

## Western Association of Fish and Wildlife Agencies (WAFWA)

### Sagebrush Conservation Strategy Concept Description

**Background.** Sagebrush (*Artemisia spp., subspecies Tridentatae*), which originated in and occurs only in the (North)-American west, has been called one of the most imperiled ecosystems in the world. Sagebrush was the dominant vegetation on over 153 million acres at one time, but human activities have eliminated about 41% of the original area of sagebrush, and the sagebrush that remains is altered to varying degrees. Sagebrush provides habitat for more than 350 plant and animal species, including iconic western species like Greater and Gunnison sage-grouse, pronghorn, mule deer, and pygmy rabbits. Other lesser-known species are no less dependent on sagebrush for their survival, including sagebrush sparrow, sage thrasher, Brewer's sparrow, sagebrush lizard and many others.

Cheatgrass, an introduced annual grass, has spread to millions of acres of sagebrush, particularly in the Great Basin where it has provided fine fuels that have facilitated fire starts and increased the size and intensity of fires while dramatically shortening fire return intervals. Significant portions of the sagebrush range within the Great Basin have been converted, irreversibly without significant management intervention, from a sagebrush community to an annual grass community. Another pervasive threat within millions of acres of sagebrush is encroachment by pinyon pine and juniper. This displaces sagebrush dependent species, reduces understory diversity and forage production, and creates an environment where invasive species and fire are more likely.

Loss and degradation of sagebrush has caused corresponding declines in distribution and abundance of sagebrush dependent species, which has triggered concern by management agencies as well as petitions to list these species under the Endangered Species Act (ESA). Petitions include: greater sage-grouse (not warranted in 2005, warranted but precluded in 2010, not warranted [based on the significant reduction in threats resulting from the implementation of Federal and State Conservation Plans] in 2015); Bi-State Distinct Population Segment (DPS) of greater sage-grouse (warranted but precluded in 2010, proposed rule to list as threatened in 2014, proposed rule to list withdrawn in 2015); Gunnison sage-grouse (warranted but precluded in 2000, not warranted in 2006, listed as Threatened in 2014); pygmy rabbits (not warranted in 2005, not warranted in 2010, Columbia Basin DPS Endangered in 2003); Columbian sharp-tailed grouse (not warranted in 2000, 2006); white-tailed prairie dog (not warranted in 2004, 2010), and others.

If current trends in habitat loss and degradation are not reversed, we can anticipate additional petitions to list all these species and more, at range-wide scales and/or for Distinct Population Segments. At the very least, responding to future petitions will siphon off staff time and resources from state and federal agencies that could be directed towards conservation efforts, and if found warranted, could lead to additional restrictions on use of Federal lands in the west. This is problematic for a variety of reasons: loss of sustainable ecosystems, loss of biodiversity, and the loss of economic activity, such as ranching and energy development, with associated negative impacts on livelihoods and communities.

State and Federal management agencies, conservation organizations, Governors, Landowners, and Industry have responded to this challenge collectively to avoid the need to list Greater sage-grouse with the largest collaborative conservation effort ever.

WAFWA, with USFWS funding, produced *The Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats* in 2004, followed by the *Greater Sage-grouse Comprehensive Conservation Strategy* in 2006. WAFWA coordinated the establishment of a Range-wide Interagency Sage-Grouse Conservation Team (RISCT) and an Executive Oversight Team (EOC) to improve communication and coordinate sage-grouse conservation among state and federal agencies. The Natural Resource Conservation Service (NRCS), created the Sage-Grouse Initiative (SGI) in 2010, which has worked in concert with landowners to implement conservation practices for sage-grouse on millions of acres across the West. The Fish and Wildlife Service (FWS) assembled a multi-agency team to develop conservation objectives that, if met, would deter the need to list greater sage-grouse under the ESA. This COT report was finalized in 2013. The 2010 warranted but precluded finding cited inadequate regulatory authority as one of the significant threats to greater sage-grouse, consequently BLM revised all their relevant land use plans and the Forest Service amended Forest Plans to incorporate needed sage-grouse protections. States developed, or updated their Sage-Grouse Conservation Plans, and/or state Governors issued Executive Orders to protect grouse and their habitat.

WAFWA, supported by FWS and BLM funding, recently coordinated efforts to obtain science needed to manage threats to sage-grouse habitat. To complete this, WAFWA established a multi-agency Fire and Invasives Work Group that developed a Resistance and Resilience Decision Support Tool both for the Great Basin and the eastern portion of the range of sage-grouse (Sagebrush Management Resistance and Resilience Tool), prepared an assessment of invasive plant management in the west, held a Western Invasive Weed Management Summit, and initiated the development of a Western Invasive Weed Management Action Plan.

The Secretary of the Department of the Interior responded to the fire and invasive issue through Secretarial Order 3336, *Rangeland Fire Prevention, Management and Restoration*, which made “protecting, conserving, and restoring the health of the sagebrush-steppe ecosystem and, in particular, greater sage-grouse habitat” a critical fire management priority for the Department. The order also called for the Department to work collaboratively with other agencies and stakeholders to develop science products to prioritize areas for conservation for sage-grouse and other sagebrush dependent species, control and reduce the spread of cheatgrass, and enhance restoration techniques. Responses to this order have included, among other products, a *Science Framework for the Conservation and Restoration of the Sagebrush Biome* (Science Framework; in press), which establishes an ecological framework upon which prioritization and management approaches can be based, a set of data layers relative to sage-grouse habitats and threats to those habitats, strategies that managers can employ to address threats (still draft) and an Actionable Science Plan that identifies additional science needs for the future

([http://integratedrangelandfiremanagementstrategy.org/IRFMS Actionable Science Plan.pdf](http://integratedrangelandfiremanagementstrategy.org/IRFMS_Actionable_Science_Plan.pdf)).

**Sagebrush Conservation Strategy.** A phenomenal amount of collaborative conservation planning and implementation has occurred for sage-grouse, which will likely benefit other sagebrush dependent species as well. The intent of the Sagebrush Conservation Strategy is to build on this collaborative effort between State and Federal agencies, academia, tribes, and stakeholders. This starts with gaining an understanding, using the best science we have now or can obtain, the degree to which existing plans and efforts will protect other sagebrush dependent species. The Strategy will identify where sage-grouse conservation measures are likely to fall short (both where and how) for other sagebrush obligates and evaluate management or conservation options to address these gaps. The Strategy will

use an ecosystem approach, because the sheer number of species (plants, animals and insects) that are obligates of, dependent on, or that make significant use of sagebrush habitats makes it clear we can't solve this problem one species at a time. Manipulations to benefit one species could potentially harm others, because species use different sagebrush habitats in different ways. Single species approaches, where conservation efforts may not be implemented until a species has experienced significant declines, are constrained in their ability to incorporate multiple resource values both because of the need to focus on the species at hand (to avoid negative consequences of listing) and because flexibility is limited by the need to protect remaining habitat. Sagebrush ecosystem management, where components and processes of functional sagebrush ecosystems are identified and retained, presents the best opportunity for managing for multiple resource values including traditional human uses, is likely to be the most effective, and in the long-term, the least expensive approach.

