2019 Nevada Greater Sage-grouse Conservation Plan

Sagebrush Ecosystem Program
State of Nevada

02/2019

As updated at the April 5, May 18, July 17, 2018 … SEC meetings

Further updates anticipated in 2019

On April 22, 2013, the Sagebrush Ecosystem Council (SEC) recommended the development of the 2012 State Plan into a more comprehensive and detailed strategy. The SEC considered proposed revisions over a series of meetings starting in July 2013. Each SEC meeting was held in compliance with the Nevada Open Meeting Law, including multiple opportunities for public comment. The result of those efforts is this document, the 2014 Nevada Greater Sage-grouse Conservation Plan (2014 State Plan), updated in 2018 (2018 State Plan) to better coincide with the Federal Resource Management Plan Amendment and Environmental Impact Statement.

CONTENTS

LIST OF ACRONYMS

AML	Appropriate Management Level
AMP	Allotment Management Plan
ATV	All-Terrain Vehicle
AUM	Animal Unit Month
BAR	Burned Area Rehabilitation
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CCS	Conservation Credit System
CDP	Conservation Districts Program
DCNR	Department of Conservation and Natural Resources
DOD	Department of Defense
DRI	Desert Research Institute
EIS	Environmental Impact Statement
ERT	Expert Review Team
ES	Emergency Stabilization
ESA	Endangered Species Act
ESD	Ecological Site Description
FIAT	Fire and Invasives Assessment Team
HA	Herd Area
HMA	Herd Management Area
HTNF	Humboldt-Toiyabe National Forest
HQT	Habitat Quantification Tool
HSI	Habitat Suitability Index
ICS	Incident Command System
LAWG	Local Area Working Group
LUP(A)	Land Use Plan (Amendment)
MOU	Memorandum of Understanding
NAC	Nevada Administrative Code
NBMG	Nevada Bureau of Mines and Geology
NDA	Nevada Department of Agriculture
NDEP	Nevada Division of Environmental Protection
NDF	Nevada Division of Forestry
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NGO	Non-Governmental Organization
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service

NRS	Nevada Revised Statutes
NWCG	National Wildfire Coordination Group
OHV	Off-Highway Vehicle
PFC	Proper Functioning Condition
P-J	Pinyon and Juniper
PMU	Population Management Unit
ROW	Right-of-Way
RSF	Resource Selection Function
SAP	Strategic Action Plan
SD	Standard Deviation
SEC	Sagebrush Ecosystem Council
SEP	Sagebrush Ecosystem Program
SETT	Sagebrush Ecosystem Technical Team
SEZ	Solar Energy Zone
SUA	Special-Use Authorization
TNR	Temporary Non-Renewable
UNR	University of Nevada, Reno
USDA- ARS	U.S. Department of Agriculture – Agricultural Research Service
USDA-APHIS	U.S. Department of Agriculture - Animal and Plant Health Inspection Service
USFS	U.S. Forest Service
USFWS	U.S .Fish and Wildlife Service
USGS	U.S. Geological Survey
WAFWA	Western Association of Fish and Wildlife Agencies
WHBT	Wild Horse and Burro Territory

1.0 INTRODUCTION

The greater sage-grouse (*Centrocercus urophasianus*; hereafter, sage-grouse) is a historically and culturally significant species in Nevada. Sage-grouse were a staple of the diet of Native American tribes in Nevada, including Northern Paiute and Western Shoshone (BLM 2013). In addition, sage-grouse play a prominent role in some tribal oral traditions (BLM 2013), as well in dances, customs, and celebrations (IDFG 1997, DOE 2007). Lewis and Clark noted the birds in their journey west in 1804 (IDFG 1997). Early pioneers dubbed them "sage chickens" and utilized them as an important food source over the next half century (IDFG 1997, DOE 2007). In Nevada, sage-grouse hunting laws began around 1890 (DOE 2007). From the early 1900s until the late 1920s, Nevada pursued reductions in the length of the hunting seasons and enforced bag limits due to decreasing bird populations (DOE 2007).

Sage-grouse increased in prominence as of species of interest in the West in the 1950s and 1960s due to a management need to learn more about basic sage-grouse biology (Stiver, personal communication 2014). Nevada has historically been a leader in sage-grouse conservation, including conducting one of the first ever scientific studies of sage-grouse in the O'Neil Basin and hosting the second ever Western Association of Fish and Wildlife Agencies (WAFWA) Sage-grouse Workshop in Elko (Stiver, personal communication 2014). State fish and game agencies began counting sage-grouse on breeding grounds, called "leks" as early as the 1930s (Stiver, personal communication 2014). Nevada has records of lek counts that date back to the 1950s (Stiver, personal communication 2014). In the later part of the twentieth century, Nevada continued its leadership role in sage-grouse conservation as a pioneer in sage-grouse monitoring techniques and scientific research, as well as by working with WAFWA to develop sage-grouse guidelines for habitat, population, and management (Stiver, personal communication 2014).

In 2000, then Governor Kenny Guinn appointed a task force representing various interest groups and agencies to develop a plan that would conserve and protect Nevada's sage-grouse and their habitat. In October 2001 the Nevada Sage-grouse Conservation Strategy identified challenges, offered potential solutions, and laid the groundwork for the formation of local area working groups (LAWG) and Population Management Units (PMU; Figure 1). It provided guidance for developing conservation plans and subsequent legislative endorsements in 2004 and 2010 reinforced Nevada's commitment to conserve the species.

From 2001 to 2004 the Governor's Sage-grouse Conservation Team under leadership of the Nevada Department of Wildlife (NDOW) completed an intensive planning effort for the State in which LAWGs developed plans for their respective areas and PMUs. In June 2004, the *1st Edition of the Greater Sage-grouse Conservation Plan for Nevada and Eastern California* (2004 State Plan) was completed. Between 2004 and the present, resource management agencies have implemented conservation projects and instituted policies to support the conservation goals in the 2004 State Plan.

On March 23, 2010, the U.S. Fish and Wildlife Service (USFWS) determined that listing the sage-grouse was warranted under the Endangered Species Act of 1973, as amended (ESA), but precluded due to

higher priority species. Consequently, sage-grouse were placed on the federal candidate species list. The USFWS later entered into a court settlement with several environmental groups, which included a schedule for making listing determinations on over 200 candidate species, including the sage-grouse. A proposed decision for sage-grouse is scheduled for September 2015.

In response, the Bureau of Land Management (BLM) and U.S. Forest Service (USFS) developed their National Greater Sage-grouse Planning Strategy in late 2011, a process to revise existing land use plans (LUPs) in order to provide regulatory mechanisms to conserve sage-grouse and their habitats. Secretary Salazar invited the states impacted by a potential sage-grouse listing to develop state-specific regulatory mechanisms to conserve the species which could be considered as an alternative in the BLM and USFS LUP revision process.

On March 30, 2012, Governor Sandoval fortified Nevada's commitment to sage-grouse conservation, by issuing Executive Order 2012-09, which established the Governor's Greater Sage-grouse Advisory Committee (Advisory Committee) with a directive to provide updated recommendations for sage-grouse conservation in Nevada in order to preclude the need to list sage-grouse under the ESA and provide an alternative for consideration in the BLM/ USFS LUP revision process for Nevada. Those efforts resulted in the *Strategic Plan for Conservation of Greater Sage-Grouse in Nevada* (2012 State Plan), completed on July 31, 2012, which consisted of a list of primary threats to sage-grouse in Nevada and recommendations to the Governor on strategies and actions to conserve sage-grouse in Nevada.

One of the main recommendations of the 2012 State Plan was the creation of the Sagebrush Ecosystem Program (SEP), which would consist of the Sagebrush Ecosystem Council (SEC) and the Sagebrush Ecosystem Technical Team (SETT; see Section 5.0). The SEC was originally established under Executive Order 2012-19, on November 19, 2012, and later codified under state statute NRS Chapter 232.162. The SETT began work on February 11, 2013. On April 22, 2013, the SEC directed the SETT to further develop the recommendation in the 2012 State Plan into a more comprehensive and detailed strategy. The SEC considered proposed revisions over a series of meetings starting in July 2013. Each SEC meeting was held in compliance with the Nevada Open Meeting Law, including multiple opportunities for public comment. The result of those efforts is this document, the *2014 Nevada Greater Sage-grouse Conservation Plan* (2014 State Plan).

The 2014 State Plan represents the best available scientific information, as well as stakeholder input, to develop a sage-grouse conservation plan specific to Nevada. This is meant to be a "working document" that will be updated as new science emerges and lessons are learned through implementation of the 2014 State Plan, through an adaptive management framework.

In addition to the 2014 State Plan, the SEP is in the process of developing a *Nevada Sage-grouse Strategic Action Plan* (SAP). The 2014 State Plan provides broad goals, objectives, and management actions to ameliorate the primary threats to sage-grouse in Nevada. The SAP is a companion document to the 2014 State Plan and goes into greater detail to identify areas in which to focus conservation efforts in order to achieve the broad goals and objectives outlined in the 2014 State Plan. The SAP looks to identify funding sources to implement the management actions recommended in the 2014 State Plan.

The SAP identifies where the primary threats to sage-grouse habitat are located across the landscape and provides specific guidance on how to ameliorate these threats based on local area conditions, resistance and resilience regimes, and ecological site descriptions. The SAP helps guide how and where the management efforts identified in the 2014 State Plan are prioritized in order to achieve landscape-scale conservation of sage-grouse and the sagebrush (*Artemisia* spp.) ecosystem. The planning efforts of the Bi-State Distinct Population Segment Greater Sage-grouse serve as a general template for the SAP in terms of the level of specificity needed for project planning and commitment to funding (Bi-state Technical Advisory Committee Nevada and California 2012, Bi-State Executive Oversight Committee 2014).

2.0 DEFINITIONS

Acts of Nature – An event resulting from natural processes of the earth which occur outside human control and may be unpredictable, such as wildfires or drought.

Adaptive Management - An adaptive approach that involves exploring alternative ways to meet management objectives, predicting the outcomes of alternatives based on the current state of knowledge, implementing one or more of these alternatives, monitoring to learn about the impacts of management actions, and then using the results to update knowledge and adjust management actions.

