group also made a concerted effort to treat invasive annual grasses within the 2014 Buzzard and Gumboot fire perimeters.

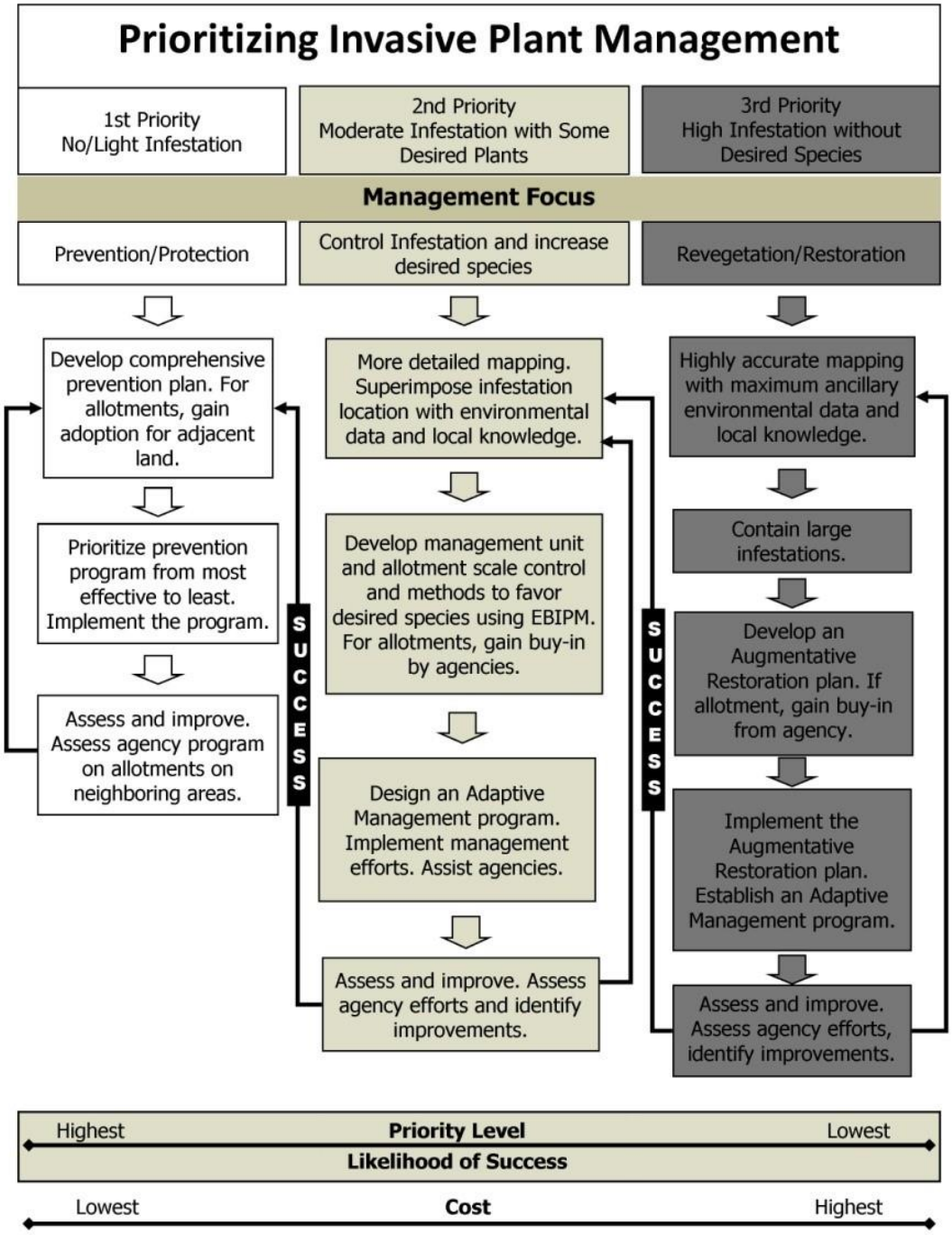

Figure IV-5. Flowchart for prioritizing and implementing invasive plant management within a planning area. Ecologically-based invasive plant management (EBIPM) is a decision-making tool designed to assist land managers to assess rangeland health; identify causes of degradation; identify and select strategies to repair causes of infestations; and adaptively manage (ebimp.org).

Conservation Objective

(1) Prevent the spread of annual grasses in areas of priority sage-grouse habitat at high risk for invasion. (2) Contain and/or reduce existing infestations in or threatening priority sage-grouse habitat. (3) Restore healthy sagebrush communities in areas with the greatest probability of success through development and implementation of invasive plant management plans. Such plans should address this threat and integrate implementation efforts across land ownership and management boundaries whenever possible.

Conservation Actions

Many actions identified below represent Oregon-tailored approaches to or support for the actions identified in the Implementation Plan for U.S. Department of the Interior Secretarial Order 3336: Rangeland Fire Prevention, Management, and Restoration (hereafter SO 3336 Implementation Plan)

Action IAG-1: Enlist LITs and cooperative weed management areas (CWMAs) in cooperation with state, federal, and private land managers to apply local expert knowledge in conjunction with spatial decision support tools (currently under development) to develop regional strategic work plans that identify priority areas to address invasive annual grasses, timelines, and responsible parties. Regional strategic work plans should identify areas for invasive annual grass *prevention*, *treatment and restoration*, and *containment*. More detailed actions relating to these three invasive plant management approaches are listed below.

> **Action IAG-1-1:** As part of regional strategic work plans, develop GIS layers with polygons spatially representing priority areas for invasive annual-grass treatment and containment. (Note: coarse layers have already been created by FIAT coordinated by the BLM for focal habitat and planning areas specific to that process).

Action IAG-2: Implement invasive plant management plans that identify priority areas for *prevention* for each PAC.

> **Action IAG-2-1:** Prioritize proactive herbicide treatments as a prevention strategy in recently burned areas, particularly areas with low resistance and resilience that are proximal to valuable sage-grouse habitat. Prioritize sites within four miles of leks (active or pending) and sites <2 miles from "key habitat," defined as areas with 75% breeding bird density and where sagebrush land cover is >65%.
>
> > **Action IAG-2-1a:** Remove administrative and policy barriers that delay herbicide treatments from the most effective implementation timeframe.
>
> **Action IAG-2-2:** Conduct systematic and strategic surveys to detect areas of expanding invasive annual grasses and expedite reporting and treatment of new infestations (see Section 7b [vii] of SO 3336 Implementation Plan).

Action IAG-2-3: In priority invasive annual-grass prevention sites, limit disturbance within and around all remaining large, intact sagebrush patches, particularly in low-elevation sites with low resistance and resilience, because these sites are highly vulnerable to annual-grass invasion once desirable species are removed or disturbed.

Action IAG-2-4: Require general techniques to prevent human-caused spread of annual invasive grasses resulting from road maintenance (e.g., blading), construction/development, and OHV activity, as well as during fire suppression activities.

Action IAG-2-5 Suppress fire in areas within or proximal to valuable sage-grouse habitat that are particularly vulnerable to annual-grass invasion.

Action IAG-2-6 Utilize grazing management techniques that increase the resilience of systems to invasive annual-grass establishment.

Action IAG-2-7 Monitor areas impacted by ground-disturbing activities for a minimum of three years and apply herbicide to new invasions of annual grasses expeditiously.

Action IAG-3: Implement invasive plant management plans for each PAC that identify priority areas for *treatment and restoration*.

Action IAG-3-1 Prioritize treatment and restoration of invaded sites with the greatest potential to succeed (e.g., moderate infestations or areas with inadequate perennial species in medium-to-high resistance and resilience) that are proximal to valuable sage-grouse habitat.

- Prioritize sites within four miles of leks (active or pending) and sites <2 miles from "key habitat," defined as areas with 75% breeding bird density and where sagebrush land cover is >65%. Over time, expand treatment and restoration activities outward from key habitat patches.

Action IAG-3-2 Prioritize restoration efforts in recently burned areas, particularly areas that are proximal to valuable sage-grouse habitat.

- Prioritize sites within four miles of leks (active or pending) and sites <2 miles from "key habitat," defined as areas with 75% breeding bird density and where sagebrush land cover is >65%.

Action IAG-3-3 Implement successful novel techniques such as “precision restoration” and bio-controls (e.g., ACK55 / soil bacterium *Pseudomonas fluorescens*, D7 *Rhizobacterium* strain), in areas where they are expected to have demonstrated efficacy.

Action IAG -3-4 Monitor restoration projects for effectiveness and repeat rehabilitation activities if performance objectives are not met. (See related monitoring actions **MON-2** and **MON-4.**)

Success on the Ground: Use of Naturally Occurring Bacterium, D7, in Keating Valley

Strategic efforts to reduce annual grasses are already under way in certain key landscapes for sage-grouse in Oregon. Across BLM-managed lands, more than 572,000 acres have been treated for noxious weeds or invasive annual grasses since 2010. Additionally, in 2010, NRCS partnered with the Keating Valley Soil and Water Conservation District, Baker County Weed District, Tri-County Cooperative Weed Management Area, USFWS, OWEB, ODFW, BLM, and local landowners to inventory and attack medusahead rye across 26,000 acres in the heart of core habitat in the Baker PAC.

Specifically, the Keating Valley area was prioritized based on sage-grouse telemetry data gathered by USFWS, which indicated that grouse concentrated in that area but tended to avoid the annual grassland patches within otherwise suitable habitat. An intensive weed inventory across the project area revealed roughly 7,500 acres in need of active treatment. Strategies implemented include herbicide application and seeding to contain annual grasslands and spot treatment of annuals in surrounding, intact sagebrush areas to maintain resilient and resistant plant communities. Improved grazing management is a key strategy being employed in and around the project area to promote perennial bunchgrass health that is essential to resisting annual-grass invasion and promoting adequate nesting cover for grouse. Within the Keating Valley, experimental plots were also established to test the effectiveness of a naturally occurring bacterium, D7, that restores soil attributes that are key to inhibiting the establishment of annual grasses. Test plots across the West have shown promising results: a 50% reduction in annual-grass growth was documented after three years (Kennedy et al. 2011). D7 was registered by the Environmental Protection Agency (EPA) in 2014, and plans are under way to manufacture and market the product, as well as to conduct further field trials on National Wildlife Refuges.

A**ction IAG-4:** Implement invasive plant management plans for each PAC that identify priority areas to *contain* existing patches of invasive annual grasses and weeds.

Action IAG-4-1 Implement and maintain containment programs for large infestations that may include the following techniques: (1) border spraying; (2) establishing a barrier to expansion with aggressive perennial species that are competitive with invasive weeds; (3) biological control agents; and/or (4) targeted grazing.

Action IAG-4-2 Prioritize containment where large infestations of invasive annual grasses threaten highly valuable sage-grouse habitat. Prioritize sites within four miles of leks (active or pending) and sites <2 miles from "key habitat," defined as areas with 75% breeding bird density and where sagebrush land cover is >65%.

Action IAG-5: Develop grazing management plans that focus on invasive plant species prevention, treatment/restoration, and containment (consistent with the above action approaches) for lands and allotments enrolled in CCAAs and CCAs, as well as other Farm Bill programs that employ grazing techniques that maintain or improve the perennial native grass and shrub community while addressing annual invasive grasses.

Action IAG-5-1 Assess pastures/allotments dominated by Wyoming big sagebrush and prioritize implementation of proper grazing management plans for those with documented improper grazing impacts to native perennial grass and forbs, and to soil biotic crusts.

Action IAG-5-2 Identify allotments with invasive annual grasses and implement control measures to prevent the transfer of invasive species via livestock.

Action IAG-5-3 Evaluate and treat heavily used areas (e.g., water sources or transfer areas) for non-native grass invasions and prioritize for treatment and containment actions.

Action IAG-5-4 Utilize targeted livestock grazing to reduce annual invasive plants, increase desirable perennial grasses and forbs, and maintain and increase desired habitat structure.

Action IAG-6: Support infrastructure, resources, and research that will enhance invasive plant prevention and habitat restoration efforts (see Section 7(b)(vii) in SO 3336 Implementation Plan).

Action IAG-6-1 Support ongoing research and implementation of pilot efforts evaluating annual-grass prevention and control techniques, as well as precision restoration technologies seeking to improve the likelihood of success when actively restoring sagebrush sites. Advance treatments that employ these new techniques and technologies (e.g., ACK55 / soil bacterium *Pseudomonas fluorescens*, D7 *Rhizobacterium* strain) in order to test their effectiveness. Expand to a wider scale where effective and where re-establishment of perennial grasses is likely to occur or can most likely be curtailed.

Action IAG-7 Create “grass banks” or reserve forage areas as alternative grazing opportunities to provide rest for over-utilized rangelands or allotments, or to be utilized during drought conditions, post-fire, or after restoration work. Do so in a manner compatible with livestock operations locally.

Action IAG-7-1 Remove administrative barriers to establishing “grass banks” on federal land.

Action IAG-7-2 Maintain fencing and other improvements on “grass banks” so they are ready for use as need emerges.

Action IAG-7-3 Assess “grass banks” to determine that, if ungrazed, they are contributing to fire risk/fuel loads, and use grazing as a management tool to reduce fuel loads if required.

Action IAG-8: Remove administrative or procedural barriers to invasive annual-grass management.

Action IAG-8-1 Place cheatgrass on Oregon’s noxious weed list.

Action IAG-8-2 Support policy changes to remove the court-ordered injunction prohibiting the use of herbicides on all federally administered lands in Oregon.

Action IAG-8-3 Support restructuring of the post-fire emergency stabilization and restoration (ESR) funding scheme to ensure adequate funds are available for long-term post-fire habitat management (see Section 7(b)(v) in SO 3336 Implementation Plan), and that funds are spent in a manner that maximizes ecological effectiveness, coordination, and habitat return on investment.

Action IAG-8-4 Support development of a post-fire emergency stabilization and restoration program for private lands in a manner that maximizes ecological effectiveness, coordination, and habitat return on investment.

Action IAG-8-5 Coordinate with state and federal agencies and local implementation entities to develop consistent procedures and policies for the treatment of noxious and invasive plants, chemical use, and timing in a manner that maximizes ecological effectiveness and habitat return on investment.

Responsible Parties:
USDA Agriculture Research Service (ARS) and stations (e.g., Eastern Oregon Agriculture Research Station), BLM, BLM FIAT, county weed departments, CWMAs, DSL, LITs, local road districts, NRCS, ODA, ODFW, ODOT, Oregon State University (OSU), OSWB, OWEB, private landowners, RFPAs, SWCDs, USFS, watershed councils, NGOs (e.g., TNC)

c. Wildfire Risk

Nature and Extent of the Threat
Wildfires are a major threat to sagebrush-steppe ecosystems in Oregon and much of the Great Basin. Fire suppression and management practices performed in the last century have resulted in fuel buildup, encroachment of trees into shrublands, and the increasing dominance of invasive annual grasses. These factors have contributed to changes in fire regimes throughout the western United States (Miller et al. 2013). Eastern Oregon is no exception. Wildfires are part of these ecosystems. Properly functioning ecosystems should have adequate resilience to recover after fires and resistance to invasive species. However, the degree of resilience and resistance is not the same across all ecosystems. It tends to be higher on more productive lands with the cooler and moister soils that are often found in higher elevations, on northern slopes, and in more northeastern latitudes (Chambers et al. 2014a). At lower elevations, on south-facing slopes, and in areas with warmer and drier soils, vegetation communities are less productive and therefore less resilient after fire.

Historically, fire was a key ecological attribute in Oregon's sagebrush-steppe, with a vital role in maintaining sagebrush habitats. Today, fire remains a driving force, but its ecological role is compromised by invasive non-native species (primarily cheatgrass and medusahead rye),

habitat reduction, and fragmentation. Wildfire, particularly in low-elevation Wyoming big sagebrush communities, is one of the primary risks to sage-grouse, especially given the positive feedback loop between exotic invasive annual grasses and fire spread and frequency (Miller et al. 2011). Wildfires can remove long-lived species, such as sagebrush, thereby reducing sage-grouse habitat quality and quantity. Further, areas impacted by wildfire are more susceptible to invasion by exotic annual grasses, and, as discussed earlier in this Action Plan, replacement of native perennial bunchgrass communities by invasive annuals is a primary contributing factor to increased fire frequencies, intensity, and extent in the sagebrush ecosystem. Thus, this Plan prioritizes efforts to retain and restore healthy native plant communities and resilience within and outside PACs.

The beneficial role of fire—in promoting plant growth, reducing fuel loads, reducing juniper presence, and other attributes—can be retained in some circumstances through the judicial use of prescribed fire and appropriate wildfire management tactics. However, given current conditions, great caution and care need to be applied before fire is used for fuel reduction, restoration, and wildfire management purposes, especially where the goal is to protect or improve sage-grouse habitat.

In some cases, up to 70% of individual PAC areas have burned (Figure IV-6, Figure IV-7) since 2005. Within PAC areas, an estimated 1,159,040 acres are at high risk of fire (Figure IV-8). Within this area, 993,919 acres are in areas with low-to-moderate resistance and resilience—areas that, if impacted by fire, could be difficult to recover to healthy sage-grouse habitat.

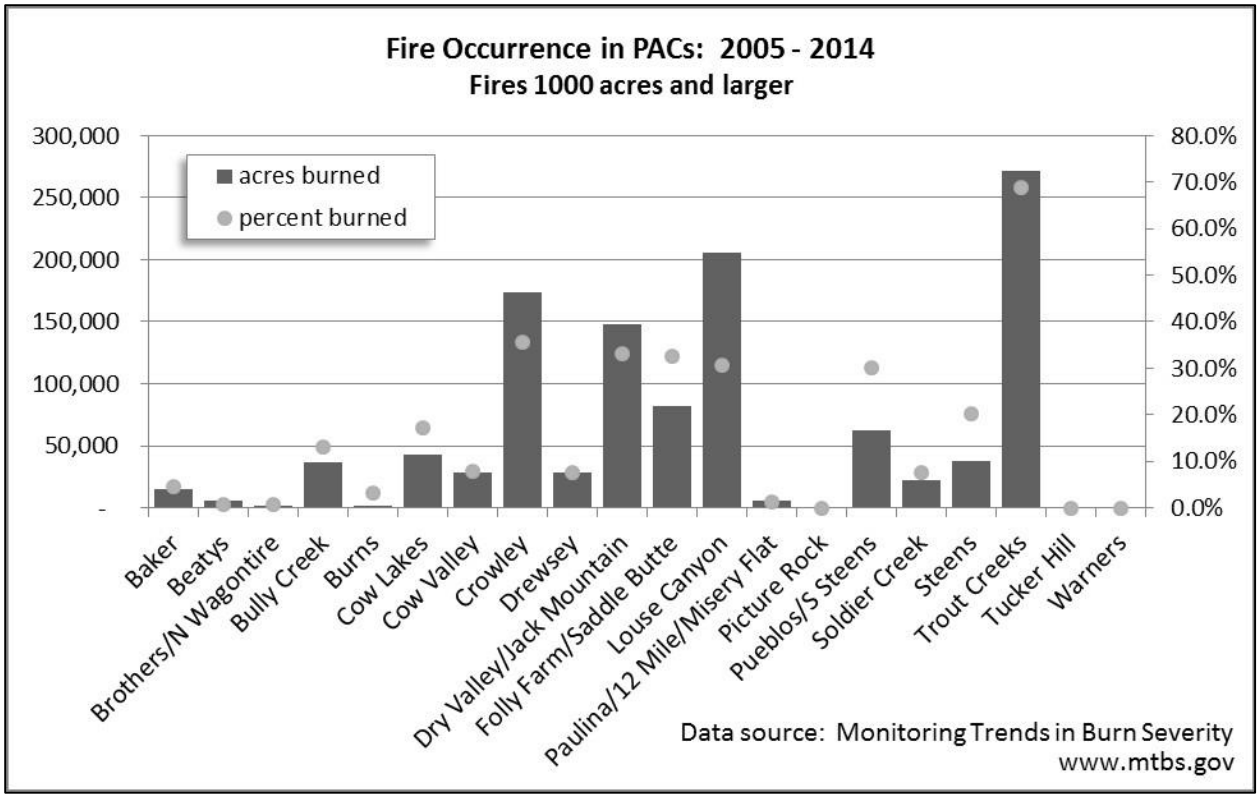

Figure IV-6. Fire occurrence in Oregon Priority Areas for Conservation expressed in acres (bars) and percentage of total PAC area (dots). Fire occurrence areas were calculated using Monitoring Trends in Burn Severity data (www.mtbs.gov). Fires smaller than 1,000 acres were not captured in the dataset.

Further compounding the problem is the remote, rural nature of priority sage-grouse habitat that is threatened by fire. Fire suppression in these areas is the responsibility of federal land managers on public lands. Rangeland fire protection associations (RFPAs) play a critical role on both private and public lands. On the positive side, more than 90% of PAC acreage in Oregon and more than 75% of low density habitat is covered under the jurisdiction of the BLM or an RFPA (Figure IV-9). Efforts to improve coordination, capacity, and operational effectiveness are ongoing and total PAC and low-density acreage under fire protection jurisdictions has increased during the development of this Plan. On unprotected lands, private landowners provide their own fire protection through independent efforts with varying levels of suppression capacity.

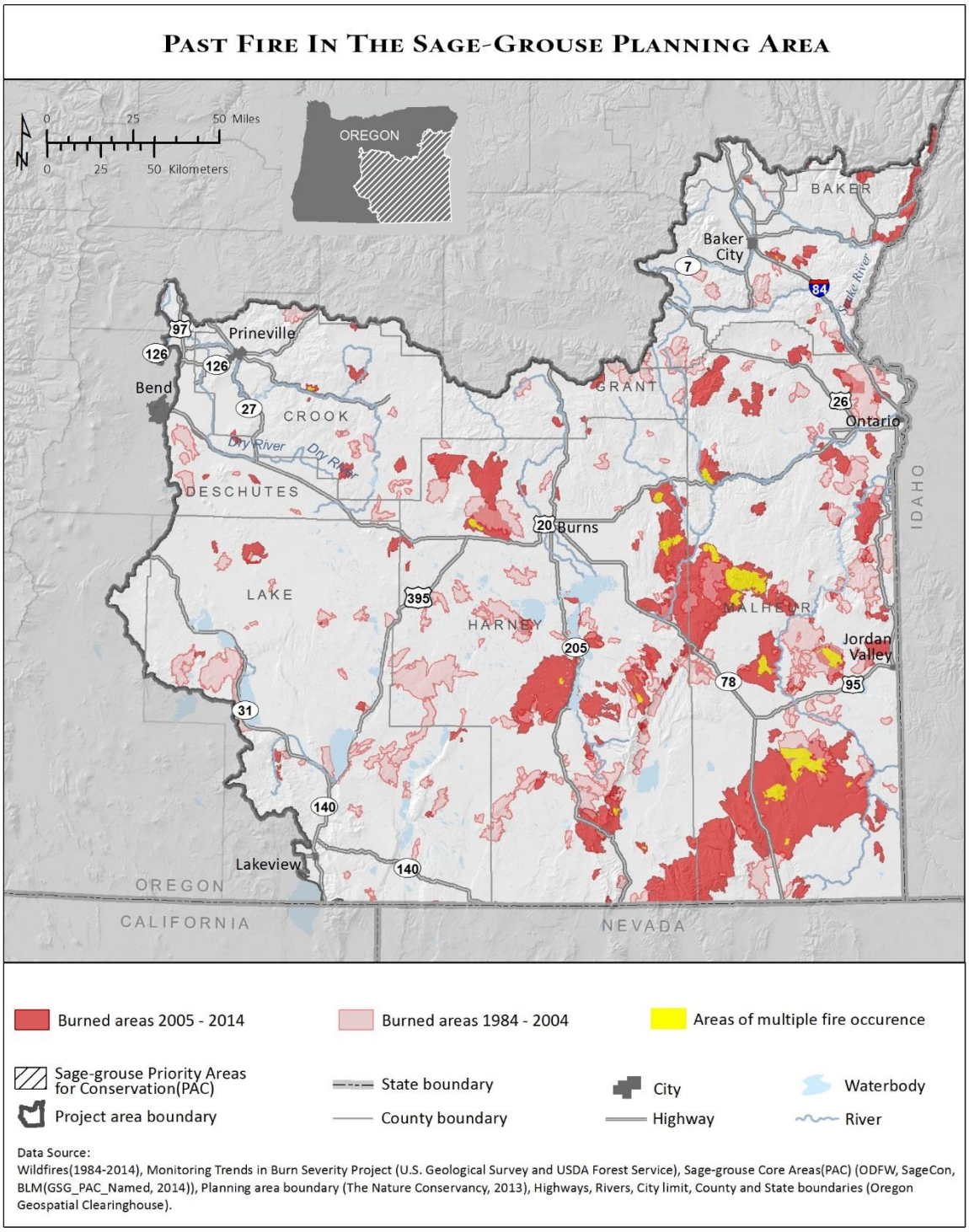

Figure IV-7. Fire history in the SageCon planning area, 2005–2014.

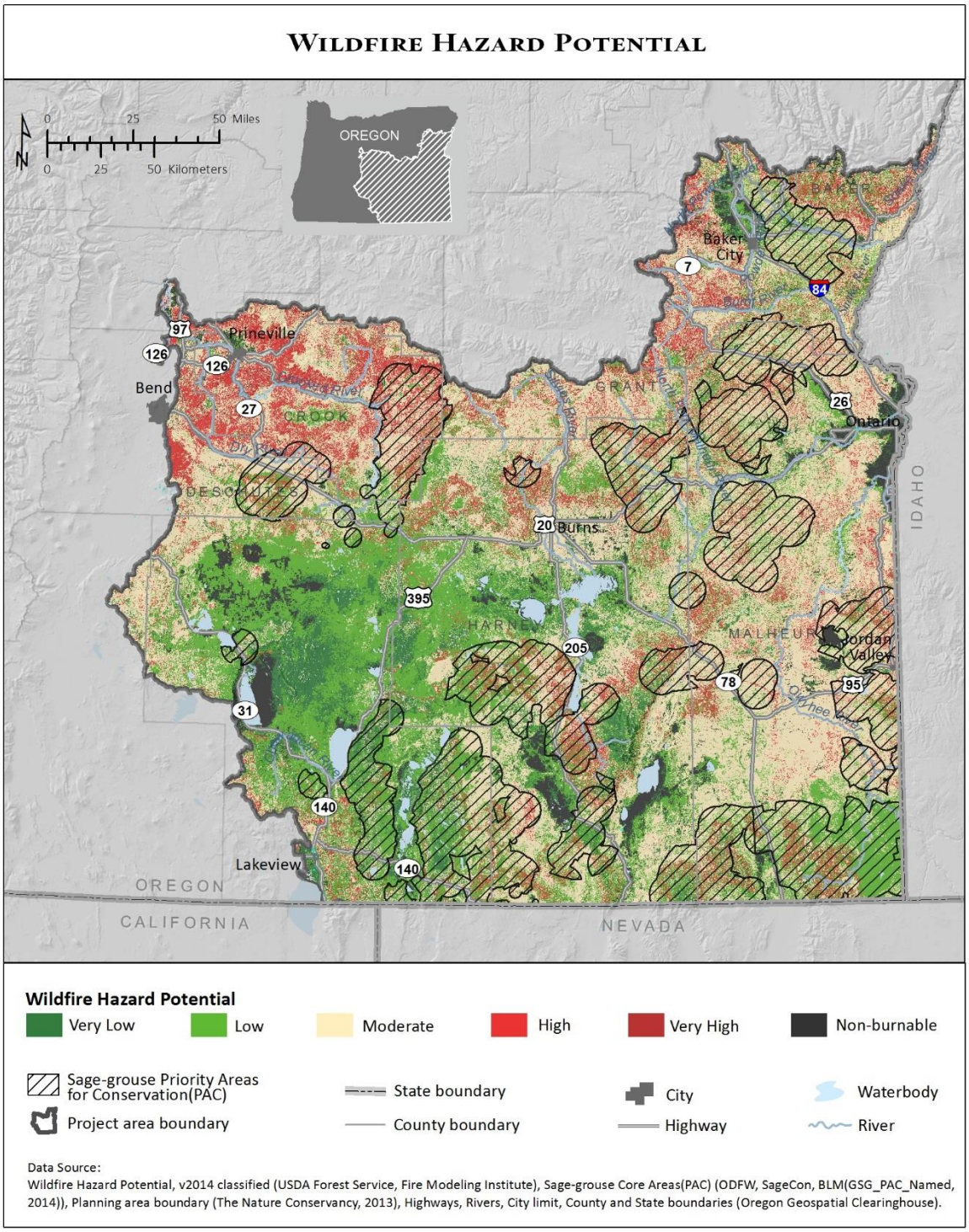

Figure IV-8. Wildfire hazard potential across the SageCon planning area.

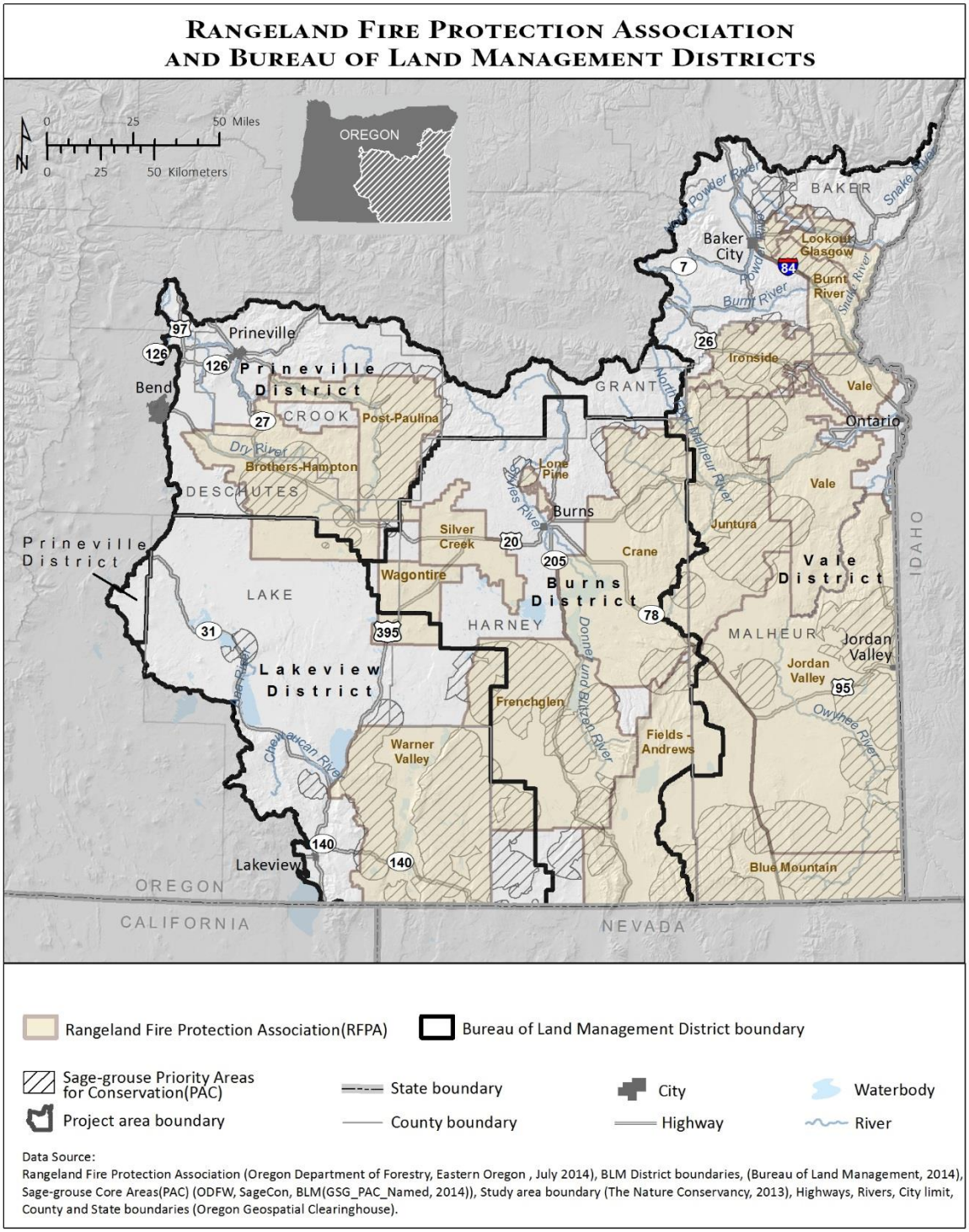

Figure IV-9. Rangeland Fire Protection Association and BLM district boundaries within sage-grouse habitat.

Conservation Objectives

Retain and restore healthy native sagebrush plant communities within the range of the sage-grouse and reduce the negative impacts of wildfire on sage-grouse habitat.

Conservation Actions

Conservation actions fall into four primary categories within an overarching proactive and reactive grouping. Proactive actions address situations prior to the existence of a wildfire and are categorized as (1) fire risk reduction and (3) fire operations policy, planning, and capacity building. Reactive actions address situations during or following wildfire events and are categorized as (2) fire operations/suppression and (4) post-fire rehabilitation. Many actions identified below represent Oregon-tailored approaches to or support for the actions identified in the Implementation Plan for SO 3336.

Action WF-1: Implement best practice, proactive *fire risk reduction* strategies to reduce the threat wildfire poses to sage-grouse habitat in PACs and important areas of connectivity.

Action WF-1-1 Identify and map priority habitat areas (e.g., sagebrush communities with low resilience to disturbance and low resistance to invasive annual grasses associated with warm and dry soil temperature and moisture regimes), where implementation of proactive management strategies should be prioritized. As part of this prioritization effort, emphasis should be placed on areas with high wildfire risk potential (e.g., areas with low resistance and resilience dominated by invasive annual grasses) that are within or proximal to areas highly valuable to sage-grouse (e.g., intact habitat in or adjacent to PAC areas or important to connectivity).

Action WF-1-2 Based on the above prioritization effort, pre-position resources near PACs when conditions are conducive to large fire growth (e.g., high fire severity conditions, forecasted lightning) in order to ensure rapid response to ignitions. Coordinate fire response agencies and entities to ensure that adequate equipment and funds are available for pre-positioning efforts.

Action WF-1-3 Restrict unnecessary motorized travel (but maintaining access to livestock for grazers) and ban campfires in sage-grouse habitat during high fire severity conditions to reduce the risk of accidental ignitions.

Action WF-1-4 Reduce the risk from vehicles or human-caused wildfires and the spread of exotic species by planting perennial vegetation (e.g., green strips) paralleling road rights-of-way.

Action WF-1-5 Take steps to prevent future degradation and address currently degraded sagebrush systems (as described in the juniper encroachment and invasive annual grasses sections above) to promote habitat resilience and reduce the impacts of wildfire in sage-grouse habitat.