The concept for the Strategy begins with the Science Framework by incorporating its' scientific approach across the board, including unapologetically incorporating all aspects of the threat assessments, habitat prioritization methods, resistance and resilience concepts, etc. The Sagebrush Conservation Strategy will consider the needs of other sagebrush obligate and dependent species, while also retaining a focus on human resource needs/values, in addition to identified greater sage-grouse resource needs. The Sagebrush Conservation Strategy will extend the ecological concepts and science tools developed for SO 3336 to other sagebrush dependent species. It will expand upon Interior strategies (under development) to recognize the importance of private lands and explore novel approaches to engage Non-governmental organizations (NGOs), industry, other stakeholders and society in general to increase funding and conservation delivery.

The Strategy will consider these potential impacts and benefits of sage-grouse management on sagebrush dependent species by obtaining appropriate data and developing additional data layers and developing decision support tools utilizing Habitat Suitability Index (HSI) models, species distribution models or other measures of habitat needs. These data layers and decision support tools can **inform** land use managers about possible advantages to other species of siting sage-grouse treatments in certain areas (maximize bang for the buck), or potential impacts to other dependent species of sage-grouse centric management actions. Sagebrush dependent species and sagebrush associated species (plant, animal, insect) are addressed at the local scale, primarily by identifying and conserving the structural and taxonomic diversity of plant communities within Ecological Site Types through local planning and implementation efforts that are described in more detail below. Developing and implementing the Sagebrush Conservation Strategy under the auspices of the Sagebrush Executive Oversight Committee will ensure continuation of, and improvement to, the coordination of science-based conservation efforts by state and federal agencies (and NGOs) in the sagebrush system.

Human resource needs and values are considered at biome and ecoregional levels by identifying how threats to the sagebrush systems such as fire and invasive species or climate change, will impact the ability of humans to utilize sagebrush systems (e.g., grazing, recreation, hunting). Human resource needs and values are also incorporated at local scales via input to Major Land Resource Area (MLRA) descriptions, and in key areas via local sagebrush strategy development. Local Sagebrush Conservation Strategies would be developed collaboratively, building upon existing sage-grouse conservation plans and practices. Local Strategy development would utilize information on site characteristics and potential to support plant communities embodied in Ecological Site Descriptions (ESDs) developed by the NRCS. ESDs also include state and transition models, where relationships between past, current and

future vegetative states are described, along with management intervention needed to achieve desired future conditions. ESDs would be expanded to include descriptions of historical, current, and potential wildlife habitats associated with plant community phases. These models will simultaneously attempt to solve for multiple resource values/needs, show ways in which they can or can't be accommodated, and show what future condition(s) would be necessary and where to meet multiple objectives. Conservation measures needed to transition to those desired future conditions would then be developed. Although the primary human resource needs these local strategies would consider would be long-term, sustainable activities that communities get built around (grazing, hunting, etc.), the models could be extended to incorporate siting of energy developments and other (relatively) short term and ecologically disruptive activities.

In this respect the Sagebrush Conservation Strategy is a roadmap, a set of science based data layers that can be incorporated into decision support tools (either existing or under development) to help managers navigate as they maintain and restore sagebrush rangelands. The Sagebrush Conservation Strategy is also a collaborative process using science tools to evaluate options for management of sagebrush rangelands (public and private) at local scales. The goal of these collaborative processes is not to pit one human use or value against another, but rather to simultaneously solve across scales to accommodate all compatible human values and societal needs from the sagebrush ecosystem. This is not a Pollyanna concept; it is patently obvious that not every need can be accommodated on every acre or section of sagebrush. Difficult decisions will still need to be made, but by employing the tools and processes embodied by this strategy, consequences of decisions will be more clear, decision making more transparent, and tradeoffs less impactful.

This strategy and these processes will support and improve upon existing adaptive management constructs. New science can be incorporated into decision support tools. The Strategy will validate or refine current quantitative goals, or develop new ones where needed at multiple spatial scales. The Strategy can also develop adaptive management models that build upon existing monitoring protocols to assess progress towards goals and feed back to modify management approaches if needed.

Successful development and implementation of the Sagebrush Conservation Strategy will require a strong, proactive communication and outreach effort that will proceed concurrently with, and support the Strategy. The ability of this communication and outreach effort to gain stakeholder and public support for conservation of the "Sagebrush Sea" will be critical to building advocacy, expanding our capacity for conservation, and ultimately our success. The benefits to society of a functional sagebrush ecosystem is both a compelling story and a strong argument for the need to address the threats to it, and we must have a communication strategy and effort to communicate both to diverse audiences.

Major threats to the sagebrush ecosystem are not just threats to sagebrush dependent species; they also threaten ranching, hunting and the western way of life. Through the collaborative and artful application of science-based management, built on a foundation of ecological principles at multiple scales, we can meet the goals of diverse stakeholders, whether they be social, environmental, or economic in nature. Our path to success will require this Sagebrush Conservation Strategy, and it should begin now.

## Potential Uses/Applications of the Sagebrush Conservation Strategy

In order to facilitate a better understanding of what the Sagebrush Conservation Strategy is intended to be and how it will contribute to conservation of sagebrush dependent species we describe examples of application of the data layers, decision support tools, analysis and processes described within it at various scales.

Prioritize Federal (and NGO) funding for sagebrush restoration efforts: Temporally, to areas weather forecasting tools have predicted will have sufficient moisture for seedling establishment and spatially to areas with high habitat values and adequate resistance and resilience to disturbances. Conifer removal is prioritized to areas the Sagebrush Decision Support Tool has identified where sage-grouse nesting/brood rearing or connectivity between subpopulations is enhanced, and where sagebrush obligates such as pygmy rabbits and sagebrush birds will benefit and conifer obligates are not harmed.