Anthropogenic Disturbance – Any human-caused activity or action or human-created physical structures that may have adverse impacts on sage-grouse or their habitats. The term anthropogenic disturbance and its associated conservation policies includes, but is not limited to the following project categories: mineral development and exploration and its associated infrastructure; renewable and non-renewable energy production, transmission, and distribution and its associated infrastructure; paved and unpaved roads and highways; cell phone towers; landfills; pipelines; residential and commercial subdivisions; activities undertaken pursuant to special use permits and right-of-way grants; and other infrastructure development. Livestock operations and agricultural activities and infrastructure related to ranch and farm businesses (e.g. water troughs, fences, etc.) are not included in this definition.

Conservation – The wise sustainable use, preservation, enhancement, or restoration of the natural environment; including: ecosystem processes, vegetation, and wildlife.

Conservation Credit System (CCS) – A pro-active solution to ensure impacts from human activities generate a net benefit for the species, while enabling human activities vital to the Nevada economy and way of life. The Credit System creates new incentives for 1) human activities to avoid and minimize impacts to important habitats for the species, and 2) private landowners and public land managers to preserve, enhance, and restore important habitats, including reducing the threat of wildfire to important habitats for the species.

De minimis – An anthropogenic disturbance that is too trivial or minor to merit consideration for mitigation.

Enhancement – Manipulation of existing habitat to improve specific habitat functionality.

Good Neighbor Agreement – A non-binding agreement between a community and an industry, which works to address specific issues of concern in a collaborative way.

Habitat – An area that provides food, cover, water, and space for an organism. It is the resources and conditions present in an area that are required by a species to carry out its life. Habitat implies more than just vegetation or vegetation structure; it is the sum of the specific resources that are needed by an organism. Other resources that influence habitat include physical and biological characteristics, such as: climate, precipitation, elevation, topography, water availability, soil type, etc.

Definitions Specific to this State Plan:

Suitable Habitat – Areas identified at the landscape scale through the habitat suitability index (Section 6.0) with index values greater than 1.5 standard deviations below the mean value of the index. These areas are identified as generally meeting the needs for sage-grouse to survive and reproduce.

High Suitability Habitat – Areas identified at the landscape scale through the habitat suitability index (Section 6.0) with index values greater than 0.5 standard deviations below the mean.

Moderate Suitability Habitat – Areas identified at the landscape scale through the habitat suitability index (Section 6.0) with index values between 1.5 and 0.5 standard deviations below the mean.

Non-Habitat – Areas identified at the landscape scale through the habitat suitability index (Section 6.0) with index values less than 1.5 standard deviations below the mean value of the index. These areas are identified as generally not meeting the needs for sage-grouse to survive and reproduce.

Habitat Quantification Tool (HQT) – The method for quantifying impacts ("debits") or benefits ("credits") to sage-grouse habitat characteristics generated by participants in the Nevada CCS. It is intended to provide an effective means for targeting credits and debits to the most beneficial locations for the sage-grouse, and tracking the contribution of the CCS to sage-grouse habitat and population goals.

Invasive Plants – A non-native plant that effectively reproduces, is able to outcompete native plants, may alter ecosystem processes, and may be difficult to control or eradicate. Invasive plants can be considered by the State Quarantine Officer for the designation of "noxious".

Lek – Traditional courtship display and mating areas attended by sage-grouse in or adjacent to sagebrush dominated nesting habitat. Leks are generally situated on gentle terrain in relatively open areas with less herbaceous and shrub cover than surrounding areas (Connelly et al 2004).

Noxious Weeds – Any species of plant which is currently or likely to become detrimental, destructive or difficult to control and is designated by the State Quarantine Officer as "noxious". These weeds are regulated by Nevada Revised Statute 555.130 – 555.201 and the designation and categorization of noxious weeds can be found in Nevada Administrative Code 555.010.

Population Management Units (PMUs) – General delineations of sage-grouse populations for management in Nevada. PMUs are based on aggregations of leks, understanding of habitats, and potential boundaries to populations (such as mountains and valleys). These were developed by NDOW for the 2001 State plan and refined in the 2004 State Plan (see Figure 1).

Preservation – Maintenance or retention of existing habitat quality and ecosystem functions currently used by or in close proximity to habitat used by sage-grouse through a variety of management tools, both active and passive.

Reclamation – Actions performed during or after an exploration project or mining operations to shape, stabilize, re-vegetate, or otherwise treat the land in order to return it to a safe, stable condition

consistent with the establishment of a productive post-mining use of the land and the abandonment of a facility in a manner which ensures the public safety, as well as the encouragement of techniques which minimize the adverse visual effects (NRS Chapter 519A.100).

Rehabilitation – Re-vegetation of a site to achieve basic ecological functions, such as preventing soil erosion, but which does not return a site to its reference state according to its ecological site description.

Resource Selection Function (RSF) – Any model that yields values proportional to the probability of use of a resource unit. RSF models often are fitted using generalized linear models (GLMs) although a variety of statistical models might be used. RSFs were used in the development of the habitat suitability model (Section 6.0; Boyce et al. 2002).

Restoration – The reestablishment of ecologically important habitat or other ecosystem resource characteristics and function(s) at a site where they have ceased to exist, or where they exist in a substantially degraded state, and that renders a positive biological response by the habitat.

Sage-Grouse Management Category Areas – The spatial extent of sage-grouse habitat and management in Nevada as identified at the landscape-scale based on the intersection of modelled habitat suitability and greater sage-grouse space use. Management Category Areas are used by the Credit System to inform mitigation ratios applied to each map unit.

Priority Habitat Management Areas (PHMA) – Areas of high estimated space use in suitable sage-grouse habitat in the State of Nevada. These areas represent the strongholds (or "the best of the best") for greater sage-grouse populations in the State and support the highest density of breeding populations.

General Habitat Management Areas (GHMA) – Areas that are determined to be highly suitable habitat for sage-grouse in areas of estimated low space use and areas of non-habitat which overlap with areas of estimated high space use.

Other Habitat Management Areas (OHMA) – Areas determined to be moderately suitable habitat for sage-grouse in areas of estimated low space use.

Service Area – The geographic scope of the Credit System which is consistent with the current Biologically Significant Unit (BSU) mapped area and depicts the general range of sage-grouse. The overarching objective of Nevada's plan is to achieve net conservation gain of sage-grouse habitat through compensatory mitigation for new anthropogenic disturbances impacting habitat within this Service Area. Disturbances located within the Service Area, but not located in Management Category Areas require evaluations to determine whether the disturbance will cause an indirect impact to Management Category Areas.

Site Specific Consultation Based Design Features – Measures or actions designed to minimize adverse effects to sage-grouse and their habitats due to disturbances.

Space Use Index – Continuous surface mapping developed based on lek attendance and density coupled with probability of sage-grouse occurrence relative to distance to nearest lek.

WAFWA Management Zones – Range-wide sage-grouse management delineations based on populations within floristic provinces. These were developed to guide sage-grouse conservation goals and range-wide management outlined in the 2006 Greater Sage-grouse Comprehensive Conservation Strategy developed by WAFWA.

3.0 CONSERVATION GOALS AND OBJECTIVES

The State's goal for the conservation of sage-grouse in the State of Nevada is to provide for the long-term conservation of sage-grouse by protecting the sagebrush ecosystem upon which the species depends. Redundant, representative, and resilient populations of sage-grouse will be maintained through amelioration of threats; conservation of key habitats; mitigation for loss of habitat due to anthropogenic disturbances; and restoration or rehabilitation of habitat degraded or lost due to Acts of Nature.

Achieving the State's goal for the conservation of sage-grouse will provide benefits for the sagebrush ecosystem and for many other sagebrush obligate species. Sage-grouse are known to be an "umbrella species" for many sagebrush obligate and associated species (Hanser and Knick 2011). The enhancement and restoration measures that bring resiliency and restore ecological functions to sagebrush ecosystems will also serve to ensure quality habitat for sage thrasher, sage sparrow, Brewer's sparrow, sagebrush vole, pygmy rabbit, pronghorn antelope, mule deer, and many other species.

The State's goal will be met through specific conservation objectives for anthropogenic disturbances and Acts of Nature, principally large acreage wildland fires and subsequent invasion or potential domination by non-native species. This combined strategy creates the regulatory framework through which sage-grouse habitat can be conserved and the decline of sage-grouse populations can be stopped in the State of Nevada. This section of the Plan details related policies and an adaptive management approach that will provide guidance to achieve these objectives.

The guiding principles that create the balanced foundation and vision for a coordinated, management approach to conserve sage-grouse and the sagebrush ecosystem in Nevada are as follows:

- Conserve sage-grouse and their habitat in Nevada while maintaining the economic vitality of the State.
- Due to the broad reach of sage-grouse habitat, effective management and implementation of sage-grouse conservation actions must be conducted through a collaborative, interagency approach that engages private, non-governmental, local, state, Tribal and federal stakeholders to achieve sufficient conservation of the sage-grouse and their habitat.
- Monitoring and adaptive management will be employed at all levels of management in order to acknowledge potential uncertainty upfront and establish a sequential framework in which decision making will occur in order to learn from previous management actions.

3.1 Anthropogenic Disturbances

3.1.1 Conservation Objective – Net conservation gain due to new anthropogenic disturbances

The overarching objective of Nevada's plan is to achieve conservation through net conservation gain of sage-grouse habitat through compensatory mitigation for new anthropogenic disturbances impacting habitat within the Service Area (Figure 1) in order to stop the decline of sage-grouse populations. Net conservation gain is defined as the State's objective to maintain the current quantity and quality of sage-grouse habitat within the Service Area at the state-wide level by protecting existing sage-grouse habitat or by mitigating for loss due to anthropogenic disturbances. Mitigation requirements are determined by the Conservation Credit System. This objective will be measured by the credit to debit ratio.

Anthropogenic disturbance is defined here as any human-caused activity or action or human-created physical structures that may have adverse impacts on sage-grouse or their habitat. The term anthropogenic disturbance and its associated conservation policies will include, but not limited to the following project categories: mineral development and exploration and its associated infrastructure; renewable and non-renewable energy production, transmission, and distribution and its associated infrastructure; paved and unpaved roads and highways; cell phone towers; landfills; pipelines; residential and commercial subdivisions; activities undertaken pursuant to special use permits and right-of-way grants; and other infrastructure development. Livestock operations and agricultural activities and infrastructure related to ranch and farm businesses (e.g. water troughs, fences, etc.) are considered "de minimis" and not included in this definition, though Section 7.5 and Appendix A address how to minimize impacts to sage-grouse and their habitat from these activities.