Action WF-1-6 Conduct fuel management treatments, including those identified below, designed to protect existing high-quality sagebrush habitat, modify fire behavior, restore native plants, and create habitat resilience and landscape patterns that benefit sage-grouse (see Section 7(b)(iii) in SO 3336 Implementation Plan).

Action WF-1-6a Reduce juniper fuel loads in areas adjacent to valuable sage-grouse habitat. Prioritize Phases I and II juniper stands within four miles of known leks. Prioritize Phase III juniper stands after Phases I and II have been addressed. Prioritize Phase III areas in or adjacent to priority areas (PACs) that provide adequate sage-grouse habitat (e.g., sagebrush land cover >25%), particularly in areas with medium-to-high resistance and resilience.

Action WF-1-6b Strategically use livestock grazing to reduce fuel loads in years with high accumulation of fuels to reduce wildfire risk, using grazing management that maintains or improves the native plant community health (e.g., dormant season use). (See related Action WF-3-4c.)

Action WF-1-6c Establish fuel breaks and/or green strips in strategic locations to compartmentalize future fires, thereby reducing the potential acres burned and the fire risk to sage-grouse habitat. Strategically place fuel breaks where high fire risk coincides with sage-grouse habitat with the lowest potential for post-fire recovery (e.g., areas with low-to-moderate resistance and resilience). Monitor and maintain fuel breaks to prevent annual-grass invasion in these disturbed areas and to determine if species planted in green strips spread beyond fuel breaks.

When designing fuel breaks, consider the following:

- The potential fire containment benefits versus the area of sage-grouse habitat lost in the fuel break footprint
- Existing roads or utility corridors that could be widened with mowing, green-stripping, or black-stripping
- Natural fuel breaks
- Prevailing winds that may influence the placement of fuel breaks (e.g., prioritize east-to-west roads or place on south side of road if only one side is mowed); the use of fire-resistant perennial species (e.g., crested wheatgrass or forage kochia) as an effective means to slow the spread of fire while preventing the establishment of non-native annual grasses. Consider the risk of these species spreading beyond seeded fuel breaks.

Action WF-1-6d In areas at very high risk for wildfire with dense sagebrush that may contribute to fuel loads and where patch removal of sagebrush has been determined to not have a negative impact on sage-grouse, create a mosaic of sagebrush density to intersperse areas of low fuel continuity (less than 25 acres in size and

constituting less than 15% of the treatment block) among areas of desired shrub density required by sage-grouse (see Appendix 3 for desired sagebrush densities).

Action WF-2: Focus fire *suppression* activities in prioritized sage-grouse habitat within the framework of the federal and state wildland fire policies (see Section 7(b)(ii) in SO 3336 Implementation Plan).

Action WF-2-1 Utilize trained resource advisors (biologists with sage-grouse expertise) to assist in prioritizing fire suppression activities so that valuable sage-grouse habitat is protected. Involve sage-grouse expertise with fire operations expertise as early and continuously as possible in fire suppression, and conduct incident command efforts so as to integrate input on sage-grouse protection into the mapping and implementation of fire response efforts.

Action WF-2-2 After protection of life and property, including livestock, prioritize sagebrush habitats within four miles of a lek for fire suppression. Further prioritize suppression to prevent fire from entering valuable habitat (PAC and low-density) that is most vulnerable to invasion by annual grasses (e.g., Wyoming big sagebrush communities, areas with low resistance and resilience).

Action WF-2-3 Enhance fire response planning and coordination in sage-grouse habitat.

Action WF-2-3a Utilize mobile technology to ensure that incident management teams can access dynamically updated spatial data that can assist in prioritizing sage-grouse habitat protection during fire suppression.

Action WF-2-3b Ensure coordination among the BLM, RFPAs, and rural fire protection districts (RFPDs) to increase initial attack and extended attack capability and effectiveness.

Action WF-2-3c Agencies should focus an appropriate combination of resources to quickly arrive at new ignitions combined with effective suppression strategies supported by appropriate tactical resources, also known as Speed and Focus—a principle of fire suppression actions.

Action WF-2-3d Reallocate fire response resources (crews, equipment, etc.) to important sage-grouse habitats, while maintaining adequate resources as required to protect life and property. Identify where resources are lacking and provide those resources to decrease response time to fires in sage-grouse habitats.

Action WF-2-3e To the extent possible, locate wildfire suppression facilities (e.g., base camps, spike camps, drop points, staging areas, helibases) in areas where physical disturbance to sage-grouse habitat can be minimized. Preferred areas for suppression

facilities may include previously disturbed areas, grasslands, areas near roads/trails, or other areas where there is existing disturbance or minimal sagebrush cover.

Action WF-2-4 During fire suppression, use tactics that will retain the most sage-grouse habitat, including those listed below.

Action WF-2-4a Retain unburned areas of sage-grouse habitat (including interior islands and patches between roads and the fire perimeter) unless there are compelling safety, resource protection, or control objectives at risk. Consider the use of aircraft and mechanized equipment to protect these islands. This may require additional suppression (e.g., aircraft and mechanized equipment) and resources for holding and mop-up. Fire managers and resource advisors should proactively plan for and anticipate these needs early in the incident.

Action WF-2-4b Judiciously use heavy equipment and limit brush removal to the level necessary to expeditiously extinguish the fire. Use existing fuel breaks, such as roads, utility corridors, or areas with fire-resistant vegetation, to minimize fire spread. Establish additional defensible fire lines in areas where (1) effectiveness is high, (2) fire risk is likely, and (3) negative impacts (fragmentation) are minimal.

Action WF-2-4c Use direct attack tactics, when safe and effective, to reduce the amount of burned habitat. Direct attack supported by any available mechanized equipment (e.g., bulldozer, tractor with blade, aerial drops) is the most efficient at reducing the overall size of rangeland fires, thereby keeping habitat intact.

Success on the Ground: BLM Fire Prevention and Suppression

On federal public lands in Oregon's sage-grouse country, the BLM's goal is to limit acres burned and damaged by wildfire within and adjacent to sage-grouse habitat. The BLM advances this goal through management actions, including fuels management, fire operations, and emergency stabilization prioritization. Rapid restoration of sage-grouse habitat has proven difficult (Arkle et al. 2014), requiring the BLM to focus on pre-fire, fire suppression, and post-fire efforts. The BLM successfully suppresses about 98% of all wildfire ignitions.

Since 2010, the BLM has addressed the threat of wildfire by building or maintaining more than 1,800 miles of strategic fuel breaks. In addition, the agency initiated a Tri-State Fuel Break Strategy involving Idaho, Nevada, and Oregon in March 2014. Because the border areas of southwest Idaho, southeast Oregon, and northern Nevada represent a significant expanse of intact and productive sage-grouse habitat that is at high risk for large-scale wildfires, the strategy prioritizes this area for proactive measures such as fuel breaks in order to contain and compartmentalize fire. In 2014, the Vale and Boise BLM Districts conducted site visits to proposed fuel break locations that are designed to integrate with those already planned or in progress in Nevada. Proposed fuel breaks are along existing roads and will be vegetation free for widths ranging from 300 to 1,000 feet (including the bladed road area).

Action WF-3 *Build capacity* and *support planning and policies* so that state and federal agencies are best equipped to reduce the threat of wildfire in sage-grouse habitat.

Action WF-3-1 Identify areas of sage-grouse habitat where fire response capacity is lacking or weak due to remoteness, difficulty of terrain, or lack of RFPA coverage, and implement an approach to improve response capabilities.

Action WF-3-1a Expand RFPAs to fully cover the extent of priority sage-grouse habitat in Oregon or provide contracted assistance or some other capacity to cover currently uncovered lands.

Action WF-3-1b Provide funding for contracted assistance, other partnership capacity, trainings, or other approaches that will improve fire response capacity, capability, and effectiveness in and adjacent to priority sage-grouse habitat.

Action WF-3-2 Support pre-fire planning activities that will ensure readiness and swift decision-making during the fire season (see Section 7(b)(i) of SO 3336 Implementation Plan).

Action WF-3-2a Compile greater sage-grouse information into statewide tool boxes. Tool boxes will contain maps, lists of resource advisors, contact information, local guidance, and other relevant information for each BLM district.

Action WF-3-2b Preload maps of sage-grouse PAC and low-density habitat as well as connectivity corridors into all dispatch plans (e.g., WildCAD, run cards).

Action WF-3-2c Educate fire duty officers on sage-grouse management objectives and PAC, low-density, and connectivity habitat to be prioritized in the event of a fire.

Action WF-3-2d Provide education to fire suppression personnel about the need and value of protecting sagebrush landscapes.

Action WF-3-2e Annually review district fire management plans (Phase I) to incorporate new sage-grouse information (e.g., lek and habitat maps) and fire suppression resources (including location of fuel breaks, water sources, etc.) to ensure that up-to-date information is available and distributed to fire suppression personnel for setting wildfire suppression priorities and initial attack planning.

Action WF-3-2f Train resource advisors to assist in working with incident commanders and incident management teams to prioritize sage-grouse considerations during fire suppression activities.

Action WF-3-3 Support policies and collaborate with all wildfire protection entities (including BLM, Oregon Department of Forestry [ODF], and RFPAs) to promote integration across agencies and jurisdictions to provide seamless fire suppression during fires.

Action WF-3-3a Implement policy changes that integrate and coordinate more fire suppression resources, such as Air National Guard Mobile Airborne Firefighting Units and RFPAs. Local resources such as RFPAs are often closest to ignition sites, knowledgeable about the landscape and infrastructure, and able to quickly mobilize. Optimize engagement of these resources during critical periods such as initial attack and in communicating with federal incident command teams to ensure that they are aware of local conditions they may need to avoid or take advantage of during suppression efforts.

Action WF-3-3b Encourage RFPAs to adopt minimum personnel training and equipment standards to ensure optimum coordination among BLM, RFPAs, and RFPDs across ownership boundaries and to most effectively achieve fire suppression and management outcomes.

Action WF-3-3c Conduct interagency training exercises with local, state, and federal agencies to ensure and optimize safety, coordination, communication, and effectiveness during fire management operations.

Action WF-3-4 Support policies and collaborate with the BLM, USFS, and the Oregon Department of State Lands (DSL) to minimize administrative barriers to implementing fire prevention activities.

Action WF-3-4a Support administrative policies to implement habitat management activities such as fire prevention efforts that maintain habitat values associated with federal lands with special designations (e.g., Wilderness Study Areas, Areas of Critical Environmental Concern).

Action WF-3-4b Build flexibility into grazing permits on public lands so that grazing intensity may be adjusted during periods of low or high grass productivity (see related Action WF-1-6b).

Action WF-3-5 Build capacity so that agencies and entities responsible for fire suppression have adequate resources to take appropriate actions.

Action WF-3-5a Identify funds to upgrade or construct additional airports outside of sage-grouse habitat that meet the requirements of single-engine air tankers to shorten response and turn-around times for suppression aircraft.

Action WF-3-5b Identify funding to acquire additional fire-fighting resources where needed, including communication and other equipment as well as contracted support and partnerships. Consider establishing new incident attack centers in or adjacent to PACs.

Action WF-3-5c Identify existing water sources and strategically develop additional water sources in priority sage-grouse habitat that (a) has high wildfire risk

and (b) is >7 miles from an existing source. Pursue development of water sources that will not increase mosquito breeding areas.

Action WF-3-5d Identify existing travel routes and primitive roads that, if upgraded, would minimally increase disturbance to sage-grouse habitat while affording decreased fire response time and reducing the need for cross-country travel during fire suppression. Incorporate strategies, such as locked gates and seasonal road closures, to restrict travel, and thereby disturbance to sage-grouse, on any upgraded roads.

Success on the Ground: Rangeland Fire Protection Associations

Approximately 4.6 million acres of private and state-owned rangelands are protected by 20 independent RFPAs in Oregon (Figure C-9). These associations are composed of 641 all-volunteer firefighters and 233 pieces of fire suppression equipment (Table IV-4). The RFPAs have responsibility to suppress all wildfires on all nonfederal lands within the RFPA jurisdictional boundary; they cannot discriminate between member or nonmember lands. RFPAs do not provide structural fire protection; they prevent and suppress wildland fires, keeping them small through effective initial attack. RFPAs have the authority to suppress any fire on federal lands that is a threat to private or state lands. RFPAs have proven especially effective in initial attack suppression activities—catching fire starts early before they have a chance to spread—in part because they are composed of local landowners who have long-standing familiarity with the local landscape and road infrastructure. Altogether, 84% of PAC and low-density sage-grouse habitat is covered by an RFPA district. Since 2010, the number of RFPAs grew from 12 to 20, which brought an additional 355,162 acres of sage-grouse habitat into coverage under RFPA districts. Since this point in time, the equipment capacity of RFPAs has also grown, with the Oregon Department of Forestry (ODF) adding more than 50 engines and slip-ons (fire trucks) and 16 D7 dozers.

Action WF-4 Coordinate with private and federal land managers to prioritize *post-fire rehabilitation* and ensure that adequate resources are available for emergency stabilization and ongoing restoration activities to protect, maintain, or restore sage-grouse habitat within PAC areas and to restore connectivity between PAC areas (see sections 7b [v] and 7b [vi] of SO 3336 Implementation Plan).

Action WF-4-1 Prioritize herbicide treatments as an invasive weed/annual-grass prevention strategy in recently burned areas, particularly areas with low resistance and resilience that are proximal to valuable sage-grouse habitat. Use best available science to strategically prioritize herbicide treatments in areas that will provide the greatest benefit to sage-grouse.

Action WF-4-2 Prioritize post-fire rehabilitation and longer-term restoration efforts in areas that are proximal to valuable sage-grouse habitat. Use best available science to strategically prioritize longer-term post-fire rehabilitation investments in areas that will provide the greatest benefit to sage-grouse.

Action WF-4-3 Utilize best practice management techniques to prevent invasive annual grasses and restore burned areas, as described in the Section IV.iii.b above.

Action WF-4-4 Coordinate with the BLM and USFWS to adapt emergency stabilization and rehabilitation (ESR) and burn area emergency response (BAER) programs to meet the needs of large-scale fire rehabilitation in sage-grouse habitat areas (see sections 7b [v] and 7b [vi] of SO 3336 Implementation Plan).

Action WF-4-4a Revise ESR and BAER policy direction and administrative procedures to ensure that planning and implementation time periods (1) allow for immediate herbicide treatments where required and (2) are adequate to ensure strategic and effective use of funds for short- and long-term site rehabilitation and restoration success.

Action WF-4-4b Allocate adequate funds through ESR and BAER to ensure that rehabilitation projects are monitored so that adaptive management techniques can be applied to foster project success.

Action WF-4-4c Develop mechanisms within ESR and BAER plans to protect rehabilitation investments over time.

Action WF-4-5 Develop mechanisms to ensure that timely and adequate funding is available for emergency stabilization and rehabilitation on private lands.

Action WF-4-6 Monitor post-fire restoration activities and sage-grouse habitat utilization and/or population response to areas that have burned. (See related monitoring actions **MON-2** and **MON-4**.)

Responsible Parties:
BLM, BLM FIAT, DSL, LITs, ODF, private landowners, RFPAs, USFS, ODFW, Burns ARS, SWCDs

Table IV-4. Characteristics of Rangeland Fire Protection Associations in eastern Oregon.

Rangeland Protection Association	Established	Private & State (acres)	Membership Properties	Volunteers (estimate)	Suppression Equipment
Ash Butte	2009	138,326	25	15	15
Blue Mountain	2013	137,213	15	30	4
Brothers / Hampton	2006	240,612	65	15	12
Burnt River	2000	171,884	10	25	5
Crane	1998	767,461	150	128	31
Fields / Andrews	1998	156,893	50	30	11
Frenchglen	2013	276,189	10	25	7
Gateway	2010	10,676	36	25	5
Ironside	1963	340,105	49	60	29
Jordan Valley	2008	470,777	50	125	37
Juntura	2007	264,684	5	15	9
Lone Pine	2013	28,106	4	21	6
Lookout Glasgow	2014	345,284	25	25	7
Post / Paulina	2006	377,188	40	25	12
Silver Creek	2001	83,925	30	10	8
Twickenham	2001	98,263	20	10	6
Vale	2008	315,445	25	20	6
Wagontire	2015	106,457	5	10	7
Warner Valley	2011	250,906	20	15	12
WC Ranches	2015	43,628	7	12	4
Total		**4,624,023**	**641**	**641**	**233**

Success on the Ground: FIAT—Fire and Invasives Assessment Team

BLM districts within Oregon have also engaged in partnership with RFPAs, ODFW biologists, and other stakeholders to conduct fire and invasives assessments that were completed in May 2015. These assessments are part of the larger Fire and Invasives Assessment Team (FIAT) effort, which is a rangewide undertaking aimed at identifying priority habitat areas and management strategies to reduce the threats to sage-grouse resulting from invasive annual grasses, wildfires, and juniper expansion. The FIAT report contains priority strategies relevant to the wildfire threat as well as potential landscape-level projects to help protect sage-grouse populations and habitat that were identified using the following two steps:

Step 1: Identification of priority areas based on breeding bird density, sagebrush landscape cover, juniper expansion, and soil temperature and moisture regimes.

Step 2: Development of management unit applications for invasive annual grasses and juniper expansion by (a) reviewing the data used in Step 1, assessing its quality, and incorporating local information; and (b) developing focal habitat activity/implementation plans (fire operations, rehabilitations, prioritized management tactics) for use across jurisdictional boundaries.

In 2013, the BLM issued Instruction Memorandum 2013-128, which provides updated and enhanced direction to managers on advancing sage-grouse conservation during fire operations and fuels management activities. More recently, in January of 2015, the Secretary of the Interior issued Secretarial Order 3336 related to “Rangeland Fire Prevention, Management, and Restoration.” The

order stems from a gathering of fire management practitioners, biologists, policy makers, landowners, conservation groups, and others at the Next Steppe wildfire conference in Boise, Idaho, in November 2014 and builds upon the experiences and infrastructure related to addressing rangeland wildfire to date.

The secretarial order sets forth enhanced policies and strategies for addressing wildfire risk and restoring sagebrush habitats in areas essential for sage-grouse, for the conservation of other species, and for the economic well-being of activities and communities associated with the sagebrush-steppe ecosystem of the Great Basin. This includes enhanced coordination among local, state, and federal actors as well as the establishment of a rangeland fire task force to implement the order through reports outlining (a) short-term actions to be accomplished before the 2105 fire season, (b) actions aimed at implementation prior to the 2016 fire season, and (c) longer-term actions to advance the policy and strategy set forth in the order. The order represents a significant point in BLM fire management policy. Actions include advancement of fire response plans tied to the FIAT; enhanced prioritization and allocation of resources; integration of ecological resistance and resilience science into the design of fuels and fire management; changes in burned area emergency stabilization and rehabilitation policy and programs; and multiyear commitments to advance large-scale restoration work, including actions to address invasive grasses and native seed/plant enhancement as well as research and monitoring.

Consistent with the instruction memo and the secretarial order, the BLM has committed to making sage-grouse habitat protection a high natural resource priority, focusing its hazardous fuels and fire suppression programs on areas where fire management for sage-grouse habitat protection is most critical. As part of this effort, and through revision of its resource management plans, the BLM will also take a number of preventive actions, including creating fuel breaks to limit the spread of fires; coordinating locally to reduce fuel loads and wildfire starts along travel corridors; pre-positioning firefighting resources to quickly respond to one or multiple fires; and expanding the training and use of RFPAs; rural fire departments; and other local, nonfederal agency individuals as liaisons in wildland fire detection and suppression operations.

iv. Addressing Development Threats

While wildfire, invasive annual grasses, and juniper encroachment represent the primary large-scale threats to the future health of the sage-grouse and its habitat in Oregon, various development activities are known to significantly impact the bird and its habitat and either have already occurred or have the potential to occur in sage-grouse habitat in Oregon. Development of infrastructure for any purpose in close proximity to sage-grouse and its habitat (e.g., roads, pipelines, energy or mining infrastructure, transmission and local distribution lines, and communication towers) can result in habitat loss and fragmentation, and may cause sage-grouse to avoid or abandon habitat due to direct and/or indirect impacts such as noise (see Section IV.iv.g below for further discussion of noise). In addition, habitat fragmentation resulting from anthropogenic disturbance can result in reductions in lek persistence, lek attendance, population recruitment, annual survival, nest initiation and nest site selection, and

the loss of winter habitat (Holloran 2005; Aldridge and Boyce 2007; Walker et al. 2007; Doherty et al. 2008).

The degree to which these anthropogenic activities have occurred to date or are likely to occur in Oregon's sagebrush country in the future depends on the activity type and location of resources, as well as market forces. Furthermore, the primary concerns to sage-grouse and their habitat with respect to these activities relates to where they are located and how they are implemented. For this reason, the Action Plan's approach to these types of threats (including regulatory mechanisms) focuses on the "where" and the "how" of development activity.

a. Oregon's State and Local Land-Use Planning Program

The following overview of Oregon's land-use planning system precedes discussion of the individual threats listed in this subsection because of this planning system's value and relevance to Oregon's baseline approach to development. A review of Oregon's land-use system is also key to understanding the State's new regulatory mechanisms, which are designed to address development threats described on a rangewide scale in the 2010 USFWS "warranted but precluded" determination, the COT Report, and the ODFW 2011 Strategy. Given that the 2010 USFWS finding was at a rangewide scale and the COT Report is also a relatively coarse-scale assessment, the mechanics, existing benefits, and future opportunities provided by Oregon's land-use planning system have not been fully assessed, documented, and credited to date. The State thus wants to ensure that the consideration of adequate regulatory mechanisms during the pending 2015 federal ESA listing determination is informed by this Action Plan's overview and details related to Oregon's land-use planning approach and its relevance to sage-grouse conservation.

In 1973, the Oregon legislature adopted a statewide planning system that draws a bright line between urban and rural land uses, channeling population growth and related infrastructure into urban areas while protecting and prioritizing farm and forest land uses on private, non-federal lands in rural areas. Public outreach around the state led to the adoption of 19 statewide planning goals (Statewide Goals). These goals are implemented through comprehensive plans adopted by local governments at the county level; these plans are in turn implemented through zoning, land division ordinances, and other planning techniques (see Appendix 5 for an overview of each county plan in the Oregon counties containing sage-grouse habitat). The Oregon Land Conservation and Development Commission (LCDC), a seven-member state governing body appointed by the governor and staffed by the Department of Land Conservation and Development (DLCD), reviews local comprehensive plans and their implementation approaches for consistency and compliance with the Statewide Goals. The majority of the Statewide Goals are written broadly, with specific regulations cited either in Oregon Revised Statutes (ORSs) or Oregon Administrative Rules (OARs). LCDC's OARs clarify and implement the Statewide Goals, and DLCD maintains oversight and regulatory jurisdiction with

respect to implementation of the overall statewide land-use system, including the Statewide Goals.

Oregon's statewide planning program has attracted national and international acclaim. As mentioned above, maintaining rural lands for rural uses and defining urban areas for urban development are the principal underpinnings of state land-use policy. Additional features include integrating transportation with land use and protecting sensitive areas like wetlands and wildlife habitat. More recently, the State has been working to develop a strategy for climate change.

Oregon's commitment to working rural landscapes led early policy makers to place an unmistakable emphasis that persists today on protecting private land acreage devoted to commercial farming, ranching, and timber production from conflicting land-use and development activities. Statewide Planning Goals 3 and 4, implemented by OAR Chapter 660, Divisions 6 and 33, direct counties to identify and protect areas with value for agriculture and forestry. The majority of lands within PACs and low-density sage-grouse habitat (more than 98%) are zoned for exclusive farm or forestry use under Goals 3 and 4. The detailed legal structure (e.g., state statutes, OARs, and local planning programs) that guides preservation and development efforts pursuant to these goals protects open space, minimizes fragmentation of large acreage, and prevents conversion of land to nonfarm/non-forest uses, all of which benefit wildlife. Long-standing protective measures include, but are not limited to, the following:

- Large minimum required parcel sizes for farm-, ranch- or forest-related land divisions codified in state statute (ORS 215.780 prescribes a range of parcel sizes from 80 to 320 acres).[51]
- Narrow opportunities to create new parcels for uses other than farm, ranching, or forest activities.
- Limits to authorization of other uses, and only under certain circumstances.
- Prohibition of certain land-use activities such as subdivisions and urban types of commercial or industrial development (e.g., destination retail, traded sector industries, large-scale recreation, etc.) on lands devoted to farming, ranching, or timber production.

Oregon pioneered the use of urban growth boundaries (UGBs) to contain and cluster urban development in and around incorporated cities. Statewide Goal 14 and its implementing rule at OAR 660 Division 24, require each city to establish a UGB. Every UGB is designed to furnish a supply of land capable of supporting growth and development over a 20-year planning horizon.

[51] Designated "rangeland" areas require new farm-related parcels to be at least 160 acres in size, and 320 contiguous acres is needed to establish a new farm- or ranch-related dwelling. Nonrangeland areas require new farm-related parcels to be at least 80 acres in size, and 160 contiguous acres is needed to establish a new farm-related dwelling. Designated forest areas require new forest-related parcels to be at least 80 acres, and 240 contiguous acres is needed to establish a new forest dwelling.

Urban growth management helps to provide certainty to environmental and development interests by promoting efficient, clustered communities with a strong sense of place. Cities must coordinate with the respective counties to establish their UGB. A hierarchy established at ORS 197.298 acts in concert with Goal 14 and OAR 660, Division 24 to direct urban planning efforts away from productive lands in favor of areas with less value for farming or timber production. This relates to sage-grouse conservation because the land-use regulations maintain the extent of unfragmented rangelands in eastern Oregon by clustering urban development and promoting the continuation of rural ranching. Continued rural ranching brings with it the associated benefits of a livestock producer infrastructure that can manage for invasive annual-grass and noxious weed prevention and eradication, fire protection, and overall rangeland health at a large scale.

Specific to wildlife protection and habitat conservation, Statewide Planning Goal 5 and its implementing administrative rule (OAR Chapter 660, Division 23) require local governments to adopt programs that protect natural resources and conserve scenic, historic, and open space resources on private lands for present and future generations. Special safeguards designed to protect wildlife are typically advanced by Oregon's cities and counties at the local ordinance and comprehensive plan level. Big-game habitat and winter range are commonly protected resources on rural lands governed by counties. Natural resources identified under Goal 5 programs are protected in a number of ways, ranging from requirements for new land use to be located in proximity to existing disturbance to an outright prohibition of uses that conflict with a specified natural resource value. Most county programs attempt to balance private property rights with protection of the identified resource. Sage-grouse habitat is also a resource available to be inventoried under Goal 5. Prior to 2015 and LCDC's adoption of new sage-grouse-specific rules, two counties (Crook and Deschutes) had local Goal 5 programs specifically dedicated to protecting sage-grouse habitat.

Oregon's land-use policies act together to maintain large areas of acreage for agriculture and forestry while containing urban sprawl and offering special consideration for unique places sensitive lands, and natural resources including wildlife. Less sprawl and large, relatively unfragmented working land acreage benefit farming, ranching, and forestry interests, and a strong natural resource sector benefits local economies. Preserving large blocks of relatively undeveloped acreage and containing sprawl also benefit wildlife and its habitat. Further, Goal 5 protections also exist across more than 9 million acres of these lands, providing additional protection to ensure their function as wildlife habitat. Even species that are not targeted by the ESA or other laws and policies benefit from Oregon's land-use provisions limiting types and intensity of development possibilities. It should be re-enforced that these large blocks of acreage and related protections apply to private lands and, as such, maintain large open-space areas and habitat beyond and often contiguous with those protected on public or federal lands.

Based on this statewide legal framework that is relatively unique to Oregon, county comprehensive land-use plans and the ordinances that implement them represent enforceable regulatory mechanisms relevant to the existing and future conservation of the sage-grouse and its habitat. Of the total private land acreage within the range of sage-grouse in Oregon, the largest share is used as undeveloped rangeland. This is not by accident; Oregon's land-use laws and Oregon counties' implementation of this land-use planning system were intended to and have successfully maintained conditions on these lands that remain similar to their historic, undeveloped, and open-space nature. As a general matter, wildlife species such as sage-grouse are better able to thrive in landscapes protected for farming and ranching than in those devoted to other, more fragmented or intensively developed uses. The success of Oregon's land-use system with respect to conservation of the sage-grouse and its habitat has recently been reviewed by Oregon's county planners and published in a report titled *Central and Eastern Oregon Land Use Planning Assessment: Sage-Grouse Habitat* (Appendix 5; Harney County et al. 2013). This report demonstrates that under current land-use practices and laws, levels of development in core sage-grouse habitat remain very low and have not changed significantly across most areas of the bird's range in Oregon in recent decades.

Beyond the existing positive benefits that Oregon's progressive land-use planning approach provides, the system has been recently strengthened with respect to the sage-grouse in particular. The SageCon planning effort examined, identified, and addressed gaps in the State's existing / pre-2015 regulatory system that allowed for past adverse development impacts in sage-grouse habitat and could allow for future adverse impacts. For instance, as mentioned earlier, as of 2014, only two of the seven counties in the range of sage-grouse had adopted sage-grouse habitat as a Goal 5 protected resource, and only one (Deschutes County) specified buffers around lek locations, which were at a distance insufficient to provide for the year-round habitat needs of the species. In addition, though minimum parcel sizes are required for lands zoned for farm use, these minimum parcel sizes range from 80–320 acres (depending on the zoning category) across the Oregon counties with sage-grouse habitat. The minimum parcel size upon which a dwelling may be permitted also varies, and opportunities exist to place dwellings on substandard-sized parcels. Some areas proximal to sage-grouse population centers already have densities of dwellings and farm-use buildings that fragment habitat, which signals a need to ensure future implementation of zoning laws and land-use protections to ensure the continuity of sage-grouse habitat.

Big-game winter habitat protection overlays often coincide with sage-grouse habitat, thereby affording some protection to the species. In some cases, however, regulations related to farm-use zoning that coincide with winter range and sage-grouse habitat are more restrictive than those associated with big-game winter range. Lastly, prior to 2015, gaps existed in Oregon's land-use laws related to managing the potential impacts from large-scale development (e.g., renewable energy; electric and natural gas transmission lines; and mining) in sage-grouse habitat.

As part of the SageCon planning effort, interested and affected parties engaged in rulemaking processes that considered and updated Oregon's land-use planning system in the specific context of sage-grouse. This rulemaking process was based on the recognition that land-use laws should advance the sustainability of local farms and ranches as well as economic development opportunities within a framework that ensures the current and long-term conservation of sage-grouse. Through this Action Plan and its related recent DLCD and ODFW rulemakings, the State has strengthened its existing land-use planning system in order to provide (a) greater certainty that the land-use system will ensure that potential future development is consistent with sage-grouse conservation and (b) greater clarity and predictability for rural communities, conservation, development, and other interests. The following subsections describe the various land uses or development types with the potential to negatively impact sage-grouse and their habitat; the nature, current extent, and future potential of each development type; and how current and new mechanisms will ensure that these land uses are consistent with the conservation of the sage-grouse in Oregon.

b. Urban Development

Urban development can result in direct habitat loss, habitat fragmentation, and the introduction of invasive plant species. Urban development-related activities (e.g., trash, landfill, bird feeders) are also known to increase the presence of predators, including predator-types that may have disproportionate impacts on sage-grouse. Additionally, pets can have negative impacts on sage-grouse through direct predation or disturbance (e.g., chasing birds). Infrastructure associated with urban development (e.g., power lines, roads) can also result in sage-grouse habitat loss and fragmentation, enhancement of avian predators (e.g., ravens), and possible disturbance to sage-grouse.

Current and potential development

Urbanization was identified as a secondary threat on a rangewide basis by the USFWS in 2010. However, the USFWS noted that the Northern Great Basin was the area least affected by urbanization, and the rate of urbanization in Oregon is much lower than in any other state—with virtually no urban expansion in the portion of eastern Oregon outside of the Bend area and Klamath County over the past 20 years (Herstrom et al. 2011; Harney County et al. 2013). Most of this expansion occurred prior to 1984, at which point Oregon's land-use regulations were fully implemented (Gray et al. 2013).

The rates of change in land area in urban uses in eastern Oregon since 1979 are shown in Table IV-5. The data for this table are derived from an ongoing long-term analysis of LANDFIRE data by the Oregon Department of Forestry and the U.S. Forest Service (Herstrom et al. 2011).

Table IV-5. Land area (acres) in urban uses in eastern Oregon 1974–2009 (adapted from Table B-1, p. 60, Herstrom et al. 2011).

Geographic Area	1974	1984	1994	2000	2005	2009
All eastern Oregon	60,000	74,000	82,000	91,000	96,000	97,000
Eastern Oregon except Bend area and Klamath County	34,000	40,000	41,000	42,000	43,000	43,000

When the Bend area and Klamath County are excluded, the total increase in land area impacted by urban uses in the range of sage-grouse in Oregon during the mid-1980s through 2009 (25 years) was 3,000 acres, and in the last 10 years, the increase was 1,000 acres. Not only is that rate very low, it is also significantly lower than in surrounding states (e.g., from 1976 to 2009, the rate of urban land area expansion in eastern Oregon was less than half the rate in eastern Washington) (Gray et al. 2013). However, it should be noted that areas designated by Herstrom et al. (2011) as the "Bend area" encompass the most northwestern fringe of sage-grouse range in Oregon (e.g., Prineville District), where leks still persist and have sustained declines since 2011 (ODFW 2011). Portions of southeastern Klamath County supported sage-grouse until the late 1980s–early 1990s but the Klamath population is now considered extirpated.

Current and proposed regulations

Existing elements of Oregon's land-use planning system and regulations, including its approach to UGB's, have contained urban development in areas generally outside of Oregon's identified sage-grouse habitat. Only one UGB (Unity, Oregon) contains any sage-grouse habitat (low-density), and all other UGB's are distant from any sage grouse habitat. Future development will remain tightly controlled by existing state and local regulatory mechanisms, which now include the new LCDC and ODFW rules (OARs 660-023-0115 and 635-140-0025, described in Section II: Implementation and Coordination – Partnerships that Work and contained in Appendices 17 and 19). Collectively, the regulations will require cities and counties to avoid significant sage-grouse habitat when amending land-use planning designations that could increase opportunities for urban development or when making changes to their codes that may affect sage-grouse habitat.