A common system of monitoring sagebrush dependent species and sagebrush habitats is in place, cooperatively funded and implemented by State and Federal Agencies and NGOs.

Habitat monitoring at local and landscape scales feeds into Integrated Population models for sage-grouse and other key sagebrush dependents so that trends in populations can be explained and predicted.

Communication efforts about the importance and value of sagebrush systems to wildlife resonate with the public to the point that crowd-sourcing, retail sponsors (Subaru, round up for conservation, etc.) and other innovative alternative funding mechanisms sites raise millions of dollars to match agency dollars for cheatgrass control and restoration of sagebrush.

The Fish and Wildlife Service considers a petition from WildEarth Guardians and 7 other groups to list the pygmy rabbit as Threatened and finds the petition “not substantial”, citing the pygmy rabbit analysis and distribution maps in the recently completed Sagebrush Conservation Strategy. The Service concluded that State, Federal, Tribal and private land managers now have the tools to identify areas important to pygmy rabbits and mitigate threats to the species. Research efforts supported by the Sagebrush Science Initiative demonstrated pygmy rabbits are more widely distributed than previously thought.

A coalition of sportsmans and environmental groups announced that they have secured conservation easements on over 20,000 acres of privately held sagebrush lands in Wyoming and Colorado that served as the anchor to a migratory pathway between seasonal habitats for mule deer and pronghorn. These lands also provide breeding, summer and wintering areas for a regionally significant greater sage-grouse population and the highest densities of sagebrush dependent birds in either state. This area was identified as a regionally significant conservation priority for mule deer, pronghorn, and other sagebrush obligates in the Sagebrush Conservation Strategy which allowed the group to find funding for the easements from a variety of sources including the Colorado Habitat Stamp Fund, SGI, Mule Deer Foundation, TNC, and others.

A BLM Range Conservationist and Wildlife Biologist in Nevada team up to develop a range and wildlife habitat improvement project proposal. They first pull up the proposed project area in the USGS Digital Land Treatment Library to see what treatments have been applied in the past. They then consult the



National Land Cover Database to determine current vegetation structure (sagebrush cover, sagebrush height, grass cover, forb cover, etc.), and extent of cheatgrass cover. They use the newly developed Sagebrush Conservation Decision support tool interface developed by USGS with BLM funding to pull up data layers that describe the relative importance and functionality (breeding, winter, etc.) of that particular area to sage-grouse, sagebrush dependent birds, pygmy rabbits, and mule deer and pronghorn, as well as predicted occupancy data for small mammals and reptiles and amphibians derived from Heritage Program data. They review the Major Land Resource Area description in the Sagebrush Conservation Strategy to better understand plant and animal communities in the project area. They pull up the Ecological Site Description (ESD) from the NRCS website and review detailed information about native and potential plant communities, and review the state and transition models describing current and potential states and how the system responds to treatments. They propose, and successfully obtain range and wildlife improvement funds for, an integrated project including invasive weed control, brush beating, rotational grazing and inter-seeding that will bring the site to range health standards and improve habitat for sagebrush dependent birds.

A BLM wildlife team and a consultant funded by the proponent is evaluating a proposed Transmission line under NEPA and developing alternative routes. Permitting is streamlined greatly by use of the Sagebrush Conservation Decision support tool which allows them to quickly determine significant wildlife resources along each of the alternative routes. A preferred alternative emerges that follows existing linear disturbances to a large degree, avoids key sage-grouse and pygmy rabbit habitats and occurs largely in areas the tool has identified that have very low resistance and resilience that have largely reverted irreversibly to cheatgrass. The Project Proponent agrees to implement BMPs to mitigate impacts to sage-grouse that were recommended in the Sagebrush Conservation Strategy and that resulted from collaborative discussions with Industry and the Avian Powerline Interaction Committee (APLIC). Because the Major Land Resource Area (MLRA) description in the Sagebrush Conservation Strategy indicated that corvid population expansion was a significant issue in this area, and the Transmission line could potentially exacerbate the problem, a cooperative corvid management plan is developed to eliminate/reduce nest sites and human food subsidies. An experimental flock of advanced artificial intelligence drones is employed to patrol the line and harass any corvid seen perching on the line or near it.

The Fictitious Mountain Sagebrush (formerly Sage-grouse) Local Working Group in Utah elects to develop a local Sagebrush Conservation Strategy that enhances the local ranching community as well as range health and wildlife populations. They employ the State and Transition Model plug-in to the Sagebrush Conservation Decision Support Tool to evaluate potential treatments and outcomes. The model predicts pounds of forage produced for livestock and deer, elk and pronghorn, and predicts habitat suitability for sagebrush dependent species under various treatment scenarios. The model plug in uses descriptions of current and natural plant communities and state and transition models described in the Ecological Site Description (ESD) along with Habitat Suitability Indices from the Strategy. They ultimately elect to inter-seed big sagebrush, forb and grass seed into a large burn, convert multiple crested wheatgrass plantings back to native sagebrush, implement rotational grazing systems and aggressively control cheatgrass along county roads. Grass banks and SWAs are used to support cattle that would normally graze in the seeded areas during a period of deferment to allow establishment.

## **Draft Workflow for Development of Sagebrush Conservation Strategy**

*(Broad overview, each work group will develop a task list and timeline)*

### **Activity**

Present (revised) draft concept proposal to Sagebrush EOC

Confirm science work groups (Agency, NGO, academic “volunteers”) and work group leads:

Human Sagebrush System Resource Values (*WG or writing assign*)

Sagebrush Dependent Species

Local Scale Sagebrush Community components/MLRA

Threats, and Strategies to Address

Subgroup on Fire

Subgroup on Invasive Species

Subgroup on Climate Change/Climate Science

Subgroup on Energy Development

Subgroup on Free-Roaming Equids

Restoration

Modeling; DST identification and development, S&T modeling

Monitoring/Adaptive Management

Conservation Capacity/Efficiency

Communication and Outreach

Complete identification of work group members, make initial writing and analysis assignments

Resolve local scale boundaries, monthly progress reports from Work Group Leads to Planning Team, scope of work and timeline for each work group completed. Finalize outreach plan to notify key stakeholders of Strategy development.