3.1.2 Conservation Policies – "Avoid, Minimize, Mitigate"

The State of Nevada's overriding policy for all management actions within the Service Area is to "avoid, minimize, and mitigate" impacts to sage-grouse habitat.

This is a fundamental hierarchical decision process that seeks to:

Avoid – Eliminate conflicts by relocating disturbance activities outside of sage-grouse habitat in order to conserve sage-grouse and their habitat. Avoidance of a disturbance within sage-grouse habitat is the preferred option. If impacts are not avoided, the adverse effects will need to be both minimized and mitigated.

Minimize – Impacts will be minimized by modifying proposed actions or developing permit conditions to include measures that lessen the adverse effects to sage-grouse and their habitat. This will be accomplished through Site Specific Consultation Based Design Features (Design Features), such as reducing the disturbance footprint, seasonal use limitations, co-location of structures, etc. Minimization does not preclude the need for mitigation of a disturbance. Any disturbance in habitat within the Service Area will require both minimization and mitigation.

Mitigate – If impacts are not avoided, after required minimization measures are specified, residual adverse effects on designated sage-grouse habitat are required to be offset by implementing mitigation actions that will result in replacement or enhancement of the sage-grouse habitat that will result in net conservation gain of habitat from the disturbance activity. This will be accomplished through the Conservation Credit System.

Proposed anthropogenic disturbances within the Service Area will trigger timely consultation with the SETT for assessment of impacts to sage-grouse and their habitats and compliance with SEC and other relevant agency policies. All currently mapped sage-grouse habitat is located within the Service Area. Specifics of the SETT Consultation will be detailed in a Memorandum of Understanding (MOU) between the applicable State and Federal agencies, still under development. SETT Consultation is designed to provide a regulatory mechanism to ensure that sage-grouse conservation policies are applied consistently throughout the State and streamline the federal permitting process.

Determination of sage-grouse habitat will be based on the Nevada Habitat Suitability Map[1]. At the onset of a proposed project, habitat evaluations or "ground-truthing" of the project site and its surrounding areas shall be conducted by a qualified biologist with sage-grouse experience using methods as defined in Stiver et al (2010), or other mutually agreed to scientifically valid techniques, to confirm habitat type. Evaluations can be conducted by the SETT or NDOW at the request of the project proponent.

The specific steps for the implementation of the "avoid, minimize, mitigate" policy are as follows:

Avoid

Project proponents must first seek to avoid disturbance in sage-grouse habitat within the Service Area. If the project is located entirely outside of habitat, but within the Service Area it will still be analyzed for indirect effects, such as noise and visual impacts. A project will only be considered to have avoided impacts if it is physically located in non-habitat and it is determined to have no indirect impacts affecting designated habitat within the Service Area. If this is determined, no further consultation with the SETT is required.

It is important to note that the avoid step is not an "all or nothing" concept. If the entirety of a project cannot be relocated to non-habitat, alternatives will be explored to relocate portions of the project to non-habitat. (For example, if a mine cannot be relocated into non-habitat, power distribution lines associated with the project may be relocated to non-habitat.) This may reduce minimization and mitigation requirements for the project proponent.

Anthropogenic disturbances should be avoided within the Service Area. If avoidance cannot be reasonably accomplished, the project proponent must demonstrate why it cannot be reasonably accomplished (as described in Table 3-1) in order for the SETT to consider minimization and mitigation alternatives. The process to demonstrate that avoidance cannot be reasonably accomplished (the "avoid process") is determined by three management categories (Figure 3), which consider both sage-

[1] Higher resolution maps are available at: http://sagebrusheco.nv.gov/Resources/Maps/

grouse breeding population density and habitat suitability within the Service Area. This approach was taken in order to minimize impacts to areas with higher estimated sage-grouse use and habitat quality. Definitions and methods for developing the management categories are provided in Section 6.0.

The burden of proof to demonstrate that avoidance cannot reasonably be accomplished within the Service Area will be on the project proponent and will require the project proponent to demonstrate the specified criteria listed in Table 3-1 as determined by the management categories the proposed project is located in. Exemptions to the avoid policy will be granted if all the criteria in Table 3-1 are met. A higher burden of proof is set for project proponents to demonstrate that avoidance cannot be reasonably accomplished in areas that have higher densities of sage-grouse populations and suitable habitat.

Table 3-1. The Avoid, Minimize, and Mitigate Process for Proposed Anthropogenic Disturbances within the Service Area

Anthropogenic disturbances should be avoided in habitats within the Service Area. If project proponents wish to demonstrate that a disturbance cannot be avoided, exemptions will be granted if the criteria listed in the table can be met for the applicable management category.

Priority Habitat Management Areas (PHMA, "best of the best")	General Habitat Management Areas (GHMA)	Other Habitat Management Areas (OHMA)	Non-Habitat Areas
• Demonstrate that the project cannot be reasonably accomplished elsewhere – the purpose and need of the project could not be accomplished in an alternative location, or that locating the project elsewhere is not technically or economically feasible; • Demonstrate that the individual and cumulative impacts of the project would not result in habitat fragmentation or other impacts that would cause sage-grouse populations to decline through consultation with the SETT; • Demonstrate that sage-grouse population trends within the PMU are stable or increasing over a ten-year rolling average; • Demonstrate that project infrastructure will be co-located with existing disturbances to the greatest extent possible; • Develop Site Specific Consultation Based Design Features to minimize impacts through consultation with the SETT; and, • Mitigate unavoidable impacts through compensatory mitigation via the Conservation Credit System. Mitigation rates will be higher for disturbances within this category.	• Demonstrate that the project cannot be reasonably accomplished elsewhere – the purpose and need of the project could not be accomplished in an alternative location, or that locating the project elsewhere is not technically or economically feasible; • Demonstrate that project infrastructure will be co-located with existing disturbances to the greatest extent possible. If co-location is not possible, siting should reduce individual and cumulative impact to sage-grouse and their habitat; • Demonstrate that the project should not result in unnecessary and undue habitat fragmentation that may cause decline in sage-grouse populations within the PMU through consultation with the SETT; • Develop Site Specific Consultation Based Design Features to minimize impacts through consultation with the SETT; and, • Mitigate unavoidable impacts through compensatory mitigation via the Conservation Credit System.	• Demonstrate that the project cannot be reasonably accomplished elsewhere – the purpose and need of the project could not be accomplished in an alternative location, or that locating the project elsewhere is not technically or economically feasible; • Demonstrate that project infrastructure will be co-located with existing disturbances to the greatest extent possible; • Develop Site Specific Consultation Based Design Features to minimize impacts through consultation with the SETT; and, • Mitigate unavoidable impacts through compensatory mitigation via the Conservation Credit System.	• Demonstrate that the project will not have indirect impacts to sage-grouse and their habitats. If it cannot be demonstrated, the project proponent will be required to develop Site Specific Consultation Based Design Features to minimize impacts and compensatory mitigation will be required.

Priority Habitat Management Areas

The Priority Habitat Management Areas (PHMA) support high densities of sage-grouse and areas of high estimated space use in suitable habitat (See Section 6.0 for details on technical language). These areas include approximately 85% of space use by sage-grouse in the State of Nevada. These areas represent the strongholds (or "the best of the best") for sage-grouse populations in the State of Nevada and support the highest density of breeding populations. Thus, the management strategy is to conserve these areas by avoidance of anthropogenic disturbances in order to maintain or improve current sage-grouse population levels.

Project proponents must seek to avoid disturbances within the Service Area. If the project proponent wishes to demonstrate that avoidance cannot be reasonably accomplished within these areas, exemptions will be granted to this restriction as part of the SETT Consultation. The project proponent must demonstrate that all of the following criteria listed below (also see Table 3-1) are met as part of the SETT Consultation process in order to be granted an exemption:

- Demonstrate that the project cannot be reasonably accomplished elsewhere – the purpose and need of the project could not be accomplished in an alternative location, or that locating the project elsewhere is not technically or economically feasible;
- Demonstrate that the individual and cumulative impacts of the project would not result in habitat fragmentation or other impacts that would cause sage-grouse populations to decline through consultation with the SETT;
- Demonstrate that sage-grouse population trends within the PMU are stable or increasing over a 10-year rolling average;
- Demonstrate that project infrastructure will be co-located with existing disturbances to the greatest extent possible;
- Develop Site Specific Consultation Based Design Features to minimize impacts through consultation with the SETT; and
- Mitigate unavoidable impacts through compensatory mitigation via the Conservation Credit System. Mitigation rates will be higher for disturbances within this category.

General Habitat Management Areas

The General Habitat Management Areas (GHMA) encompass lands that are determined to be highly suitable habitat for sage-grouse by the Nevada Habitat Suitability Model and areas of high space use (See Section 6.0 for details on technical language). These areas represent the strongholds (or "the best of the best") for sage-grouse populations in the State and support the highest density of breeding populations.

Management in these areas provides more flexibility to project proponents, though avoidance in these areas is still the preferred option and project proponents are encouraged to develop outside of these areas whenever possible. Anthropogenic disturbances will be permitted in these areas if the criteria listed below (also see Table 3-1) are met as part of the SETT Consultation process:

- Demonstrate that the project cannot be reasonably or feasibly accomplished elsewhere – the purpose and need of the project could not be accomplished in an alternative location, or that locating the project elsewhere is not technically or economically feasible;
- Demonstrate that project infrastructure will be co-located with existing disturbances to the greatest extent possible. If co-location is not possible, siting should reduce individual and cumulative impacts to sage-grouse and their habitat;
- Demonstrate that the project should not result in unnecessary and undue habitat fragmentation that may cause declines in sage-grouse populations within the PMU through consultation with the SETT;
- Develop Site Specific Consultation Based Design Features to minimize impacts through consultation with the SETT; and
- Mitigate for unavoidable impacts through compensatory mitigation via the Conservation Credit System.