To the extent urban development were to occur in agriculturally zoned lands, it would either be subject to the avoidance, minimization, and compensatory mitigation requirements of OAR-635-140-0025 and OAR 660-023-0115—which apply to development that is not related to farm use and exceeds either five acres in size, 50 feet in height, generates more than 50 vehicle trips per day, or produces noise greater than 70 dB—or require a local comprehensive plan amendment, which would trigger a new site-specific Goal 5 process. The new rules also include limits on and metering of future new human development within PACs, limiting total development-related direct impacts to no more than 3% of total PAC acreage with increases

over current baseline development levels not to exceed 1% in a 10-year period. Urban development direct impacts would be subject to and counted against these numeric thresholds.

Oregon's land-use planning system, existing and recently revised regulations, and approach to tracking and capping direct impact levels in PACs provide a robust approach to ensuring urban development does not threaten the short or long-term conservation of sage-grouse in the State.

c. Exurban Development

The biological implications of this land use (dispersed homes on small acreages) are similar to those described above under "Urban Development." However, because exurban development often occurs closer to important occupied sage-grouse habitat, the impacts described in the "Urban Development" subsection could be exacerbated. According to the COT Report, "exurban development … results in direct habitat loss, habitat fragmentation and the introduction of invasive plant species. … Infrastructure associated with exurban development (e.g., power lines and roads) also results in habitat loss and fragmentation" (USFWS 2013, p. 50).

Current and potential development

Exurban development has occurred in the Prineville area and, to a lesser extent, in the Baker area, but even in these areas, the geographic extent and density of such uses remain low. Exurban development was not identified as a factor in habitat fragmentation in the Vale, Lakeview, and Burns areas.

Oregon's land-use system, administered by its county governments, limits exurban development in lands zoned for agricultural (farm or forest) uses. In the 11.5 million acres of sage-grouse habitat in Oregon, there are approximately 900 homes (Harney County et al. 2013, p. 104). This translates into an estimated population density of one person per eight square miles (or one person per 5,100 acres; Harney County et al. 2013).

Ninety-eight percent of sage-grouse habitat in Oregon is planned and zoned for agricultural uses (mainly ranching) under the land-use program. These lands are subject to very large minimum parcel size requirements (160–320 acres for most rangelands), limited land division opportunities, and limited provisions for uses not related to farm, ranch, or forest management. Residential development on resource lands is limited to farm- or forest-related dwellings, again with minimum parcel size requirements ranging from 160 to 320 acres or limited provisions for nonfarm- or nonforest-related dwellings on smaller parcels. Nonfarm dwellings must satisfy several rigorous criteria and pay a tax penalty. Baker and Deschutes Counties impose a 40 acre minimum parcel size for nonfarm dwellings in big-game winter range. A limited number of other uses may be allowed through a conditional-use review process by county governments (ORS 215.283[2]).

Dwelling opportunities on lands protected by Goal 3 are identified at OAR Chapter 660, Division 33s, and complement local ordinances. Dwelling opportunities for lands protected under Goal 4 are expressed at ORS 215.720, 740, and 750, as well as in corresponding provisions in OAR Chapter 660, Division 6, and local ordinances. Reflecting these standards, and as shown in Table IV-6 below, 97 new dwellings were permitted in PAC or low-density sage-grouse habitat during the period 2003–2013. The local ordinances are described in detail in Appendix 18. In addition to permit approvals, data compiled by Herstrom et al. (2011) also documented minimal change in the area of land in eastern Oregon categorized as low-density residential, when the Bend area and Klamath County were excluded (Table IV-7).

Table IV-6. Exurban dwelling approvals in sage-grouse habitat in Oregon, 2003–2013 (adapted from Table 6, Harney County et al. 2013).

County	Exurban dwelling approvals in PAC habitat	Exurban dwelling approvals in low-density habitat
Baker	9	4
Crook	1	4
Deschutes	NA	7
Harney	21	14
Lake	9	4
Malheur	14	3
Union	6	1
Total	**60**	**37**

However, as indicated above, areas designated by Herstrom et al. (2011) as the "Bend area" encompass portions of sage-grouse range in Oregon (e.g., Prineville District) most susceptible to contraction, and southeastern Klamath County includes areas where sage-grouse have been extirpated (ODFW 2011). Further, Herstrom et al. (2011) documented that proximity to developed areas (urban and exurban) is predictive of future conversion to more developed land uses. In other words, areas that currently provide sage-grouse habitat that are near areas of low-density development are most likely to be developed. The rates of development also appear to be driven by economic conditions. For instance, annual average rates of conversion of wildland rangelands to areas of exurban development were higher prior to 2007 but dropped after 2007, when a national and regional economic recession occurred (Herstrom et al. 2011). In addition, low-density residential land use is projected to expand by 2065 (most notably in Deschutes and Crook Counties), along with projected population growth (Gray et al. 2013), and this could be expected to result from zoning changes that shift non-developable lands into lands with the potential to be developed (Herstrom et al. 2011). Consequently, from a sage-grouse conservation perspective, the potential increase in exurban developed land in eastern Oregon (including the Bend area) should not be ignored.

Table IV-7. Land area (acres) in low-density residential uses in eastern Oregon, 1974–2009 (Herstrom et al. 2011).

Geographic Area	1974	1984	1994	2000	2005	2009
All Eastern Oregon	265,000	349,000	397,000	421,000	422,000	431,000
Eastern Oregon except Bend area and Klamath County	151,000	174,000	180,000	185,000	185,000	187,000

Current and proposed regulations

There has been very little exurban development in Oregon's identified sage-grouse habitat over the past 10 years, and future development is tightly controlled by existing state and local regulatory mechanisms. LCDC and ODFW rules adopted in July 2015 (OARs 660-023-0115 and 635-140-0025, described in Section II: Implementation and Coordination – Partnerships that Work and contained in Appendices 17 and 19) create additional safeguards against expansion of exurban development in significant sage-grouse habitat.

Oregon's collective regulatory landscape has proven to be more than adequate to address potential threats from exurban development given its applicability to conflicting uses with customary activities for agriculturally-zoned rangelands. For the purposes of OAR 660-023-0115, conflicting uses include both large-scale activities and other smaller-scale uses subject to county permitting or other applicable laws, and in particular include development in significant sage-grouse habitat that is not related to farm use and exceeds either five acres in size, 50 feet in height, generates more than 50 vehicle trips per day, or produces noise greater than 70 dB.

Specifically, under the avoidance approach in OAR 660-023-0115, proponents for exurban development meeting the definition above would need to demonstrate that the development cannot avoid locating within a PAC area through an analysis of alternatives and a demonstration that (1) the project is dependent on unique geographic or physical features that cannot be found elsewhere, *or* (2) it is not technically feasible to locate the project elsewhere based on accepted engineering practices (but financial costs cannot be the only basis considered); *and* (3) the project provides important economic opportunity, needed infrastructure, or other public health or safety benefits. A similar avoidance test also applies to low-density sage-grouse habitat.

If the avoidance test has been satisfied, minimization of impacts is then required, along with compensatory mitigation of direct and indirect impacts to the sage-grouse and its habitat. Compensatory mitigation must be designed and implemented to be consistent with the standard defined in OAR-635-140-0025, such that a net conservation benefit for sage-grouse is achieved by ensuring that habitat impacts are offset by a level of habitat functionality capable of supporting greater sage-grouse numbers than the functionality lost. In addition, direct impacts from future exurban development would be captured in and counted against the 3% and 1% protective thresholds described above in the "Urban Development" subsection. Finally,

while existing and the newly adopted regulations do not specifically address the density of farm-use dwellings and associated buildings in sage-grouse habitat, this type of development will be tracked and monitored as part of the central registry associated with ensuring compliance with the above thresholds and in coordination with CCAA best managment practices. This approach will allow for adaptive management in the regulatory context should such types of exurban development unexpectedly grow to a level of concern.

Oregon's land-use planning system, existing and recently revised regulations, and approach to tracking and limiting direct impact levels in PACs provide a robust approach to ensuring that exurban development does not threaten the short- or long-term conservation of sage-grouse in the State.

d. Renewable Energy

Across the western United States and within the sage-grouse range, the demand for and development of renewable and nonrenewable energy resources has increased over the past decade. Sage-grouse populations can be significantly reduced and, in some cases, locally extirpated by non-renewable energy development activities, even when mitigation is implemented (Walker et al. 2007). With respect to renewable energy development, although data are limited, negative impacts to sage-grouse populations and habitats are expected to be similar due to the similar supporting infrastructures employed by both renewable and non-renewable energy activities (Becker et al. 2009; Hagen 2010; LeBeau 2012; USFWS 2012).

Concerns surrounding wind energy development and sage-grouse include noise produced by the rotor blades, sage-grouse avoidance of vertical structures, and mortality to sage-grouse flying into rotors (Manier et al. 2013). However, a perhaps greater negative influence on sagebrush ecosystem health likely results from the roads necessary to construct and maintain wind and other forms of renewable energy developments, as well as power lines required to transfer energy to existing transmission lines (Connelly et al. 2004).

Geothermal energy remains too nascent in its development to clearly quantify and elucidate immediate or large impacts to sage-grouse (BLM and USFS 2008; Knick et al. 2011). However, extraction of geothermal fluids (gases, steam, and water) for power generation generally requires the same infrastructure for construction and operation as do traditional nonrenewable energy resources. Geothermal *exploration* activities have impacts similar to *production* drilling. While the exploration impacts may be temporary, the timing and location of the activities could have detrimental effects on sage-grouse through indirect impacts from noise and tall drilling towers, and direct impacts on habitat from test pits and grab samples. Geothermal operations are often very noisy due to the reinjection process, which requires pumping of the used steam into the wells. Consequently, impacts of geothermal developments from direct habitat loss, habitat fragmentation due to roads and transmission lines, noise, and increased human

presence (Connelly et al. 2004) likely have effects on local sage-grouse populations comparable to the effects from non-renewable energy development.

The USFWS 2010 "warranted but precluded" finding, the COT Report, and the ODFW 2011 Strategy all identify wind energy development as a potential threat to sage-grouse habitat. Geothermal development is mentioned in passing in these reports, and solar development was not identified as a specific threat.

Potential for development

The SageCon planning process evaluated and estimated the potential for wind, solar, and geothermal energy development within sage-grouse habitat in Oregon. Areas of potential wind energy development certainly exist (Figure IV-10), but many areas are too distant from transmission infrastructure for development to be feasible. Other areas on federal lands are already excluded from surface development or otherwise protected from development by existing or proposed designations (e.g., Wilderness Study Areas; designations proposed though the BLM RMP Amendment for Oregon). Figure IV-11, prepared by the Oregon Department of Energy (ODOE), shows areas of potential wind energy development, taking into consideration *both* wind potential and distance to transmission lines. However, while relevant to these two factors, this figure does not overlay current protective designations or other proposed designations on federal lands that may preclude wind or other development activity.

Initial feasibility assessments indicate that approximately 488,600 acres of sage-grouse habitat are suitable for wind development, with the majority of these acres occurring in PACs (230,700 acres), followed by low-density habitat (158,100 acres), with the remainder in occupied habitat (99,800 acres). However, a nearly equivalent amount of land (412,300 acres) is suitable for wind energy development within 10 miles outside of the sage-grouse habitat perimeter. This suggests that ample opportunity also exists to develop wind energy without impacting sage-grouse habitat.

Approximately 3.9 million acres of sage-grouse habitat have been identified as suitable for solar energy development. The majority of the land within the sage-grouse habitat boundary has potential for solar development. While this creates a high potential for development within sage-grouse habitat, it also allows for considerable flexibility in the siting of projects to avoid or minimize impacts to significant sage-grouse habitat.

Finally, the SageCon effort's analysis identified only two known wells or quantifiable resource areas where geothermal development would impact significant sage-grouse habitat, with approximately 59 acres impacted. A separate BLM analysis, however, identifies geothermal potential as considerably higher in Oregon.[52] While both analyses were limited to lands

[52] See BLM/USFS Geothermal Leasing in the Western United States Programmatic Environmental Impact Statement (PEIS) (October 2008)

currently open to development and areas of geothermal potential within specified distances of existing transmission lines, the differences in the Oregon and BLM analyses likely result from different approaches to defining geothermal potential.

ODOE's 2014 assessment of renewable energy development potential (wind, geothermal, and solar) through 2020 concludes that such potential is minimal, particularly without the extension of a currently expired federal production tax credit. Further, scoping documents suggest that if the federal production tax credit were extended, most wind energy development would occur in states other than Oregon. Wind energy projects developed in Oregon by 2020 would likely occur at facilities currently undergoing review by the Oregon Energy Facility Siting Council for site certificates. To date, none of the facilities under review are proposed in counties with sage-grouse habitat.[53]

The feasibility of renewable energy projects also hinges on other market drivers, such as future natural gas prices, carbon taxes, potential closures of coal plants, and Oregon's Renewable Energy Portfolio. The 2014 ODOE assessment found that these factors are unlikely to stimulate increased renewable energy demand or economic feasibility by 2020. Figure IV-11 is excerpted from ODOE's analysis of the potential for wind and solar development in sage-grouse habitat, which is documented in Appendix 12. Relatively recent changes in energy markets in the western United States, and in California in particular, have altered the likelihood of this form of development occurring in Oregon's sage-grouse habitat since the 2010 USFWS "warranted but precluded" determination (see Appendix 13). Most analysts now believe that further large-scale wind or solar development in sage-grouse habitat in Oregon is unlikely in the next 10 years. In addition to the regulatory and market forces identified in the ODOE analysis, that agency also determined that additional regional electrical transmission capacity would need to be built in order for significant wind development to occur in the southern portion of Oregon within or near sage-grouse habitat. Figure IV-11 also shows areas of geothermal potential and exploration in sage-grouse habitat.

Like wind, future solar energy development is also unlikely in the near term. Collectively, the three major energy companies in Oregon have nearly satisfied the 2020 minimum solar energy

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(http://www.blm.gov/wo/st/en/prog/energy/geothermal/geothermal_nationwide.html). Both the Oregon and BLM analyses defined geothermal potential. Oregon's definition was based on known geothermal wells and quantifiable geothermal resources, whereas BLM's definition was broader and based on national-level analyses by the Idaho National Engineering and Environmental Laboratory, supplemented with locations of operating geothermal facilities; issued and pending leases; state agency–provided maps of geothermal potential as well as supporting environmental data; areas identified through the PEIS scoping process; and other areas known to have geothermal potential that were not identified previously. Oregon assessed distances of 20 and 40 miles from transmission lines; BLM assessed a distance of 20 miles. Oregon's reliance on existing geothermal wells and quantifiable resources dramatically limited the total area of geothermal potential before the distance to transmission line filter was applied. As a result, the total land area considered feasible for geothermal energy development by Oregon was smaller than that considered in the PEIS.

[53] http://www.oregon.gov/energy/Siting/Pages/Facilities.aspx

capacity standards as stipulated by Oregon statute. Considerable technological advances would be required before solar energy development is economically competitive with non-renewable sources; however if these advancements are made, solar energy development may accelerate after 2020.

Similarly, the threat of geothermal energy development to sage-grouse is low in Oregon. To date, two geothermal facilities are operational. Though an additional 35 megawatts of geothermal projects are under way, future development is limited by resource uncertainties and the high cost of exploration and development.

Photo Credit: Jeremy Roberts, Conservation Media.

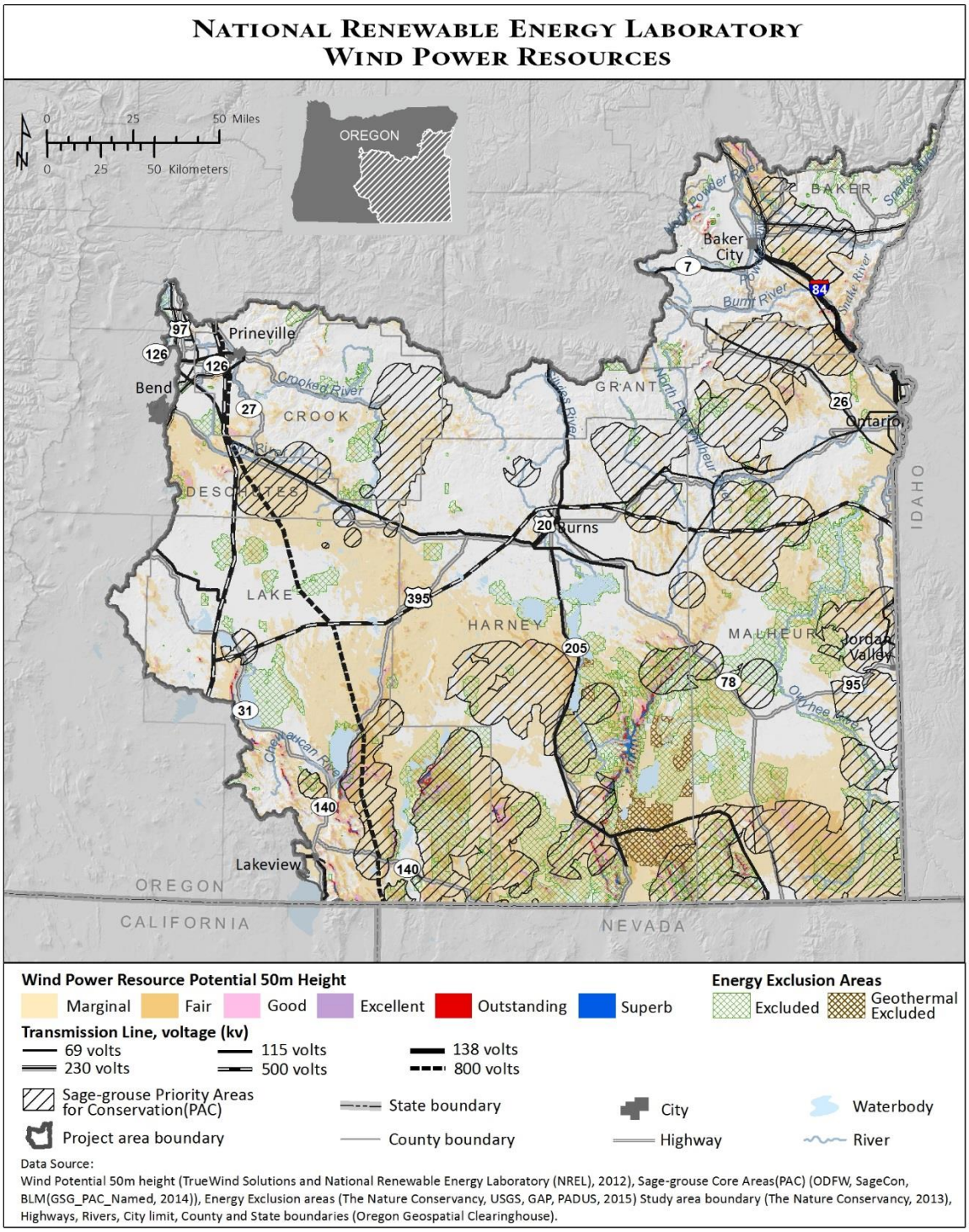

Figure IV-10. Oregon wind power resource estimates.

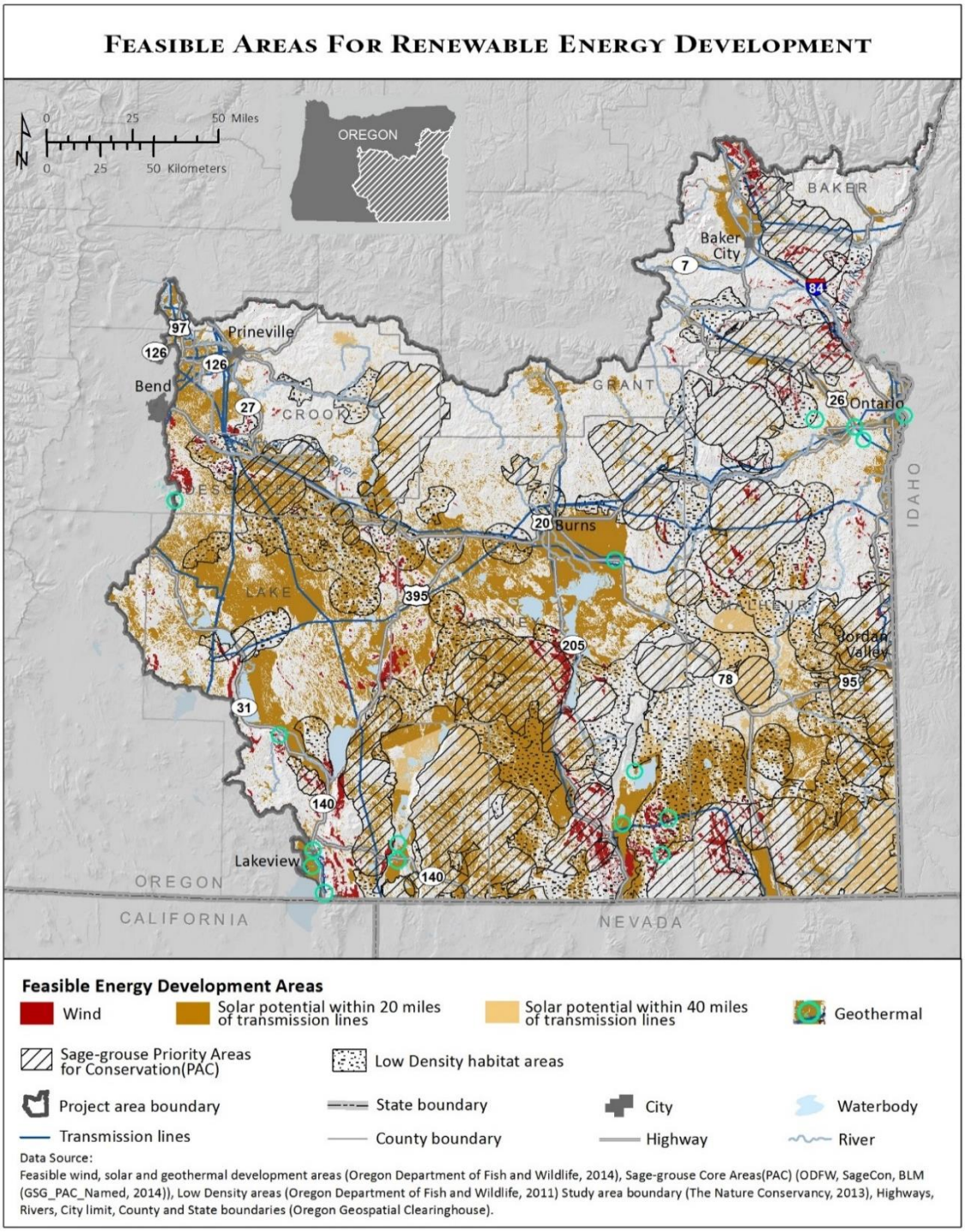

Figure IV-11. ODOE/ODFW energy feasibility map. This map illustrates areas considered feasible for renewable energy development based on the criteria for selection. Areas excluded from renewable energy development were not considered for the ODOE/ODFW analysis. The analysis for geothermal development feasibility retained decommissioned and abandoned wells.

Current and proposed regulations

Large-scale wind (more than 104 megawatts nameplate capacity), solar (more than 99 or 319 acres depending on agricultural productivity), and geothermal (more than 38 megawatts nameplate capacity) energy generation facilities are regulated at the state level through the Oregon Energy Facility Siting Council (EFSC), a division of ODOE (ORS 369.010). EFSC's wildlife standard requires proposed projects to be consistent with ODFW mitigation policy (OAR 345-022-0060). As with proposed oil and gas and energy-related hard rock mining proposals (described below), this means that pursuant to ODFW's recently revised mitigation rules at OAR 635-140-0025 (and referring rules at OAR 635-415-0015), a proposed wind, solar, or geothermal development subject to EFSC jurisdiction must avoid PACs unless it can demonstrate through an alternatives analysis that it must locate within a PAC to remain viable (based on considerations that cannot rest solely on costs). If such a showing is made, the project also must minimize its footprint within PACs and provide compensatory mitigation for its direct and indirect adverse effects consistent with ODFW's net-conservation benefit mitigation standard. Finally, such developments are also subject to the 3% and 1% protective thresholds for allowable impacts in PACs, as described in Section IV.iv.b above, as well as in Section II: Implementation and Coordination – Partnerships that Work and in the rules themselves at Appendices 17 and 19.

Geothermal projects also are subject to additional state regulation by the Oregon Department of Geology and Mineral Industries (DOGAMI). ORS Chapter 522 and OAR 632-020 provide general authority to DOGAMI to consider effects of proposed operations on natural resources, and ORS 517.750(13) and OAR 632-030-025(1)(z) provide the agency with specific authority to impose setbacks to protect wildlife.

Smaller-scale wind (below the 105 megawatt nameplate capacity), solar (less than 100 or 320 acres, depending on agricultural productivity), and geothermal (below the 38.85 megawatt nameplate capacity) projects are subject to Oregon's statewide land-use planning system and the local county review and permitting process. As such, these projects are not subject to the EFSC process described above and are instead reviewed as a non-farm conditional use within the category of a commercial utility facility proposed for the purpose of generating power for public use by sale. Under ORS 215.275, utility facilities must demonstrate that they must locate on lands zoned for farm use on the basis of an alternatives analysis.[54] In addition, such proposals may be conditioned to avoid conflicts with existing farming and ranching practices, as well as with wildlife resources that have been protected under a county's comprehensive plan.

[54] Standards under ORS 215.275, however, do not automatically apply. Wind, solar, and geothermal projects are conditional uses allowable under ORS 215.283(2)(g), which do not automatically trigger the siting standards under ORS 215.275 unless the facility has a transmission line associated with it. A transmission line or a pipeline, on the other hand, is not a conditional use and would be allowable under ORS 215.283(c), subject to the siting standards of ORS 215.275.

Renewable energy facilities such as wind and solar are also subject to special rules located at OAR 660-033-0130(37) and (38), which apply restrictive siting criteria and conditions aimed at avoiding negative effects upon agricultural operations, protecting high-value soils, and addressing natural resource values such as wildlife protection and noxious weed prevention.[55] Every county with sage-grouse habitat also has protected big-game habitat. The overlap of inventoried big-game habitat and identified sage-grouse habitat in these areas appears to range from 68% to 100%, depending on the county. Protection measures for wildlife species—which commonly include clustering sites near existing development, siting close to a road, managing hours of operation, or requiring larger than normal minimum parcel sizes— contribute to maintaining an open landscape that has a multitude of benefits, including the indirect support of sage-grouse habitat.

In addition to the existing regulatory mechanisms described above for wind, solar, and geothermal energy projects, these development activities are subject to the State's newly adopted LCDC and ODFW regulations described in Secion II.ii and attached as Appendices 17 and 19. These new regulations were designed to address gaps of relevance to sage-grouse conservation in the existing state regulatory structure, ensuring that strong protections for the sage-grouse and its habitat will exist for large-scale development actions known to adversely impact the species, including renewable energy projects, regardless of whether they are subject to county-level, EFSC, or other jurisdictions. Specifically, the new LCDC rules apply to renewable energy development in significant sage-grouse habitat that exceeds either five acres in size, 50 feet in height, generates more than 50 vehicle trips per day, or produces noise greater than 70 dB.

The OARs require project proponents to avoid significant sage-grouse habitat unless they meet narrow criteria. Specifically, and as described in earlier subsections on "Urban Development" and "Exurban Development," the avoidance approach in OAR 660-023-0115 and OAR 635-140-0025 requires proponents for new renewable energy projects to demonstrate that the project cannot avoid locating within a PAC through an analysis of alternatives and a demonstration that (1) the project is dependent on unique geographic or physical features that cannot be found elsewhere, *or* (2) it is not technically feasible to locate the project elsewhere based on accepted engineering practices (but cost cannot be the only basis considered); *and* (3) the project provides important economic opportunity, needed infrastructure, or other public health or safety benefits. A similar but somewhat less stringent avoidance standard exists for low-density habitat, along with protective measures for leks in other occupied habitat.

Regardless of whether the avoidance test has been satisfied, the rules also require minimization of impacts in PACs, low-density, and other occupied habitat (including enhanced protections for

[55] For example, OAR 660-033-0130(38) requires solar projects to consider the presence of any and all wildlife, including sage-grouse, regardless of whether it has been included in a local county program or listed as a Goal 5 resource.

"Areas of High Population Richness" within PACs), and they require compensatory mitigation for direct and indirect impacts to the sage-grouse and its habitat consistent with the net-conservation benefit standard defined in OAR-635-140-0025. This standard ensures that habitat functionality is replaced at a level capable of supporting greater sage-grouse numbers than the habitat that was impacted. The rules also ensure that science-based thresholds important to the bird's population viability and habitat use are not crossed; they ensure this by subjecting renewable energy development to the overall limitation requiring that the direct footprint of human development impacts shall not exceed 3% of total PAC acreage and no more than 1% in any 10-year period.

Finally, county land-use decisions involving conditional uses such as renewable energy projects require notice to landowners within 750 feet of the proposed use and an opportunity for a hearing. Large proposals are almost always considered by a county planning commission or a hearings officer at a public hearing. County land-use decisions are subject to appeal to the Oregon Land Use Board of Appeals, a special panel that only considers land-use appeals. Its decisions are also subject to judicial review in State court, as are other State-level permitting decisions by other entities implementing the above rules. County land-use decisions regarding transmission or energy facilities are often controversial, and appeals are not uncommon.

In sum, the new LCDC and ODFW rules enhance Oregon's existing legal framework with respect to renewable energy development. When these rules are combined with the State's approach to avoidance, exclusion, sage-grouse focal areas, and other provisions advanced by the BLM's RMP Amendment (BLM 2015), Oregon has strong regulatory mechanisms in place to address potential threats from renewable energy development and to ensure that such activity proceeds in a manner consistent with the short and long-term conservation of sage-grouse and its habitats.

e. Electric and Natural Gas Transmission Lines

Electrical and natural gas transmission lines and their associated corridors can create habitat fragmentation, acting as a barrier to sage-grouse movement. Even facilities and lines located underground can degrade habitat in the construction phase as well as in the long term (providing site restoration and access for maintenance and ongoing operation). Further, structures or towers that support electrical lines are known to deter sage-grouse from using nearby habitat and can be perching sites for corvids and other sage-grouse predators (see Section IV.vi.e).

Current and potential development

Currently, there are no major natural gas transmission lines in Oregon PACs (caveat: the recently completed Ruby Pipeline parallels the southern Oregon border before heading north to Malin in Klamath County). Due to the sparse human population in Oregon's sage-grouse habitat in Oregon, electrical transmission and distribution infrastructure are also limited and

mainly associated with service to small communities and surrounding agricultural operations. The existing infrastructure is owned and operated by various electric utility service providers serving these communities and surrounding customers. There are four larger transmission lines that cross the region—three that generally cross the area running north to south, to the east of the Bend-Redmond area; and one that crosses the area running east to west, to the north of the Burns area then running north to south from the Summer Lake area to the Oregon-California border. An additional high-capacity transmission line in southern Oregon was in early planning by PacifiCorp, but that effort has been suspended for the foreseeable future. Notably, Idaho Power Corporation is planning a new 500-kilovolt transmission line between Boardman, Oregon and Hemingway, Idaho (known as the "B2H Project"). This is a significant effort, and Idaho Power has worked closely with ODFW and BLM biologists to develop a proposed transmission route that strives to impact the least amount of sage-grouse habitat.

Current and proposed regulations

Electric transmission lines with a capacity of more than 230 kilovolts, greater than 10 miles in length, and spanning more than one city or county in the state are subject to the EFSC State siting process and regulations. To be permitted, these uses must comply with the EFSC wildlife standard, which requires consistency with ODFW's mitigation policy. As stated in earlier subsections, ODFW's recently updated mitigation rules require avoidance of PAC and low-density sage-grouse habitat. Certain pipelines are also subject to EFSC review based on diameter, length, and purpose. Interstate electrical transmission lines and natural gas lines are both regulated by the Federal Energy Regulatory Commission (FERC). Smaller transmission lines are subject to the same ORS 215.175 siting requirements to avoid farm land, as described in the above subsection on "Renewable Energy Development." Generally, this requirement results in new facilities following existing roads or transmission lines rather than cutting cross-country, thereby protecting open space and minimizing habitat fragmentation.

Finally, the LCDC and ODFW regulations (OAR 660-023-0115 and 635-140-0025, respectively) apply to all new non-residential or non-farm electrical and natural gas transmission lines (except those regulated by FERC) within significant sage-grouse habitat. The rules subject these transmission lines to the specific avoidance, minimization, and compensatory mitigation requirements described in Section IV.iv.d as well as in Section II: Implementation and Coordination – Partnerships that Work of the Plan and in the rules themselves, found at Appendices 17 and 19. The rules also subject these transmission lines to the protective 3% backstop and 1% metering approach for allowable development impacts within PACs, as previously discussed in more detail above (see Sections IV.iv.b, IV.iv.c , and IV.iv.d) and stated in the rule itself (see Appendices 17 and 19). The ongoing B2H Project, which submitted materials related to project site certification prior to adoption of the new state rules, is not subject to the avoidance requirements in the new rules but will be subject to minimization and compensatory mitigation requirements, and direct impacts will be calculated against the above 3% and 1% thresholds.

Together with existing land-use controls that have prevented (and are continuing to prevent) exurban development, Oregon's recently updated regulatory framework ensures that there will be little if any additional habitat fragmentation from transmission lines in PACs. Any impacts that do occur will be kept below scientific thresholds important to the bird's continued viability in that area and will be mitigated to ensure a net conservation benefit to sage-grouse. Oregon's existing and recently revised regulations also provide protections for low-density and other sage-grouse habitat, as well as a mitigation approach that advances conservation benefits. When combined with the BLM RMP Amendment's (BLM 2015) approach to avoidance and other designations applicable to transmission lines, a robust approach is in place in Oregon to address threats that transmission line development poses to the short- and long-term conservation of sage-grouse.

f. Mining

Strong evidence in the scientific literature suggests that surface-disturbing energy and mineral exploration or development within significant sage-grouse habitat results in impacts that are inconsistent with maintaining or improving population and habitat conditions. Surface mining (including mining exploration) within sage-grouse habitats results in the direct loss of habitat, habitat fragmentation, and indirect impacts from disturbance (e.g., noise and predator subsidies). Research in the context of uranium mining, for example, indicates that the largest risk is the potential disturbance to sage-grouse during the drilling phases of development, from the processing plant, and from traffic on roads to access well fields and the processing plant (Manier et al. 2013). The magnitude of the impacts of other forms of mining (e.g., gravel) on sage-grouse and their habitats is unknown (Braun 1998). However, development of surface mines and associated infrastructure (e.g., roads and power lines), noise, sage-grouse predator attractants, habitat for mosquitoes (West Nile virus vectors), and increased human activity can negatively impact sage-grouse numbers (Braun 1998). Further, current reclamation activities do not always consider sage-grouse habitat needs.[56] And the typically long response times of sagebrush ecosystems to most reclamation activities necessitate that these activities be initiated early and effectively if the results are to be considered meaningful for long-term conservation.