Presentation to WGA Governors’ Sage-Grouse Task Force on Strategy development, update Sagebrush EOC on progress at North American

Presentation to WGA Governors at their Annual meeting

Rough conceptual draft completed, incorporating appropriate elements from the Science Framework, additional completed portions, and annotated outline of additional components

Update on progress to Sagebrush EOC at WAFWA Annual Conference

Update Western Association of State Departments of Agriculture on Sagebrush Conservation Strategy concept and progress

Concurrent workshops, *proposed, dependent on interest and funding:*

*Using State and Transition Models as a Planning Tool in Sagebrush: Incorporating Rancher Knowledge and Wildlife Habitat Values (Potentially issue an RFP following Workshop for development of an STM tool for this purpose)*

*Developing an Adaptive Management Model for the Sagebrush Biome at Multiple Scales*

*Climate Change and the Sagebrush Biome, Challenges and Opportunities*

*Integrating Sagebrush Ecosystem Science, Western Culture and Solutions Using Human Dimensions*

*Manager/scientist workshop to identify management needs relative to communicating and translating sagebrush science and science products*

Draft of Sections I-VIII, X, XIV-XVI completed, Section IX (Strategies) well underway, most additional data layers for this section completed. Draft of Section IX completed. Conceptual basis for the development of local sagebrush conservation strategies (Section XI) Monitoring (Section XII) and Adaptive Management (Section XIII) completed.

Update Sagebrush EOC at WAFWA mid-winter meeting

Draft document out for stakeholder review and comment, public meetings to gather input

Update Sagebrush EOC on progress at North American

Revise draft per comments from stakeholders, complete additional sections

Present final draft to Sagebrush EOC at WAFWA annual meeting, obtain endorsement. Submit Sagebrush Conservation Strategy for peer review and publication, outlet TBD.



## Draft Outline for Sagebrush Conservation Strategy

### Executive Summary of Sagebrush Conservation Strategy

Importance of sagebrush system – to wildlife, to people, ecosystem services

Loss and degradation of sagebrush system which is impacting people now and will more so in the future; less forage, fewer deer and pronghorn and other sagebrush dependent species, more restrictions.

Need for ecosystem approach to conservation (can't do it one species at a time, unintended consequences), need for engagement of all stakeholders.

Strategy is a collaborative, science-based document and process that builds upon previous sage-grouse science and planning efforts. Strategy is a science-based assessment of the status of, and threats to, the health of sagebrush systems and species that depend on it, expanding on the Science Framework and other foundational work. It also describes strategies that can be implemented at various scales on public and private sagebrush rangelands across the west to maintain and improve the health of those systems.

It is not a plan that commits resources, nor is it a policy document. It could lead to changes in policy or programs, but does not depend on or drive those potential changes.

Goal is collaborative management of public and private sagebrush rangelands so that the full range of ecosystem services that have been derived from healthy sagebrush landscapes can continue, including traditional human uses and maintenance of diverse, well distributed populations of wildlife so that there is no need to list species under the ESA and so that the nation's need for energy can be met.

Hierarchical approach, across biome, ecoregional/management zone, and local scales guided by science products relevant to each scale – Biome-wide decision support tools to help prioritize and target conservation efforts, but conservation implemented locally with inclusive local planning strategy developed by stakeholders that considers all resource values, including human.

#### Approach

- Assess/define habitat needs of sagebrush dependent species
- Collaborative process to assess needs to maintain/enhance traditional uses and local communities
- Update assessments of range-wide threats to both
- Identify high priority areas for conservation at range-wide or ecoregional scales
- Identify local sagebrush areas of highest conservation opportunity, establish collaborative process to develop pilot Sagebrush Conservation strategies at local level that incorporates Ecological site descriptions, and Resistance and Resilience concepts using state and transition models as an ecological framework that incorporate:
  - Resource needs to maintain important traditional uses that support local communities

- Important wildlife values for sagebrush dependent and sagebrush associated species of conservation concern or that support hunting and recreation
- Evaluate resource value tradeoffs, and the degree and way incompatible uses that have significant human value (energy development, mining, recreation, cropland conversion, etc.,) can be accommodated

Overview of high level strategies

**I. Introduction**

Importance of sagebrush system – to wildlife, to people

Human use of sagebrush system – Indians through homesteading to today, importance into the future

Introduce sagebrush community concept; > 350 species, diversity within and across ecoregions, carbon cycling(?), energy, etc.

Degradation, fragmentation, and conversion

Single species management cannot conserve all components, need for ecosystem based approach to solve an ecosystem problem

Vision for Sagebrush Conservation Strategy:

Conserve healthy sagebrush landscapes (cite relevant BLM/FS mandates) so:

Diverse, abundant, well distributed and well connected populations of wildlife are maintained, no need to petition for or list sagebrush dependent or associated species under the ESA

Traditional uses can be maintained/increased and communities benefit

Nations need for energy can be accommodated

Describe consequences of unhealthy sagebrush landscape

Guiding Principles:

Collaborative:

Common goals (healthy landscapes)

Common science

Common adaptive approaches, implemented by appropriate group(s)

Stakeholders involved in establishing resource values/needs and evaluating options

Builds on existing efforts and partnerships

Voluntary, incentive based

Science-based, founded in ecological principles

Adaptive

Transparent

#### Goals of Sagebrush Conservation Strategy

At biome and ecoregional scales, stabilize and reverse declines of sagebrush dependent species of conservation concern so that there is no net loss in species range and populations remain relatively large, well distributed and connected; contribute to nations energy production and distribution needs and economy. To do this, provide sagebrush of sufficient size, configuration, resiliency and taxonomic diversity to maintain all sagebrush dependent species so that listing is not warranted, enough connectivity to allow sagebrush to move across the biome, retain normal ecological processes.

At Ecoregion scale (mid-scale) - provide sagebrush stands of sufficient size, configuration, resiliency and taxonomic diversity to maintain all sagebrush dependent species within the ecoregion, enough connectivity to maintain gene flow and demographic rescue of plant and animal populations, retain normal ecological processes, protect watersheds and hydrologic processes, maintain or enhance regional human uses and economies.

At local scale, goals will be based upon local stakeholder input so in that respect TBD, but in general: provide healthy landscapes with sagebrush patches of sufficient size, configuration, resiliency and taxonomic and structural diversity to maintain local sagebrush dependent or associated plant and animal communities, with enough connectivity between patches to maintain gene flow and demographic rescue of plant and animal populations; maintain or enhance traditional uses and local communities.

Existing sage-grouse conservation efforts foundational to this strategy:

BLM land-use plan revisions

FS Forest Plan Amendments

State plans and Executive Orders

SO 3336 and Federal/WAFWA Products

NRCS Sage Grouse Initiative

Sage-grouse conservation can serve as an “umbrella” that protects other sagebrush dependent and associated species, but it is also important to understand and consider potential benefits and potential impacts of sage-grouse management on sagebrush-dependent and sagebrush-associated species.