Other Habitat Management Areas

The Other Habitat Management Areas (OHMA) encompass areas determined to be suitable habitat for sage-grouse, though less suitable than General Habitat Management Areas and are not contained within the Priority Habitat Management Areas (See Section 6.0 for details on technical language). Management of these areas provides the greatest flexibility to project proponents. Anthropogenic disturbances will be permitted in these areas if the criteria listed below (also see Table 3-1) are met as part of the SETT Consultation process:

- Demonstrate that the project cannot be reasonably or feasibly accomplished elsewhere – the purpose and need of the project could not be accomplished in an alternative location, or that locating the project elsewhere is not technically or economically feasible;
- Demonstrate that project infrastructure will be co-located with existing disturbances to the greatest extent possible;
- Develop Site Specific Consultation Based Design Features to minimize impacts through consultation with the SETT; and
- Mitigate for unavoidable impacts through compensatory mitigation via the Conservation Credit System.

Non-Habitat Areas

The non-habitat areas are located outside of areas determined to be suitable for sage-grouse by the Nevada Habitat Suitability Model (See Section 6.0 for details on technical language). As specified above, all proposed projects within the Service Area, including in non-habitat within the Service Area must conduct habitat evaluation or ground-truthing to confirm presence or absence of sage-grouse habitat. If areas are confirmed by habitat evaluations to be non-habitat, an analysis for indirect impacts on sage-grouse within their habitat in the Service Area will be required to determine if Site Specific Consultation Based Design Features to minimize impacts and compensatory mitigation are necessary as part of the SETT Consultation process (also see Table 3-1).

Minimize

If a project cannot avoid adverse effects (direct or indirect) to sage-grouse habitat within the Service Area, the project proponent will be required to implement Site Specific Consultation Based Design Features (Design Features) that minimize the project's adverse effects to sage-grouse habitat to the extent practicable.

Minimization will include timely consultation with the SETT to determine which Design Features would be most applicable to the project when considering site conditions, types of disturbance, etc. Some general examples could include: reducing the footprint of the project, siting infrastructure in previously disturbed locations with low habitat values, noise restrictions near leks during breeding season, and washing vehicles and equipment to reduce the spread of invasive species. Land use specific Design Features are included in Appendix A.

A list of Design Features for the project must be specified and agreed upon by the SETT and project proponent prior to the start of the project and will become part of the permit/ contract requirements issued for the project. The project proponent will be required to implement, maintain, and monitor the required Design Features in good working order throughout the duration of the project.

Mitigate

Mitigation involves the successful restoration, enhancement, or preservation of sage-grouse habitat and is designed to offset the negative impacts caused by an anthropogenic disturbance. Mitigation will be required for all anthropogenic disturbances impacting sage-grouse habitat within the Service Area. Mitigation requirements will be determined by the State's Conservation Credit System (Section 8.0).

Options for mitigation will be identified in the State's Strategic Action Plan. The State's Strategic Action Plan identifies prioritized areas on public and private lands to implement a landscape scale restoration effort. The plan Possible Future Revision identifies where the primary threats to sage-grouse habitat are located throughout the State and provide management guidance for how to ameliorate the threats based on local area conditions and ecological site descriptions. The prioritization will include efforts to use mitigation funding in areas where sage-grouse will derive the most benefit, even if those areas are not adjacent to or in the vicinity of impacted populations. This Strategic Action Plan will be updated at least every five years to reflect improvements in understanding, science, and technology for mitigation activities.

3.1.3 Adaptive Management

The SETT, in close coordination with applicable federal and state agencies, will evaluate and assess the effectiveness of these policies at achieving the objective of net conservation gain and will provide a report to the SEC annually. The objective will be considered to have been met if there is a positive credit to debit ratio within the Conservation Credit System on an annual basis. If the State falls short of its objective, the SEC will reassess and update polices and management actions based on recommendations from the SETT using the best available science to adaptively manage sage-grouse habitat.

3.2 Acts of Nature – Fire and Invasive Plants

3.2.1 Conservation Objectives –

The overarching objectives of Nevada's plan is to achieve conservation through the following short and long term objectives for Acts of Nature in order to stop the decline of sage-grouse populations and restore and maintain a functioning sagebrush ecosystem:

Short Term:

- *Reduce the amount of sage-grouse habitat loss due to large acreage wildfires and invasion* or potential domination *by non-native plants.*

Long Term:

- *Maintain an ecologically healthy and intact sagebrush ecosystem that is resistant to the invasion of non-native plants and resilient after disturbances, such as wildfire.*

- *Restore wildfire return intervals to within a spatial and temporal range of variability that supports sustainable populations of sage-grouse and other sagebrush obligate species.*

The Greater Sage-grouse Advisory Committee, using the best available science, identified fire and invasive plant species, principally cheatgrass (*Bromus tectorum*), as the primary threat to sage-grouse and their habitat in the State of Nevada. The State acknowledges these threats must be adequately addressed in order to achieve the conservation goal for sage-grouse within the State of Nevada; however, it is not economically or ecologically feasible to restore all fire damaged or invasive species dominated landscapes at this point, nor is it possible to prevent all fires. The State will put forth a best faith effort to reduce the rate of sage-grouse habitat loss due to fire and invasive plant species. This objective will be measured by evaluating the amount of habitat lost due to fire over a five year rolling period. This will include an evaluation of the amount of habitat gained through post-fire sagebrush re-establishment for those communities with higher resistance and resilience, and the amount of habitat lost post fire which is subsequently dominated by invasive plant species.

3.2.2a Conservation Policies – Fire Management: Paradigm Shift

In order to address the threats of fire and invasive species, which has long challenged land managers throughout the western United States, the State proposes a paradigm shift. This would entail a more proactive, rather than reactive approach, to stop the dominance of invasive species and restore fire to within a range of variability to support sustainable populations of sage-grouse. For specific management actions associated with these policies, refer to Section 7.1 of this State Plan.

3.2.2b Conservation Policies – Invasive Plants: Prevent, Detect, Control, Restore, and Monitor

While wildfire is commonly the vector for the spread of invasive plants, such as cheatgrass, invasive plants are currently widespread throughout the Great Basin and can spread without the aid of wildfire. In order to address the general threat of invasive plants, the State proposes a policy of Prevent, Detect,

Control, Restore, and Monitor. For specific management actions associated with these policies, refer to Section 7.1 of this State Plan.

3.2.3 Adaptive Management

Fire and the subsequent reestablishment of plant species (native or not) is a natural process, and consequently this threat is extremely challenging across the western United States as humans are still limited in our ability to directly control this cycle. However, scientific understanding of ecological processes and resource management techniques continues to improve. Adaptive management approaches, committed to by the State, will provide an opportunity to continue to gain a greater understanding of the ecological mechanisms that drive these processes and will subsequently lead to improvements in resource management practices that reduce the occurrence of catastrophic wildfire and minimize the risk of crossing ecological thresholds due to the invasion and subsequent potential domination by invasive annual grasses.

The SETT will evaluate and assess the effectiveness of these policies at achieving the stated short and long term objectives and will provide a report to the SEC annually. The objectives will be met if there is a decrease or leveling off of the amount of habitat loss due to the effect of wildland fire within the Service Area over a five year period. If the State and federal agencies fall short of this objective, the SEC will reassess and update polices and management actions based on recommendations from the SETT using the best available science to adaptively manage sage-grouse habitat.

4.0 DESIRED HABITAT CONDITIONS FOR GREATER SAGE-GROUSE IN NEVADA

The desired habitat conditions for sage-grouse describe what is generally considered to be the highest quality seasonal habitat for greater sage-grouse, specific to Nevada. The desired habitat conditions do not specify what is and what is not habitat, but depict the characteristics of seasonal habitats that sage-grouse in Nevada are using most successfully, based on research, data and observations in Nevada and the Great Basin. The desired habitat conditions are based on current knowledge of sage-grouse selection and demographic rates related to habitat conditions in Nevada and the Great Basin. Management to work towards these desired habitat conditions must be implemented using professional judgement that assesses ecological site descriptions (including potential and current state and phase), adaptive management, and knowledge of authorized land uses and plans as described in the Nevada Rangeland Monitoring Handbook (Swanson, et al., 2018). Vegetation community responses to management techniques can be highly variable and may take years to reach desired conditions depending on a multitude of factors. Vegetation communities go through natural and human influenced successional stages over time that may or may not be progressing sites towards the desired habitat conditions. Therefore, monitoring and data collection must be conducted over a sufficient period of time to allow for an accurate accounting of whether or not a site is making progress toward the desired conditions.

Current and desired habitat conditions and other locally relevant resource values and information about management context and commitments will be used to inform priorities, management strategies, and achievable site-specific, disturbance response group based, or landscape scale to ensure that 1) habitats are maintained if meeting desired conditions, 2) habitats are trending toward these conditions if they are not being met and should be, 3) Habitats are being managed for long-term resilience of ecological attributes and processes these habitat conditions depend upon. Progress of management actions will be evaluated through long-term monitoring for adaptive management. When habitat within Nevada is identified as not meeting these desired conditions and there are opportunities and resources available, the State will seek to work with private and public land managers to assess the causal factors and recommend adjustments in management to work towards the desired conditions with site specific resource objectives. The desired habitat conditions in Table 4-1 should not be used to conduct land health assessments and are not regulatory, but are intended to help guide planning for current and future management using adaptive management as a part of the process. In implementation, managers must have flexibility to manage for these desired sage-grouse habitat conditions along with other desired conditions on the site, taking into consideration existing permitted uses and corresponding management plans. Some sites do not have the potential to meet desired sage-grouse habitat conditions and retain their resilience (Stringham & Snyder, 2017), which is why resource objectives must be specific to the site[2] or the array of ecological sites or disturbance response groups across a landscape.

[2] More information regarding current State-and-Transition Models per Major Land Resource Area can be found at http://naes.unr.edu/resources/mlra.aspx.

The State of Nevada recognizes that a resilient and resistant sagebrush ecosystem should be heterogeneous (a mosaic of multiple seral phases) across the landscape and that achievement of any desired habitat conditions resulting in a large-scale homogenous landscape is not optimum. Thus, the State will work with land managers and advisors to work towards achieving or maintaining a resistant and resilient landscape informed by the desired conditions in Table 4-1 and ecological site descriptions, and to incorporate new science, adaptive management, and incentives in the future that will allow this to occur.