Current and potential development

To date, mining has not contributed significantly to the overall surface disturbance within PACs in Oregon. Recent assessments undertaken during the SageCon planning effort attribute less than 8,000 acres of direct impacts to mining operations within PAC habitat areas. This equates

[56]DOGAMI must approve reclamation proposals by applicants if they are compatible with the secondary land uses (uses of mining areas no longer employed for mining) designated by the local land-use administrator. Secondary land uses are determined on a case-by-case basis. If the land-use administrator specifies that areas disturbed by mining are returned to sagebrush habitat, DOGAMI has the authority to ensure compliance. However, secondary uses that are not compatible with sage-grouse habitat needs may be designated by the local land-use administrators, and DOGAMI must approve reclamation proposals for these uses as well.

to less than 0.02% of the 6.5 million acres making up the state's total PAC habitat area. This assessment, however, is focused on direct impacts and did not attempt to quantify acres of habitat compromised by indirect mining impacts, including roads and noise.

Aggregate mining has not been specifically identified as a threat to sage-grouse habitat in Oregon by either the USFWS or ODFW. There is little new aggregate development in eastern Oregon, as there is very little new road construction. Existing aggregate sites are used periodically for road maintenance. Figure IV-12 shows State-owned and State-controlled aggregate sites. Other sites are owned or controlled by local road departments. As indicated, these aggregate sites are typically located in close proximity to existing roads, thereby minimizing impacts to sage-grouse habitat, and are used primarily for road maintenance. A site may go for long periods without use, depending on maintenance needs and the number of sites in the vicinity.

Oregon's oil, gas, and mining permits are shown in Figure IV-13. There is only one pending larger-scale mining proposal within Oregon's sage-grouse habitat: Calico Resources' proposed Grassy Mountain gold mine near Vale.[57] The proposal is in the study phase and under review pursuant to the DOGAMI standards discussed below. There is no active oil or gas development in Oregon sage-grouse habitat, although there has been some exploratory activity in the Snake River Plain, including exploration leasing. And the Celatom Mine, also near Vale, Oregon, is an existing diatomaceous earth mining operation that is proposed for expansion on BLM lands. Over the longer term, there is potential for additional mining operations within sage-grouse habitat.

Current and proposed regulations

Oregon DOGAMI regulates and permits aggregate mining operations under ORS Chapter 517.[58] The primary focus of DOGAMI's program is reclamation and the protection of water quality. However, the program does give DOGAMI authority to regulate operations to protect natural

[57] A previously proposed uranium mine near Ft. McDermitt is no longer a pending proposal with DOGAMI.

[58] DOGAMI does not issue permits for activities that fail to meet the definition of mining operations (ORS 517.750), such as the following:
(1) Operations with less than 5,000 cubic yards of excavation per 12-month period. When multiple disturbance areas are located within one parcel or contiguous parcels under the same ownership, the yardage shall be calculated based on the total of all sites within the parcel or contiguous parcels.
(2) Operations with less than one acre of disturbance per 12-month period and less than five acres of lifetime disturbance. When multiple mining areas are located within one parcel or contiguous parcels under the same ownership, the disturbed acreage shall be calculated based on the total of all sites within the parcel or contiguous parcels.
(3) Excavations of sand, gravel, clay, rock, or other similar materials conducted by the landowner or tenant for the primary purpose of construction, reconstruction, or maintenance of access roads on the same parcel or on an adjacent parcel that is under the same ownership as the parcel that is being excavated.
(4) Excavation or other land disturbance operations reasonably necessary for farming, as that term is used in ORS 517.750(15)(b)(B).

resources on adjoining properties. ORS 517.750(13) and OAR 632-030-025(1)(z) provide DOGAMI with specific authority to impose setbacks to protect wildlife.

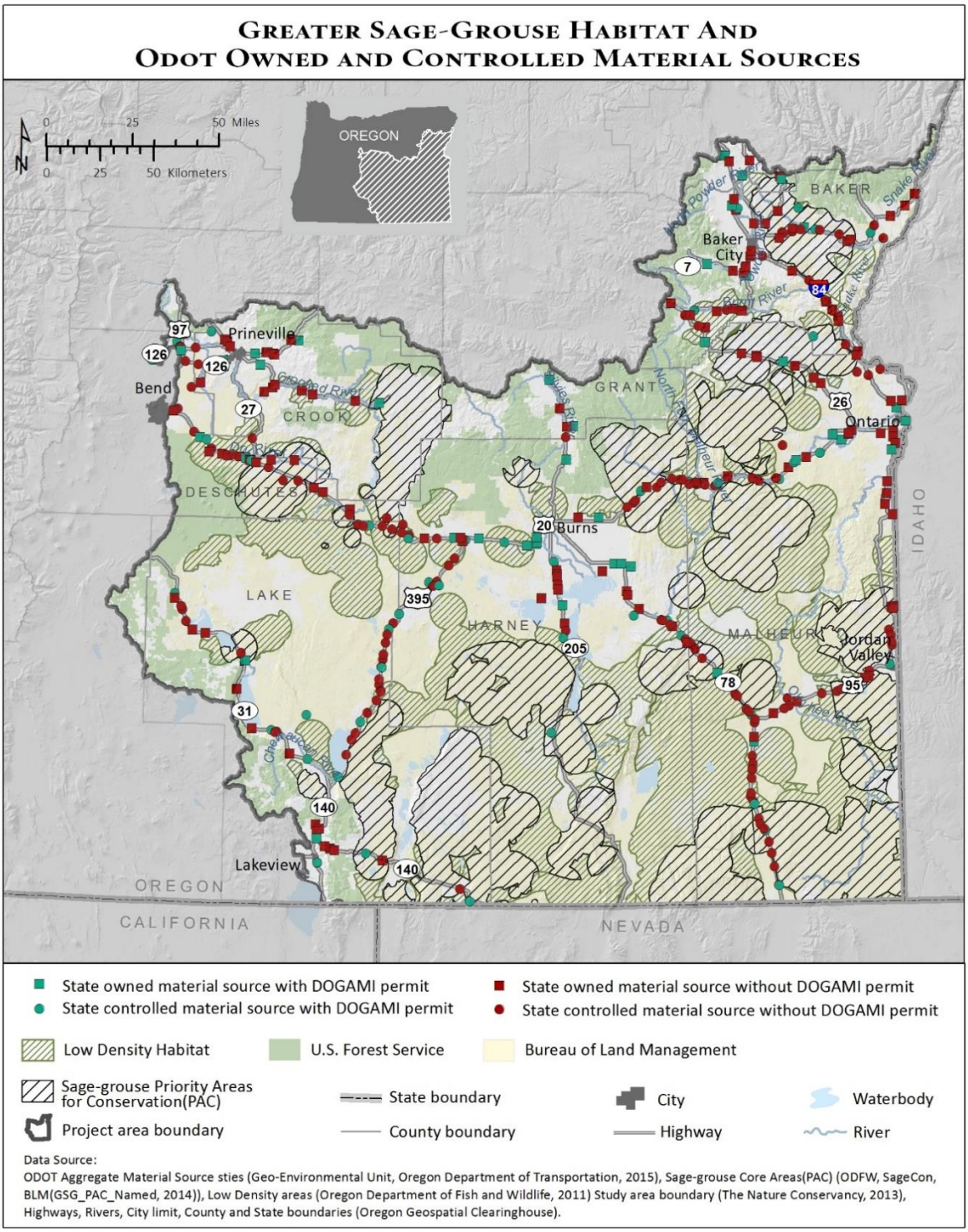

Figure IV-12. Greater sage-grouse habitat and ODOT-owned or -controlled material sources.

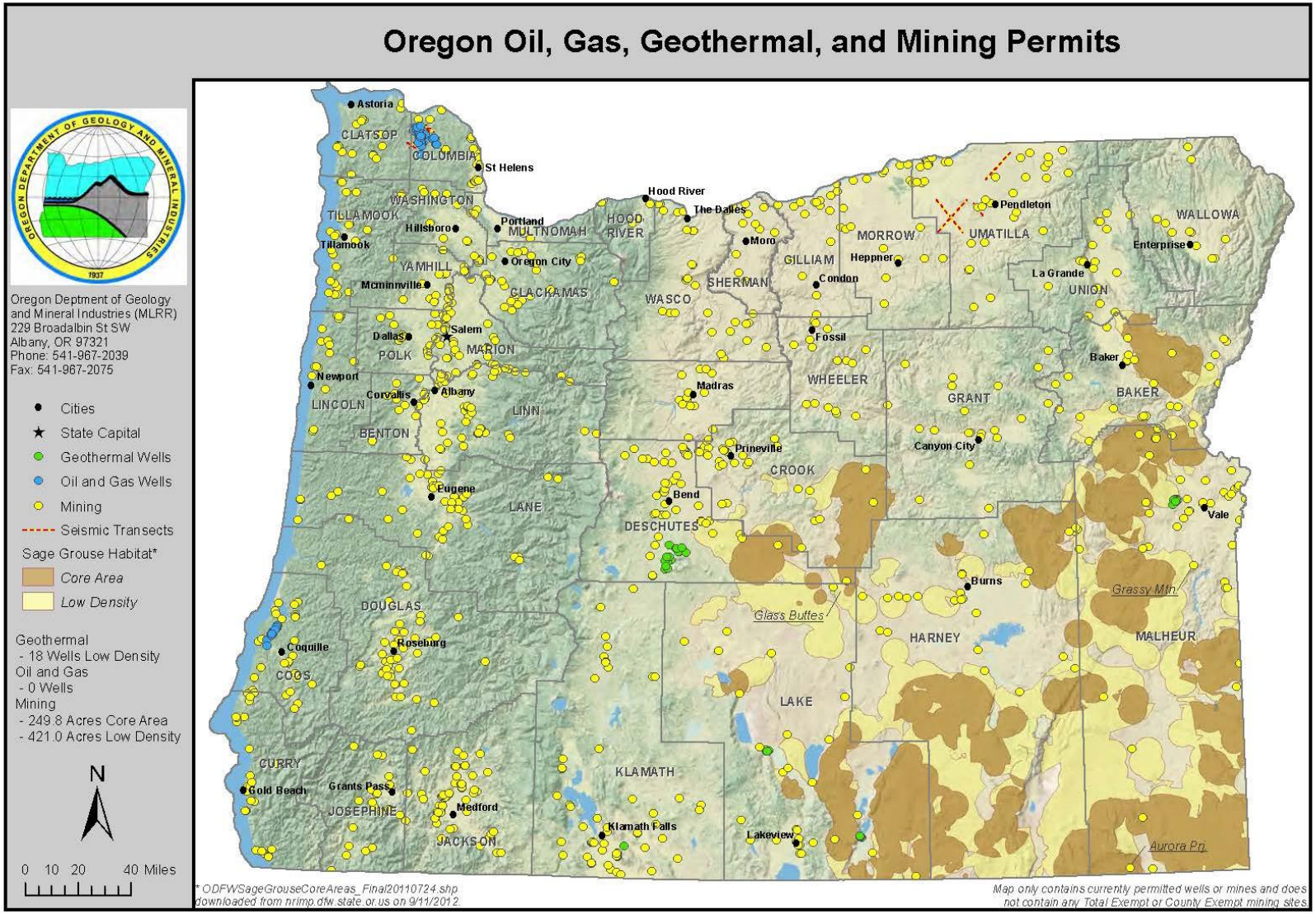

Figure IV-13. Oregon oil, gas, geothermal, and mining permits.

Local land-use approval for aggregate operations is also required. Aggregate is an identified and protected Goal 5 resource under Oregon's land-use planning system, so local land-use planning is typically the venue where potential conflicts with other uses or resources are considered (including other Goal 5 resources). Land-use approvals are governed by both State law and county ordinance, and aggregate operations are often addressed under conditional use permits. On rangelands, the primary focus of most land-use regulations is to minimize conflicts with ranching operations, but many counties also have regulations addressing wildlife conflicts, especially when designated as significant through Goal 5. County ordinances governing aggregate operations do not apply to BLM lands.[59] However, the BLM's recent RMP Amendment would close BLM lands within PACs to commercial aggregate development (BLM 2015a).

DOGAMI also regulates both hard rock and oil and gas mining. Hard rock mining using chemical techniques to separate ore is regulated closely by the State under a comprehensive permitting program that requires compliance with ODFW standards (OAR Chapter 632, Divisions 037-0010(28), 037-0060(7)(b), 037-0125).

Oil and gas exploration and development are regulated under ORS Chapter 520; associated implementing rules provide DOGAMI with relatively broad authority to regulate this activity to prevent adverse impacts to natural resources or neighboring property. DOGAMI permitting requirements are in addition to local land-use regulations, and county ordinances also often contain protections for wildlife resources. For fluid leases (oil and gas) on BLM land, project proponents are subject to a dual (state and federal) permitting process.

Finally, the recently adopted ODFW and LCDC rules (OAR-635-140-0000 and OAR 660-023-0115, respectively) address real or potential gaps in the state's approach to protecting against adverse development-based impacts to sage-grouse and their habitat, and the new regulatory mechanisms are applicable to the types of mining activities discussed in this subsection. As described in more detail in the above subsections (see, for example, Section IV.iv.f) as well as in Section II: Implementation and Coordination – Partnerships that Work and Appendices 17 and 19 of this Plan, the rules ensure that new mining proposals follow the sequential mitigation hierarchy of avoidance, minimization, and compensatory mitigation for actions proposed in significant sage-grouse habitat. The rules direct development activity away from PACs with a rigorous avoidance test (described in more detail in previous subsections) and limit the total amount of direct development impacts (existing and future) from sources (including but not limited to mining) to 3% or less of the acreage within any PAC and no more than a 1% increase

[59] *See* Soledad Canyon Case (CEMEX, Inc. v. County of Los Angeles) for descriptions of county limitations on federal lands.

over baseline conditions in any 10-year period.[60] Minimization and compensatory mitigation of adverse impacts are also required for all proposals subject to the rules, whether in PACs, low-density, or other occupied habitat. These particular provisions advance a mitigation standard that focuses on habitat functionality in order to ensure a net conservation benefit for sage-grouse and include enhanced protections for "Areas of High Population Richness" in PACs.

The new LCDC rules apply to development in significant sage-grouse habitat that exceeds either five acres in size, 50 feet in height, generates more than 50 vehicle trips per day, or produces noise greater than 70 dB. In addition to future proposed mining activity of this type, rules are applicable to the re-permitting of existing activities that are proposing new impacts beyond current conditions (OAR 660-023-0115[3][d]). For example, while resumption of aggregate mining activity within the footprint of an existing site (e.g., ODOT gravel pit) would not be subject to regulation under the avoidance, minimization, or compensatory mitigation provisions of the rules, an existing operation that is seeking a permit modification to expand its footprint, height, or noise levels would trigger the rules.

Under DOGAMI's state agency coordination program rules (OAR 632-001-0015) all of the agency's regulatory programs described above must comply with statewide land-use planning goals and rules adopted by LCDC. Existing and new state permitting requirements enforced by DOGAMI will ensure that most mining development will be consistent with LCDC and ODFW rules.[61] Where a proposed development does not meet DOGAMI's regulatory definition of "mining operations," the proposal may still trigger LCDC's rules through applicability at the county permitting level. In addition, the provisions of the new OARs will be relevant in BLM's consideration of future mining operations on federal lands, based on the applicability of state authorities during federal land decision-making.

Oregon's existing and recently revised regulatory approaches address threats posed by mining to sage-grouse and their habitats in Oregon. Based on the applicability of these state authorities as well as BLM's proposed mineral withdrawals, no-surface-occupancy, sage-grouse focal area designations, and other mining-related provisions in its RMP Amendment for Oregon (BLM 2015), future mining development in the state will be subject to a regulatory structure

[60] Valid existing rights under the General Mining Law of 1872 on federal lands and existing mining operations permitted by DOGAMI on all land ownerships are not subject to development limits in the event the development cap of 3% is reached within a PAC. However, all mining developments, including those associated with existing locatable mineral rights (regardless of whether extraction operations have commenced), will be counted when calculating the 3% and 1% thresholds established in OAR 660-023-0115 and OAR 635-140-0025.

[61] Because DOGAMI does not issue permits for mining activities that fail to meet the definition of mining operations in ORS 517.750 (e.g., small-scale mining operations—see FN 36 above), these mining activities currently will not trigger the new LCDC rule (OAR 660-023-0115). Also, while the new LCDC rule is not directly applicable to locatable mineral claims on BLM lands, the BLM is required to address a claimant's noncompliance with state regulations as a component of enforcement of 43 CFR 3809 regulations §5, §415, and §420, relating to adherence to federal and state laws to prevent "unnecessary or undue degradation of public lands."

focused on ensuring consistency with the protection and long-term conservation of sage-grouse.

g. Roads and Other Infrastructure

Roads (including paved highways, graded gravel roads, and two-track roads) have multiple impacts on sage-grouse and their habitat, including increased mortality from collision with vehicles, changes in behavior, loss and fragmentation of habitat, increases in predator impacts, spread of exotic species, and increased disturbance from human activities and access.

Additionally, sage-grouse may avoid areas because of noise from vehicular traffic (Lyon and Anderson 2003). Most anthropogenic noise is dominated by low frequencies, which can mask or distort bird vocalizations that are important for mating and are required for parent-offspring communication (Blickley and Patricelli 2012). Disturbance in the form of noise has also been documented to increase stress hormones in sage-grouse (as measured in corticosterone metabolites in fecal samples) (Blickley et al. 2012b). Leks impacted by noise have documented decreases in lek attendance (up to 73%), and intermittent road noise has been documented to be more harmful than continuous noise associated with natural gas drilling (Blickley et al. 2012a). Even light vehicular traffic (one to 12 vehicles per day) has substantially reduced nest initiation rates (Lyon and Anderson 2003). Consequently, current recommendations are to limit noise at the perimeter of leks during the breeding season to less than 10 decibels above ambient sound levels (BLM 2015a).

While major roads such as interstates, state highways, and well-maintained (e.g., paved) county roads have had past impacts and may pose some ongoing concern for sage-grouse conservation in Oregon, the greater road-related threat to sage-grouse in the future will stem from the increased density and expanded use of secondary roads (e.g., paved, aggregate, and/or natural surface) and user-created roads accessible to passenger and off-highway vehicles in sage-grouse habitat. As explained in the paragraphs above regarding specific impacts from roads (including noise), high road densities in PACs or other significant habitat may be undesirable from a biological perspective for a variety of reasons, but the concern is often more related to the volume of use on a given road (and the timing of that use with respect to the sage-grouse life cycle) than to the existence of a road in and of itself.

In addition to roads, the other types of infrastructure development are also relevant to the conservation of sage-grouse and their habitat; however the only other type identified in the COT Report as a concern for Oregon were communications towers, which are treated in this subsection. Infrastructure such as fencing is addressed separately in Section IV: Assessing and Addressing Threats to Sage-Grouse.

Current and potential development

The USFWS 2010 "warranted but precluded" finding and the COT Report both note a relatively low level of habitat fragmentation in the two rangewide management zones in Oregon, the Northern Great Basin and the Western Great Basin. Road density is low in these areas due to terrain and distance from population centers. The existing road network, by county, is documented on maps maintained by ODOT and is available online.[62]

Infrastructure associated with the Oregon State Transportation System is recognized as having contributed to sage-grouse habitat fragmentation. The majority of ODOT-managed transportation facilities in sage-grouse habitat are major highways and freeways with relatively high traffic noise (up to 90 decibels). Fragmentation impacts associated with ODOT-maintained roads is supported by research showing that sage-grouse generally do not prefer to occupy habitat near high-volume roads (Lyon and Anderson 2003; Connelly et al. 2004; Aldridge and Boyce 2007). Existing traffic, noise, and disturbance along these ODOT transportation corridors generally preclude sage-grouse presence within the existing highway right-of-way in Oregon. ODOT's road system has been in place for a significant time period, and adverse impacts to sage-grouse and their habitat occurred in the distant rather than the recent past. Over the course of the last decade, ODOT has been collecting data on collisions between wildlife and motor vehicles. During this period, no incidents of sage-grouse killed by vehicles along ODOT-maintained transportation routes have been recorded (ODOT, unpublished data).

The mileage of county roads—including all types (from primitive to fully improved)—has been declining in eastern Oregon. Some decreases in county road mileage, however, can be attributed to counties turning roads over to private ownership and may not necessarily indicate decreases in road surfaces or traffic. Table IV-8 presents the total county road mileage for Baker, Crook, and Harney Counties from 1998 to 2013 (ODOT 2014). These are the sage-grouse counties in Oregon where the COT Report indicated the most concern over habitat fragmentation.

More than 2,300 miles of roads capable of being accessed by passenger vehicles (maintenance levels 3, 4, and 5) are maintained by the BLM in sage-grouse habitat (BLM 2015b).[63] The traffic volume on these roads is difficult to estimate because traffic counters are not customarily installed in these locations. The degree to which secondary roads of this nature pose a threat to sage-grouse due to volume of use must therefore be interpreted in regional contexts. It can be inferred that secondary roads in close proximity to population centers (Bend, Baker City,

[62] http://www.oregon.gov/ODOT/TD/TDATA/Pages/gis/countymaps.aspx

[63] This value is likely an underestimate of the actual miles of secondary roads that may pose a threat to sage-grouse because (1) roads maintained privately or that fall under other jurisdictions have not been quantified; (2) high-clearance vehicles are common in eastern Oregon and have access to additional roads; and (3) there is no documented correlation between the BLM maintenance classification and traffic volumes.

Prineville) or highly traveled state and county roads have higher traffic rates than those in more remote regions of sage-grouse habitat.

Table IV-8. Total county road mileage for Baker and Crook Counties 1998–2013 (ODOT 2014).

County	1998	2003	2008	2013
Baker	942	909	904	905
Crook	522	515	482	471
Harney	812	811	805	805

Further, with the increased popularity of motorized recreation (i.e., four-wheeler or OHV use), secondary roads may be utilized more heavily than in the past, particularly those in close proximity to population centers, state- and county-maintained roads, or OHV recreation areas. This is evidenced by traffic counter data available from ODFW's Access and Habitat Program within the Baker PAC, which shows significant traffic on local roads during summer and fall, when sage-grouse use in that area is also high (e.g., as many as 80 or more vehicles per day, which exceeds the classification of "high traffic" in the 2012 Sage-Grouse Mitigation Framework). When combined with increased use levels, the location of some of these roads and OHV recreation areas presents a conservation concern, with the Baker PAC being one such area in particular. In addition, secondary roads on BLM or other lands often serve as a stem or launching point for unplanned, user-created routes. While further data on the level and location of these routes as well as the volume and timing of their use may be needed, the activity has been increasing, along with increases in the popularity of motorized recreation, and it can represent a concern for sage-grouse conservation (see Section IV.v.d).

Given the lack of new state and county road development in sage-grouse habitat, impacts from new road development on non-federal lands do not appear to be a significant concern. However, upgrades to roads that result in increased traffic rates and use of secondary roads and OHV areas must be considered.

With respect to other infrastructure, this subsection focuses on the one example cited by the COT Report: communication towers. In 2014, the Federal Communications Commission documented a total of 45 cell communication towers in Oregon PACs. This represents a relatively low level of communications infrastructure within sage-grouse habitat, and, with the combination of low demand and existing as well as new regulations (described below), minimal future increases in this infrastructure are anticipated in sage-grouse habitat. In recent years (2003–2013), the counties within Oregon's sage-grouse range reported few permits for additions to communication infrastructure, some of which involved replacement of existing infrastructure or co-locating of new infrastructure with existing towers (Table IV-9; Harney County et al. 2013). It is also important to consider the value communication towers provide as part of wildfire response and, when sited based on considerations for sage-grouse and other wildlife, how they may advance important conservation benefits with respect to this threat.

Table IV-9. New communication infrastructure in counties with sage-grouse habitat (2003–2013) (Source: Harney County et al. 2013).

County	New communication infrastructure projects	Details
Baker	None reported	
Crook	None reported	
Deschutes	10	Includes cell towers, microwave dishes, and shelters/foundations for communication/radio equipment; four were replacements of or colocation with existing infrastructure.
Harney	4	All were replacements of or colocation with existing infrastructure.
Lake	None reported	
Malheur	1	Telecomm facility received structural permit to locate new antennas equal to or less than existing heights.
Union	1	Microwave tower (located outside sage-grouse habitat).

Current and proposed regulations

New roads require land-use approval by county governments on agricultural-zoned lands (including rangelands), which make up the majority of non-federal land in sage-grouse habitat in Oregon. Such roads are considered "conflicting uses" and require review by county decision makers. Communication towers are regulated through the Oregon land-use system as utility facilities. Pursuant to ORS 215.275, siting of communication towers on lands zoned for exclusive farm use must consider several criteria, among which is the potential for colocation of new infrastructure along roads or adjacent to existing development.

In addition, the new LCDC and ODFW rules (OAR 660-023-0115 and 635-140-0025, respectively) apply to new road and communication tower development in significant sage-grouse habitat so long as (a) the road is proposed for purposes other than farm use as defined in ORS 215.203(2), and (b) the proposed road or communication tower exceeds either five acres in size, 50 feet in height, generates more than 50 vehicle trips per day, *or* produces noise greater than 70 dB. Proposed new roads and communication towers that fit the above criteria will be subject to the required mitigation hierarchy of avoidance, minimization, and compensatory mitigation, as described in previous subsections of Section IV: Assessing and Addressing Threats to Sage-Grouse and in the new rules themselves (see for example, Sections IV.iv.d or IV.iv.f, as well as Section II: Implementation and Coordination – Partnerships that Work and Appendices 17 and 19). Related avoidance tests, minimization, and net-conservation benefit mitigation standards will apply. In addition, aside from the mitigation hierarchy requirements, the rules' development limits and metering approach will limit development-based direct impacts to 3% or less within any PAC and no more than 1% increase beyond baseline conditions in any 10-year

period so as to ensure that important thresholds related to the bird's viability and use of these habitats are not crossed.

Within their applicable jurisdiction, Oregon's existing and recently updated land-use and mitigation rules address potential threats to sage-grouse conservation posed by road and communication tower development. With respect to federal land jurisdiction, the BLM's RMP Amendment for Oregon provides relevant direction for addressing concerns over secondary roads and unplanned, user-created routes on BLM lands, and future travel management planning.

h. Conservation Objectives and Actions (for all development)

The following is a compilation of conservation objectives and actions related to the suite of development-based threats and actions discussed in Sections IV.iv.a to IV.iv.e. The actions are compiled here for clarity and future tracking purposes and lumped into the general category of "Development" (DEV). The actions discussed below may not apply equally to each individual development type, but the individual threat subsections above contain more specific discussions of how each development action listed below applies to a given threat. Farm/ranch-related activities are not included in the development actions below.

The general objective for development is to steer it to areas outside of sage-grouse habitat whenever possible, and then toward areas where the least impact to sage-grouse populations may be expected with close attention paid to the importance of the habitat (i.e., in ascending order: other occupied habitat, low density, core areas). Specifically:

- Limit the level of direct development impacts (as defined by and using the methodologies adopted in OAR 660-023-0115) within PACs to less than 3% of the total individual PAC acreage, including current baseline developed areas.
- Meter the rate of increase in new direct development impacts (as defined by and using the methodologies adopted in OAR 660-023-0115) within PACs to 1% or less of the total individual PAC acreage in any 10-year period.
- Apply the mitigation hierarchy (avoid, minimize, and provide compensatory mitigation, per OAR-635-140-0025 and OAR 660-023-0115) to development impacts in significant sage-grouse habitat, doing so in a manner that achieves the above general objective of steering development to the least impactful areas and achieving net conservation benefit through mitigation.
- Achieve habitat and population objectives established in the 2011 Strategy (ODFW 2011) such that a minimum of 70% of the range of sage-grouse is sagebrush in advanced structural stages, with the remaining 30% of the range composed of potential habitat that could be restored to desirable sagebrush habitat states.

- Adaptively manage and adjust actions to address development-based impacts and/or other factors if population responses are negative, despite application of the above approach to limiting and metering development impacts in PACs.

i. Conservation Actions (for all development)

Action DEV-1: Implement a memorandum of understanding for coordination among permitting counties, federal agencies, the Oregon Department of Land Conservation and Development (DLCD), the Oregon Department of Energy (ODE), the Oregon Department of Geological and Mining Industries (DOGAMI), Department of State Lands (DSL), Oregon Parks and Recreation, Oregon Department of Transportation (ODOT), and all other land management or permitting agencies to site developments in accordance with ODFW's Sage-Grouse Mitigation Policy (OAR-635-140-0025) and the LCDC rule governing development in sage-grouse habitat (OAR 660-023-0115).

Action DEV-2: Regulate new development (as defined by and using the methodologies adopted in OAR 660-023-0115) within PACs to ensure that future development does not exceed 3% of the total PAC acreage, including current baseline developed areas, and that future development does not exceed the metering described in OAR 660-023-0126 (no more than 1% in any 10-year period) (see related Action **MON-3**.)

Action DEV-3: Halt or slow development activities (as allowable within federal and state regulations) if predetermined "hard" or "soft" sage-grouse population and/or habitat adaptive management triggers are reached—as described in BLM RMP Appendix D, "Adaptive Management Strategy in the BLM Proposed Resource Plan Amendment" (BLM 2015a). (See related Action **MON-1-1 and MON-5**.)

Action DEV-4: Apply ODFWs mitigation hierarchy, as described in OAR-635-140-0025, to new development impacts in significant sage-grouse habitat subject to state permitting or state jurisdiction on federal lands. Where development in sage-grouse habitat is permitted in accordance with the aforementioned rules, (1) ensure that projects minimize the extent to which sage-grouse are negatively impacted; and (2) require compensatory mitigation for direct and indirect impacts consistent with the standard defined in OAR-635-140-0025, such that a net conservation benefit for sage-grouse is achieved that replaces the lost functionality of the impacted habitat to a level capable of supporting greater sage-grouse numbers than the habitat that was impacted.

Action DEV-4-1 Per OAR-635-140-0025 and OAR 660-023-0115, require consultation (at minimum, a pre-application conference) with ODFW to assess the functionality of the habitat proposed to be impacted by developments.

Action DEV-4-2 Develop mitigation banking and/or advance mitigation opportunities, consistent with OAR 635-140-0025

Action DEV-4-3 Utilize Oregon's Greater Sage-Grouse Mitigation Manual and Habitat Quantification Tool (Appendix in progress) to calculate and implement compensatory mitigation requirements and opportunities (i.e., credits) consistently for all development projects that impact sage-grouse habitat. (See related Actions **MON-4** and **MON-7**.)

Action DEV-5: Identify and implement opportunities to reduce the risk of habitat loss due to development.

Action DEV-5-1 Implement mechanisms in coordination with county planning departments and/or DLCD to further limit the density of farm-use dwellings and associated out-buildings within 3.1 miles of leks.[64]

Action DEV-5-2 Require site planning to consolidate infrastructure associated with new developments.

Action DEV-5-3 Seek opportunities to acquire easements from willing landowners to eliminate future habitat conversion and development threats.

Action DEV-5-4 Do not relinquish public lands for the purpose of urban development in priority sage-grouse habitat.

Action DEV-6: Encourage private landowners to participate in long-term or permanent sagebrush habitat protection or enhancement programs.

Action DEV-6-1 Encourage private landowner participation in Candidate Conservation Agreements with Assurances (CCAAs) offered through county SWCDs. Once enrolled, landowners must agree to "maintain contiguous habitat by avoiding further fragmentation" and are required to maintain their land with no net loss in habitat quantity or quality.

Action DEV-6-1a Conduct outreach and education to promote private landowner enrollment in CCAAs.

Action DEV-6-2 Encourage private landowners to participate in conservation easements with restrictions that preclude further agricultural conversion, with particular focus on land within PAC habitat.

Action DEV-6-2a Promote the development of land trusts and encourage existing land trusts to expand service areas to eastern Oregon in order to accommodate conservation easements on lands in sage-grouse habitat.

Action DEV-6-3 Identify opportunities to transfer or exchange lands where such action involves willing landowners, would result in significant conservation benefits for sage grouse, and would support rural economic values.

[64] Dwelling density to be determined.

Action DEV-7: Identify areas where mining leases or surface occupancy is not compatible (or not compatible without stipulations) with maintaining functional sage-grouse habitat.

Action DEV-7-1 Consider options to limit future development of existing leases on county and state lands in incompatible areas (e.g., withdraw underperforming or underdeveloped leases, limit extensions of underdeveloped leases).

Action DEV-7-2 Where deemed necessary to limit disturbance to sage-grouse or their habitat, add relevant restrictions (e.g., timing and seasonality of operations) to existing state and federal leases through the state permitting process or a memorandum of understanding with the federal land manager.

Action DEV-8: Eliminate or minimize risk to sage-grouse by utilizing implementation recommendations and guidelines in the siting, construction, operation, and maintenance of new or existing infrastructure.

Action DEV-8-1 Develop conservation agreements with developers to ensure that implementation recommendations and guidelines for all activities associated with development activities will be implemented to minimize risk to sage-grouse (see Appendix 4. Implementation Recommendations and Guidelines).

Action DEV-8-2 Ensure state regulatory oversight exists to minimize impacts to sage-grouse habitat from all relevant types of mining operations.

Action DEV-9: Prioritize reclamation of all mines, including abandoned mines in PAC areas, with the aim of restoring areas disturbed by mining and associated facilities to healthy sagebrush ecosystems.[56]

Action DEV-9-1 Develop reclamation plans with a realistic timeline that incorporates the likelihood of multiple treatments to return disturbed areas to functional sage-grouse habitat.

Action DEV-9-2 Evaluate the need for restoration of previously reclaimed infrastructure sites. Prioritize areas in need of additional restoration efforts and identify potential funding sources, including mitigation credit/banking options.

Action DEV-9-3 Monitor reclamation activities to document habitat and sage-grouse response.

Action DEV-9-4 Evaluate and, where needed, develop improved state regulations and standards related to reclamation to reduce threats to sage-grouse.

Responsible Parties:
BLM, counties, DLCD, DOGAMI, DSL, ODFW, ODOE, and ODOT

v. Addressing Other Threats to Sage-Grouse

Beyond the habitat- and development-based threats discussed in in the Sections IV.iii and IV.iv above, other threats to sage-grouse in Oregon, such as direct impacts or loss or fragmentation of habitat, are associated primarily with anthropogenic influences. They include loss or potential loss of sagebrush habitats as a result of rangeland conversion to cultivated agriculture, unmanaged or improperly managed livestock grazing, recreational use, fences, and free-roaming equids. These threats are described on a rangewide scale in the 2010 USFWS "warranted but precluded" determination. The COT Report (in both the draft and final versions) provides information and analysis at the scale of management zones (two zones are partially located in Oregon). And, the 2011 Strategy (ODFW 2011) provides information and analysis relevant to these threats in the Oregon-specific context.