## II. Governance

Developed under the auspices of, and endorsed by Sagebrush Executive Oversight Committee (EOC)

Clarify what this means and doesn't mean (supportive, not bound by Strategy)  
 Develop process for resolving technical disputes (RISCT team?)  
 Develop process for updating strategy and incorporating new science  
 Statement of support for training and outreach

### III. Approach

Biome and ecoregional scales:

Prioritize areas for full spectrum of conservation efforts to address threats and restore sagebrush habitats using data layers (habitat importance, threat probabilities, resistance and resilience, and other as appropriate) from Science Framework expanded to full extent of sagebrush biome and to sagebrush dependent species. Improve/develop decision support tools to make these layers accessible and interpretable to managers. Ideally consolidate data layers and tools into an existing web-based dashboard available to all users (as opposed to multiple decision support tools across multiple agencies and NGOs using different data layers).

Assess threats to sagebrush biome and dependent species, recommend strategies to avert or mitigate threats.

Identify barriers and constraints to effective ecosystem conservation at these scales and recommend strategies to increase capacity.

Communicate importance of sagebrush and sagebrush conservation to diverse audiences to highlight social, environmental, and economic benefits and increase support for, and engagement in, conservation and restoration efforts.

Local Scale:

Identify components of sagebrush system, including plant taxonomic and structural diversity, and associated wildlife habitats and communities.

Identify human uses and resource needs from sagebrush system

Create opportunities for, and information and tools to develop locally led sagebrush conservation strategies that incorporate human uses and values as well as wildlife needs, and employ state and transition models to identify projects needed to maintain in a desirable state or to move to a more desirable state.

### IV. **Human Sagebrush System Resource Values** *(Describe positive attributes here, negative aspects, either how they affect sagebrush communities or how threats to sagebrush impact human resource values addressed in threats section)*

*Ecosystem Services*

*Water, water quality*

*Carbon sequestration*

*Etc.*

*Ranching*

Discuss use of sagebrush systems, modifications to systems (irrigated hay meadows, fencing, crested wheatgrass conversion, chemical spraying, plow and seed, etc.) and effect on community composition and function

Importance to western communities

*Farming*

Discuss extent of conversion of sagebrush systems to agriculture, and effect on community composition and function

Importance to western communities

Opportunities for native plant material development by private sector with appropriate incentives

*Recreation*

Hunting/Fishing

Importance of big game and small game hunting to western communities

Importance of fishing in streams that flow through sagebrush systems (product of healthy landscapes?)

Viewing/tourism

Great Basin National Park Lek viewing

OHVs

*Energy Development/mining*

Extent of current development within biome, resource potential (hotspot map), national and local significance for:

Oil and gas

Coal

Solar

Wind

Geothermal

Hard rock mining

*Infrastructure*

Identify extent of infrastructure in sagebrush biome, recognize need for pipelines, roads, transmission and distribution lines, cell phone towers, etc., and discuss projects on the books in the near term

V. **Range, Conservation Status and Habitat Requirements for Sagebrush Dependent Species**  
*(Of concern at biome-wide scale because anything we do or don't do in sagebrush systems will impact these species, also landscape scale indicator of how we are doing)*

Define relative degree of dependency on sagebrush (obligate, near-obligate, dependent)

Discuss relationship to sagebrush, year-round, seasonal, structural, patch size, etc.

Discuss conservation status and population/distribution trends of each species, discuss monitoring approaches and relative degree of confidence in trend information

Evaluate key threats to each species, and what is known about degree to which sage-grouse conservation practices can act as an umbrella for this species

VI. **Overview of the Science Framework for the Sagebrush Conservation Strategy**  
*(Will be derived to a large degree from Science framework, expanded to sagebrush dependent species)*

Background – Adopts and extends SO 3336 Science Framework approach

Approach

Scope and Scales

Biome – provide sagebrush communities of sufficient size, configuration, resiliency and taxonomic diversity to maintain all sagebrush dependent plant and animal species so that listing is not warranted, enough connectivity to allow sagebrush to move across the biome, retain normal ecological processes, contribute to nations energy production and distribution needs and economy. Management emphasis on prioritizing landscapes relative to value to sage-grouse and sagebrush dependent species, resistance and resilience, and threat probability surfaces. Monitor sage-grouse and sagebrush dependent species population trends, broad scale metrics of sagebrush extent.

Ecoregion (mid-scale) - provide sagebrush stands of sufficient size, configuration, resiliency and taxonomic diversity to maintain all sagebrush dependent species within the ecoregion, enough connectivity to maintain gene flow and demographic rescue of plant and animal populations, retain normal ecological processes, protect watersheds and hydrologic processes, maintain or enhance regional human uses and economies. Management emphasis on prioritizing landscapes relative to value to sage-grouse and sagebrush dependent species, resistance and resilience, and threat probability surfaces. Monitor sage-grouse and sagebrush dependent species population trends, broad scale metrics of sagebrush extent, configuration (proportion of landscape in sagebrush, etc.)

Local scale *(TBD, likely some derivative of MLRAs and/or ecoregional level IVs)* – local goals will be based upon local stakeholder input so in that respect TBD, but in general: provide healthy landscapes with sagebrush patches of sufficient size, configuration,



resiliency and taxonomic and structural diversity to maintain local sagebrush dependent or associated plant and animal communities, with enough connectivity between patches to maintain gene flow and demographic rescue of plant and animal populations; maintain or enhance traditional uses and local communities. Management focus on restoration and project level practices to increase forage and/or browse, to prevent transitions to less desirable states or to transition to a better state; monitoring focus on measures of landscape health which may include forage production, plant and animal species composition and diversity, and select animal performance metrics (breeding density, reproductive output, survival, or livestock weight gain, etc.)

**VII. Climatic Regimes, Vegetation Types, Major Land Resource Areas in the Sagebrush Biome**  
*(Taken from Science Framework, local scale descriptions (likely MLRA?) will be added*

West-Central Semiarid Prairies Ecoregions

Cold Deserts Ecoregions, Eastern and Western Parts of the Sagebrush Biome

Western Cordillera Ecoregions in the Eastern and Western Parts of the Sagebrush Biome

For each Ecoregion and MLRA:

Identify plant composition of sagebrush communities, identify key sagebrush dependent species within ecoregion, and discuss conservation concerns

Discuss and depict in a map, Major Land Resource Areas (MLRAs) within ecoregion; describe significant sagebrush community elements, significant threats including extent and nature of invasive species threat and how threats cumulatively affect wildlife.