The desired conditions in Table 4-1 should not be reviewed, measured, or managed for, independently. Sage-grouse habitat suitability should be determined by the relationship among several indicator values including ecological site descriptions (including current state and potential) along with the relative abundance of habitat types across the landscape. These conditions apply to an area being used by sage-grouse for the appropriate life stage (microsites) and not across the entire site or landscape. The desired conditions for each seasonal habitat should only be considered relevant during the appropriate season of use (dates can vary annually based on climatic conditions) and in areas spatially mapped as the relevant seasonal habitat (expected from USGS in May 2019). Habitat types may not be mutually exclusive and therefore may have to be managed for multiple seasonal conditions or selected for the more limiting habitat in the area. It is important to understand that the desired conditions described for these habitat types are based on average preferred habitat in plant communities with spatial variation in plant productivity and structure. Concepts are supported by scientific literature, and expert opinion relative to sage-grouse use of sagebrush communities and they may not apply to all sagebrush communities, patches, or microsites in the planning area (Davies, Bates, & Miller, 2006). These measures also do not account for inter-annual weather variation (e.g., precipitation) (Davies, Bates, & Miller, 2006). Herbaceous vegetation, in particular, varies dramatically year to year; measurements for a single given year should not necessarily be used to adjust management decisions or actions. When evaluating herbaceous vegetation in areas grazed in different seasons in different years, it is important to evaluate conditions across the years of rotation, recognizing that effective management for robust healthy plants may leave more or less residual in a specific season of any one year. Individual indicator values do not define site suitability and overall site suitability descriptions require an interpretation of the relationships among the indicators, ecological site descriptions (including potential and current state and phase), and other factors. In order to provide recommendations for management changes and adaptive management, professional expertise and judgment are required to properly assess current conditions. This should include but not be limited to inter-annual climate variation, and authorized uses and their associated plans.

The proposed Desired Habitat Conditions are a synthesis of existing data across the state of Nevada and portions of the Bi-State in California. The U.S. Geological Survey was primarily responsible for much of the synthesis and in translating often complex habitat relationships and GRSG responses into the proposed desired habitat conditions which could be summarized and applied on the ground. A team consisting of representatives from the U.S. Fish and Wildlife Service, BLM, Nevada Department of Wildlife, and U.S. Forest Service reviewed the Connelly et al. 2000 guidelines and also reviewed a bibliography of Nevada-based research made available by the U.S. Geological Survey. The guidelines

themselves suggest that studies which define GRSG habitat on a more region-specific basis should be used where supported by research. These proposed desired habitat conditions respond to more localized data than the Connelly et al. 2000 guidelines, which relied heavily on data from the eastern half of the range of GRSG where a perennial grass component is more dominant, and where large-scale ecological changes such as invasive grasses and conifer encroachment are largely absent. The team then went through each Connelly et al. 2000 guideline and reviewed it with respect to localized data. The proposed desired habitat conditions are supported by numerous studies throughout Nevada from the Bi-State area in southwestern Nevada and California through the Elko District into northeastern Nevada. However, much of the synthesis of research which resulted in these proposed desired habitat conditions for GRSG was conducted by the U.S. Geological Survey.

The Connelly et al. 2000 guidelines remained as a default unless refined by new information. While numerous differences between Connelly et al. 2000 and the Proposed Desired Habitat Conditions exist, they are driven primarily by three elements: 1) the reduced role of perennial grasses for nest concealment as revealed by many nesting habitat studies throughout Nevada; 2) the increased habitat fragmentation and degradation as a result of invasive grasses and conifer encroachment; and 3) the elevated importance of late-summer brood-rearing habitats in the lower precipitation zones of Nevada. The proposed desired habitat conditions also reflect recent research into more complex aspects of habitat juxtaposition, such as the interspersion of meadow habitat with adjacent sagebrush cover, and the attempt to quantify other scale-dependent relationships such as the degree of conifer encroachment. Residual cover standard (7 in/18cm) was also eliminated from GRSG nesting habitat. Localized data indicate that sagebrush canopy cover was the primary indicator of nesting success within Nevada. Research indicates that the primary deterrent to successful nesting was predation, specifically by common ravens, an aerial predator. Thus, the research demonstrated that overhead concealment was the primary indicator of nesting success and that the lateral concealment component of perennial grasses drove nesting success only when sagebrush canopy was deficient.

In March 2015, the Science Work Group met and further revised the State Plan section 4.0 and the desired habitat conditions table. These vary slightly from the BLM National Technical Team (NTT) report in which the NTT Report suggests the use of local and state seasonal GRSG desired habitat conditions when they are available and references the habitat recommendations from Connelly et al. 2000 if they are not.

Table 4-1. Desired Habitat Conditions for Greater Sage-Grouse.

Site-specific objectives should be defined based on ecological site descriptions and current ecological state.

Life Requisite	Habitat Indicator	Objective	Notes
GENERAL/LANDSCAPE-LEVEL			
All Life Stages	Rangeland Health Indicator Assessments	Conduct assessments in sage-grouse habitat and develop site-specific objectives informed by assessments	Pellant et al. 2005
Cover (Nesting)	Seasonal Habitat Needed	>65% of the landscape in sagebrush dominated cover	Aldridge and Boyce 2007
	Annual Grasses	<%5	Blomberg et al. 2012
Security (Nesting)	Conifer Encroachment	<3% phase I (>0- <25%cover) No phase II (25–50% cover) No phase III (>50% cover)	Casazza et al. 2011 USGS (In prep) (A)
Cover and Food (Winter)	Conifer Encroachment	<5% phase I (>0 - <25% cover) No phase II (25–50% cover) No phase III (>50%)	USGS (In prep) (A) USGS (In prep) (B)
	Sagebrush Extent	>85% sagebrush dominated land cover	USGS (In prep) (A) Doherty et al. 2008
LEK (Seasonal Use Period: 1 March – 15 May)			
Cover	Availability of Sagebrush Cover	Has adjacent sagebrush cover	Connelly et al. 2000 Blomberg et al. 2012 Stiver et al. (In press) HAF
Security[1]	Pinyon and/or Juniper Cover[2]	<3% landscape canopy cover within 1 km of leks	Connelly et al. 2000 (modified) Stiver et al. (In press) HAF Baruch-Mordo et al. 2013 Coates et al. 2013 Manier et al. 2014
	Proximity of Tall Structures[2, 3]	None within 3 miles (5 kilometers)	
NESTING[4] (Seasonal Use Period: 1 April- 30 June)			
Cover	Sagebrush Canopy Cover	≥20%	Kolada et al. 2009a Kolada et al. 2009b
	Residual and Live Perennial Grass Cover	≥10% if shrub cover is <25%	Coates et al. 2013 Coates and Delehanty 2010 Kolada et al. 2009a Kolada et al. 2009b
	Annual Grass Cover	<5%	Lockyer et al. (In press)
	Total Shrub Cover	≥30%	Coates and Delehanty 2010 Kolada et al. 2009a Lockyer et al. (In press)
	Perennial Grass Height	Provide overhead and lateral concealment from predators	Connelly et al. 2000 Stiver et. al. (In press) HAF Connelly et al. 2003 Hagen et al. 2007

Security[1]	Proximity of Tall Structures[2, 3]	None within 3 miles (5 kilometers)	Coates et al. 2013 Gibson et. al. 2013 Manier et al. 2014
BROOD-REARING/SUMMER[4] (Seasonal Use Period: 15 May- 15 September) Early brood-rearing seasonal use period: 15 May- 15 June Late brood-rearing seasonal use period: 15 June- 15 September			
All brood-rearing sites			
Cover	Perennial Grass Canopy Cover and Forbs	>15% combined perennial grass and forb canopy cover	Connelly et al. 2000 Hagen et al. 2007
Cover and Food	Perennial Forb Canopy Cover	≥5% arid ≥15% mesic	Casazza et al. 2011
Early and late brood-rearing – Upland Sites Only			
Cover	Sagebrush Canopy Cover	10-25%	Connelly et al. 2000
Late brood-rearing- Riparian Sites Only			
Cover and Food	Riparian Areas/Meadows	PFC[6]	Prichard et al. 1998 Prichard et al. 1999 Dickard et al. 2015 Stiver et al. (In press) HAF
Security	Riparian Area/Meadow Interspersion with Adjacent Sagebrush	Has adjacent sagebrush cover	Casazza et al. 2011 Stiver et al. (In press) HAF
Cover	Perennial Grass Height	Provide overhead and lateral cover from predators, for thermoregulation, insects, etc.[7]	Connelly et al. 2000 Stiver et. al. (In press) HAF Connelly et al. 2003 Hagen et al. 2007
Late brood-rearing – Both Upland and Riparian Sites			
Food	Perennial Forb Availability and Understory Species Richness[5]	Understory Species Richness- > 5 grass and forb species present	Casazza et al. 2011
WINTER[4] (Seasonal Use Period: 1 November – 28 February)			
Cover and Food	Sagebrush Canopy Cover	≥10% above snow depth	Connelly et al. 2000 USGS (In prep) (C)
	Sagebrush Height	>9.8 inches (25 centimeters) above snow depth	Connelly et al. 2000 USGS (In prep) (C)

[1]Applicable to Phase I and Phase II pinyon and/or juniper.

[2] The difference between tall trees and powerlines is in degree of impact. Generally, power lines are larger and have much greater visibility. They contribute to fragmentation and provide potential predators with larger scale, more pervasive access to habitats.

[3] Defined as structures that provide nesting resource for Sage-grouse predators using best available science. Does not include fences.

[4]Field collection data for these seasonal habitat delineations should only be taken in the areas mapped as that habitat type (maps expected from USGS in May 2015) and during the appropriate seasonal use period. Seasonal use periods are standardized for the purposes of this table, but may fluctuate annually due to climatic conditions.

[5]Species richness should include some forb species, with consideration given to sage-grouse preferred forb species listed in Stiver et al. in Press.

[6]Site does not have to meet PFC but should be showing progress in trending toward proper functioning condition or have an upward trend if functioning at risk.

[7]Applies to grasses within sagebrush-shrub communities adjacent to riparian area. Sage-grouse generally select for perennial grass heights that are greater than what is randomly available in a given site (USGS unpublished data). Selected heights in Nevada on average range from 4" - 8" (average droop height of live plants) depending upon resistance and resilience mapping and ecological site descriptions (USGS unpublished data). Generally, sites in the northern portion of the management area trend toward the upper end and those in the southern portion trend toward the lower end of the height range (USGS unpublished data).