The following subsection briefly recaps information from these sources concerning each threat, describes relevant conservation objective(s), and then describes Oregon's existing as well as new conservation actions advanced by this Plan.

a. Direct Sagebrush Elimination

Nature and Extent of the Threat

The intentional removal or treatment of sagebrush (using prescribed fire, mechanical, and/or chemical tools to remove or alter the successional status of sagebrush ecosystems) contributes to habitat loss and fragmentation, which has been a primary factor in the decline of sage-grouse populations rangewide. Removal and manipulation of sagebrush may also increase the opportunities for the incursion of exotic annual grasses (Beck et al. 2012). However, sagebrush removal to create fire breaks may serve as an important tool in reducing the size of wildfires, and thus provide protection from habitat loss at a much larger scale than the sagebrush removed. In addition, some sagebrush treatments are designed to diversify the age structure of sagebrush plants and to enhance understory grasses and forbs and ultimately to restore plant vigor to benefit wildlife species, including the sage-grouse.

Sagebrush elimination occurred on a large scale historically in Oregon to enhance grazing capacity (e.g., the Vale Program, in which brush control spanned 500,000 acres) (Willis et al. 1993). More recently, sagebrush removal has slowed considerably, although it does still occur on both public and private lands. Careful consideration is required to determine situations in which sagebrush removal will provide a net benefit for sage-grouse rather than acting as a detriment.

Conservation Objective

Avoid sagebrush removal or manipulation in sage-grouse habitats, such that a minimum of 70% of the range of sage-grouse is maintained as sagebrush in advanced structural stages (sagebrush classes 3, 4, and 5), with the remaining 30% of the range composed of potential

habitat (areas of juniper encroachment, non-sagebrush shrubland, and grassland) that could be restored to desirable sagebrush habitat states to increase available sage-grouse habitat.

Conservation Actions

Intentional removal of sagebrush may be considered when relatively minor habitat losses are sustained while implementing other conservation measures, such as vegetation treatments, fuel breaks, or fuel reduction. All prescribed burns, chemical treatments, and mechanical fuel treatments within sagebrush habitats should have identified sage-grouse habitat objectives, and should consider existing sagebrush communities, site conditions, and site potential in treatment designs (Monsen 2005). This Action Plan recognizes that management of lands enrolled in CCAAs or under management by the BLM will employ the respective related guidance (CCAA Conservation Measures or BLM RMP) for proper sagebrush treatments and that treatments (per this guidance) will be designed with sage-grouse habitat enhancement goals in mind. (See related monitoring actions: **MON-2, MON-4, MON-5,** and **MON-7**).

Action SBE-1: Encourage landowners to enroll in habitat management assistance programs (e.g., CCAAs, SGI, and others) to ensure that technical expertise through ODFW, NRCS, SWCDs, and/or the OSU Extension Service is available to landowners prior to implementing vegetation treatments.

> **Action SBE-1-2:** Ensure that adequate funds and staff capacity are available for development and implementation of conservation measures identified in site-specific habitat management plans.

Action SBE-2: Strategically use chemical or mechanical treatments to remove sagebrush in areas where warranted with the highest potential to achieve treatment objectives, while minimizing the risk of annual-grass invasion and habitat fragmentation and loss (see Appendix 4 for additional implementation guidance related to spot treatments and the creation of mosaics of sagebrush density to benefit sage-grouse).

Action SBE-3: Avoid sagebrush conversion or maintenance of conversion projects on public lands for the sole purpose of increasing livestock forage (e.g., conversion to or maintenance of existing crested wheat seedings).

Action SBE-4: Balance the intent, position, and extent of fuel breaks with the direct habitat loss caused by such fire prevention measures (see **Action WF-1-6c** and associated **IRG-WF-1-6c**).

Responsible Parties:

BLM, DSL, SWCDs, private landowners

Success on the Ground: Prineville BLM District and Prescribed Burns

In the Prineville BLM District, prescribed burns were planned and implemented with the objectives of reducing juniper canopy coverage and reinvigorating sagebrush and understory grasses and forbs. These burns were conducted at higher-elevation sites with northerly aspects where soil temperature and moisture qualities (cool and moist) ensured that the sites would be resistant to annual-grass invasion and would be likely to restore to a healthy native plant community. In the 10 years since these burns were conducted, the areas continue to have reduced juniper canopy coverage, and the return of juniper has been slowed. Additionally, sagebrush canopy cover has returned to 5-20%, and summer brood-rearing forage has improved with increases in the herbaceous plant density and vigor.

b. Improper Grazing Management

Nature and Extent of threat

Appropriate livestock grazing regimes are compatible with sage-grouse habitat needs. For instance, strategic grazing at moderate levels can increase the vigor of perennial bunchgrasses and forbs, while strategic, grazing at more intense levels can be used as a tool to reduce invasive annual grasses in areas with high infestations. However, inappropriate livestock management can result in overuse of vegetation, with impacts that deteriorate seasonal sage-grouse habitats.[65] When improperly managed, livestock grazing can impact sage-grouse by reducing grass height below levels needed to shield nests from predators (Beck and Mitchell 2000), reducing forb abundance beyond levels needed for hens and chicks to meet nutritional requirements, damaging soil crusts in a manner that reduces vegetation diversity and contributes to annual-grass invasion, impacting the ecological integrity of riparian vegetation and other wetlands (Crawford et al. 2004), and directly trampling sagebrush at levels of concern for providing a winter food source and cover to sage-grouse. To ensure desirable vegetative trends and conditions, adaptive management is necessary to adjust the levels and season of livestock grazing to local conditions and to a forage supply that is always changing in response to varying growing conditions.

In addition, infrastructure related to grazing can have negative impacts to sage-grouse, particularly when improperly sited or designed. For example, fences (described in more detail in the subsections below) can contribute to sage-grouse collisions and mortality if located or designed improperly. Water developments and salting, while helpful in certain situations by moving livestock away from leks or other important sage-grouse sites, can, when properly implemented, cause livestock to concentrate in small areas and thus overly impact these sites. In addition, natural dispersion of water to meadows or riparian areas can be disrupted by water developments for livestock. Further, certain water sources for livestock may require design features to avoid sage-grouse entrapment and to reduce mosquito breeding areas and, consequently, the risk of West Nile virus.

[65] See 75 Fed. Reg 13910 and references therein

Livestock grazing occurs on approximately 14 million acres of BLM-managed allotments in Oregon. Within the four BLM districts located within sage-grouse occupied range, just over 1 million animal unit months (AUMs—the amount of forage required to sustain a cow and her calf for one month) are available through grazing permits and leases.[66] The BLM's 2010 grazing information is found in Table IV-10. In addition to BLM lands, the Oregon Department of State Lands (DSL) manages livestock grazing leases across approximately 630,000 acres of rangeland in Lake, Harney, and Malheur Counties, which can accommodate approximately 62,000 AUMs. The vast majority of these BLM and DSL leases are linked to ranch operations on surrounding private lands, which provide seasonal forage to the cattle that also graze on public lands.

Table IV-10. 2010 BLM grazing permits, leases, and associated animal unit months (AUMs) (Source: http://www.blm.gov/or/resources/rangelands/index.php).

BLM District	Section 3 Permits	Permit AUMs	Section 15 Leases	Lease AUMs
Burns	159	243,559	9	3,946
Lakeview	90	168,785	76	6,343
Prineville	122	85,430	284	32,351
Vale	382	462,514	75	2,977
Total	753	960,288	444	45,617

These figures merely demonstrate that grazing occurs across the extent of sage-grouse habitat in Oregon. However, grazing intensity and livestock management vary across this landscape. Where livestock are managed appropriately in response to environmental variables and grazing is moderate, this land use does not pose a threat to sage-grouse persistence. The extent to which *inappropriate* grazing may pose a threat to sage-grouse in Oregon is highly variable, depending on a number of factors, including, but not limited to, the ecological conditions of individual allotments (extent of invasive annual grass, resistance and resilience qualities); aspects of animal use (number of animals, season of use, and the pattern by which they utilize forage across an allotment); climate (drought versus high-moisture years); and individual operator factors (management practices, capacity for management, responsiveness to changing conditions).

Together with Oregon's national leadership related to CCAAs on private and state lands, as well as the CCA effort and BLM RMP Amendment provisions on federal lands, Oregon has an approach in place that addresses threats posed by livestock grazing to sage-grouse conservation. The "Conservation Actions" subsection below and the highlight box entitled

[66] http://www.blm.gov/or/resources/rangelands/index.php

"Success on the Ground: CCAAs and CCAs" provide more detail on Oregon's remarkable CCAA efforts.

Conservation Objective

Ensure that livestock grazing practices on public and private lands are compatible with sage-grouse habitat requirements (e.g., shrub cover, nesting cover) and allow for the continuation of rural economies that depend on livestock grazing and rural communities that provide habitat management and protective measures.

Important sage-grouse-related management objectives for livestock grazing include the following: (1) maintaining residual grass height that provides adequate shielding of nests from predators (Beck and Mitchell 2000) and reflects local ecological site potential; (2) maintaining forb abundance that is essential for hens and chicks to meet nutritional requirements; (3) avoiding impacts to soil crusts that can reduce vegetation diversity and contribute to annual-grass invasion; (4) maintaining the integrity of riparian vegetation and other wetlands (Crawford et al. 2004); and (5) avoiding the trampling of sagebrush that serves as a winter food source and provides cover to sage-grouse.

Conservation Actions

Recognizing that the State of Oregon has no authority to direct grazing management on private lands, the State relies upon landowners to voluntarily implement conservation actions through incentive-based programs (including CCAAs and SGI) associated with SWCDs, NRCS, the Oregon Watershed Enhancement Board, and others (see Section II: Implementation and Coordination – Partnerships that Work). This Action Plan encourages private landowners to enroll in voluntary conservation plans and apply actions related to livestock grazing. With CCAAs that cover all private lands across Oregon's sage-grouse counties in place, over 140 private landowners are making significant contributions to sage-grouse conservation through completed and draft site-specific plans. These commitments to CCAA-based conservation work cover over 460,000 acres of sage-grouse habitat on private land. In addition, over 140 landowners have signed letters of intent, staging their lands for enrollment in the programmatic CCAAs across over 1.4 million acres of additional private land sage-grouse habitat. For more information see "Success on the Ground: CCAAs and CCAs" below. Importantly, Oregon has secured substantial capacity to advance CCAA-related sage-grouse conservation benefits on private lands through NRCS RCPP and SGI funding, state investments through OWEB and other agencies (see Table II-1 and Table II-2), and private landowners as well as SWCD and NGO contributions. Development and implementation of site-specific CCAA management plans will result in sage-grouse habitat and rangeland health benefits backed by durable commitments for decades to come.

Grazing management on state lands will ensure consistency with sage-grouse conservation through enrollment by DSL of its state lands in a CCAA as well as through the Governor's Executive Order, which directs state agencies to implement actions in accordance with this Action Plan. In addition to the overview in Section II: Implementation and Coordination –

Partnerships that Work and Table II-2, implementation of identified conservation measures under the DSL CCAA will begin in the 2015 to 2017 biennium and include actions such as invasive annual grass and juniper treatment, fence marking, and escape ramp construction. These measures will become part of DSL's range improvement projects funded lease revenues collected off the land over time. DSL has been conducting additional field-level habitat assessments in conjunction with its grazing lease administration work. The USFWS has already approved 25% of the acreage enrolled in sage grouse habitat assessments under the CCAA before signing and issuing an ESA take permit. As additional increments are completed and approved, the permit will be commensurately increased. Oregon DSL and the USFWS signed and issued the final CCAA on September 18, 2015. Full completion of assessments and approvals are expected within three years.

On federal lands, grazing management is guided by the recently revised Resource Management Plan Amendment for Oregon (BLM 2015a), other regulations specific to federal lands, and CCAs developed for permittees with BLM allotments.

Conservation actions set forth below include (1) managing livestock grazing to provide functional habitat that supports sage-grouse needs and restoring areas within habitat that do not currently do so; (2) adapting livestock practices and infrastructure to reduce threats to sage-grouse; and (3) using livestock grazing as a tool to manage threats, such as wildfire, invasive grass, and reduced plant vigor. (See related monitoring actions; **MON-2, MON-4, MON-5,** and **MON-7**).

Action GRZ-1: Encourage landowners to enroll in habitat management assistance programs (e.g., CCAAs, SGI, and others) to ensure that technical expertise through ODFW, NRCS, SWCDs, and/or the OSU Extension Service is available to landowners to develop grazing management plans that promote sage-grouse habitat and sustainable grazing operations.

> **Action GRZ-1-2:** Direct funding to ensure that adequate funds and staff capacity are available for development and implementation of conservation measures identified in site-specific habitat management plans.

Action GRZ-2: Implement grazing management plans that contribute to the health of sage-grouse habitat. Grazing management conservation measures have been developed for the Greater Sage-Grouse Programmatic CCAAs for private and state rangelands, as well as CCA for BLM public land. That list is represented in part below. However, additional conservation measures may be required for specific site conditions.

> **Action GRZ-2-1** Inventory private lands and allotments to determine the current state of plant communities and, where available, use available ecological site descriptions to set realistic habitat goals. Utilize appropriate state and transition models (see Section III: An Ecological Approach – Healthy Landscapes and Wildlife Through Strategic Efforts and

Appendix 8, “Site-Specific Management”) to develop grazing management strategies that will transition inventoried habitat from less degraded states to more desirable states or will maintain the latter.

Action GRZ-2-2 Prioritize inventories and processing of grazing permits within allotments that have the best opportunities for conserving, enhancing, or restoring sage-grouse habitat within PAC areas. Once inventories are completed, prioritize grazing allotments adjacent to PAC areas.

Action GRZ-2-3 On BLM land, when incorporating desired habitat indicators as described in Table 2-4 of BLM RMP (BLM 2015a) and conditions consistent with the Sage-Grouse Habitat Assessment Framework (HAF) (Stiver et al. 2015) into grazing management plans, ensure that any limitations of these approaches and potential benefits from the use of state-and-transition models are addressed. In particular, recognize that the conditions stipulated in the HAF may need to be adjusted for regional/local conditions and may not be realistic objectives given the initial vegetation state or underlying ecological site characteristics (e.g., soil and moisture regimes). Objectives must also be adjusted for factors unrelated to grazing (e.g., wildfire, drought) as well as for inter-annual variability.

Action GRZ-2-4 Follow recommended grazing guidelines to meet seasonal sage-grouse habitat requirements. Consider (1) season or timing of use; (2) numbers of livestock, including temporary nonuse or livestock removal; (3) distribution of livestock use; (4) intensity of use; and (5) type of livestock.

Action GRZ-2-5 Adjust grazing to respond to environmental conditions, such as wildfire, catastrophic flooding, or drought, in order to prevent overuse of vegetation and to facilitate habitat recovery. Grazing adjustments may include deferment, rotation, rest, seasonal use, timing, intensity, and so forth.

Action GRZ-2-6 Manage grazing in riparian areas to ensure bank stability, survival of deep-rooted riparian vegetation, floodplain connectivity, and stream functionality.

Action GRZ-2-7 Monitor grazed lands upon which conservation measures are implemented, and adaptively manage to achieve positive trends and desirable states for sage-grouse.

Action GRZ-2-7a Assess grazing impacts based on the portion of the pasture/allotment known to be sage-grouse habitat rather than on “average use” throughout the entire pasture/allotment.

Action GRZ-2-7b When monitoring demonstrates that grazing has contributed to forage-use levels that are detrimental to habitat quality, make timely adjustments to minimize the impact to sage-grouse.

Success on the Ground: CCAAs and CCAs

In May 2014, the Harney County Soil and Water Conservation District, in coordination with the USFWS, entered into a Greater Sage-Grouse Programmatic Candidate Conservation Agreement with Assurances (CCAA), covering over 1 million acres of private rangelands in Harney County. In March 2015, participating SWCDs and the USFWS entered into five additional CCAAs with the Baker Valley, Crook, Grant, Lakeview, and Malheur Soil and Water Conservation Districts covering the remaining private lands in Oregon's sage-grouse habitat. Collectively, these agreements could enroll more than 2.3 million acres of sage-grouse habitat spanning eight Oregon counties in voluntary conservation commitments. Enrollment in the CCAAs and the development and implementation of individual management plans across Oregon's sage-grouse counties is ongoing.

Through CCAA enrollment, landowners voluntarily agree to manage their lands to remove or reduce threats to sage-grouse, including specific conservation measures over the 30 year agreement term. In return, landowners receive assurances from the USFWS against additional regulatory requirements, conservation measures, or resource restrictions on the associated land should the species ever be listed under the ESA. The CCAAs identify conservation measures to be included in site-specific plans that protect and improve habitat, address threats from livestock operations to sage-grouse, as well as improve forage and rangeland health on private land. Additional conservation measures are implemented per site-specific assessments.

The private lands CCAAs have been supported by the Oregon Cattlemen's Association and individual livestock operators. As of the writing of this Plan, over 140 landowners had signed agreements or letters of intent to enroll in the CCAAs, totaling more than 1.5 million acres of private land in Oregon's sage-grouse habitat. In addition, the Oregon Department of State Lands (DSL) has developed a CCAA to address grazing on state public lands (633,000 acres).

Also, a Programmatic Candidate Conservation Agreement (CCA) for public lands was completed in May 2013 between the USFWS, BLM, and the Oregon Cattlemen's Association. The goal of this programmatic CCA is to reduce or eliminate negative impacts of rangeland management practices to sage-grouse and to maintain and support practices that benefit sage-grouse. It accomplishes this by providing a framework for livestock grazing so permittees can voluntarily implement conservation measures beneficial for sage-grouse. Under the programmatic CCA, permittees may request an allotment CCA to identify specific threats to sage-grouse on the allotment and implement appropriate conservation measures. One allotment CCA is complete, comprising 2,527 acres of PAC habitat (PPH) and 19,972 acres of general sage-grouse habitat (PGH). To date, in the Burns BLM District, 11 permittees on 20 allotments have submitted written requests for allotment CCAs, and 44 permittees have verbally requested CCAs for a total of 519,634 acres of PPH and 725,639 acres of PGH to potentially be enrolled in allotment CCAs. In the Lakeview BLM District, one allotment CCA is complete, with two additional CCAs in draft form. Additional recruitment for permittee participation in the Lakeview District is scheduled to begin in January 2015.

In addition to the CCAAs and CCAs, it should be noted that, since 2010, grazing management on 20 BLM allotments in Oregon was modified to benefit 429,766 acres of sage-grouse habitat.

Action GRZ-2-7c Conduct adjustments to grazing management in accordance with regulations of the responsible land management agency.

Action GRZ-2-8 Where practicable, coordinate grazing management strategies across public and private lands so operations with deeded and BLM allotments can be planned as single units.

Action GRZ-3: In consultation with permittees and/or private landowners, modify infrastructure to minimize impacts to sage-grouse.

Action GRZ-3-1 Reduce physical disturbance to sage-grouse leks from livestock by placing salt, water, or mineral supplements beyond 0.6 miles on private lands, consistent with CCAA specifications (Harney SWCD and USFWS 2014) and 1.2 miles from occupied and pending leks on BLM lands, consistent with BLM RMP (BLM 2015a).

Action GRZ-3-2 Assess water developments for livestock and modify features according to Implementation Recommendations and Guidelines (Appendix 4) to minimize threats to sage-grouse.

Action GRZ-3-3 Where necessary, develop new water sources for livestock in order to reduce the impact to riparian, wetland, playas, and wet meadow areas important to sage-grouse.

Action GRZ-3-4 Use fencing where helpful in excluding livestock to promote trends toward proper functioning condition of springs, seeps, wet meadows, and/or riparian areas. Engage other techniques if they are equally effective in promoting such trends. Install antistrike markers on wetland fences to reduce sage-grouse collisions (see Section IV.v.e below for more detail).

Action GRZ-3-5 Assess salting locations and alter the placement of salt to improve livestock distribution to the benefit of sage-grouse habitat.

Action GRZ-3-6 Conduct range management activities using Implementation Recommendations and Guidelines to avoid disruption to lekking and nesting behaviors (see Appendix 4).

Action GRZ-3-7 When practical, avoid supplemental winter feeding of livestock in PACs and low-density habitat, unless it is part of a plan to improve ecological health or create a mosaic of habitat in dense sagebrush stands, or is required for emergency care of livestock.

Action GRZ-3-7a Develop grazing management plans that ensure that supplemental feeding is designed to minimize adverse impacts to sage-grouse.

Action GRZ-3-8 Design and locate range management infrastructure according to Implementation Recommendations and Guidelines (Appendix 4) so that there is a neutral effect or benefit to sage-grouse.

Action GRZ-3-9 Remove predator (corvid, coyote, raptor) attractants; remove and/or bury dead livestock.

Action GRZ-4: Develop and implement invasive plant management plans to prioritize areas for prevention, restoration, and containment of invasive annual grasses (see Section IV.iii.b and related conservation actions **IAG-1** to **IAG-8**).

Action GRZ-5: Minimize direct impacts (mortality) and indirect impacts (reduction of forage) to sage-grouse when applying insecticides within sage-grouse habitat.

Action GRZ-5-1 Consult with SWCDs, Oregon Department of Agriculture (ODA), and/or the Animal and Plant Health Inspection Service to determine the appropriate application of insecticides (products, timing, methods) to avoid harming sage-grouse.

Success on the Ground: Burns Paiute Tribe Mitigation

In 2000, the Burns Paiute Tribe acquired more than 8,000 acres of meadow, wetland, and sagebrush-steppe habitats along the Malheur River. The tribe has implemented mitigation projects to address multiple goals for fish, wildlife, and tribal members. Many of their actions directly benefit sage-grouse, including restoring wetlands; removing unneeded fencing; controlling weeds; planting native sagebrush-steppe species such as bitterbrush, Idaho fescue, and bluebunch wheatgrass; and modifying grazing regimes.

Cattle grazing intensity, frequency, and duration were reduced, and sage-steppe habitats and riparian areas were protected through fences and livestock management. The tribe grazes cattle on BLM allotments on a three-year rest rotation and on a state allotment every other year, to allow native perennial grasses to recover between grazing periods. Through proper management, livestock grazing can benefit sage-grouse and other wildlife by creating a mosaic of habitat patches that sage-grouse can use through all life stages. Through the combination of weed and juniper removal, native plantings, and livestock management, the tribe has restored hundreds of acres of sagebrush-steppe, meadows, and wetlands, benefiting the tribe, the sage-grouse, and the many other species that rely on these habitats.

Action GRZ-6: Support infrastructure, resources, and research that will contribute to rangeland health.

Action GRZ-6-1 Provide educational opportunities for permitees and private landowners to learn about sage-grouse habitat requirements and conservation measures they can implement to improve rangeland conditions for livestock and sage-grouse.

Action GRZ-6-2 Advance additional funding and capacity support for USDA Burns Agricultural Research Station and related institutional research efforts related to sage-grouse habitat health and rangeland management.

Action GRZ-6-3 Create “grass banks” or reserve forage areas as alternative grazing opportunities to provide rest for overutilized rangelands or allotments, or to be used during

drought conditions, post-fire, or after restoration work. Do so in a manner compatible with livestock operations locally.

Action GRZ-6-3 Create new and incorporate existing incentive-based programs to develop/improve important seasonal habitat (lek, nesting, brood-rearing, wintering).

Action GRZ-6-5 Assist Local Implementation Teams (LITs) in developing a process to evaluate management options and set priorities for funding habitat improvement projects.

Action GRZ-6-6 Identify opportunities to compensate landowners for the cost of implementing conservation measures and facilitating practices to benefit sage-grouse and their habitat.

Responsible Parties:
BLM, SWCDs, DSL, NRCS, private landowners, LITs

c. Agricultural Conversion

Nature and Extent of the Threat
Agricultural conversion is typically defined as the conversion of sagebrush habitats to tilled agricultural crops or to reseeded domestic grass pastures, resulting in habitat loss and fragmentation. In the northern half of eastern Oregon, large areas of sagebrush-steppe habitat were converted to agricultural lands prior to the 1950s (Wisdom et al. 2002). Fragmentation or conversion of habitat was identified in the 2010 USFWS finding as one of the threats to the sage-grouse across its range, and the COT Report identifies this threat as localized rather than widespread for the management areas relevant to Oregon. Specific to Oregon, most agricultural conversion occurred in the late 1800s to early 1900s, reaching a threshold in the mid-1950s. It has remained relatively unchanged since that time. However, the number of irrigated acres has increased slightly in some areas since the 1950s.

Sage-grouse are known to forage in alfalfa fields in some parts of the species' range (see review by Knick et al. 2011), and irrigated alfalfa fields could be an important element of brood rearing in some habitats, especially in areas where native forbs and moist meadows have been depleted or degraded. On the other hand, although sage-grouse will occasionally use agricultural lands as late summer and late brood-rearing habitat, row crops and dryland cereal grains are generally not beneficial habitat (Swenson et al. 1987; Blus et al. 1989). Furthermore, flood-irrigated fields pose the risk of providing mosquito breeding areas. The largest suspected die-off of sage-grouse due to West Nile virus occurred in a flood-irrigated alfalfa field near Burns Junction, Oregon.

The SageCon planning effort modeled the potential for tillage on current rangelands within the extent of sage-grouse habitat in Oregon. Presently untilled private land areas with soil data available were included in this analysis. The resulting model covered most of Baker, Lake, and

Harney Counties, as well as portions of Deschutes and Crook Counties (Figure IV-14). Within the modeled locations, approximately 3.5 million acres of private land were identified to have the potential to be tilled, but the vast majority of these acreages have low (<25% probability) tillage potential. Approximately 655,000 acres had moderately-high-to-high potential for tillage (>50% probability). Within PAC sage-grouse habitat, approximately 48% of currently untilled private land had soil data available to assess tillage potential (equivalent to approximately 707,000 acres). Within that area, approximately 49,000 acres (7%) had moderately-high-to-high potential for tillage, with the remaining 658,000 acres (93%) having less than 50% probability of tillage.

Though the State has not experienced and is not expected to experience further large-scale growth in cultivated agriculture within sage-grouse habitat, conversion of sagebrush to pivots and crested wheatgrass continues to occur in some areas on private (pivots and crested wheat) and public (crested wheat) land. In most cases, water availability limits the potential for future agricultural conversion. However, crested wheat conversions do not require irrigation and thus can occur without regulation on private land. The Oregon Water Resources Department (OWRD) requires a state permit for any new surface- or ground-water use for irrigation. Under OWRD rules, new water rights are not available in most areas of sage-grouse habitat. Conversion of sagebrush to agriculture would depend on either new water storage or water conservation measures (for irrigated crops) and is also influenced by current agricultural commodity prices.

Oregon's land-use program and Goal 5 rule do not regulate agricultural development. The new LCDC rule (OAR 660-023-0115) also exempts farm uses including the granting of new water right permits by the OWRD. That said, pursuant to OAR 660-023-0115, OWRD must report the proposed water right to DLCD, along with an estimate of the direct impact of the development on sage-grouse habitat. DLCD will track new development in a central registry pursuant to OAR 660-023-0115 and the Governor's Executive Order that will include new agricultural development. This information will be reported to the statewide coordinating council (see Section II.iii). As part of this effort, the coordinating council, in connection with the SageCon partnership, will evaluate cultivated agriculture thresholds within PACs that may trigger additional new measures to control agricultural expansions in sage-grouse habitat. That said, given the low level of agricultural expansion, water availability, and combination of Oregon's strategic approach to conservation with this Plan's conservation actions, Oregon is posed to ensure potential threats from agricultural conversion do not impede short- or long-term conservation of sage-grouse and its habitat in the State.

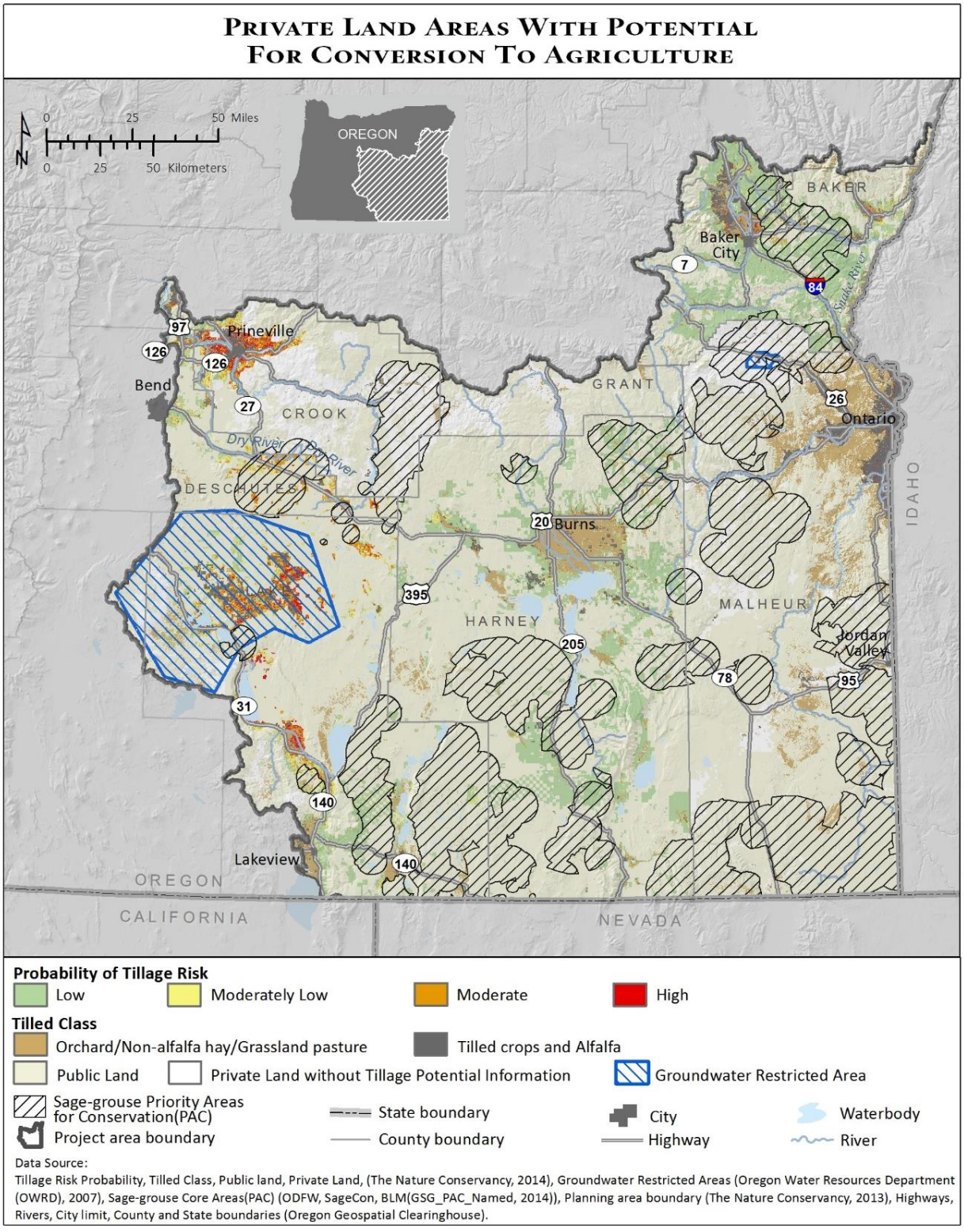

Figure IV-14. Tillage potential for the SageCon planning area.

Conservation Objective

Minimize further loss of sagebrush habitat and prioritize restoration. Avoid agricultural conversion of sagebrush that renders habitat unusable by sage-grouse and maintain a minimum of 70% of the range of the sage-grouse as sagebrush in advanced structural stages with the remaining 30% of the range composed of potential habitat that could be restored to desirable sagebrush habitat states.

Conservation Actions

Incentives to encourage private landowners to preserve intact sagebrush habitat are key to minimizing the impact of agricultural conversion on sage-grouse. Working lands conservation easements and CCAAs are tools available to ensure ongoing habitat protections. Programs through the NRCS, ODFW, and SWCDs are available to assist private landowners in increasing the habitat potential of agricultural lands and provide guidance on how to reduce the risk of agricultural practices to sage-grouse. (See related monitoring actions: **MON-2**, **MON-3**, and **MON-5**).

Action AGC-1 Encourage private landowners to participate in long-term or permanent sagebrush habitat protection and/or enhancement programs.

Action AGC-1-1 Encourage private landowner participation in CCAAs offered through county SWCDs. Once enrolled, as part of receiving assurances related to ESA liability protection, these agreements ensure that landowners "maintain contiguous habitat by avoiding further fragmentation" and manage their land with no net loss in habitat quantity or quality.

Action AGC-1-1a Conduct outreach and education to promote private landowner enrollment in CCAAs.

Action AGC-1-1-b Ensure that technical expertise through SWCDs and the USFWS is available to develop and implement site-specific plans designed to enhance habitat quality or quantity on private lands enrolled in CCAAs.

Action AGC-1-2 Encourage private landowner participation in working lands conservation easements that protect their ranching interests and preclude additional agricultural conversion/tillage of sagebrush habitat, with particular focus on land within PAC habitat.

Action AGC-1-3 Encourage private landowner participation in cost-share habitat improvement programs (Farm Bill, Crop Reserve Program, Sage-Grouse Initiative) offered by the NRCS, ODFW, and SWCDs, particularly those with land ownership within PAC habitat.

Action AGC-1-4 Where lands are at risk of conversion to non-sagebrush habitat (through sale, development, generational change, etc.), identify opportunities to compensate, incentivize, and/or transfer lands from willing property owners to conservation-focused land management organizations, agencies, or private owners/entities in order to ensure

that lands will remain as functioning sage-brush habitat, with particular focus on land within PACs.

Action AGC-2: Review and, where warranted, revise government programs that incentivize sagebrush elimination in order to curtail this practice outside the context of conservation-based efforts.

Action AGC-2-1 Discourage the use of Farm Bill policies and commodity programs that facilitate ongoing conversion of native habitats to marginal cropland.

Action AGC-3: Develop new policies that reduce the potential for agriculture conversion from sagebrush habitats.

Action AGC-3-1 Continue and expand incentive programs that support conservation of sagebrush habitat on private lands

Action AGC-3-2 Develop and/or enforce state restrictions on agricultural conversion of State-owned lands.

Action AGC-3-3 Work with counties and the State to restrict or reduce agricultural conversion through planning and zoning efforts.

Action AGC-4: Where sagebrush manipulation does occur, prioritize avoidance of agricultural conversion of sagebrush in certain areas and manners (see Appendix 4, "Implementation Recommendations and Guidelines").