Describe human uses at local scales; sustainable, long term vs. disruptive or deleterious, short-term

**VIII. Threats to Sagebrush Ecosystems and Ecosystem Services and Strategies to Address them**

*(Threat assessment largely from framework, impact to sagebrush dependent species added, strategies added (will incorporate common science framework part II when available)*

Pervasive Threats

Invasive species

Issue *(This section will draw heavily on the recent WAFWA report and expand upon recommendations within it, and when available, the Invasive Plant Management Action Plan being developed by the Western Association of State Departments of Agriculture. Although the focus will be on invasive annual grasses, other invasive perennial species will be highlighted as well)*

Describe nature and extent of issue, biome and ecoregional scales

Discuss ecological and social impacts - why we need to care about invasive species

Goal to decrease invasive impacts, reduce rate of spread within native plant communities, control for successful restoration, reestablish native plant communities to increase resistance and resilience.

Describe the current on-going efforts in the 13 western states, need to better coordinate, engage more partners and gain buy-in from the public and agencies

Review and highlight the Challenges and Barriers described in the WAFWA report “Invasive Plant Management and Greater sage-grouse Conservation: A Review and Status Report with Strategic Recommendations for Improvement”, (Ielmini et al., 2015)

### Strategies

Prioritize areas to focus invasive species efforts by:

Synthesize existing location and extent information on invasive species into a spatially explicit distribution data layer and map at ecoregional and biome scales, can we extrapolate trends, regionally, biome wide?

Expand/extend efforts to develop invasive species environmental suitability modeling to the entire sagebrush biome (*sensu* work by Northern Rocky Mountain Invasive Species Council) so that we can predict future spread of key invasive species

Integrate output of future spread modeling into state EDRR programs

Increase the pace, scale, and success of restoration efforts by: use of genetically appropriate native plant materials; utilizing an “All lands, All hands” approach; bringing new tools online (new biocides and seed pillows as examples)

Develop and implement monitoring protocols;  
Effectiveness – need to define success (when do landowners know that they got it right?)

Develop spatially-balanced monitoring programs to track trends in distribution and abundance of key invasive species over time

Develop key messages, define key audiences to promote efforts to control and prevent spread of invasive species

Create a “Sagebrush Ecosystem Invasive Plant Species Support Team” comprised of Sagebrush Ecosystem Invasive Plant Species Coordinator hired through a third-party (Foundation, Joint venture etc.) to:

Stay apprised of, compile and synthesize new information and make it available to managers in a useful format across the sagebrush biome

Identify existing portal, or establish and maintain a web-based, one-stop-shop for information about techniques, tools, chemicals and other invasive control information

Oversee monitoring and communication efforts related to invasives

Consult with managers about BMPS with respect to management alternatives and invasive species

Coordinate invasive species control efforts within sagebrush across agencies and jurisdictions

*Altered Fire Regimes (expand from Science Framework discussion)*

Issue – Nature and extent of issue, link to invasive plants, biome and ecoregional scales

Impact on sagebrush system and plant and wildlife communities

Impact on human resource needs/values

Ranching

Hunting

Strategies

Prioritization at biome and ecoregional scales (convergence of SDS hotspots and high risk of fire or resistance/resilience low)

Prevention (biome, ecoregional and local scales, start at top, work down?)

Pre-positioning

Fuel breaks, etc.

Targeted grazing

Partnerships: Rangeland Fire Protection Associations (authorized @ state level)

Restoration of plant communities in burned habitats, including use of genetically appropriate native plant materials

*Conifer encroachment (expand from Science Framework discussion)*

Issue – Nature and extent of conifer encroachment, biome and ecoregional scales

Impact on sagebrush system, ecosystem processes and wildlife communities

Impact on human resource needs and values, decreased forage production

Potential impact of conifer removal on sagebrush associated species

Strategies

Prioritization

Incorporate conifer encroachment maps into decision support tools that identify areas where removal will do the most good for sage-grouse while also benefiting other sagebrush dependent species while doing the least harm to pinyon juniper obligates. *(Proposal to do this now funded under Sagebrush Science Initiative)*

Targeted conifer removal

Chainsaw vs. other mechanical vs. fire, advantages & disadvantages

Climate Change/climate science - *(expand from common science framework discussion)*

Issue – nature and extent of climate change and probable impact on sagebrush ecosystem

Probable impact on associated plant communities, invasives and fire risk

Probable Impact on human resource needs and values

Strategies *(This Section will use as a basis adaptation strategies identified in the Common Science Framework)*

Plan and conduct a workshop on climate change impacts to the sagebrush biome and human uses of sagebrush biome

Define and map climate refugia – multi-species assessment

Define and map hotspots of change – develop conflict maps

Incorporate climate change metrics into vegetation monitoring

Improve accuracy of landscape composition/structure data layers and response to extremes

Evaluate and incorporate information about social and economic vulnerability and response to climate change in the sagebrush biome

Complete climate and science research identified in Actionable Science Plan

Develop knowledge (eventually tools) to utilize medium-term climate forecasts (e.g. multi-month precipitation forecast) to maximum success of restoration, fire management, wildlife population recovery, grazing management, and inform management decisions

Develop strategies for effectively informing decision makers and stakeholders about climate change

Incorporate potential direct climate impacts and interactions with disturbance dynamics & invasive species into prioritization decision support tools along with

importance to sagebrush dependent species and resistance and resilience matrices

Land Use and Development Threats (*expand from common science framework discussion on each*)

Cropland conversion

Issue – nature and extent of cropland conversion, biome and ecoregional scales

Impact on sagebrush system and wildlife communities

Impact on human resource needs and values (?)

Strategies

Prioritize areas for retention of existing sagebrush plant community – map cropland conversion risk vs. value to other sagebrush dependent species, other threats, resistance and resilience, etc.

Easements, CRP, etc., as strategy

Evaluate type and extent of impact of threats to sagebrush system (e.g., invasives, climate change) to economic viability of farming (quantitatively if possible, certainly qualitatively)

Infrastructure

Issue – Habitat loss, fragmentation, degradation, subsidize predators/predation, facilitate spread of invasive species, etc.

Strategies

Prioritization of habitats, site in areas to do least harm

Co-locate linear disturbances

Mitigation, reduce human subsidies for predators such as corvids, etc.