5.0 IMPLEMENTATION RESPONSIBILITIES

The creation of the Sagebrush Ecosystem Program (SEP) was one of the main recommendations of the 2012 Governor's Sage-grouse Advisory Committee. The SEP consists of the Sagebrush Ecosystem Council (SEC) and the Sagebrush Ecosystem Technical Team (SETT). The program is established under the Department of Conservation and Natural Resources – Division of State Lands. The program is a collaborative, multi-stakeholder approach, charged to carry out programs to preserve, restore, and enhance sagebrush ecosystems in the State of Nevada. In addition, the SEP will work with Local Area Working Groups (LAWGs) and Conservation Districts to help identify and implement on-the-ground sage-grouse and sagebrush ecosystem conservation efforts. Also, the SEP will work with local governments to avoid conflicts with sage-grouse habitat, including but not limited to urbanization issues.

Sagebrush Ecosystem Council (SEC)

The SEC was originally established under Executive Order 2012-19 and later codified under state statute NRS Chapter 232.162. The SEC consists of a nine voting member board, appointed by the Governor with representatives from the following interests: agriculture, energy, general public, conservation and environmental, mining, ranching, local government, Native American tribes, and Board of Wildlife Commissioners. In addition, the state directors of the Nevada Departments of Conservation and Natural Resources (DCNR), Wildlife (NDOW), and Agriculture (NDA), as well as the state directors for the federal agencies of BLM, USFWS, and HTNF serve as ex-officio members. The SEC is responsible for determining policy associated with the sagebrush ecosystem and sage-grouse.

The objective of the SEC is to establish and guide a consistent, transparent process to coordinate disturbance and conservation activities and set policy in the Service Area in order to provide for a resilient and resistant sagebrush ecosystem and stable or increasing sage-grouse populations.

The specific duties of the SEC include:

- Consider the best science available in its determinations regarding the conservation of sage-grouse and sagebrush ecosystems in this State;
- Establish and carry out strategies for: 1) the conservation of the sage-grouse and sagebrush ecosystems in this State; and 2) managing land that includes those sagebrush ecosystems, taking into consideration the importance of those sagebrush ecosystems and the interests of the State;
- Establish and carry out a long-term system for carrying out strategies to manage sagebrush ecosystems in this State using an adaptive management framework and providing for input from interested persons and governmental entities;
- Oversee the SETT;
- Establish and set policy for the Conservation Credit System (CCS);

- Solicit suggestions and information and, if necessary, prioritize projects concerning the enhancement of the landscape, the restoration of habitat, the reduction of nonnative plants and the mitigation of damage to, or the expansion of, scientific knowledge of sagebrush ecosystems;
- If requested, provide advice for the resolution of conflict concerning the management of the sage-grouse or a sagebrush ecosystem in this State;
- Coordinate and facilitate discussion among persons, federal and state agencies, and local governments concerning the maintenance of sagebrush ecosystems and the conservation of the sage-grouse;
- Provide information and advice to persons, federal and state agencies and local governments concerning any strategy, system, program or project carried out under this State Plan;
- Provide direction to state agencies concerning any strategy, system, program or project carried out pursuant to this State Plan and resolve any conflict with any direction given by another state board, commission, or department jointly with that board, commission or department, as applicable;
- Submit semi-annual program progress reports to the Governor;
- Pursuant to the "Inter-Tribal Council of Nevada, Inc. Resolution & Letter of Support," (Appendix A) integrate Tribal participation in the statewide conservation effort, and acknowledge traditional Tribal ecological knowledge when available to update the Service Area;
- Establish policies for the identification and prioritization of landscape-scale enhancement, restoration, fuel reduction, and mitigation projects based upon ecological site potential, state and transition models, and other data that will contribute to decision making informed by science to increase resiliency; and
- Encourage and facilitate land management education and training for all user groups of sage-grouse habitat.

Sagebrush Ecosystem Technical Team (SETT)

The SETT is a multi-disciplinary, interagency team with representation from DCNR – Divisions of State Lands and Forestry, NDOW, and NDA. The SETT serves as staff to the SEC and advises them on the best available science.

The objective of the SETT is to implement a multi-disciplinary approach for the administration of this State Plan that incorporates various scientific and technical expertise and provides a well-defined process for assessing impacts and permitting activity in the Service Area.

The specific duties of the SETT include:

- Serve as staff to the SEC and advise the SEC on the best available science in order for them to set policy;

- Develop a comprehensive State Plan based on the recommendations from the Governor's Sage-grouse Advisory Council;
- Oversee the day-to-day implementation of the goals, objectives, and management actions established under this State Plan. Propose revisions to the State Plan as needed;
- Coordinate the development of the CCS. In accordance with SEC policy, administer and operate the CCS once it is established;
- Work with the USGS and other technical experts to development sage-grouse habitat and management maps;
- Establish and manage a process in cooperation with applicable federal and state agency partners to update sage-grouse habitat and management maps using the best available science;
- Coordinate with the BLM and USFS and other federal and state agencies on the development of the Nevada and Northeastern California Greater Sage-grouse Land Use Plan Amendment (LUPA) and Environmental Impact Statement (EIS);
- Enter into an MOU with the BLM and USFS for agency coordination on sage-grouse management and administration of the CCS;
- Compile and submit state-wide data for the USFWS data call for the sage-grouse listing decision;
- Work with scientific and technical experts for advice on the best available science for implementing and updating management actions;
- Identify and prioritize landscape-scale enhancement, restoration, fuel reduction, and mitigation projects based upon ecological site potential, state and transition models, and other data that will contribute to decision making informed by science to increase resiliency following wildfire;
- Provide timely consultation for project proponents who want to conduct activities in the Service Area to avoid, minimize, and mitigate impacts to sage-grouse. This will likely include robust ground-truthing for the presence or absence of habitat. Foster and maintain collaborative processes with state and federal agencies to expedite state and federal permitting, while providing for the conservation of sage-grouse;
- Secure grants and other funding opportunities to implement habitat enhancement and restoration projects;
- Develop and oversee a monitoring and adaptive management program and provide recommendations to the SEC on how to update policies based on new information learned; and
- Establish a geographic database repository to maintain the inventory of development and mitigation projects, population data, and monitoring results.

Local Area Working Groups (LAWGs)

The LAWGs provide all stakeholders with an opportunity to work together in actively managing and restoring landscapes across boundaries. Even with collaboration there is a realization that to be successful there is a need for more investment from all sources to achieve sage-grouse conservation objectives. LAWG membership includes representation from private land owners, tribes, federal land management agencies, local governments, conservation districts, USFWS, USGS, NDOW, NGO, USDA-ARS, UNR, NRCS, DOD, sportsmen, mining, energy, Off-Highway Vehicle (OHV) users, agricultural and environmental interests.

The SEP will work with the LAWGs to:

- Develop and implement site-specific plans to accomplish enhancement and restoration projects in areas that are identified by the SEP as important areas for sage-grouse conservation;
- Monitor and adaptively manage conservation actions;
- Identify potential habitat enhancement and restoration projects; and
- Provide local, site-specific expertise on a variety of issues.

Conservation Districts Program (CDP)

The CDP provides administrative support to the State Conservation Commission, which develops policy and regulations for Nevada's twenty-eight locally elected conservation districts. The CDP is comprised of a program coordinator and three staff specialists stationed in Elko, Ely, and Winnemucca. The CDP's role in the implementation of this State Plan is to assist in the development of on-the-ground conservation projects.

The SEP will work with the CDP to:

- Implement on-the-ground conservation and mitigation projects identified by the SEP and LAWGs, including perusing grants and other funding opportunities. Provide recommendations to the SEP on possible additional projects; and
- Facilitate communication between individual CDs, SEP, LAWGs, and other stakeholders in order to more effectively achieve on-the-ground conservation.

Local Governments

Thirteen of Nevada's seventeen counties, as well as several cities are located within the Service Area.

The SEP will work with local governments:

- When a county or city considers a change to its master plan for a land use of higher intensity affecting the Service Area.
- To address any potential conflicts with sage-grouse habitat.

6.0 MAPPING

The SEP contracted with the USGS to serve as the lead technical and science advisor for the development of habitat suitability index (HSI) for sage-grouse in Nevada using resource selection function (RSF) modeling. The SEP used the HSI to develop habitat and management maps to be implemented through this State Plan. The SETT assembled an Expert Review Team, comprised of local sage-grouse technical experts from the UNR, BLM, NDOW, USFWS, and HTNF to advise the SETT on technical aspects of the mapping process.

Methods

The State's process for developing spatially explicit maps for sage-grouse habitat and Sage-Grouse Management Category Areas was completed in four stages: 1) development of the HSI; 2) classification of the HSI into suitability categories; 3) development of a space use index; and 4) merging the habitat suitability categories and space use index to develop management categories. The methods for each of these stages are outlined below.

Habitat suitability index

Model averaged RSFs were used to develop HSIs that ranked areas of the State based on a continuum of sage-grouse selection, from highly selected for to strongly avoided. The modeling is driven by actual location data obtained using radio-telemetry information, informed by >31,000 telemetry locations from >1,500 radio-marked sage-grouse across 12 study areas within Nevada and California collected over a 15-year period, and by environmental factors including land cover composition, water resources, habitat configuration, elevation, and topography, each at multiple spatial scales that are relevant to sage-grouse movement patterns. The modeling process contrasted these environmental factors for sites used by sage-grouse (telemetry data) with available sites (randomly generated locations). Contrasting the environmental factors of used versus available sites provided information about what factors were correlated with greater sage-grouse selection or avoidance (e.g., streams, pinyon-juniper).

RSFs were applied to calculate an overall probability of use per pixel[3]. This created a single sage-grouse HSI and resulted in a surface of predicted use by sage-grouse across Nevada. This surface, the HSI, is represented by probability values that range across a continuous spectrum of 0.0 to 1.0 (Figure 4).