Action AGC-4-1 Avoid sagebrush removal or manipulation in sage-grouse breeding or wintering habitats.

Action AGC-4-2 Avoid conversion of native rangeland to monotypic perennial grass seedings, cropland, and/or irrigated pasture.

Action AGC-4-3 For lands enrolled in CCAAs, per CCAA Conservation Measure 1 (Harney SWCD and USFWS 2014) mitigate internally for any loss of habitat quality or quantity in sage-grouse habitat (short-term losses related to long-term conservation gains excluded).

Action AGC-4-3 Evaluate the extent to which vegetation restoration within previously converted agricultural lands serves as suitable habitat.

Responsible Parties:
DLCD, private landowners, SWCDs, NRCS, DSL, ODFW, OWRD, BLM, ODA

d. Recreational Uses

Nature and Extent of the Threat
Recreational activities in sagebrush habitats range from hiking, camping, and hunting, to lek viewing and OHV use. Hunting in particular is covered in a separate subsection below (see

Section IV.vi.f). The impacts of other types of recreational activities on sage-grouse habitat have been poorly documented. However, excessive use within sage-grouse habitat can result in habitat loss and fragmentation (e.g., creation of off-road trails) as well as both direct and indirect disturbance to the birds (e.g., repeated disturbance to leks for viewing). Repeated disturbance and harassment can negatively impact sage-grouse by disrupting breeding activities (Call 1979). In addition, as noted above in Section IV.iv.g, secondary roads and off-trail recreation by OHV users can fragment habitat and create corridors for the spread of exotic plant species (Knick et al. 2011). Although improper OHV use is identified as a potential threat to sage-grouse habitats in Oregon (ODFW 2011), there have been no specific published studies to date of OHV effects on sage-grouse[67] (ODFW 2011; Knick et al. 2011). Adverse effects on sage-grouse have therefore been inferred from studies of physical and behavioral effects of OHV use and similar activities[68] in sagebrush and other habitats.

The physical damage caused by OHVs has been well documented in a variety of habitats, including sagebrush-steppe and deserts (e.g., Webb and Wilshire 1983; Stokowski and LaPointe 2000; Ouren et al. 2007; Knick et al. 2011). Long-term effects of OHV travel include compaction and consequent decreased water infiltration, creation of deep ruts and gullies in high-use areas, and changes in drainage patterns. Documented effects to vegetation include loss of plant cover followed by failure of seed germination as well as introduction of invasive weeds. OHV use has also resulted in decreased insect populations upon which sage-grouse chicks depend, increased dust, and habitat fragmentation.

Depending on the location, intensity, and season of use, sage-grouse behavior may be disrupted to the extent of avoiding areas where OHV use occurs in occupied sagebrush habitat. Sage-grouse could be adversely affected if OHV use took place at or near breeding or nesting sites during the spring and early summer (ODFW 2011). Intense OHV use could cause hens to abandon nests. In addition, sage-grouse on winter range habitat could be disturbed by OHVs or snowmobiles. The presence of OHVs and people may also attract and/or subsidize predators of sage-grouse nests and young such as common ravens (Knick et al. 2011).

In Oregon, OHV use was specifically identified as a threat to greater sage-grouse in portions of the BLM Prineville and Vale Districts (ODFW 2011). The Virtue Flat OHV area in Baker County offers more than 5,000 acres of trails open to off-highway motorized sports year-round in the Vale BLM District. Some portions of this OHV area are adjacent to sage-grouse leks. Each year, the district uses state OHV/ATV funds to hire personnel to enforce seasonal closures for sage-grouse during the lekking season. In addition, the Baker County sheriff's office has patrolled to help enforce closures and verify that users have proper recreation tags. The fiscal resources to monitor the Virtue Flat OHV area have been consistent, and every attempt is made to ensure

[67] 75 Fed. Reg. 13910 – 14014 (March 23, 2010).
[68] Ibid.

that personnel are hired and trained prior to the lekking season, when enforcement is most critical. Nonetheless, the Baker population has continued to experience population declines.

The Millican Valley OHV area in Deschutes and Crook Counties consists of 255 miles of trails and eight staging areas. Located in the Prineville BLM District, portions of this OHV area have seasonal use restrictions to minimize disturbance to sage-grouse during winter and lekking seasons. In particular, the South Millican trail system is closed from December 1 to July 30, and use is restricted to designated trails to minimize cross-country damage. In addition to OHV disturbance, lek viewing in this area may have contributed to lek abandonment. Two leks that were identified to the public for viewing purposes near the populous Bend area subsequently experienced declines in attendance and ultimately abandonment.

Ongoing concern related to the need to better regulate OHV use resulted in the issuance of Executive Order 11644.[69] This executive order requires public land management agencies to develop regulations and designate areas where OHV use is and is not permitted. Executive Order 11644 was amended to exclude some emergency and national defense uses from regulation by Executive Order 11989.[70] The BLM (2012) issued Instruction Memorandum (IM) 2012-043, designed to provide additional, interim protections of sage-grouse. This instruction memorandum specifically addresses many types of development, including ongoing and proposed travel management authorizations and activities. For ongoing travel activities, it requires evaluation of existing use and the effects on sage-grouse and, where needed, implementation of seasonal travel restrictions, closure, and reclamation of unauthorized travel routes, as well as limitation and enforcement of trail use to existing trails/roads and seasons. For proposed authorizations and activities, the memorandum limits construction to existing routes (unless rerouting reduces impacts to sage-grouse), restricts new construction to minimum standards, and prohibits construction on existing routes that would change the route category or enhance capacity.

The BLM's RMP Amendment for Oregon establishes objectives to manage OHV use in order to achieve sage-grouse conservation by taking actions that create neutral or positive sage-grouse responses. This includes reducing existing disturbance by evaluating or modifying OHV designated areas and routes so as to minimize impacts (see Table 2-2, BLM RMP FEIS [2015]). The BLM proposes to achieve these objectives through the BLM district-level application of minimization criteria as well as planning elements for BLM-administered roads, including direction to: avoid designating roads or trails with certain use-levels within 1.0 mile of occupied or pending leks, consider seasonal restrictions for routes that are already closer than this 1.0 mile threshold, and advance rerouting or closure of routes that are shown to be associated with negative impacts on sage grouse population trends (see Table 2-3, BLM RMP FEIS [2015]).

[69] 37 Fed. Reg. 2877 (Feb. 8, 1972)
[70] 42 FR 26959 (May 24, 1977)

The BLM's application of these measures and planning elements would occur during future travel management planning at the implementation-level. At this level, actions on-the-ground would be implemented through data collection; route evaluation for purpose, need, and conflicts; selection for closure, rerouting, or other individual route designation; and other implementation actions. At that phase, timelines for completion of travel planning would be established and updated annually with public outreach and engagement of the State and other interested stakeholders. In the meantime, roads, trails, and areas currently designated "closed" to OHVs would remain that way, and those that are currently designated "limited" within Priority Habitat Management Areas and General Habitat Management Areas of sage-grouse habitat (roughly corresponding to core and low density areas, respectively) would be restricted to existing roads and trails (e.g., no cross-country travel) until completion of individual route designation during the travel planning process. In addition, the BLM would avoid upgrading or building new roads if found to contribute to sage-grouse mortality or lek-abandonment. (See Actions TM 2 and TM 3, Table 2-3, BLM RMP FEIS [2015]).

Conservation Objective

In areas with substantial recreational activities, maintain healthy native sagebrush communities based on local ecological conditions and with consideration of drought conditions, and manage direct and indirect human disturbance (including noise) to avoid interruption of normal sage-grouse behavior.

Conservation Actions

Enact measures to protect existing leks and key sage-grouse habitat from current and future recreational activities.

Action REC-1: Avoid development of recreational facilities (e.g., roads, trails, kiosks, and campgrounds) in sage-grouse habitats, particularly within PAC habitat and within four miles of leks to preserve key lekking and nesting habitat.

Action REC-2: Implement usage regulations for existing OHV recreational activities that will benefit sage-grouse habitat.

Action REC-2-1 Apply seasonal closures to recreation sites during lekking and nesting periods. Based on the type of use and the nature of the potential impacts, provide further restrictions on recreational activities (including but not limited to motorized recreation) during these periods and/or other situations.

Action REC-2-2 Limit OHV travel to existing trails and restrict cross-country travel to reduce the negative impacts to sage-grouse habitats.

Action REC-2-3 Identify additional resources to support monitoring and enforcement of usage regulations and/or restrictions.

Action REC-2-4 Restrict OHV use in rangelands at risk of wildfire during fire season.

Action REC-2-5 Monitor the extent and intensity of OHV use. Quantify daily and seasonal use in order to have adequate information to mitigate potential conflicts with sage-grouse habitat needs and recreational pursuits.

Action REC-2-6 Eliminate refuse and food subsidies for predators of sage-grouse associated with OHV recreational areas.

Action REC-3: Provide education to OHV users and other recreationalists (including lek viewers) about how to avoid detrimental impacts to sage-grouse habitat or sage-grouse populations.

Action REC-3-1 Educate the public and commercial bird watching guides about ethical viewing and photography of sage-grouse.

Action REC-3-2 Educate OHV users about the impacts of noise to sage-grouse, as well as strategies to avoid erosion, spread of invasive annual grasses, and negative impacts to native plant health.

Action REC-4 Prioritize lek persistence over providing lek viewing opportunities for the public.

Action REC-4-1 Develop and implement a lek viewing protocol for managing lek viewing activities so that impacts to sage-grouse are minimized.

Action REC-4-2 Develop a volunteer base to monitor and provide education at designated public lek viewing areas.

Responsible Parties:
BLM, DSL, ODFW, recreational organizations (e.g., OHV, hunting, other organizations/user groups), NGOs (e.g., Audubon and other bird conservation/watching organizations).

e. Fences

Nature and Extent of the Threat
Fences are ubiquitous across the vast rangelands of western states. In fact, during the period 1996–2002, more than 600 miles of fencing were constructed annually across several western states, including Oregon (Connelly et al. 2004). Fences can have significant impacts on sage-grouse populations by causing direct mortality resulting from collisions (Stevens et al. 2012a). Fences also can provide perches for avian predators (Connelly et al. 2004). However, fencing can also be an important element of a livestock grazing regime compatible with sage-grouse habitat requirements, which may create a dilemma of negative versus positive effects associated with livestock fencing. Nonetheless, high collision–risk zones can be identified and mitigated by relocating fences or by attaching reflecting fence markers, thereby making them more visible to sage-grouse in flight. These efforts can significantly reduce fence-collision mortality (>80%) (Stevens et al. 2012b).

Not all fences need to be marked, but marking fences within 2 km of known leks, in areas where sage-grouse are abundant and in specific types of terrain, can substantially mitigate collisions. The exact amount of fencing that poses a risk to sage-grouse on both private and public land in Oregon is not well quantified. Within the Burns BLM District alone, more than 850 miles of fencing is located within three miles of leks (Schindel and Kerby 2013). An analysis using a Fence Collision Risk Tool (developed by the University of Montana and the University of Idaho) determined that only 52 miles of fencing in the Burns BLM District posed a high risk to sage-grouse, based on proximity to active leks and topography. An additional 103 miles of fencing posed a moderate risk to sage-grouse in the Burns BLM District (Schindel and Kerby 2013). Based on this information, ongoing research and fencing work, and the conservation actions below, Oregon has an approach in place to address threats from fencing.

Success on the Ground: Fence-Marking and Removal in Oregon's BLM Districts

Fence removal and modifications conducted in Oregon are designed to reduce the risk of sage-grouse mortality resulting from fence strikes. From 2010 to 2012, no new fences were installed in sage-grouse habitat using NRCS-SGI funds in Oregon. The NRCS-SGI effort has installed approximately 10.6 miles of antistrike devices on fences to improve visibility of fences to sage-grouse during flight. In the Baker Resource Area, the Baker SWCD and the USFWS Partners Program installed more than 6,000 markers along 3.5 miles of fence. Fences for these efforts were prioritized using the Fence Collision Risk Tool on private lands with willing landowners.

In the Prineville BLM District, fences were removed after temporary protections for restoration projects were no longer required. In the Vale BLM District, including the Baker Resource Area, 12 miles of fence were marked with antistrike devices as a component of post-fire Emergency Stabilization and Rehabilitation (ESR) projects during the period 2012–2014. Additionally, in the Burns BLM District approximately eight miles of new fencing (constructed after the Miller Homestead fire) were marked, including fences with past documented sage-grouse collisions. Finally, the Lakeview BLM District has marked 21 miles of prioritized fencing.

Conservation Objective

Minimize the impact of fences on sage-grouse populations by reducing habitat fragmentation associated with fences, as well as sage-grouse mortality resulting from collisions with fences or increased predator perching opportunities on fence posts.

Conservation Actions

Prioritize activities to reduce the risk of fences to sage-grouse on private and public land through fence removal and fence marking within 1.2 miles (2 km) of leks located within PAC habitat. (See related monitoring action, **MON-4**.)

Action FNC-1: Use the Fence Collision Risk Tool to identify fence segments that pose the highest risk to sage-grouse, based on proximity to occupied leks and topography (flat to gentle rolling terrain). Consider additional geographic features when prioritizing fence segments to

target for risk reduction, such as the proximity to water sources, other infrastructure, and surrounding vegetation that may impact sage-grouse concentrations, predator presence, or sage-grouse flight trajectories.

Action FNC-2: In consultation with the BLM, grazing permittees, and private landowners, identify and remove high-risk fences that are no longer necessary or are abandoned.

Action FNC-3: Prioritize installing antistrike devices on fence segments that pose the highest risk to sage-grouse (as identified by the Fence Collision Risk Tool) within 1.2 miles (2 km) of leks within PAC habitat. Utilize Implementation Recommendations and Guidelines outlined in Appendix 4 when conducting this work.

Action FNC-4: Avoid constructing new fences within 1.2 miles (two km) of leks.

Responsible Parties:
BLM, DSL, private landowners, NRCS, SWCDs, ODFW

f. Isolated/Small Size (Population Connectivity)

Nature and Extent of the Threat
Continued habitat loss and fragmentation may increase the risk of loss of genetic variation in small, isolated sage-grouse populations. Genetic diversity is necessary for a population to respond to environmental change; thus a loss of genetic variation may jeopardize the persistence of fragmented populations (Shaffer 1981). New information regarding minimum population sizes necessary to maintain the evolutionary potential of a species suggests that sage-grouse in some areas of its range may already be at population levels below that threshold. The Oregon portion of the Klamath population, for example, is believed to have been extirpated as a result of habitat changes (primarily juniper encroachment) that led to its isolation from the California portion of the population and the lack of sufficient ecological flow within the population as a whole. Population connectivity is an important factor in ensuring genetic exchange and long-term persistence of populations.

The 2011 ODFW Strategy identified the concern that sage-grouse populations in the Baker Resource Area may be isolated. These populations are in the most northeastern portion of the species' occupied habitat in Oregon and are subject to threats relating to habitat fragmentation and loss, as well as anthropogenic disturbance. The fact that the remaining intact sage-grouse habitat is nested within areas of steep terrain and forests contributes to the geographic isolation of this population. However, a recent genetic analysis showed that the genetic diversity among sage-grouse in the Baker Resource Area is comparable to that in the rest of the state, and no unique haplotypes were identified (ODFW 2011). These findings suggest that there may be sufficient connectivity between birds in the Baker region and the rest of the state.

Nonetheless, continued population declines in this portion of Oregon warrant additional attention.

The ODFW 2011 Strategy also indicated that sage-grouse populations in the Prineville District may be geographically isolated by highways, increased human development, and large areas of juniper. The Twelve Mile and Brothers/North Wagontire PACs represent the most northwestern portion of the species' occupancy in Oregon. Continued investigation into the potential for population-limiting impacts related to isolation is required and warranted, given the sustained population declines documented in the Prineville District.

In the Burns District, the Burns PAC could also be impacted by geographic isolation. Additionally, there are several small areas of the sage-grouse range that are constrained by narrow corridors of intact habitat in the Lakeview District (e.g., the Picture Rock and Tucker Hills PACs and areas near Christmas Valley).

As part of the SageCon planning process, The Nature Conservancy (TNC) analyzed lek-to-lek connectivity in the landscape mosaic between PACs and areas with >75% breeding bird density, modeling habitat continuity in the form of both "least-cost" linkages and "functional" connectivity, with insights into how sage-grouse may encounter connective habitat in real time (Figure IV-15; Figure IV-16). Results of the study have qualified linkages by their relative quality and robustness, identified areas where sage-grouse movement may be most constrained, highlighted areas where habitat restoration would most benefit connectivity, and delineated the most traversable potential nesting habitat surrounding active leks. The results of these analyses have identified areas with connectivity constraints similar to those described in the ODFW 2011 Strategy.

Conservation Objective

Maintain or enhance existing sage-grouse concentrations; promote connectivity where population isolation is a concern; and avoid further loss of small, isolated populations.

Conservation Actions

Maintain and enhance existing contiguous areas of habitat and connectivity corridors across the range of sage-grouse in Oregon to ensure adequate linkages between leks, areas with >75% breeding bird density, and PAC areas.

Action CON-1: Identify and protect existing areas of habitat between PAC areas and >75% breeding bird density areas that provide good lek-to-lek connectivity.

> **Action CON-1-1** Utilize connectivity mapping and telemetry data to identify connectivity corridors that currently function as linkage pathways between portions of the sage-grouse population.

Action CON-2: Identify isolated leks and enhance habitat in areas with the most potential to improve connectivity, with the goal to improve linkages between these leks and the remaining sage-grouse population.

Action CON-2-1 Coordinate with TNC and others to identify linkages that currently have low "quality" and "robustness" and likely limit sage-grouse movement between small or isolated populations.

Action CON-2-2 Coordinate with TNC and others to identify areas functioning as barriers to movement ("pinch points") and prioritize these portions of linkages for habitat enhancement activities.

Action CON-2-3 Identify and implement strategies to reduce barriers to movement in linkages prioritized for enhancement.

Action CON-2-4 Include projects to improve connective habitat for consideration by credit producers engaged in sage-grouse mitigation activities.

Success on the Ground: Connectivity Modeling

Finally, recent efforts to map lek-to-lek connectivity between PAC areas and areas representing >75% breeding bird density will aid in prioritizing specific linkages for protection and further enhancement. These efforts reinforced previous identification of subpopulations of birds that are at particular risk of isolation and help to focus efforts to ameliorate this risk. The connectivity layers generated by the TNC will be incorporated into the aforementioned overall spatial decision support tool that will be used to prioritize conservation efforts across the range of sage-grouse in Oregon.

Action CON-3: Prevent loss and enhance functionality of connectivity corridors by encouraging private landowners to participate in long-term or permanent sagebrush habitat protection or enhancement programs. Protect connectivity corridors on private and public land from future development and avoid habitat projects that reduce or eliminate sagebrush.

Action CON-3-1 Encourage private landowner participation in CCAAs offered through county SWCDs. Once enrolled, as part of receiving assurances related to ESA liability protection, these agreements ensure that landowners "maintain contiguous habitat by avoiding further fragmentation" and manage their land with no net loss in habitat quantity or quality.

Action CON-3-1a Conduct outreach and education to promote private landowner enrollment in CCAAs.

Action CON-3-1b Ensure that technical expertise through SWCDs and the USFWS is available to develop and implement site-specific plans designed to enhance habitat quality or quantity on private lands enrolled in CCAAs.

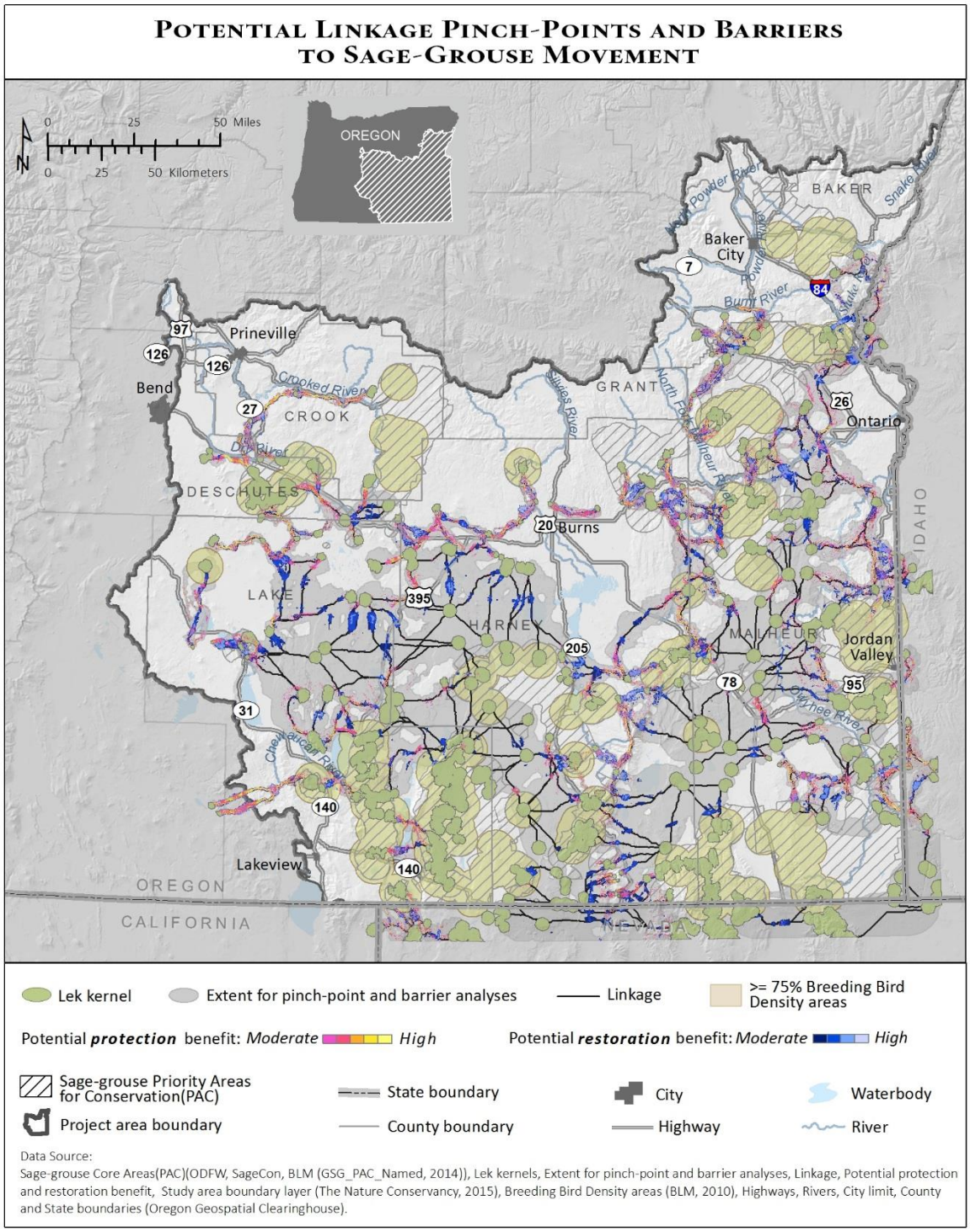

Figure IV-15. Connectivity map illustrating areas where animal flow may be limited due to low quantities of connective habitat or where few options for movement exist.

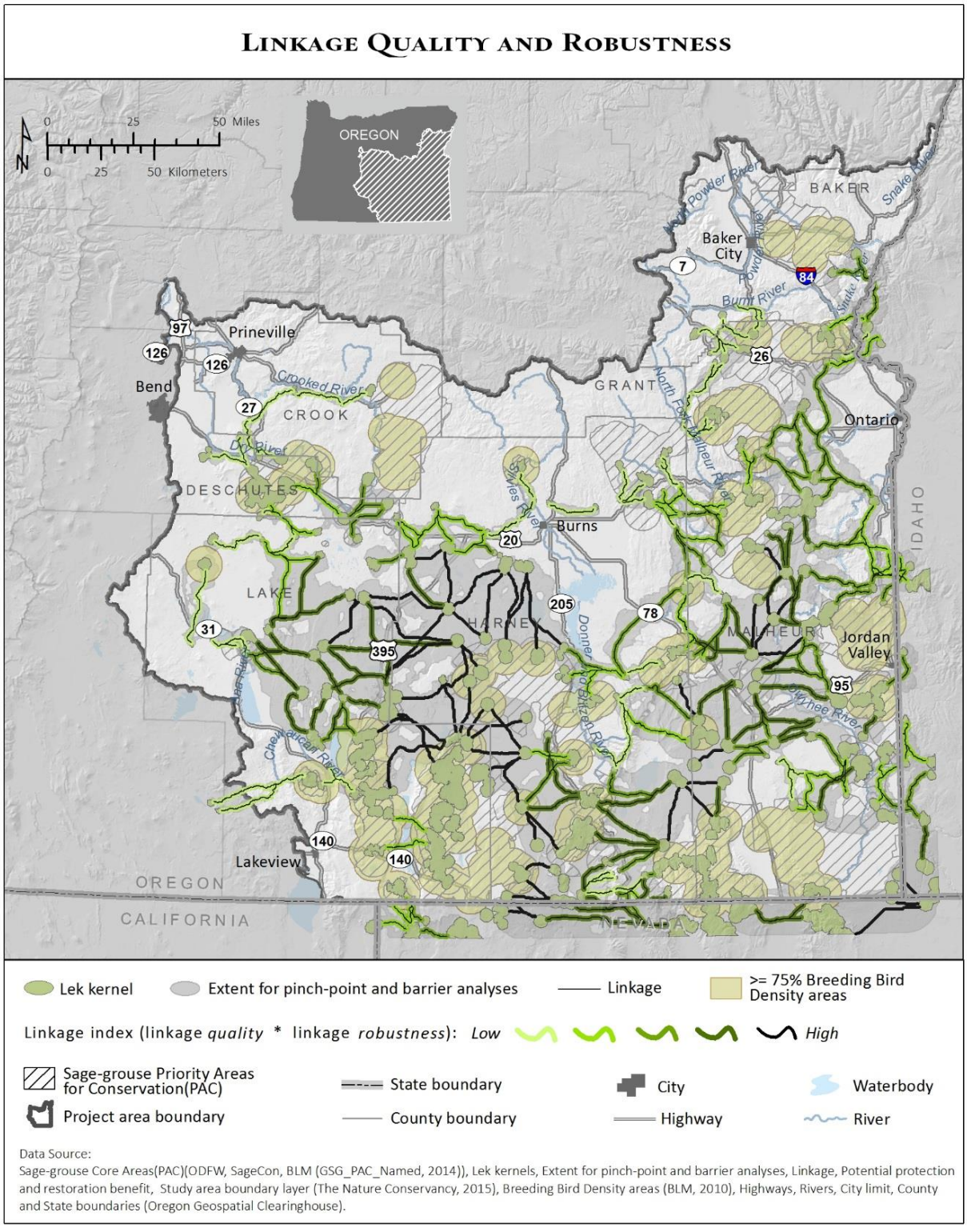

Figure IV-16. Connectivity map illustrating the variation in the linkages between areas of high connectivity (lek kernels).

Action CON-3-2 Encourage private landowner participation in working lands conservation easements that protect their ranching interests and preclude additional agricultural conversion of sagebrush habitat, with particular focus on land within PAC habitat.

Action CON-3-3 Encourage private landowner participation in cost-share habitat improvement programs (Farm Bill, Crop Reserve Program, Sage-Grouse Initiative) offered by the NRCS, ODFW, and SWCDs, particularly those with land ownership that overlaps with connectivity corridors and is within PAC habitat.

Action CON-3-4 Where lands providing existing or potential connectivity benefits are at risk of conversion to non-sagebrush habitat (through sale, development, generational change, etc.), identify opportunities to compensate, incentivize, and/or transfer lands from willing property owners to conservation-focused land management organizations, agencies, or private owners/entities in order to ensure that lands will remain as functioning sage-brush habitat, with particular focus on land within PACs.

Action CON-3-5 In accordance with OAR-635-140-0025 and OAR 660-023-0115, new development and related rights-of-way should avoid sage-grouse habitat, including important connectivity corridors and PAC areas.

Action CON-4: Where appropriate, consider augmenting small or isolated populations and use recommendations and guidelines for translocations (see Appendix 4).

Action CON-4-1 Monitor translocated sage-grouse to determine efficacy.

Responsible Parties:
TNC, SWCDs, private landowners, NRCS, ODFW, counties, DLCD

Success on the Ground: Using Telemetry to Understand Important Areas for Connectivity

Several research projects have been initiated to address the information gaps identified by the *Greater Sage-Grouse Conservation Assessment and Strategy for Oregon* and LITs. Notably, three studies have specifically addressed winter habitat use and seasonal movements that describe sagebrush communities used by sage-grouse and provided some limited migratory information for populations in portions of the Prineville and Vale BLM Districts and Baker Resource Area. Telemetry studies conducted from 2006 to 2008 in the Prineville District focused on mapping seasonal habitats with an emphasis on winter habitat use. In 2009, the USFWS initiated a project to address the lack of data on the distribution and movements of sage-grouse occupying the Baker Resource Area. From 2009 to 2012, the USFWS collected more than 1,300 bird locations from a sample of 63 radio-marked sage-grouse. These data have already been used to inform land management agencies responsible for actions that may impact this sage-grouse population. For instance, telemetry locations from the Baker project helped to prioritize areas for invasive annual-grass treatment and restoration work.

Currently, a baseline telemetry study is under way to better understand winter habitat use in the Warner Mountains. These data will also serve as a baseline for demography and spatial use relative to large-scale juniper removal and potential wind energy development within the Lakeview BLM District. In addition, ODFW, in collaboration with Oregon State University, is evaluating the effects of wildfire on sage-grouse population dynamics in the Trout Creek Mountains. These studies all provide information on the basic biology of these populations that was previously unknown.

g. Free-Roaming Equids

Nature and Extent of the Threat

Concentrated or overabundant free-roaming horse and burro populations can reduce habitat quality and quantity and reduce forage resources for wildlife, including sage-grouse. Areas with free-roaming equids have been associated with decreased shrub cover, lower availability of palatable plants and forbs, and increased annual-grass infestations (Beever and Aldridge 2011). Shrub canopy coverage was also more fragmented as a result of trampling, rubbing, and foraging by free-roaming equids (Beever and Aldridge 2011). Free-roaming horses and burros can also negatively impact insect communities and soil. Beever and Aldridge (2011) noted that sites with free-roaming equids had up to 10 times fewer ant mounds and significantly more compacted soils. All of these impacts result in reduced cover for sage-grouse nesting and brood rearing, as well as fewer sage-grouse food resources (sagebrush, forbs, and invertebrates).

Effects of free-roaming horses on sagebrush habitats may be especially pronounced during periods of drought. They have contributed to the destruction of seeps and springs and have been documented guarding water sources. Free-roaming horses are more mobile than domestic livestock, remain on the landscape year-round, and have different grazing patterns. Thus, grazing impacts are variable across the range of habitats used by free-roaming equids, which vary according to biotic and abiotic factors (Beever and Aldridge 2011).

The Federal Land Policy and Management Act (FLPMA)[71] directs the BLM and the Forest Service to manage free-roaming horses and burros as one of numerous uses and resources on federal lands, including mining, recreation, domestic grazing, and fish and wildlife. The BLM and the Forest Service are charged with protecting, managing, and controlling free-roaming horses and burros in accordance with the Wild Free-Roaming Horses and Burros Act of 1971[72] (hereafter "the Act"). This federal law precludes state management of free-roaming horses and burros. The Act mandates that the BLM and the Forest Service "prevent the range from deterioration associated with overpopulation" and "remove excess horses in order to preserve and maintain a thriving natural ecological balance and multiple use relationships in that area."

[71] 43 U.S.C. §§ 1701-1785

[72] 16 U.S.C. §§ 1331-1340; Pub.L. 92-195, as amended by Congress in 1976, 1978, 1996, and 2004

In Oregon, the BLM manages free-roaming horses and burros across 17 herd management areas (HMAs) (Figure IV-17) that overlap with sage-grouse habitat. HMAs include approximately 2.7 million acres of BLM land, of which 857,670 acres overlap with sage-grouse PAC habitat. All HMAs are directed to achieve and maintain an appropriate management level (AML). Across the 17 HMAs in Oregon, the BLM has set an AML range from 1,340 to 2,655 free-roaming horses and burros. However, free-roaming horse populations grow on average by approximately 20% annually, and populations typically exceed AML.[73] Currently, 11 of the 17 Oregon HMAs are in excess of their respective upper AML based on 2015 population estimates. These HMAs range from 103% (Paisley HMA) to 502% (Beatys Butte) of their upper AML (Table IV-11).

Excess free-roaming horses are occasionally gathered and are adopted or sold to the public or placed in long-term holding facilities. BLM free-roaming horse gathers rotate among HMAs, typically on a three- to five-year basis. Priorities for gathering excess free-roaming horses and burros to achieve and maintain AML are based on population inventories, resource monitoring objectives, gather schedules, holding space availability, and budget. Gathers are also conducted in emergency situations when the health of the population is at risk due to lack of forage or water and, in some situations, wildland fire. Gather requests are submitted yearly to the BLM Washington D.C. office for consideration and approval based on specific criteria, including, but not limited to, (1) court ordered removals, (2) private landowner requests, and (3) critical public safety or health. Although the Act directs the maintenance of a "thriving natural ecological balance," current national BLM direction for prioritizing gathers is not based on sage-grouse habitat needs.

Sage grouse and other wildlife species experience the consequences of habitat impacts from excessive free-roaming horse grazing. In addition, these impacts adversely affect other uses reliant upon rangeland health (i.e., livestock grazing, hunting, etc.). Where livestock grazing numbers or seasons are curtailed due to rangeland health conditions that may be significantly related to free-roaming horse grazing, this raises not just frustration but economic and social impacts for rural communities. In recognition of the need to address this issue, the Western Governors' Association (WGA) issued Policy Resolution 2015-01 to urge the BLM and USFS to collaborate with local and state governments, tribes, and other federal agencies to use science-based adaptive management in a timely manner to adjust herd sizes if AMLs are exceeded. This resolution directs the WGA to work at all levels of government (including congressional committees and the executive branch) to address potential deficiencies in the Act and implementation of it that impede federal authorities from addressing the negative impacts of free-roaming horse and burro populations.

[73] http://www.blm.gov/or/resources/whb/index.php

The BLM RMP Amendment for Oregon (BLM 2015a) recognizes that, although not explicitly, free-roaming equids should be managed to benefit sage-grouse in order to fulfill the Act's mandate. The RMP Amendment restates the objective to manage free-roaming horse and burro populations within established AMLs. It also prioritizes rangeland health assessments for HMAs in designated Sagebrush Focal Areas, PACs, and general sage-grouse habitat, and prioritizes gathers in HMAs that are not meeting sage-grouse habitat objectives in PACs (secondary in priority only to gathers necessary to meet emergency conditions).