Energy development and mining

Cross cut Issue – Habitat loss and degradation and disturbance that reduce functionality of habitat

Oil and gas

Issue

Discuss what is known about impacts to sagebrush dependent species

Display maps of significant developed and undeveloped fields across the biome

Strategies

Evaluate degree to which sage-grouse protections protect other sagebrush dependent species

Identify key gaps, if any

Identify and incorporate BMPs to avoid, minimize, mitigate impacts

Restore pipelines and well pad sites to prevent cheatgrass from taking over the site, see Johnston 2016

Solar

Issue

Discuss what is known about impacts to sagebrush dependent species

Display maps of areas of significant potential and likely development across the biome

Strategies

Evaluate degree to which sage-grouse protections protect other sagebrush dependent species

Identify key gaps, if any

Identify and incorporate BMPs to avoid, minimize, mitigate impacts

Wind

Issue

Discuss what is known about impacts to sagebrush dependent species

Map areas of significant potential and likely development across the biome

Strategies

Evaluate degree to which sage-grouse protections protect other sagebrush dependent species

Identify key gaps, if any

Geothermal

Issue

Discuss what is known about impacts to sagebrush dependent species

Map areas of significant potential and likely development across the biome

Strategies



Evaluate degree to which sage-grouse protections protect other sagebrush dependent species

Identify key gaps, if any

Identify and incorporate BMPs to avoid, minimize, mitigate impacts

Coal

Issue

Discuss what is known about impacts to sagebrush dependent species

Display maps of areas of significant potential and likely development across the biome

Strategies

Evaluate degree to which sage-grouse protections protect other sagebrush dependent species

Identify key gaps, if any

Identify and incorporate BMPs to avoid, minimize, mitigate impacts

Hard rock mining

Issue

Discuss what is known about impacts to sagebrush dependent species as well as existing and proposed conservation measures

Map areas of significant potential and likely development across the biome

Strategies

Evaluate degree to which sage-grouse protections protect other sagebrush dependent species

Identify key gaps, if any

Identify and incorporate BMPs to avoid, minimize, mitigate impacts

Human development

Issue

Discuss what is known about impacts to sagebrush dependent species at relative densities of development

Use Theobald or similar approach to predict areas of likely encroachment of development into currently undeveloped parts of the sagebrush biome

Strategies

Evaluate degree to which public lands, conservation easements and other buffers to development retain habitat for sagebrush dependent species.

Identify key gaps, if any

Prioritize key areas for conservation easements

Free roaming equids

Issue

Discuss what is known about impacts to sagebrush system, and how those impacts will likely cascade to affect sagebrush dependent species.

Discuss competitive interactions and exclusion, loss of forage

Discuss realized or potential losses to ranchers

Strategies

Prioritize areas where free-roaming equids are having the greatest impacts on sagebrush communities and human and wildlife resource values

Reduce numbers of free roaming equids in priority areas significantly through means TBD

Consider changes in legislative mandates

Inappropriate Grazing

Issue (as discussed in Common Science Framework)

Strategies- Manage grazing to meet land health standards

Recreation

Issue

Strategies – Evaluate the degree and extent to which sage-grouse management prescriptions address issue for other sagebrush dependent species

**IX. Strategies to inform sagebrush/sage-grouse management relative to sagebrush dependent species**

Compile all available data sets and develop best distribution map layers feasible for sagebrush dependent species. Evaluate relative degree of confidence in distribution information and limitations on inference, identify additional data needs

Compile all available data sets and develop best map layers feasible depicting relative density of sagebrush dependent species at range-wide and ecoregional scales, if known, and/or habitat suitability to identify strongholds for the species and degree of overlap with sage-grouse

Evaluate potential benefits/impacts of sage-grouse management practices to sagebrush dependent species, identify potential opportunities for enhancement

Develop synthesis mapping products that identify areas of overlap or convergence in habitat suitability or density across sagebrush dependent species as well as exceptions to prioritize areas for management:

Soil temperature and moisture regimes as indicators of ecosystem resilience and resistance

Greater Sage-grouse breeding habitat probabilities and population indices

Gunnison Sage-grouse breeding habitat probabilities and population indices

Sagebrush obligate passerine breeding habitat probabilities, range-wide (BBS), and regional (Aldrich et al., IMBCR)

Pygmy rabbit breeding habitat suitability model (Matocq et al. 2017)

Pronghorn and mule deer migration corridors, etc.

Landscape cover of sagebrush as an indicator of habitat

Sage-Grouse habitat resilience and resistance matrix

Adapt the Sage-grouse resilience and resistance matrix and management strategies to other sagebrush dependent species

Expand Resilience and Resistance models to full sagebrush extent

Delineate Habitats for Targeted Management Intervention at the Biome and Ecoregion or Management Zone Scale – *The strategy will evaluate the extent to which these layers can and should be incorporated into a decision support tool useful at range-wide and local scales.*

Assess Priority Areas for Habitat Management – Key Data Layers and Their Use *(Strategy will incorporate maps assessing threat risk probability into Threats to Sagebrush Ecosystem Section above, and other key data layers in the Prioritize areas for conservation section and Decision support tool)*

**X. Crosscut Strategy – Restore Habitat Functionality of Sagebrush Systems**

Issue

Fire, type conversion, crested wheat plantings, well pads, pipelines, etc.

Fragmentation and loss of connectivity

Opportunity to regain functionality of native plant communities and restore losses

Need to stop the bleeding

Strategies

Prioritization, convergence of resistance and resilience concepts with priority habitats for sagebrush dependent species to identify areas where restoration of native plant communities can be successful and meaningful

Develop and apply short-term climate models to predict areas where there is a high probability that precipitation and other climate variables will be conducive to successful restoration of native plant communities and prioritize those areas for restoration efforts

Map and prioritize areas that can retain or restore connectivity at scales meaningful to sagebrush dependent species

Develop and use genetically appropriate native plant materials

## XI. **Develop and Implement Locally Led Sagebrush Conservation Strategies**

### Issue

Ultimately all conservation is local

Must incorporate public and private lands

To be effective and sustainable, conservation must reflect local values and meet local needs

Discussion of MLRAs, Ecological Sites, and State/transition models (already in Framework) as an ecologically sound framework for local conservation planning

### Strategies

Work with stakeholders to develop appropriate scale for local planning efforts; MLRA, Ecoregional level IV, socio-political boundaries, or combination thereof.