Habitat Suitability Categories

To identify suitable habitat, the HSI described above was classified into three categories of suitability (high, moderate, and non-habitat) using cutoff values based on the standard deviation (SD) from the mean HSI value. High suitability habitat was comprised of all HSI values greater than 0.5 SD below the mean. Moderate suitability habitat was comprised of HSI values between 1.5 and 0.5 SD below the mean. Non-suitable habitat was comprised of HSI values 1.5 SD below the mean. This bottom cut-off point was validated by a cost-benefit ratio looking at the trade-off between additional area to telemetry

[3] Pixels are the 30 x 30 meter resolution of the RSFs.

points. The equalization point occurs at 1.5 SD. The resulting habitat categories were then aggregated at the 1 km scale to account for corridors and smoothed at the 1.2 km scale to remove "islands".

Space use index

An index of space use was developed based on lek attendance and density coupled with probability of sage-grouse occurrence relative to distance to nearest lek. This index was then categorized into two categories: high use and low to no use. High use consisted of areas that included up to 85 percent of the highest space use index density and low-to-no use consisted of areas with less than 15 percent.

Management Categories

To create a management prioritization for the implementation of this State Plan, the habitat suitability classes were intersected with the space use categories as follows and are displayed in Figure 3:

Priority Habitat Management Areas (PHMA) – areas of suitable sage-grouse habitat that are found within areas of estimated high space use;

General Habitat Management Areas (GHMA) – high suitability habitats that are found in areas of estimated low space use and areas of less suitable habitat that overlaps with areas of estimated high space use;

Other Habitat Management Areas (OHMA) – moderate suitability habitats that are found in areas of estimated low space use; and

Non-habitat areas – are located outside of areas determined to be suitable for sage-grouse.

Full methods for the development of the Nevada HSI, Habitat Suitability Map, and Management Category Map are detailed in "Spatially Explicit Modeling of Greater Sage-Grouse Habitat in Nevada and Northeastern California: A Decision Support Tool for Management" (Coates et al. 2016).

The Nevada sage-grouse habitat and management mapping process is a product of the SETT and is a collaborative group process with state and federal agency review and input and with the USGS serving as the scientific contractor on the habitat suitability model.

<u>Map revisions</u>

This mapping effort is iterative and is intended to inform and better define aspects of the State Plan. To that end, the habitat and management mapping process will be reviewed and refined every 3 to 5 years. New or improved spatial data (*e.g.*, additional sage-grouse telemetry data, updated or improved vegetation community data) will be incorporated during the refinement process. The review and refinement process will be scientifically based and include review and input from SETT, NDOW, BLM, USFS, and USFWS. Other stakeholders will be encouraged to participate in the process by submitting relevant information to the listed agencies. It is anticipated that the habitat suitability modeling processes will be the basis for refinements, unless more rigorous methods are developed.

Project assessment under SETT Consultation will be based on the map that is current at the commencement of the review process. If a new map becomes available after the review process has begun, the previous version of the map will continue to be used. If the project proponent proposes changes in scope of the project, then the assessment will be based on the revised map. In addition, individual projects will typically include on the ground habitat determinations for the presence or absence of habitat.

The following outlines the process to be followed to update the above mentioned biological and management tools for greater sage-grouse in Nevada (excluding Bi-State Distinct Population Segment).

1) Biologically Significant Units (BSUs) and Population Management Units (PMUs)
Definition: General delineation of sage-grouse populations in Nevada (excluding Bi-State) at two scales.

Guidance for updating: Collaborative process with NDOW biologists and the SETT based on available spatial connectivity data and understanding. USGS Rangewide Connectivity maps (from range-wide genetic research) should inform modification of the PMUs and BSUs. Other "in-state" or "in-house" genetic work would expand upon that knowledge. In addition, continued collection of telemetry locations will be able to assist in determining if there are movements of birds across BSU boundaries. If sage-grouse and leks are identified outside BSU or PMU boundaries, this will be incorporated into modification of BSUs and PMUs, as well. PMU boundaries and BSU boundaries would likely be reviewed together and modified as new science and field-level knowledge arises, but not more frequently than once per year. In general, the population delineations are anticipated to be fairly static as these are coarse-scale population delineations.

Timeline of updates: At this point in time, there is no scheduled update for the BSUs and PMUs as there is no clear defined date for information to become available that would inform the changes. NDOW and the SETT will review USGS Rangewide Connectivity Maps upon new iterations (or other statewide genetic information that may be developed and telemetry and lek information) to determine if there is sufficient information that warrants BSU or PMU updates. If new telemetry data shows deviations from PMUs or BSUs, modifications may also be made to population delineations. When updates are completed, NDOW will make available maps and shapefiles.

2) Management Categories
Definition: State of Nevada landscape scale management prioritization of sage-grouse habitat.

Process for updating: Below is a general schematic of the inputs and processes for the Management Categories. Red indicates areas for possible update.

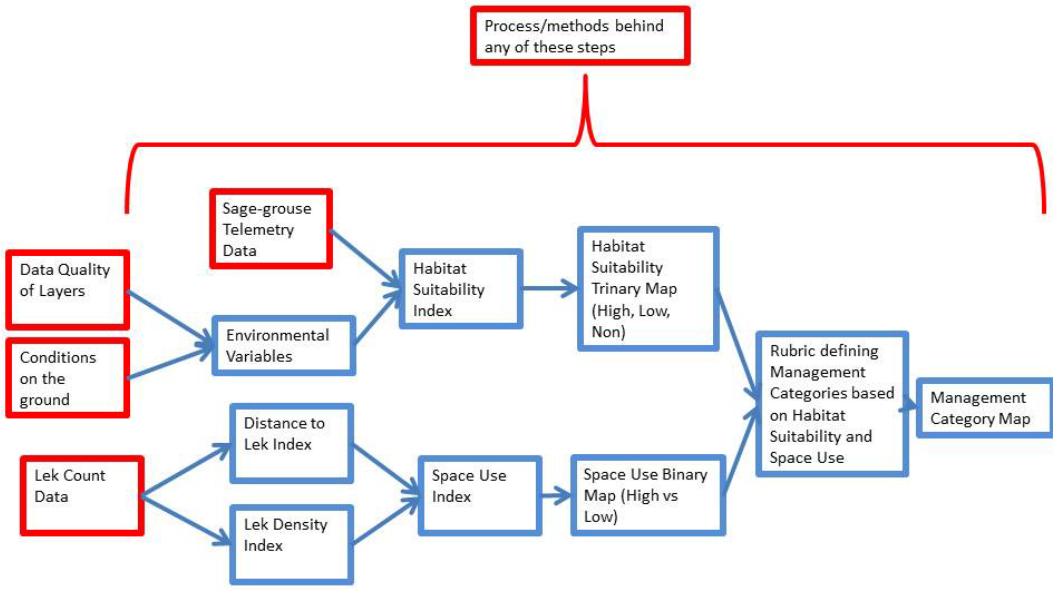


Table 4. Rubric for determining habitat management classes from habitat suitability and space use categories.

	Space Use Index Category	
Region-Wide RSF Category	**High Use Area**	**Low-to-No Use Areas**
High Habitat Suitability	Priority Habitat Management Area	General Habitat Management Area
Moderate Habitat Suitability	Priority Habitat Management Area	Other Habitat Management Areas
Low Habitat Suitability	Priority Habitat Management Area	Other Habitat Management Areas
Non-suitable Habitat	General Habitat Management Area	Non-habitat areas

Updates can come from

1) Process
- **a.** Methods for development of management categories (rubric – table 4 above)
- **b.** Methods behind HSI (including changes in the environmental variables selected)
- **c.** Methods behind SUI.

2) Input information
- **a.** Additional telemetry data
- **b.** Improvement or updates of underlying layers to HSI
- **c.** Change in conditions on landscape (most obvious being fire)
- **d.** Yearly lek counts.

1a, 1b, and 1c – The methods and rubric outlined in Coates et al. (2016) are the methods for the updating process moving forward unless the coordination team (SETT, NDOW, BLM, FS, FWS) agrees to changes in the methods. The methods used are anticipated to be fairly consistent; modifications to methods should consider best available science. Modifications to methods should generally occur on the 3-5 year update schedule, but only made when Team identifies new analytical tools and determine the current model no longer represents best available science.

2a and **2b** – These will be updated every 3-5 years. New telemetry data will be collected yearly. New data products may become available. The updates to the HSI and HSI Map will be made every 5 years unless TEAM (TBD –SETT, NDOW, BLM, FS) decides there is sufficient new data to revise sooner, but not more frequently than once every 3 years.

2c. Fire is currently incorporated with a 10-year lag period – meaning fire <10 year ago are assumed to be pre-fire vegetation class as the post fire veg response is not known. While conditions change due to fire yearly, the process for updating this data in the HSI will be completed every 3-5 year. There will not be a yearly update for the following reasons: 1) sage-grouse may not respond immediately to fire, 2) current vegetation class input to the model is based on Synthmap data from ~2005, which means the map currently reflects the 10 year lag period, 3) it is too cumbersome to change the management map on a yearly basis. The next iteration of the model, 3-5 years out, will likely include an updated vegetation layer and, for post burn areas not appropriately captured in the new vegetation layer, will include either ground-truthing for fires that are 10+ years old or a sub-model that predicts post fire outcome based on resistance and resilience parameters (sub-model still to be developed and accuracy verified).

2d. Leks that are categorized as active status or pending status are included in the SUI modeling. Lek status can change yearly, and 5-year averages can change yearly. This affects leks that show up in SUI and the size of high space use areas as it relates to lek size and density. While lek status can change yearly, the process for updating this data in the HSI will be completed every 3-5 year, but not more frequent than once every 3 years. There will not be a yearly update for the following reasons: 1) not many leks change status every year, 2) it takes 2-3 years of data for a lek to change status so having a 3-5 year period is generally acceptable, 3) from a management perspective, it is time intensive and costly to change maps with a greater frequency.

Subsequent revisions will occur every 3-5 years beginning in 2018, as determined by the Team (TBD – SETT, NDOW, BLM, FS). When updates are completed, SETT and NDOW will make available maps and shapefiles.

3) Service Area

Definition: The extent of the Service Area is consistent with the current BSU map and triggers federal agency consultation with the SETT for anthropogenic disturbance projects.