Effectiveness in addressing free-roaming equid impacts to sage-grouse and its habitat in Oregon depends largely on the ability of BLM to effectively implement the above RMP Amendment direction. Oregon remains ready to assist in such efforts, and several state agencies as well as diverse SageCon partners and others have been engaged with the BLM in collaborative conversations around addressing the Beatys Butte and other situations.

Table IV-11. Estimated 2015 free-roaming horse and burro populations and appropriate management levels (AMLs). (Source: http://www.blm.gov/or/resources/whb/files/popdata-mar2015.pdf).

	Population estimate	AML (low)	AML (high)	% of AML (low)	% of AML (high)
Burns District					
Warm Springs	253	111	202	228%	125%
Palomino Buttes	78	32	64	244%	122%
Stinkingwater	144	40	80	360%	180%
South Steens	662	159	304	416%	218%
Riddle Mountain	68	33	56	206%	121%
Kiger	130	51	82	255%	159%
Prineville District					
Ligget Table	35	10	25	350%	140%
Vale District					
Hog Creek	62	30	50	207%	124%
Cold Springs	213	75	150	284%	142%
Three Fingres	130	75	150	173%	87%
Jackies Butte	75	75	150	100%	50%
Sand Springs	128	100	200	128%	64%
Coyote Lake/Alvord Tule	346	198	390	175%	89%
Sheepshead-Heath Creek	286	161	302	178%	95%
Lakeview District					
Paisley	154	60	150	257%	103%
Beatys Butte	1255	100	250	1255%	502%
Pokegama	42	30	50	140%	84%
BLM total	**4061**	**1340**	**2655**	**303%**	**153%**

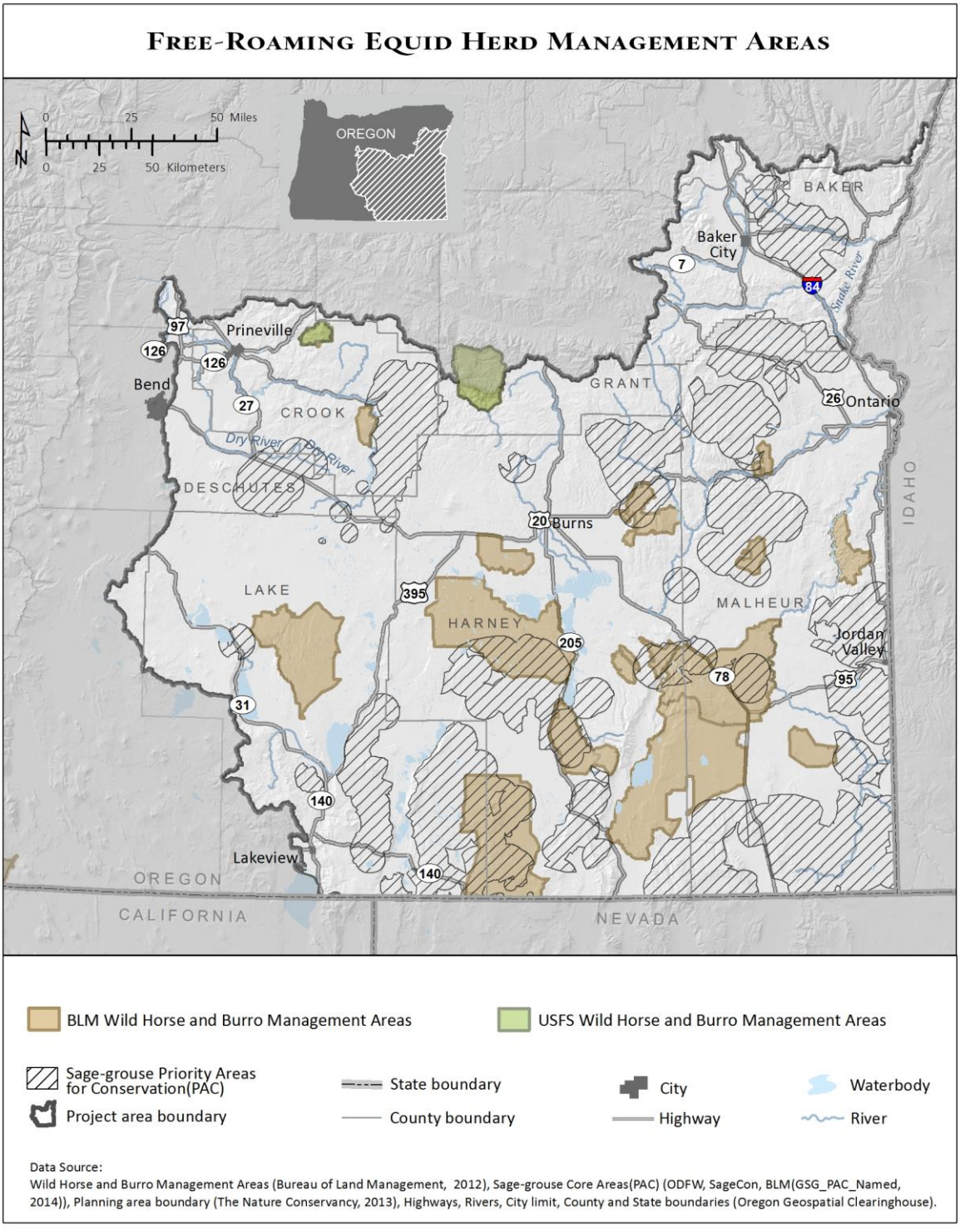

Figure IV-17. BLM and FS free-roaming equid herd management areas.

Conservation Objective

Provide suitable habitat for sage-grouse by reducing the negative impacts of grazing by free-roaming equids through management of free-roaming horses and burros that meets rangeland health standards. Maintain free-roaming equid populations within AMLs to reduce negative impacts of grazing.

Conservation Actions

Prioritize free-roaming equid management across land ownership within PACs and manage herd sizes to maintain populations at or below AMLs.

Efforts on the Ground: Beatys Butte Working Group

In 2014, a working group consisting of many different stakeholders, including the livestock grazing community and the conservation community, was formed to develop management direction and solutions for the future of the Beatys Butte area. This area is important to Oregon's rural heritage and economy, and provides important habitat for a variety of wildlife species including sage-grouse. Issues include free-roaming horse numbers vastly exceeding AML (i.e., by over 500%), drought, livestock management, and the potential for the area to serve as an energy corridor. Concerning the sage-grouse, the group adopted a set of conservation measures that will help guide the development of different management alternatives going forward. The group continues to work with the diverse interests to develop solutions.

Action FRE-1: Develop, implement, and enforce adequate regulatory mechanisms that ensure that free-roaming horse and burro populations do not exceed AMLs in HMAs, particularly those that overlap with PACs.

Action FRE-1-1 Incorporate desired habitat conditions consistent with the Sage-Grouse Habitat Assessment Framework (HAF) (Stiver et al. 2015) into HMA management plans, and adjust AMLs as necessary to maintain suitable sage-grouse habitat parameters.

Action FRE-1-1a If habitat indicators demonstrate grazing overuse in HMAs with free-roaming horse populations in excess of AMLs, ensure that grazing reductions or responses are not focused solely on livestock operations (i.e., prioritize free-roaming horse gathers and/or other efforts to reduce horse populations to AML; livestock reductions should not occur without actions in place to address free-roaming horse impacts).

Action FRE-1-2 Prioritize funding for free-roaming horse gathers in PACs that exceed AML unless removals are necessary in other areas to prevent catastrophic environmental impacts.

Action FRE-1-3 Exclude free-roaming horses from habitat restoration sites until perennial grasses are re-established and can sustain disturbance.

Action FRE-1-4 Use permanent sterilization as a method to suppress population growth rates.

Action FRE-1-5 Conduct range improvements to reduce the impacts of free-roaming horse and burro use in areas of critical sage-grouse habitat

Action FRE-2: Develop sound research methods to assess free-roaming equid populations and their environmental impacts.

Action FRE-2-1 Establish a consistent statistically based methodology for free-roaming horse surveys to obtain population estimates across all HMAs.

Action FRE-2-2 Develop and implement a monitoring plan to assess the impacts of free-roaming equids on sage-grouse habitat, including measures of vegetation, soil, and invertebrates.

Action FRE-2-3 Develop management triggers for free-roaming horse and burro populations so that, when population levels or habitat impacts are met, an appropriate set of actions to ameliorate the situation is implemented.

Action FRE-3 Advance policy changes at the national level (statute and/or BLM national office) to ensure improved responsiveness to and prioritization of efforts to address habitat impacts caused by free-roaming equids.

Responsible Parties:
BLM, ODFW, SWCD and NGO partners, WGA (policy)

Success on the Ground: BLM Efforts to Address Free-Roaming Equids

Several actions have occurred or are currently under way to address free-roaming equids. In 2010, free-roaming horse gathers on the Hart Mountain National Antelope Refuge eliminated the last remaining free-roaming horses from the refuge. In addition, a Candidate Conservation Agreement is in place to address free-roaming horse management within the Kiger Herd Management Area. Sage-grouse habitat guidelines are currently being used in HMA evaluations, and objectives for sage-grouse habitat are being incorporated into new HMA plans. To that end, numerous range improvements have been used to remove or reduce grazing impacts from critical sage-grouse habitat (e.g., riparian exclosures to promote late brood-rearing habitat). Further, free-roaming horse removal, exclusion, or relocation is used to promote recovery of desired perennial vegetation following free-roaming and prescribed fire. Lastly, the BLM is improving the methods used to estimate free-roaming horse and burro populations. Since 2014, a "Simultaneous Double-Count with Sightability Bias Correction" inventory method has been implemented and should provide population estimates with a statistical basis. Although substantial effort has been made to manage free-roaming equids, most Oregon populations within sage-grouse habitat are significantly above AML. Management of equid numbers will be an ongoing challenge to managing sage-grouse habitat quality.

vi. Other Circumstances and Threats

Unforeseen circumstances and/or other threats (e.g., drought, West Nile virus, predation) that may have local, short-term negative impacts on sage-grouse populations and/or sagebrush-steppe habitat also exist in Oregon. The impact of these threats on local sage-grouse populations varies across the landscape in both presence and intensity, and the degree of impacts is also likely based on the resilience of that population and its associated habitats.

a. Climate Change

Nature and Extent of the Threat

The effect of climate change on the amount and distribution of future sage-grouse habitat is largely unknown (USFWS 2013). However, global climate change models project more variable and severe weather events, higher temperatures, drier summer soil conditions, and rainier winter seasons across much of the sage-grouse range (Miller et al. 2011). Projected changes in climate regimes for the sagebrush biome may influence sage-grouse conservation both directly and indirectly (Neilson et al. 2005; Schrag et al. 2011).

Global climate change poses a significant threat to sage-grouse through a variety of mechanisms. Increasing temperatures will likely result in a shift in the climatic conditions most suitable to the species, possibly resulting in portions of the current sage-grouse range becoming unsuitable for the bird. Such range shifts are already occurring for many species (Root et al. 2003). Climate change may also bring changes in seasonality that could impact reproduction. Decreased synchrony between photo-stimulated events (e.g., mating and nesting) and temperature-stimulated events (e.g., habitat green-up, insect availability) could negatively impact reproductive success. In addition, weather extremes associated with climate change typically carry negative implications for species reproduction and survival. Increased frequency and intensity of drought may pose the greatest threat to sage-grouse relative to climate change. Habitat quality may play an even greater role in sage-grouse reproduction and survival in the future. For example, habitats that were adequate for the species under normal conditions could become unsuitable if weather fluctuations become more extreme, with only the highest-quality current habitats remaining suitable.

Climate change modeling specific to sage-grouse habitat in southeastern Oregon evaluated outcomes of four climate change scenarios (including continuation of current climate conditions) in the context of habitat management scenarios proposed by local habitat managers (Creutzburg et al. 2015). Hypothetical climate conditions tested were (1) hotter annual temperatures with annual precipitation similar to current conditions; (2) warmer annual temperatures with slightly more precipitation than current conditions; (3) hotter annual temperatures with considerably more precipitation than current conditions; and (4) continuation of current climate conditions. In southeast Oregon, over the course of a century,

each of these climate change scenarios, including continuation of current conditions, resulted in increases in wildfire, invasive annual grasses, and juniper, and transitions to phases of increased juniper canopy cover (Creutzburg et al. 2015).

By the end of the century, each hypothetical climate scenario predicted the extent of the area impacted by wildfires to double or quadruple due to increased invasive annual grasses. Some individual years were projected to have wildfire impacting more than 1.6 million acres (Creutzburg et al. 2015). With the hypothetical continuation of current climate conditions, the climate model showed a steady decline in sage-grouse habitat throughout the century to less than half of the initial level. In contrast, model results showed that the amount of sage-grouse habitat declined initially in each of the other climate scenarios but was regained (partially or entirely) and in some cases surpassed present acreages, by the end of the century.

Hypothetical aggressive increases in juniper removal in priority areas (primarily on federally managed lands) proved to be successful in climate models at maintaining the extent of juniper at current levels under all climate change scenarios (Creutzburg et al. 2015). In contrast, today's rate of juniper treatment was expected to result in continued juniper expansion. Increases in treatments to address invasive annual grasses were modeled to roughly double the current amount of semi-degraded areas treated annually. These restorative activities, however, were predicted to be ineffective in reducing the area of sage-grouse habitat degraded by invasive annual grasses and other exotics plant species. While Creutzburg et al. (2015) identified some long-term optimistic outcomes for sage-grouse, initial declines in suitable sage-grouse habitat may prove to be overwhelmingly harmful to the persistence of the species, locally or regionally.

Success on the Ground: The Oregon Conservation Strategy and Climate Change

The Oregon Conservation Strategy was completed in 2006 and takes a statewide approach to identifying opportunities to conserve species diversity and the habitats upon which the State's native species depend. In 2009, ODFW initiated a process to incorporate information about climate change and its effects on fish, wildlife, and habitats into the Oregon Conservation Strategy. This process highlighted several overarching guiding principles and policy recommendations to ensure that the State is poised to address climate change as it relates to biodiversity (Michael and O'Brien 2008). Building upon this work, ODFW convened a workshop in 2011 during which land and wildlife managers, researchers, and policy makers identified climate change impacts and adaptation strategies specific to sagebrush and closed-basin wetland habitats. By reviewing past, present, and projected future climates and how they affect vegetation, hydrology, and wildlife in Oregon's basin and range habitats, workshop participants addressed the following concerns: (1) how to better link research relevant to Oregon's basin and range ecosystem to management efforts, and (2) what management strategies are most likely to be successful in light of landscape-scale changes and future climate conditions. The Oregon Fish and Wildlife Commission unanimously adopted the revised Oregon Conservation Strategy (including incorporation of climate information) at its September 4, 2015, meeting.

Conservation Objective

Prioritize protection of sagebrush communities most likely to be resilient to the effects of climate change, with the goal of maintaining a minimum of 70% of the range of sage-grouse as sagebrush in advanced structural stages with the remaining 30% of the range composed of potential habitat that could be restored to desirable sagebrush habitat states.

Conservation Actions

Action CC-1: Use climate change models to identify zones of sage-grouse habitat that are predicted to tolerate future climate patterns.

> **Action CC-1-2** Incorporate connectivity mapping with climate change modeling to ensure that opportunities exist for sage-grouse to adapt (to the extent that their biological site fidelity allows) to changing habitat availability.

Action CC-2: Identify and protect sagebrush habitat within PACs that is most likely to persist into the future under new climatic conditions associated with climate change.

> **Action CC-2-1** Utilize the conservation measures identified throughout this Action Plan to protect these areas from primary and secondary threats that result in habitat fragmentation or loss.

Responsible Parties

TNC, BLM, ODFW

Success on the Ground: Climate Change Assessment for Southeast Oregon

In 2014, The Nature Conservancy completed a set of data products that help to identify areas in the Pacific Northwest that are likely to be resilient under new temperature and moisture regimes associated with climate change scenarios (Buttrick et al. 2014). These products were developed using geophysical inputs that remain static in light of changing climatic conditions, such as topographic, geological, and soil information. Other inputs were factors related to a site's resilience to climate change, including "microclimate diversity" (an indicator of the availability of microclimate niches that provide suitable habitat in light of regional or changing climate conditions) and "landscape permeability" (an indicator of the degree to which intact habitat exists to allow for species' movement to respond to changing climate conditions). An eco-regional assessment for southeast Oregon was among the products of this project. Although the data inputs relating to climate change are coarse, these inputs are derived from abiotic landscape qualities that will remain constant into the future. Thus, this eco-regional assessment may help to characterize areas where sage-grouse habitat is likely to be resistant and resilient to changes in climate over time and can be useful in prioritizing areas of sage-grouse habitat to protect and enhance.

b. Drought

Nature and Extent of the Threat

While vegetation in the sage-steppe ecosystem is adapted to arid conditions, drought—defined as two growing seasons with below-average precipitation—has pronounced impacts on shrubs, grasses, and forbs. For instance, during drought, sagebrush produces fewer stems, leaves, and flowering shoots, and has smaller canopy coverage (Miller et al. 1991). Drought can reduce perennial grass and forb production as well as insect populations, the latter two of which are of dietary importance to sage-grouse during brood rearing (Drut et al. 1994). During dry years, sage-grouse shift to wet meadow areas earlier in the summer (Fischer et al. 1996) and may switch to a sagebrush diet earlier in the year. Reduced forbs and insects and higher amounts of sagebrush in chick diets have been linked to lower chick survival (Drut et al. 1994).

Conservation Objective

During drought conditions, preserve and maintain the ecological integrity of sagebrush-steppe ecosystems and conserve the essential habitat components for sage-grouse.

Conservation Actions

Action DRT-1: Adaptively manage livestock grazing during drought conditions to meet rangeland health standards that support sage-grouse habitat needs.

Action DRT-1-1 Implement grazing management plans that contribute to the health of sage-grouse habitat and include conservation measures for drought conditions.

Action DRT-1-2 Follow recommended grazing guidelines during drought conditions to meet seasonal sage-grouse habitat requirements (see Appendix 4). Consider drought-based adjustments in (1) season or timing of use; 2) numbers of livestock (including temporary nonuse or livestock removal); (3) distribution of livestock use; (4) intensity of use; and (5) type of livestock.

Action DRT-1-3 Increase monitoring during drought conditions to ensure that adaptive management is implemented in a timely manner.

Action DRT-1-4 Remove administrative barriers to enforcing and/or regulating AUM reduction during drought.

Success on the Ground: Drought and CCAAs

The county- and SWCD-based private land CCAA, the DSL programmatic CCAA for state lands, and the CCA for federal lands all have provisions to prompt adaptive management strategies if moderate or extreme drought occurs. These strategies are intended to retain adequate habitat characteristics required by sage-grouse through the use of alternate grazing methods (rest, rotation, deferment, and "grass banks").

Action DRT-2: Prioritize free-roaming horse gathers during drought conditions in Herd Management Areas (HMAs) in PACs that exceed Appropriate Management Levels (AMLs) to meet rangeland health standards that support sage-grouse habitat needs.

Action DRT-2-1 During drought conditions, maintain free-roaming horse AMLs at the low end of the specified range for HMAs, particularly for HMAs that overlap with PACs.

Action DRT-3: Support infrastructure and resources in advance of drought or other environmental factors so that livestock producers are able to adjust grazing as required.

Action DRT-3-1 Provide educational opportunities for permittees and private landowners to learn about sage-grouse habitat requirements and conservation measures they can implement to improve rangeland conditions for livestock and sage-grouse.

Action DRT-3-2 Create "grass banks" or reserve forage areas as alternative grazing opportunities to provide rest for over-utilized rangelands or allotments, or to be utilized during drought conditions, post-fire or after restoration work. Do so in a manner compatible with livestock operations locally.

Action DRT-3-3 Identify opportunities to compensate landowners for the cost of implementing conservation measures associated with drought and facilitating practices to benefit sage-grouse and their habitat.

Responsible Parties:
BLM, private landowners, SWCDs, DSL

Success on the Ground: Adjusting Stocking Rates in Response to Drought

During the past 10 years Lakeview BLM has set annual stocking rates based on expected forage availability. For example, the expected number of AUMs in a "normal year" in the Beatys Butte Allotment is 24,400. During the 2014 grazing season, the allowed number of AUMs was 4,800. The reduction was due to drought conditions and the amount of free-roaming horse utilization that had already occurred prior to turn-out. However, it should be noted that stocking reductions are not implemented consistently or in a timely manner across the sage-grouse range. Also, it is important to address the compounding impacts of free-roaming horse populations that are over appropriate management levels (AMLs) in Herd Management Areas (HMAs) during drought. Further attention needs to be given to these matters in all BLM districts, so timely adjustments to stock rates and free-roaming horse populations are made during drought in the face of political, cultural, administrative, and economic barriers.

c. West Nile Virus

Nature and Extent of the Threat

The emergence of West Nile virus (WNv) in the western United States and the lack of resistance to it in the sage-grouse immune system is a relevant management concern (Naugle et al. 2004; Clark et al. 2006). While outbreaks can cause severe local declines, Manier et al. (2013) characterized this threat as having a small influence on sage-grouse population persistence rangewide in comparison to primary threats related to habitat loss and degradation. Surface water developments associated with geothermal projects, livestock production, wildlife habitat improvements, or other infrastructure are anthropogenic factors that may increase habitat for mosquitoes, and thus increase the potential for WNv exposure. Artificial developments, by design, retain water longer than naturally occurring ephemeral water sources, thereby extending the duration that mosquito habitat persists on the landscape (Manier et al. 2013).

Oregon documented one mortality event due to WNv in 2006 that resulted in at least 60 sage-grouse deaths (Dusek et al. 2014). Monitoring of hunter-submitted blood samples from clipped wings was initiated in 2006. During the period 2006–2010, only one of nearly 1,900 samples tested positive for WNv (Dusek et al. 2014).

Conservation Objective

Maintain healthy sage-grouse populations by reducing the potential for mosquito-borne disease transmission and direct mortality resulting from WNv.

Conservation Actions

Action WNV-1: Reduce, eliminate, or augment artificial water developments that may contribute to mosquito prevalence.

Action WNV-2: Monitor sage-grouse and other species for the presence of WNv.

Action WNV-2-1 Coordinate monitoring efforts with the Oregon Department of Agriculture (ODA) and the Public Health Division (PHD) of the Oregon Health Authority (OHA), as well as other research and management activities.

Action WNV-2-2 Report observations of dead or sick sage-grouse or other bird deaths that could be attributed to disease or parasites to responsible agencies within 48 hours.

Action WNV-3: When planning or modifying water developments, use Implementation Recommendations and Guidelines to mitigate potential impacts from WNv and encourage the design of water development structures to minimize WNv risk to sage-grouse (see Appendix 4).

Action WNV-4: Ensure cooperation and coordination between responsible agencies to implement feasible recommended mosquito control guidelines (see Appendix 4) if WNv becomes a concern in a local area.

- Use appropriate EPA-regulated larvicides and/or adulticides in areas proximal to key sage-grouse habitat where mosquito habitat cannot be reduced.
- Evaluate the effectiveness of spraying adult mosquitoes and consider using mosquito-specific control measures.
- Balance the benefits of mosquito control to sage-grouse with other environmental considerations (e.g., impacts to other species dependent on mosquitoes).

Responsible Parties

ODA, PHD, OHA, ODFW, private landowners, SWCDs, NRCS, BLM, DSL

Success on the Ground: WNv Monitoring in Oregon

The Oregon Department of Agriculture, in coordination with mosquito control agencies and local county health departments, has implemented a surveillance program to monitor the re-emergence and spread of WNv in the state to assist state and local agencies in reducing the potential impact of this disease. As part of the ongoing surveillance efforts throughout the state, the Oregon Health Authority is testing adult mosquitoes and birds for mosquito-borne encephalitis.

ODFW has also increased its monitoring efforts for WNv across the occupied range of sage-grouse in Oregon. In 2006, a die-off of at least 60 sage-grouse was documented near Burns Junction, and two other sage-grouse mortalities from WNv were confirmed from Crane and Jordan Valley. Of the birds found dead, three provided suitable tissue samples and all were confirmed to be infected with WNv. No other significant mortalities have been documented in Oregon since 2006. From 2004 to 2011, ODFW collaborated with the National Wildlife Health Center to monitor sage-grouse for the presence of the disease or its antibodies. More than 1,000 blood samples (using Nobuto strips) from hunter-harvested birds were collected. Only one bird (a juvenile male harvested in the Beulah Unit in northern Malheur County) tested positive for antibodies in the Nobuto strip samples.

d. Catastrophic Flooding

Nature and Extent of the Threat

Excessive rain or snowfall that results in flooding can have several adverse outcomes for sage-grouse. Some vegetation species in the sage-steppe ecosystem are not tolerant of saturated soils and consequently have reduced vigor or die. For instance, during a wet climatic cycle (1978–1984), floods expanded the Malheur Lake basin (Harney County, Oregon) by 43,000 hectares (Ganskopp 1986). Wyoming big sagebrush in inundated areas succumbed to the surface flooding in three to four weeks (Ganskopp 1986). In addition, when significant hydrologic (e.g., rain) events occur in areas that have recently burned, the effect of excessive water may be exacerbated because scorched, vegetation-free areas have reduced water infiltration, and streamlets form that contribute to rill (channelized) erosion (Pierson et al. 2003; Pierson et al. 2013). Other aspects of a site's vegetation (e.g., the degree of juniper establishment and understory characteristics) can also convey various runoff and erosion

responses. Extensive bare ground (>50%) is particularly prone to erosion during flooding events (Pierson et al. 2010).

Restoration activities may improve erosion outcomes. Pierson et al. (2007) demonstrated that runoff and soil erosion were significantly reduced in recovered sites 10 years after juniper trees were removed. In addition, depending on site-specific conditions, when catastrophic hydrologic events occur, a host of downstream impacts may ensue, including mass-wasting of hill slopes and degradation of river banks, as well as changes in stream hydrology and vegetation composition.

The Rangeland Hydrology and Erosion Model is a web-based application that uses inputs such as soil, vegetation cover, slope, and simulated storm intensity to predict runoff and erosion rates (Nearing et al. 2011). The utility of this tool is that it "should be capable of capturing the mechanics of how plant species, disturbances (such as fire), climate change, and management practices affect erosion rates on rangelands" (Nearing et al. 2011). Land managers can use this model to identify particular areas at risk of erosion and implement conservation actions accordingly.

Conservation Objective

Ensure that suitable sage-grouse habitat is resilient to catastrophic flooding by maintaining or enhancing existing shrub-steppe plant communities.

Conservation Action

Implement conservation actions that prevent erosion and runoff in sage-grouse habitat, including the development of proactive plans to adaptively manage grazing in areas affected by catastrophic flooding.

Action FLD-1: Use the Rangeland Hydrology and Erosion Model to identify areas in sage-grouse habitat with a high susceptibility to erosion risk during catastrophic flooding events and, where appropriate, develop and implement strategies to minimize erosion risk.

Action FLD-1-1 Prioritize erosion mitigation activities (juniper removal, seedings, plantings, etc.) in areas identified by Rangeland Hydrology and Erosion Model that are proximal to key sage-grouse habitat, with special focus on areas that have burned.

Action FLD-1-2 Evaluate stream segments to identify areas critically at risk of erosion and identify and implement measures to enhance stream function.

Action FLD-2: Implement grazing management plans that contribute to the health of sage-grouse habitat and include conservation measures for catastrophic flooding conditions.

Action FLD-2-1 Follow recommended grazing guidelines during catastrophic flooding conditions to meet seasonal sage-grouse habitat requirements (see Appendix 4). Consider adjustments in (1) season or timing of use; (2) numbers of livestock (including temporary

nonuse or livestock removal); (3) distribution of livestock use; (4) intensity of use; and (5) type of livestock.

Action FLD-3: Support infrastructure and resources in advance of catastrophic flooding or other environmental conditions so that livestock producers are able to adjust grazing as required.

Action FLD-3-1 Provide educational opportunities for permittees and private landowners to learn about sage-grouse habitat requirements and conservation measures they can implement to improve rangeland conditions for livestock and sage-grouse.

Action FLD-3-2 Create "grass banks" or reserve forage areas as alternative grazing opportunities to provide rest for over-utilized rangelands or allotments, or to be utilized during or in response to catastrophic flooding, post-fire or after restoration work. Do so in a manner compatible with livestock operations locally.

Action FLD-3-3 Identify opportunities to compensate landowners for the cost of implementing conservation measures associated with catastrophic flooding and facilitating practices to benefit sage-grouse and their habitat.

Responsible Parties
Private landowners, BLM, DSL

e. Predation

Nature and Extent of the Threat
The USFWS did not identify predation as a significant rangewide threat to sage-grouse in the 2010 "warranted but precluded" finding.[74] As a prey species, sage-grouse are subject to predation throughout their life history, and in fact, the ultimate fate for most sage-grouse is to be eaten. Sage-grouse are not the primary prey for any predator. Instead, predators that typically prey on rodents, rabbits, and hares also take sage-grouse. Predators of chicks and adult sage-grouse include coyotes, red fox, badgers, bobcats, and several species of raptors, while egg depredation is frequently attributed to weasels, raccoon, common ravens, black-billed magpies, coyotes, badgers, bobcats, and snakes. Sage-grouse eggs, chicks, and males on leks are most vulnerable to predation, and females have their highest mortality during the breeding season (Davis et al. 2014). As adults, sage-grouse have relatively high survival rates throughout the late summer and during the winter.

Few studies have demonstrated that predation strongly influences sage-grouse population shifts except for isolated populations in degraded habitats (Baxter et al. 2007), and no conclusive research has been conducted in Oregon to investigate how predation may limit sage-grouse population growth. Annual survival rates for adult sage-grouse are 45-60%, with females

[74] 75 Fed. Reg. 13910 (March 23, 2010)

having higher survival rates than males (Connelly et al. 2011). Predation is the primary cause of adult annual mortality. Predation on nests and chicks can also be high in some areas (Coates et al. 2008; Lockyer et al. 2013), but sage-grouse have comparatively high rates of nest success and adult survival, which suggests that predation is not a limiting factor rangewide.

Predator populations are known to increase in association with human activity. Predators benefit from human-supplied food resources, such as road-killed carrion, artificial water sources, landfills, livestock carcasses, and cereal crops (Newsome et al. 2013). Human structures also assist predators by providing additional denning, roosting, nesting, or perching sites. Further, human disturbance can help predators achieve greater hunting efficiency in fragmented or degraded landscapes. Predator subsidies (i.e., human activities that assist predators) are linked to increased raven populations, which have increased an estimated ≥4-fold in the western United States over the last 40 years.

Predator removal programs can achieve short-term population response benefits for sage-grouse, but their ultimate utility as a conservation tool is less established. Lethal removal of predators in vast landscapes is not cost effective or practical (Willis et al. 1993), and complete removal of the target predator is unlikely. In addition, lethal removal may result in unintended consequences (e.g., an increase in other predator species), and predator populations are generally capable of rebounding quickly once pressure is lifted.

Lethal control of predators may be useful as a short-term management tool to increase nest success and survival when localized sage-grouse populations are declining and have reached a critically low population threshold (Baxter et al. 2007). In degraded habitats, sustained predator control and removal of predator subsidies may increase nest success and chick survival to prevent further population declines, while allowing time for habitat improvement. Lethal predator control could also be used prior to and after releases of sage-grouse as part of efforts to reintroduce them in a given area or to augment local populations. Translocated birds are more vulnerable to predation until they become familiar with their new location (Musil et al. 1993).

Because predator control programs at a scale and extent likely to benefit sage-grouse would require a sustained effort with uncertain results—as well as a high level of cost and controversy—managers must carefully consider when to use this management tool (Treves and Karanth 2003). A management approach likely to achieve long-term conservation goals would be built upon a foundation that (1) addresses habitat conditions that ultimately limit sage-grouse production (e.g., hiding cover, food resources) and provide advantages to predators (e.g., fragmented habitat, non-native vegetation); and (2) eliminates human-based predator subsides that artificially boost predator populations. Predator removal, in conjunction with this foundation, could be an appropriate management action to address localized and critical population declines, or during sage-grouse reintroduction programs. Divorced from those

scenarios and the underlying foundation, however, predator removal risks being a costly and uncertain treatment of what is a symptom, and not the primary threat to sage-grouse, which is generally habitat loss, degradation, and fragmentation.

Conservation Objective

Minimize the effects of predation by (1) addressing habitat declines—generally the primary threat associated with long-term to sage-grouse population viability—in order to improve habitat quality and resilience; (2) reducing predator subsidies (i.e., human activities that assist predators) that artificially bolster predator populations; and (3) implementing predator control programs locally, where predators are implicated in population declines or during population reintroduction or augmentation programs.

Success on the Ground: Addressing Predator Subsidies through CCAAs

Strategies to remove or reduce anthropogenic subsidies that result in localized increases in predator populations, as well as offering them additional hunting advantages, are infused throughout conservation measures related to other threats that have been described previously. For instance, the site-specific plan development process for landowners participating in CCAAs recommends identification and elimination of predator subsidies. In the context of a private landowner, this may mean altering how livestock carcasses and other refuse are disposed of, installing perch deterrents on existing tall structures, and avoiding construction of new structures within designated buffers around lek locations. Reduction of predator subsidies is also a requirement of future developments associated with energy, infrastructure, and recreational facilities. This means avoiding development activities within PACs and, when development is determined to be unavoidable in sage-grouse habitat, designing infrastructure to minimize the benefits to predators. Lastly, conservation actions already implemented or under way that address habitat loss and fragmentation (as described in previous sections) also indirectly address the threat of predation. Because predators gain an advantage in identifying and capturing prey with increased edges between intact and degraded habitat, conservation measures designed to maintain large, contiguous areas of sage-grouse habitat reduce this effect.

Conservation Actions

Action PRD-1: Use Implementation Recommendations and Guidelines (see Appendix 4) to reduce anthropogenic influences that artificially boost predator populations or provide predator hunting advantages in PACs and within four miles of leks.

Action PRD-2: Where sage-grouse populations are declining, evaluate the localized influence of predators relative to other factors. If predators are implicated in local population declines, consider predator control programs in combination with reductions in predator subsidies (Acton PRD-1) to provide a short-term conservation benefit, while also addressing habitat loss, degradation, and fragmentation (unless it is not a causal factor of population declines).

Action PRD-2-1 When predation-based downward population trends and declining nesting success are detected, initiate predator surveys to identify the responsible predator species and relevant control efforts for a given species.

Action PRD-2-2 When determined to be needed, pursue take permits for corvids from the USFWS under the Migratory Bird Treaty Act.