Identify MLRAs of highest conservation opportunity as assessed above

From this subset, determine which have Ecological Site Descriptions (ESDs) and (vegetation) State and Transition models completed

Conduct workshops with stakeholders in MLRAs of highest conservation opportunity using State and Transition models (STMs) within ESDs to incorporate local knowledge into models (Knapp and Fernandez-Gimenez 2009, Knapp et al. 2010, Knapp et al. 2011), and then use them to explore alternative paths forward for the local sagebrush system. Identify conservation measures needed under various alternative scenarios to meet demands for ecosystem services. Incorporate wildlife habitat needs into STMs (Holmes and Miller 2010)

Develop local sagebrush conservation strategy, tiered to larger scale needs and strategies, to implement appropriate conservation actions to meet desired future condition(s)

## XII. **Monitoring**

### Issue

Monitoring is paradoxical in that conservation dollars spent for monitoring don't preserve, protect, or enhance anything and compete with programs that do, yet

monitoring is essential to identify successful practices and maximize efficiency of conservation spending and ensure resources are spent on the right things.

#### Strategies

Define clear goals for monitoring to support an adaptive management paradigm at biome and ecoregional scales. Define scales and what to monitor at each scale – projects, species trends, etc, and how long to monitor (e.g. monitoring specific projects or restoration efforts might have different timescales than species monitoring)

Evaluate current monitoring approaches (BBS, IMBCR, etc.), and recommend expansion, synthesis, or new approaches to monitor trends in sagebrush dependent species at range-wide and ecoregional scales as a check on success of sagebrush conservation efforts.

Evaluate current approaches to evaluate health of sagebrush community at local scales and ways in which these efforts can be expanded or improved, if necessary. Evaluate extent to which local scale monitoring can be rolled up into larger scale frameworks. Measures to consider should include structural and taxonomic diversity of plant communities, habitat functionality for dependent and associated species, ability to meet human needs for ecosystem services, etc.

### XIII. Adaptive Management

*(Adaptive management is an intuitive concept, yet notoriously difficult to implement at large scales. It doesn't get any bigger or more complicated than adaptive management for the sagebrush biome, with myriad management goals, and management and non-management drivers to the system involving thousands of landowners and dozens of state and federal agencies and NGOs. Focus for this strategy will not be on adaptive management with respect to any particular agency's decisions, rather on a nested, hierarchical adaptive management construct).*

Local scale – Adaptive management construct built into local sagebrush conservation strategies and state and transition models. Oriented around local goals, and key states that strategy attempts to maintain or transition to. In the latter case, predictions about restoration efforts needed and transitional vegetative states (plant composition, plant diversity, abundance, etc.) needed to meet resource objectives (forage, wildlife habitat, etc.), are explicitly described and progress assessed through monitoring. Pathways and feedback loops are explicitly modeled.

Mid-scale, ecoregional – Build around expanded sage-grouse adaptive management construct developed by BLM or Interior (??). Suggestion to develop mid-scale and biome adaptive management models through a workshop facilitated by experts in adaptive management. Focus would be on major drivers to the system, and what would have to be true if we are to meet eco-regional goals. Set ecoregional quantitative goals with respect to major drivers and evaluate through monitoring; trends in annual grass infestation, conifer encroachment, major fires, etc. Evaluate progress towards goals by summing number, acreage, and success of local scale treatments; invasive species control efforts, restoration, conifer removal, etc., and by monitoring remotely extent and coverage of sagebrush, multi-year trends in invasive species distribution, fire

frequency and acres burned, etc. (likely available from Conservation Effects Database maintained by USFWS). Incorporate ecoregional level monitoring of sagebrush dependent species (sage-grouse and passerines, mule deer, pronghorn, others?) as a check on success of sagebrush conservation strategies and efforts. Incorporate explicit triggers into ecoregional adaptive management models to re-evaluate whether and where additional conservation efforts are needed or whether assumptions or goals need to be changed.

Biome scale – similar to ecoregional scale, but with biome-wide goals and assessed through monitoring at biome-wide levels, e.g. remotely monitoring extent and coverage of sagebrush, multi-year trends in invasive species distribution, fire frequency and acres burned, etc., across ecoregions. Incorporate biome-wide trends in sagebrush dependent species by aggregating ecoregional monitoring (sage-grouse and passerines, mule deer, pronghorn, others?) as a check on success of sagebrush conservation strategies and efforts. Incorporate explicit triggers into biome-wide adaptive management models to re-evaluate whether and where additional conservation efforts are needed or whether assumptions or goals need to be changed.

#### **XIV. Additional Science Needs**

*(This section will segue off the Actionable Science Plan developed in response to SO 3336, and identify areas where additional research, data layers, or other science products are needed to directly inform management options that could not be completed for the Strategy)*

Monitoring

Restoration

Species Distribution or Habitat use

Climate Change

Sagebrush dependent species responses to disturbances or sage-grouse management prescriptions

Key MLRAs where Ecological Site descriptions/state and transition models should be developed or refined

Additional data layers or decision support tools to aid prioritizing treatments and management

Etc.

#### **XV. Increasing Capacity for Sagebrush Conservation**

*(This Section will evaluate barriers and constraints to effective conservation, particularly restoration, be they financial, policy, regulatory/legislative, describe examples of innovative approaches that have overcome these barriers, and develop recommended strategies to remove or minimize barriers and constraints. New models or approaches for funding will be explored, be it NASECA, go-fund me or other approaches)*

#### **XVI. Communication and Outreach**



*(Part of larger initiative begun by Audubon, FWS and others in Salt Lake City last summer)*

Internal

Develop strategy and tools to keep internal audiences, broadly interpreted to include state and federal agencies and NGOs with technical capability and/or other resources to contribute to development or implementation of the Sagebrush Conservation Strategy, informed and engaged during and after Strategy development

External

Communication/outreach to increase public awareness of benefits of healthy sagebrush communities and need to conserve them and thereby increase support/advocacy for sagebrush conservation effort

Communication/outreach efforts to inform stakeholders about Sagebrush Conservation Strategy development and opportunities to provide input, review, and engage in the process.

During the development of the Conservation Strategy, we should celebrate the diversity of the people and sectors who are interested in the sagebrush ecosystem, value their role and contributions, deliberately recruit them to the table, leverage the capacity that each brings. Examples of this:

- Private landowners: Insight, knowledge of the land, and knowledge of what is feasible, ecosystem services

- Extension agents and other trusted sources of knowledge

- Tribes

- Employers and markets in a diverse new economy:

  - Energy

  - Niche markets such as bird friend beefing

  - Markets that connect new economies to sagebrush restoration such as seeds and seedlings, implementation of restoration treatments, mitigation, etc.