Action PRD-2-3 Implement nonlethal methods to reduce predator subsidies in conjunction with lethal predator removal programs.

Action PRD-2-4 Monitor predator control programs to determine effects on sage-grouse nest success, recruitment, survival, and population trends. Adapt control strategies accordingly.

Action PRD-3: Consider implementing local predator threat reduction programs to promote the success of translocation efforts. Threat reduction should include removal of predator subsidies and may also include predator removal programs.

Responsible Parties:
ODFW, SWCDs, private landowners, USFWS, BLM, DSL

f. Hunting

Nature and Extent of the Threat
Pursuant to ORS 496.138, 496.146, and 496.162, as well as associated administrative rules (OAR Divisions 008, 051, 053, and 060), ODFW advances licensed, regulated hunting and harvest management. Oregon's sage-grouse hunting seasons are based on a long history of monitoring, surveying, and research. The current license system allows ODFW to closely control the harvest of sage-grouse. Each year, ODFW projects the fall population of sage-grouse based on lek counts and summer production inventories. ODFW has a policy (supported by relevant scientific and wildlife management literature) not to harvest more than 5% of the fall population, with harvest usually estimated at around 3% of the fall population. In addition, hunting currently occurs in less than half (48%) of the state wildlife management units (WMUs) where the bird exists. This policy and corresponding harvest levels are captured in the Oregon Upland Bird Hunting Regulations, published annually.

Compared to other states that offer a sage-grouse hunting season, Oregon's hunting season is among the most conservative:

- Oregon's hunt is limited-entry for each WMU.
- Permit numbers reflected in Oregon's hunting regulations are allocated to take no more than 5% of the fall population (3% or less in practice).

- Sage-grouse are not hunted rangewide in Oregon. In 2014, the most recent year for which data exist, ODFW offered permits in 10 of 21 (48%) of the WMUs where sage-grouse occur.
- Each permit holder is allowed only two sage-grouse per season.

In addition, ODFW takes advantage of the sage-grouse hunting season to gather the most biological information possible—data that would be difficult or expensive to collect otherwise. All hunters are provided envelopes to submit one wing from each bird harvested. ODFW receives tremendous cooperation from hunters, with wings from 65% of the annual harvest returned. ODFW biologists obtain a large amount of information about sage-grouse populations from the sample of wings, including sex, age, proportion of successfully nesting hens, timing of hatch, and more (see West Nile virus subsection above).

In 2014, ODFW estimated there were 17,227 sage-grouse in the fall population in the 12 wildlife management units that permit sage-grouse hunting and made 845 permits available, of which 470 were issued. In 2014, the statewide harvest of sage-grouse was estimated to be 451 birds, or 2.6% of the fall population. As in prior years (Table IV-12), this is well below ODFW's conservative harvest policy of less than 5% of the fall population as well as the harvest rate of 10% or less, which is the figure that appears in peer-reviewed sage-grouse management recommendations and guidelines (Connelly et al. 2000). It is also consistent with recently published peer-reviewed science from Colorado and Nevada, which found "at harvest rates <11%, harvest is unlikely to have an important influence on local population dynamics of sage-grouse" (Sedinger et al. 2010).

Table IV-12. Estimated fall sage-grouse population, permits allowed and issued, and estimated harvest (2009–2014).

Year	Estimated Fall Population[1]	Permits Allowed	Permits Issued	Estimated Harvest	% of Fall Population Harvested
2009	24,550	1,150	803	783	3.2
2010	28,629	1,150	724	745	2.6
2011	22,645	1,130	654	633	2.8
2012	27,795	880	518	502	1.8
2013	16,446	870	501	360	2.2
2014	17,227	845	470	451	2.6

[1] Estimated fall population only in WMUs open to hunting; (estimate does not include sage-grouse from nonhunted units).

Conservation Objective

Ensure that state-regulated hunting remains consistent with the conservation and long-term viability of sage-grouse populations. Minimize the effects on isolated or declining populations.

Conservation Actions

Because of the restrictive and conservative nature of Oregon's current approach to regulated hunting of sage-grouse, this Action Plan does not propose additional immediate restrictions on hunting.

Action HNT-1: Maintain ODFWs harvest policy of less than 5% of the fall population.

Action HNT-2: Do not authorize recreational harvest of sage-grouse in wildlife management units where the estimated spring population is <100 males in consecutive years.

Responsible Parties:

ODFW

Success on the Ground: ODFW Adaptive Harvest in Response to Population Trends or Habitat Conditions

ODFW adapts sage-grouse harvest in response to changing local habitat conditions or population trends. For instance, the Whitehorse WMU was entirely closed to hunting in 2012 due to the uncertainty about the effects of the Long Draw and Holloway fires. Permit numbers were also reduced in that same year in the Juniper WMU because of the Miller-Homestead fire. In 2013, a portion of the Whitehorse WMU was reopened and permit numbers were allocated based on the population projections in the open area. In 2013, permit reductions continued in the Juniper WMU. In 2014, no permits were offered in the Lookout Mountain and Sumpter units due to declining population trends in these units and the uncertainty over the impacts of wildfires, particularly the Kitten Complex, which likely impacted the habitat around some of the largest leks in the WMUs. The partial closure in the Whitehorse WMU was continued in 2014 due in part to the ongoing research in the Trout Creek Mountains to assess the impacts of the large wildfires of 2012.

g. Insecticides

Nature and Extent of the Threat

Insect infestations can pose significant damage to croplands, as well as to sagebrush-steppe vegetation (Redak et al. 1992; Welch 2005). Yet, these insects provide important ecosystem functions by cycling nutrients and providing a food source to birds and other wildlife (Branson et al. 2006). Though the COT Report (USFWS 2013) does not identify insecticides used to control infestations as a widespread threat to sage-grouse, organophosphorous insecticides can cause mortality among sage-grouse (Blus et al. 1989). Because sage-grouse are known to use areas adjacent to or within agricultural fields during brood rearing, care must be taken in the use of insecticides to minimize potential impacts to sage-grouse. A summary of the direct and indirect impacts of insecticides was prepared by the USGS (Manier et al. 2013). Direct effects result from the varying degrees of toxicity of insecticides to sage-grouse. Indirectly, these chemicals reduce the availability of insects that are an important component of brood-rearing diets.

Conservation Objective

Balance objectives to prevent long-term insect damage to croplands and sagebrush with the positive ecosystem effects stimulated by insects, the need to maintain an insect forage base for sage-grouse, and the need to avoid direct mortality to sage-grouse.

Conservation Actions

Action INS-1: Prioritize treatment of insect infestations that could lead to significant loss of sagebrush plant communities in PAC areas while minimizing direct (mortality) and indirect (reduction of forage) impacts to sage-grouse.

Action INS-2: Use Implementation Recommendations and Guidelines pertaining to the use of insecticides in sage-grouse habitat (see Appendix 4).

Action INS-3: Evaluate the use of other, nonchemical alternatives to treat or prevent insect infestations that are safe for wildlife.

Responsible Parties:

SWCDs, ODA, the Animal and Plant Health Inspection Service, private landowners

h. Sagebrush Defoliator Moth

Nature and Extent of the Threat

As a result of specific temperature and precipitation events, outbreaks of the sagebrush defoliator moth (*Aroga websteri*) can occur, causing extensive damage to rangelands in the Great Basin (Bolshakova 2013). The moth is destructive to its sagebrush host during the larval stage, when larvae cut sagebrush leaves with which they form cocoons (Gates 1964). During outbreaks, this behavior can kill the host plants outright or retard leaf and flower production among surviving plants.

Although the Aroga moth is widespread throughout its native range, its impact on sagebrush ecosystems can vary considerably. Aroga moth outbreaks are a natural phenomenon, and any impacts to sage-grouse habitat are temporary. During outbreaks, the moth appears to be most concentrated on north-facing slopes that tend to be more resistant and resilient to disturbances, such as annual-grass infestation and wildfire (Bolshakova 2013). However, when dense sagebrush stands with degraded understories are killed, the risk of invasive annual-grass establishment or infestation exists. The loss of sagebrush caused by *A. websteri* must also be considered in combination with other natural or human-caused habitat loss or fragmentation. Another consideration is that when the moth kills large areas of sagebrush, additional fuels are generated that can contribute to wildfire intensity.

Recent research has identified naturally occurring parasites of the moth during its immature stages that can reduce moth numbers (Bolshakova 2013). Additional investigations are required to determine the potential to use these parasites in biocontrol efforts during Aroga moth

outbreaks. Further research is also required to determine potential interactions between grazing and Aroga moth outbreaks. Bolshakova (2013) postulated that grazing could interfere with the abundance and diversity of Aroga moth parasites and thus indirectly contribute to moth outbreaks.

Outbreaks of Aroga moth have occurred in Oregon and have had significant impacts. For example, during the period 1961 to 1964, an estimated 12 million acres of sagebrush were infested and 10-15 thousand acres of sagebrush in Malheur County were killed (Gates 1964). More recently, an outbreak in 2012 impacted several thousand acres in southeast Oregon. Outbreaks of this scale result in large contiguous areas of dead sagebrush that reduce habitat value to sage-grouse, contribute to fuel loads, and are at risk of invasion by annual grasses.

Conservation Objective
Protect sage-grouse habitat by monitoring for Aroga moth outbreaks and prioritizing impacted areas for wildfire prevention and restoration work.

Conservation Actions
Action SDM-1: Assess areas impacted by Aroga moth to determine the extent of damage to sagebrush and recommended guidelines and activities to reduce the risk of annual grass invasion and wildfire (see Appendix 4).

Action SDM-2: Monitor sage-grouse habitat for Aroga moth outbreaks. As bio-control methods are developed, consider their use where warranted.

Responsible Parties:
BLM, private landowners, LITs, county weed boards, ODA, SWCDs, NRCS, DSL

i. Noxious Weeds (other than cheatgrass and medusahead)

Nature and Extent of the Threat
As discussed in Section IV.iii, invasive annual grasses are a primary threat to sage-grouse habitat and conservation in Oregon. Non-native plants other than annual grasses present an additional threat to sage-grouse and their habitat, even if not as widespread or impactful at the landscape scale. Like annual grasses, these non-native weeds can permanently degrade sage-grouse habitat.

Noxious weeds present in Oregon's sage-grouse habitat include:

- Canada thistle (*Cirsium arvense*)
- Knapweeds (*Acroptilon repens, Centaurea* spp.)
- Perennial pepperweed (*Lepidium latifolium*)
- African wiregrass *(Ventenata dubia)*
- Red and Japanese brome (*Bromus rubens* and *B. japonicus*)

- Dyer's woad (*Isatis tinctoria*)
- Whitetop (*Lepidium draba*)
- Yellow starthistle (*Centaurea solstitialis*)
- Scotch thistle (*Onopordum acanthium*)
- Musk thistle (*Carduus nutans*)

Conservation Objective

(1) Prevent the spread of noxious weeds in areas at high risk for invasion; (2) contain existing infestations; and (3) restore healthy sagebrush communities in areas with the greatest probability of success by developing and implementing effective invasive plant management plans.

Conservation Actions

Action NXW-1: Enlist LITs and CWMAs in cooperation with state, federal, and private land managers to apply local expert knowledge in conjunction with the spatial decision support tool (currently under development) to develop regional strategic work plans that identify priority areas to address noxious weeds, timelines, and responsible parties. Regional strategic work plans should identify areas for invasive annual-grass *prevention*, *treatment and restoration*, and *containment*. More detailed actions relating to these three invasive plant management approaches are listed below.

> **Action NXW-1-1** As part of regional strategic work plans, develop GIS layers with polygons spatially representing priority areas for noxious weed treatment and containment (note: coarse layers have already been created by FIAT coordinated by the BLM for Focal Habitat and Planning Areas specific to that process).

Action NXW-2: Encourage landowners to enroll in habitat management assistance programs (e.g., CCAAs, SGI, and others) to ensure that technical expertise through ODFW, NRCS, SWCDs, and/or the OSU Extension Service is available to landowners to address noxious weed issues.

> **Action NXW-2-2:** Direct funding to ensure that adequate funds and staff capacity are available for development and implementation of conservation measures identified in site-specific habitat management plans.

Action NXW-3: Implement noxious weed management plans for each PAC that identify priority areas for *prevention*.

> **Action NXW-3-1** Prioritize proactive herbicide treatments as a prevention strategy in recently burned areas, particularly areas with low resistance and resilience that are proximal to valuable sage-grouse habitat. Prioritize sites within four miles of leks (active or pending) and sites <2 miles from "key habitat," defined as areas with 75% breeding bird density and where sagebrush land cover is >65%.

Action NXW-3-1a Remove administrative and policy barriers that delay herbicide treatments from the most effective implementation timeframe.

Action NXW-3-2 Conduct systematic and strategic surveys to detect areas of expanding noxious weeds and expedite reporting and treatment of new infestations.

Action NXW-3-3 In priority noxious weed prevention sites, limit disturbance within and around all remaining large, intact sagebrush patches, particularly in low-elevation sites with low resistance and resilience, because these sites are highly vulnerable to noxious weed invasion once desirable species are removed or disturbed.

Action NXW-3-4 Require general techniques to prevent human-caused spread of noxious weeds resulting from road maintenance (e.g., blading), construction/development, and OHV activity, as well as during fire suppression activities.

Action NXW-3-5 Suppress fire in areas within or proximal to valuable sage-grouse habitat that are particularly vulnerable to noxious weed invasion.

Action NXW-3-6 Utilize grazing management techniques to increase the resilience of systems to noxious weed establishment.

Action NXW-3-7 Monitor areas impacted by ground-disturbing activities for a minimum of three years and apply herbicide to new invasions of noxious weeds expeditiously.

Success on the Ground: Oregon Department of Agriculture Noxious Weed Control Program.

The ODA Noxious Weed Control Program has authority under ORS 569 to coordinate and implement noxious weed control projects with federal, state, county, and private land managers to protect the natural resources of the state. ORS 569.180 identifies noxious weeds as a public nuisance and states, “In recognition of the imminent and continuous threat to natural resources, watershed health, livestock, wildlife, land, and agricultural products of this state, and in recognition of the widespread infestations and potential infestations of noxious weeds throughout this state, noxious weeds are declared to be a public nuisance and shall be detected, controlled and, where feasible, eradicated on all lands in this state. It is declared to be the policy of this state that priority shall be given first to the prevention of new infestations of noxious weeds and then to the control and, where feasible, eradication of noxious weeds in infested areas.”

Action NXW-4: Implement invasive plant management plans for each PAC that identify priority areas for *treatment* and *restoration*.

Action NXW-4-1 Prioritize treatment and restoration of invaded sites with the greatest potential to succeed (e.g., areas with moderate infestations or areas with inadequate perennial species in medium-to-high resistance and resilience) that are proximal to valuable sage-grouse habitat.

- Prioritize sites within four miles of leks (active or pending) and sites <2 miles from "key habitat," defined as areas with 75% breeding bird density and where sagebrush

land cover is >65%. Over time, expand treatment and restoration activities outward from key habitat patches.

Action NXW-4-2 Prioritize restoration efforts in recently burned areas, particularly areas that are proximal to valuable sage-grouse habitat.

- Prioritize sites within four miles of leks (active or pending) and sites <2 miles from "key habitat," defined as areas with 75% breeding bird density and where sagebrush land cover is >65%.

Action NXW-4-3 Implement successful new techniques such as “precision restoration” and bio-controls, in areas where they are expected to be effective.

Action NXW-4-4 Monitor restoration projects for effectiveness and repeat rehabilitation activities as required.

Action NXW-5: Implement invasive plant management plans for each PAC that identify priority areas to *contain* existing patches of noxious weeds.

Action NXW-5-1 Implement and maintain containment programs for large infestations that may include the following techniques: (1) border spraying, (2) establishing a barrier to expansion with aggressive perennial species that are competitive with noxious weeds, (3) biological control agents, and/or (4) targeted grazing.

Action NXW-5-2 Prioritize containment where large infestations of noxious weeds threaten highly valuable sage-grouse habitat. Prioritize sites within four miles of leks (active or pending) and sites <2 miles from "key habitat," defined as areas with 75% breeding bird density and where sagebrush land cover is >65%. Also prioritize meadows and riparian areas where noxious weeds impact brood-rearing habitat.

Action NXW-6: Develop grazing management plans for lands and allotments enrolled in CCAAs and CCAs, as well as other Farm Bill programs that employ grazing techniques that maintain or improve the perennial native grass and shrub community, and that prevent the spread of noxious weeds.

Action NXW-6-1 Assess pastures/allotments dominated by Wyoming big sagebrush and prioritize implementation of proper grazing management plans for those with documented improper grazing impacts to native perennial grass and forbs, and soil biotic crusts.

Action NXW-6-2 Identify allotments with noxious weeds and implement control measures to prevent the transfer of invasive species via livestock.

Action NXW-6-3 Evaluate and treat heavily used areas (e.g., water sources or transfer areas) for noxious weed invasions and prioritize for treatment and containment actions.

Action NXW-6-4 Utilize targeted livestock grazing to reduce annual invasive plants, increase desirable perennial grasses and forbs, and maintain and increase desired habitat structure.

Action NXW-7: Support infrastructure, resources, and research that will enhance noxious weed prevention and habitat restoration.

Action NXW-7-1 Support ongoing research and pilot efforts evaluating noxious weed prevention and control techniques and precision restoration technologies seeking to improve the likelihood of success when actively restoring sagebrush sites. Advance treatments that employ these new techniques and technologies in order to test their effectiveness, and expand to a wider scale where effective.

Action NXW-8: Designate "grass banks" or reserve areas for grazers to utilize when rest is recommended on existing allotments or pastures, or to be utilized during drought conditions, post-fire, or after restoration work in order to ensure restoration treatment success. Do so in a manner compatible with livestock operations locally.

Action NXW -8-1 Remove administrative barriers to establishing "grass banks" on federal land.

Action NXW -8-2 Maintain fencing and other improvements on "grass banks" so they are ready for use as need emerges.

Action NXW -8-3 Assess "grass banks" to determine whether, if ungrazed, they are contributing to fire risk/fuel loads, and use grazing as a management tool to reduce fuel loads if required.

Action NXW-9: Remove administrative or procedural barriers to noxious weed management.

Action NXW-9-1 Support policy changes to remove the court-ordered injunction prohibiting the use of herbicides on all federally administered lands in Oregon.

Action NXW-9-2 Support restructuring of the post-fire emergency stabilization and restoration (ESR) funding scheme to ensure that adequate funds are available for long-term post-fire habitat management.

Action NXW-9-3 Support development of a post-fire emergency stabilization and restoration program for private lands.

Action NXW-9-4 Coordinate with state and federal agencies to develop consistent procedures and policies for the treatment of noxious and invasive plants, chemical usage, and timing.

Action NXW-9-5 Support funding infrastructure and resources for federal-, state-, and county-level noxious weed control programs, which are key to sage-grouse habitat protection.

Responsible Parties:
LITs, ODFW, BLM FIAT, USFS, ODFA, RFPAs, BLM, NRCS, ARS, DSL, ODA, OSWB, OWEB, OSU, CWMAs, county weed departments, SWCDs, watershed councils, private landowners

Success on the Ground: Using Biological Controls (Insects) in Lake County to Combat Canada Thistle

In Lake County, control of noxious weeds is a high priority, and local partners, including federal and state agencies, are cooperating to address noxious weeds. Some areas in Lake County are being invaded by Canada thistle in the riparian habitats of the Deep Creek Watershed (Warner WMU), and some of those areas are used for late-season brood rearing. At this time, BLM and the Lake County Cooperative Weed Management Area are releasing specialized insects and appear to be having some success.

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Glossary

A

Action Areas
Provide guidance on where to focus mitigation actions associated with impacts to sage-grouse habitat from renewable energy development and its associated infrastructure, or other large-scale industrial-commercial development projects, consistent with the Oregon Department of Fish and Wildlife's (ODFW's) Mitigation Framework for Sage-Grouse Habitats.

All-lands, all-threats approach
An approach to planning that looks across all land ownerships to address the full suite of threats.

Areas of high population richness
Mapped areas of breeding and nesting habitat within core habitat that support the 75th percentile of breeding bird densities (i.e., the top 25 percent).

B

Bunchgrass
Native perennial grass that grows in a bunch, unlike many non-native perennial grasses that form sod and have rhizomes. Native bunchgrasses support forb-rich communities and are more drought resistant than rhizomatous grasses, but are more vulnerable to livestock damage.

C

Candidate Conservation Agreement (CCA)
A formal agreement between the United States Fish and Wildlife Service (USFWS) and one or more parties to address the conservation needs of proposed or candidate species, or species likely to become candidates, before they become listed as endangered or threatened. Landowners voluntarily commit to conservation actions that will help stabilize or restore the species, with the goal that listing under the Federal Endangered Species Act will become unnecessary.

Candidate Conservation Agreement with Assurances (CCAA)
An agreement that provides incentives for nonfederal property owners to engage in voluntary conservation activities that can help make listing a species unnecessary. More specifically, a CCAA provides participating property owners with a permit containing assurances that, if they engage in certain conservation actions for species included in the agreement, they will not be required to implement additional conservation measures beyond those in the CCAA. Also, additional land-, water-, or resource-use

limitations will not be imposed on them, should the species become listed in the future, unless they consent to such changes.

Conflicting use
A land use, or another activity reasonably and customarily subject to land-use regulations, that could adversely affect a significant Goal 5 resource (except as provided in OAR 660-023-0180[1][b]). Local governments are not required to regard agricultural practices as conflicting uses.

Connectivity, Landscape
Describes the degree to which movement is facilitated or impeded by the landscape. Connectivity consists of both structural and functional components. Structural connectivity describes the physical arrangement of habitat patches and the relationships between them. Functional connectivity describes the degree to which the landscape does or does not provide means for movement of animals and ecological processes to occur such as natural species genetic exchange. Many wildlife species, including the greater sage-grouse, require different areas for different parts of their life history, including areas to mate (leks), areas to raise young in the spring and summer, and areas in which to winter. It is important that wildlife can freely move between each of these areas.

Conservation action
Any activity or action which, when implemented or continued to be implemented, will reduce or remove threats to sage-grouse and/or will improve or maintain sage-grouse populations and/or healthy sagebrush-steppe habitat.

Core Areas
Mapped habitats that support sage-grouse annual life history requirements. Core Areas encompass land areas (a) of very high, high, and moderate lek-density strata; (b) where low lek-density strata overlap local connectivity corridors; and (c) where winter habitat-use polygons overlap with either low lek-density strata, connectivity corridors, or occupied habitat. Core Area maps are maintained by the ODFW.

Core Area approach
A conservation strategy that is based on the maintenance of Core Areas.

Conservation objectives and measures
Objectives identified as necessary to allow for conservation outcomes, and actions to be taken to accomplish the objectives. “Measures” can be identified to achieve outcomes or to illustrate how habitat or species are changing over time.

COT Report
Report of the Greater Sage-Grouse Conservation Objectives Team (COT) describing the conservation needs of the greater sage-grouse and assembled by the USFWS. The final

report, *Greater Sage-Grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report* (2013), is available online at (http://www.fws.gov/greatersagegrouse/documents/COT-Report-with-Dear-Interested-Reader-Letter.pdf).

Crucial Habitat Assessment Tool (CHAT)
An online tool developed to assist regional planning efforts by establishing a common starting point for discussing the intersection of development and wildlife. The tool is managed by the Western Association of Fish and Wildlife Agencies (WAFWA). CHAT is designed to reduce conflicts and surprises while ensuring that wildlife values are better incorporated into land-use planning, particularly for large-scale linear projects. It is a nonregulatory tool and not intended for project-level approval.

D

Development action
Any human activity subject to regulation by local, state, or federal agencies that could result in the loss of significant sage-grouse habitat. Development actions may include, but are not limited to, construction and operational activities of local, state, and federal agencies. Development actions also include subsequent re-permitting of existing activities that propose new impacts beyond current conditions.

Direct impact
An adverse effect of a development action upon significant sage-grouse habitat which is proximal to the development action in time and place.

Disturbance
Includes natural threats to sage-grouse habitat such as wildfire, juniper infestation, and the spread of noxious weeds or human activities that can negatively affect sage-grouse use of habitat, either through changing the vegetation type or condition or displacing sage-grouse use of an area.

E

Endangered Species Act (ESA)
A federal law passed by Congress in 1973, designed to protect and recover imperiled species and the ecosystems upon which they depend. It is administered by the U.S. Fish and Wildlife Service and the Commerce Department's National Marine Fisheries Service (NMFS). The State of Oregon also passed the state Endangered Species Act in 1987. Oregon's endangered species list includes all native species listed under the federal ESA as of May 15, 1987, plus any additional native species determined by the appropriate state agency to be in danger of extinction throughout any significant portion of its range within the state.

Ecosystem
A community of living organisms and the nonliving components of their environment (e.g., air, water, and mineral soil) interacting as a system.

F

Farm Bill
Federal legislation also known as the Agricultural Act of 2014 that provides authorization for services and programs that fund many of the activities in the U.S. Department of Agriculture.

Forb
Herbaceous or non-woody plant, generally growing on the ground, usually a flowering plant. There are both annual forbs, which flower, set seed, and die each year, and perennial forbs, which grow back year after year from underground roots. Forbs are important food items for greater sage-grouse when rearing young chicks.

G

Gathers
Efforts result in the capture and transport of free-roaming horses and burros from federal land to protect land health and functioning

General habitat
Sage-grouse habitat (seasonal or year-round) outside core and low-density habitats that birds are known to use. Synonymous with “occupied habitat”.

Goal 5 (Statewide Planning Goal 5)
Originally adopted in 1979, Goal 5 and its associated Oregon Administrative Rules (Chapter 660, Divisions 16 and 23) require local governments to adopt programs that protect natural resources and conserve scenic, historic, and open space resources on private lands for present and future generations. Special safeguards designed to protect wildlife are typically advanced by Oregon’s cities and counties at the local ordinance and comprehensive plan level.

Grass bank
A physical place where forage is made available to ranchers, at a reduced fee, in exchange for conservation benefits being produced on participant ranches, which may include private rangeland as well as federal or state allotments. A grass bank may also serve as a *de facto* ranch community insurance policy, where forage is made available in the event of natural disaster (e.g., wildfire).

Greater Sage-Grouse Comprehensive Conservation Strategy (2006)
A publication of the Western Association of Fish and Wildlife Agencies’ National Sage-Grouse Conservation Planning Framework Team designed “to develop the partnerships

needed to design and implement actions to support robust populations of sage-grouse and the landscapes and habitats upon which they depend.
http://wdfw.wa.gov/publications/01317/wdfw01317.pdf

Greater Sage-Grouse Conservation Assessment and Strategy for Oregon ("2011 Strategy")
Oregon's 2011 plan for the conservation of the greater sage-grouse. Available online at http://www.dfw.state.or.us/wildlife/sagegrouse/docs/20110422_GRSG_April_Final%2052511.pdf

I

Indirect impacts
Adverse effects to significant sage-grouse habitat that are caused by or will ultimately result from a development activity. Indirect impacts usually occur later in time or are removed in distance, compared to direct effects.

Invasive species
Plants, animals, or pathogens that are not native to the ecosystem and whose introduction causes or is likely to cause harm to the ecosystem, economy, or human health.

K

Key Habitat

Sage-grouse key habitat incorporates several habitat designations further described in this glossary. They include: Core Areas; Priority Areas for Conservation (PACs); low-density areas; and significant habitat.

L

Land Conservation and Development Commission (LCDC)
Oregon's primary land-use policy making body, composed of volunteers appointed by the governor and confirmed by the Senate, which adopts state land-use goals and implements rules, assures local plan compliance with the goals, coordinates state and local planning, and manages the coastal zone program.

Landscape-level
A look at a large landscape. When planning or evaluating actions, reviews are often done at local levels, which examine the area immediately around the proposed project or planning area. Some highly mobile species or large projects require a review of a larger area, sometimes a subwatershed or watershed, sometimes a region. This is often referred to as a landscape-level assessment. When referred to as a spatial scale, it typically lies somewhere between broad and local scales.

Large-scale development
Uses that are more than 50 feet in height; have a direct impact in excess of five acres; generate more than 50 vehicle trips per day; or create noise levels of at least 70 dB at zero meters for sustained periods of time. Large-scale development uses require review by county decision makers and are listed in one of the following categories identified in the table attached to OAR 660-033-0120.

A. Commercial Uses
B. Mineral, Aggregate, Oil and Gas Uses
C. Transportation Uses
D. Utility/Solid Waste Disposal Facilities
E. Parks/Public/Quasi-Public

Lek
An area where one or more males have been observed displaying in two or more of the seven previous observation years.

Lek complex
Generally used for counting all displaying males in a series of leks where no two lek sites are more than one mile apart, but the separation rule is flexible and based on field knowledge of district biologists. A lek complex is as an area that includes all closely allied leks within approximately one mile of each other (C.E. Braun pers. comm., 1999), which male grouse attend on different days during the breeding season.

Local Implementation Team (LIT)
Implementation teams composed of ODFW representatives, land managers, and landowners, which serve to guide on-the-ground conservation efforts in the geographic areas defined by the BLM districts.

Low-density areas or low-density habitat
Locations of mapped sagebrush types or other habitats that support sage-grouse where:

A. Low lek-density strata overlap with seasonal connectivity corridors
B. Local corridors occur outside of all lek-density strata
C. Low lek-density strata occur outside of connectivity corridors
D. Seasonal connectivity corridors occur outside of all lek-density strata.
E. Low-density area maps are maintained by ODFW.

M

Mitigation hierarchy
An approach used by decision makers to consider development proposals. It ordinarily constitutes a three-step process:

A. “Avoidance” is the first step, accomplished by not taking a certain development action or parts of that action.
B. “Minimization” is the second step and is accomplished by limiting the degree or magnitude of the development action and its implementation.
C. “Compensatory mitigation” is the third step and means the replacement or enhancement of the function of habitat capable of supporting sage-grouse in greater numbers than those predicted to be impacted by a development.

O

Occupied habitat
Sage-grouse habitat (seasonal or year-round) outside core and low-density habitats that birds are known to use. Synonymous with “general habitat”.

Occupied lek
A lek that has been regularly visited by ODFW and has had one or more male sage-grouse counted in one or more of the last seven years.

Occupied pending lek
A lek that has not been counted regularly by ODFW in the last seven years, but sage-grouse were present at ODFW’s last visit.

Off-highway vehicle (OHV)
Also known as ATVs or all-terrain vehicles, these represent cars, trucks, motorcycles, and 3- or 4-wheel ATVs that are designed to operate off of paved or maintained roads. OHV use can impact nesting and breeding sage-grouse populations.

Oregon Sage-Grouse Action Plan
Also sometimes referred to as Oregon’s Greater Sage-Grouse Action Plan (“Action Plan”).

P

Playa
Also called an alkali flat, a playa a desert basin with no outlet that periodically fills with water to form a temporary, often very shallow lake.

Priority Area for Conservation (PAC)
Key habitats identified by state sage-grouse conservation plans or through other sage-grouse conservation efforts (e.g., BLM planning). In Oregon, Core Area habitats are PACs.

R

Renewable Energy and Eastern Oregon Landscape Conservation Partnership (REECon Partnership)
A private-public consortium convened by the Oregon Governor’s Natural Resources

Policy Director and the Deputy State Director for the U.S. Bureau of Land Management to address renewable energy development and habitat conservation across Eastern Oregon in relation to sage-grouse and sagebrush issues.

S

Sagebrush-steppe habitat
Steppe habitat of any type refers to grass-dominated areas with generally widely dispersed shrub cover, where shrubs usually make up between 5 and 25% of the cover. Sagebrush-steppe habitats are those in which a sagebrush species is the dominant shrub. In Oregon, most sagebrush-steppe habitat in good condition has native bunchgrasses as dominant, and either Wyoming big sagebrush at the lower elevations, or mountain big sagebrush at the higher elevations, as the dominant shrubs.

Sage-grouse and greater sage-grouse
Interchangeable terms for *Centrocercus urophasianus*, the largest native grouse species in North America, and a ground nesting game bird which occurs in 11 states. The greater sage-grouse is known for spectacular mating displays at its mating sites, or leks.

Sage-Grouse Conservation Partnership (SageCon)
The name for the partnership convened by Governor's Natural Resources Office with the Oregon state office of the U.S. Fish and Wildlife Service and the National Resources Conservation Service. SageCon was designed to develop an "all lands, all threats" approach to supporting community sustainability in eastern Oregon into the future, while addressing the long-term conservation needs for the greater sage-grouse.

Sage-Grouse Initiative (SGI)
A national program launched by the USDA Natural Resources Conservation Service as a partnership of ranchers, agencies, universities, nonprofit groups, and businesses to conserve wildlife through sustainable ranching.

Significant sage-grouse habitat
Sage-grouse habitat that is deserving of protection under statewide Planning Goal 5 and is made up of Core Areas, low-density areas, and lands within 3.1 miles of an occupied or occupied pending lek in general habitat.

State-and-transition model (STM)
Also known as a box and arrow diagram, it describes vegetation and pathways for change in that vegetation. Boxes are created to describe all of the different vegetation conditions or "states" that can occur in a place (usually based on the plants that are present in the area and that can grow in that place), while the arrows describe drivers of the vegetation change. STMs can be used as conceptual models to convey understanding about the system dynamics. STMs have also been used as the framework for several types of simulation modeling software, in which the transitions are given

probabilities and change times, so that vegetation changes can be predicted, based on different management actions, fire probabilities, or succession.

Structural stage
A term that describes how mature vegetation is at any particular location. Most commonly used to describe forests, the word “structure” addresses the size of different parts of the forest. Some forest structure stages include seedling forest, young forest, pole-sized trees, mid-size forest with shrubs, open canopy old forest, or closed canopy old forest. In sagebrush ecosystems, structural stages can include bunchgrasses with few young sagebrush plants, mature sagebrush steppe with 10-20% cover of sagebrush, and old dense sagebrush stands. Structural stages are most commonly used to describe different boxes in box and arrow diagrams and different states in the STMs used in simulation modeling software.

W

Warranted but precluded
A decision that the U.S. Fish and Wildlife Service or the National Oceanic and Atmospheric Administration fisheries office can make in response to a petition to list a species as threatened and endangered under the U.S. Endangered Species Act (ESA). It means that the evidence provided by the petitioner indicates that the species meets the minimum requirements for listing, but the listing cannot occur because the agency has insufficient resources to list, usually because there are other, higher-priority species to be listed.

West Nile Virus (WNv)
A mosquito-borne disease that occurs in tropical and temperate regions, with birds being the most commonly infected animal and serving as the primary reservoir host. Most WNv infections do not cause symptoms in birds or people, but in about 20% of human infections, some symptoms, often serious, can occur.

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