Guidance for update: Collaborative process with NDOW and the SETT based on the extent of population delineations and habitat delineations as defined above to encompass the broad scale at which impacts (direct and indirect) to sage-grouse are to be considered for management. In general, the SGMA is anticipated to be fairly static as these are coarse scale delineations.

The Sagebrush Ecosystem Council must approve revisions to the Service Area.

7.0 THREAT ASSESSMENT—GOALS, OBJECTIVES, AND MANAGEMENT ACTIONS

Threats to sage-grouse and their habitats in Nevada were based on those identified in USFWS' 2010 proposed rule for sage-grouse and further developed in their Conservation Objectives Team Report, as well as from input by local areas experts. The list of threats and proposed actions was originally determined by the Advisory Committee and further developed in greater detail by the SEP.

7.1 Fire and Invasive Plants

In 2012, Nevada's Greater Sage-grouse Advisory Committee, using the best available science, identified fire and invasive plants, principally cheatgrass, as the primary threat to sage-grouse and their habitat in the state of Nevada. Wildland fires and the subsequent invasion or potential domination by cheatgrass and other invasive plants continue to create large-scale habitat loss and fragmentation (Figure 5 and Figure 6). This current rate of habitat loss is not sustainable for long-term sage-grouse population persistence.

While the vast majority of fires in sage-grouse habitat are suppressed in the initial attack phase, the continued loss of large areas in sage-grouse habitat occurs most often during periods of 'Extreme Fire Danger Conditions' when fire behavior has the greatest impact on suppression capabilities. These 'Extreme' conditions can exist simultaneously over large areas of the western U.S, creating a shortage of regional/national firefighting assets due to pre-existing large fires with greater values at risk (Murphy et al. 2013).

In Nevada and throughout the western United States, the years in which the highest number of acres burned occurred after wet productive growing seasons that produced abundant fine fuels. Consecutive wet years can add to residual fine fuels. An unprecedented series of four wet years in 1995-1998 was followed by an unprecedented three years in 1999-2001 during which more than 2.75 million acres burned in Nevada (Littell et al. 2009). Woody fuels become most flammable when lack of fire or a fire surrogate vegetation management allows woody fuel to accumulate. Many areas of Nevada that prehistorically burned every few decades have not burned for over a century (Gruell and Swanson 2013).

The State acknowledges these threats must be adequately addressed in order to achieve the conservation goal for sage-grouse and actions must be taken to increase overall preparedness, strategically locate fuels management projects using resistance and resilience concepts (Chambers et al. 2014), increase local suppression capabilities, and improve rehabilitation/restoration capabilities.

To this end, the State began efforts to address these threats by creating the Sagebrush Ecosystem Program, composed of the Sagebrush Ecosystem Council, with its attendant Sagebrush Ecosystem Technical Team, and developed and approved a state plan that facilitates best available science review and technology transfer to State and local agencies and to work in coordination with federal land managers and other public and private partners. In addition, the State continues to implement the

Nevada Division of Forestry's (NDF) Wildland Fire Protection Program, which allows for full implementation of Nevada Revised Statute, Chapter 472, improving delivery of financial, technical and wildland firefighting equipment/human resources to Nevada counties in fuel reduction planning and implementation, wildfire management and suppression and short and long term restoration of burned areas.

As well, the SAP, developed after the first iteration of this State Plan, considered concepts of resistance and resilience as a multi-scale approach to prioritize management actions for sage-grouse. Chambers et al (2014) outlines the role of these concepts relative to fire cycle and the role of annual invasive grasses. The SETT participated in the interagency collaborative Fire, Invasive Assessment Team (FIAT) that has developed a step-down process (FIAT 2014) based on Chambers et al. 2014 to identify management projects focused in key sage-grouse habitat to address the continual threat of fire and invasive plants, as well as conifer encroachment. Projects identified through the FIAT were incorporated into the SAP, as appropriate.

Collaboration among agencies on projects will be paramount in ameliorating the main threats to sage-grouse. Good Neighbor Agreements, non-binding agreements between a community and an industry which works to address specific issues of concern in a collaborative way, are one way to accomplish this. Recently signed Good Neighbor Agreements will streamline the ability to conduct joint projects (e.g., fuels reduction, vegetation treatment, etc.) and transfer project-related funds between federal and state agencies. A Good Neighbor Authority (GNA) Master Agreement was signed in 2017 between DCNR, NDOW, NDA and the USFS. A separate Good Neighbor MOU was signed between these agencies and the BLM to cover all federal lands throughout Nevada.

Nevada Revised Statute (NRS) Chapter 555 and Nevada Administrative Code (NAC), Chapter 555 address both noxious and invasive plants, their status, and any regulations regarding the control of such plants. The State has established a priority list of noxious weeds that require some form of control. Other widespread invasive plants, such as cheatgrass, while not on the noxious weed priority lists, pose a significant threat to Nevada's landscapes and habitats and will be addressed on a priority basis, particularly when they compromise sage-grouse desired habitat conditions (see Section 4.0).

The introduction of exotic invasive plant species in Nevada has likely been occurring since the early European settlers arrived and has been intentionally and unintentionally occurring since that time. While some species may go seemingly unnoticed, many currently pose significant threats to the sagebrush ecosystem, wildlife habitats, and our landscape in general. While all of these identified species are currently considered by the State as invasive plants, some warrant further declaration as 'noxious'. Noxious weeds are defined in NRS 555.130 as: "Any species of plant which is likely to be detrimental, destructive or difficult to control, but is not already introduced and established in the State to such an extent as to make its control or eradication impracticable in the judgment of the State Quarantine Officer". Plants that do not meet this definition are generally considered to be invasive or nuisance weeds. Cheatgrass falls into the 'invasive' category due to its expansive footprint within Nevada's sagebrush ecosystem.

Cheatgrass is an exotic species from the Middle East that was introduced in North America in the late nineteenth century and has become one of the most adaptive and dominant invasive plants in the Western U.S. This is especially true following fire and other major ground disturbing activities in sagebrush ecosystems, particularly at lower elevations and precipitation zones in Nevada.

Many factors will be considered when prioritizing treatments for fire and invasive plants (i.e. noxious weed presence, sage-grouse breeding densities, habitat suitability (abundance, quality, and connectivity), existing additional threats, resistance, resilience, ecological site description, state and transition models, etc.). Additionally, further prioritization may be determined by the type of action required (conservation related, prevention based, or restoration or rehabilitation activities), presence of or proximity to sage-grouse habitat, and the amount of funding available for treatment in a given year.

Goals, Objectives, and Management Actions

The overarching direction of Nevada's plan is to stop the decline of sage-grouse populations and restore and maintain a functioning sagebrush ecosystem. Currently, it is not economically or ecologically feasible to restore all fire damaged or invasive plant dominated landscapes, nor is it possible to prevent all fires, though the State acknowledges that this threat must be addressed in order to provide for the conservation of sage-grouse. In order to achieve this goal, the State will take a phased approach through a series of short term and long term objectives and management actions. The State will first seek to reduce the amount of habitat loss, with the long-term objective of restoring ecosystem functions and processes. This will require a concerted and consistent commitment to achieve these objectives over the long-term.

The State has already taken steps to achieve these objectives through statewide adoption and implementation of the Nevada Division of Forestry's Wildland Fire Protection Program, creating a tiered system that gives equal priority to cooperative pre-suppression fire prevention projects; adopting and incorporating National Wildfire Coordination Group (NWCG) approved training and firefighting techniques that can help preserve habitat; and, cooperative post-suppression rehabilitation and restoration activities in and around areas of important habitat.

1.1 Goal: Ameliorate the threat of fire and invasive plants in order to provide for the conservation of sage-grouse and their habitat.

Short term objectives and management actions:

1.1.1 Objective: Reduce the amount of sage-grouse habitat loss due to large acreage wildfires and invasion or potential domination by non-native plants.

Pre-suppression

In order to address the threat of fire and invasive plants, which continues to challenge land managers throughout the western United States, the State proposes a continued shift in focus from the current suppression-centric approach to a more nuanced, cost effective, and proactive approach focusing on pre-suppression activities; which if adequately supported, will contribute greatly to Federal, State and local efforts to stop the dominance of invasive plants, reduce

catastrophic wildfire incidence, and restore fire to within a range of variability to support sustainable populations of sage-grouse in Nevada.

1.1.1.1 Management Action: Develop, and provide sustainable, predictable federal, state, and local funding sources for pre-suppression activities (including maintenance) separate from funding for suppression and post-fire rehabilitation activities.

1.1.1.2 Management Action: Dedicate funding to plan and implement cost effective pre-suppression activities with an emphasis on strategic, scalable cooperative projects informed by best available science; utilize cost efficient methods and tools; and follow up with effective, repeatable monitoring.

1.1.1.3 Management Action: Make decisions regarding pre-suppression planning and fuels management projects based on best available science. This information will be incorporated into the planning process to inform locations of landscape and local scale fuels management projects and to provide protection to areas of sage-grouse habitat that have compromised resilience, resistance, and heterogeneity.

1.1.1.4 Management Action: Prioritize pre-suppression fuels management projects, fire prevention planning, and invasive plant control activities in and around Priority and General Habitat Management Areas. Pre-suppression projects will be identified, designed and prioritized so that they facilitate firefighter safety, protect private property, prioritize important sage-grouse habitat, and work to maintain natural resource functions.

1.1.1.5 Management Action: Establish, maintain, and fund an effective, repeatable pre-suppression monitoring and adaptive management program that informs future project planning and implementation.

Suppression

State and federal agencies will provide safe, cost-effective fire management programs that support the conservation of sage-grouse habitat through collaborative planning, coordination, training, staffing, resource allocation, and fire management oversight.

1.1.1.6 Management Action: Support robust, coordinated, and rapid fire suppression management using a diversity of agencies, including federal, state, tribal and local government, as well as creating, empowering and training (to latest Nevada and National Wildfire Coordinating Group (NWCG) standards) Rural Fire Associations, Fire Protection Districts and Wildfire Support Groups.

1.1.1.7 Management Action: Support and improve interagency wildfire prevention activities and education statewide, including: interagency agreement updates, wildfire workshops, demonstration projects, and public service announcements on wildfire and sage-grouse habitat loss.

1.1.1.8 Management Action: When prioritizing wildland firefighting actions in the Service Area, give priority to Priority Habitat Management Areas, followed by General and Other Habitat Management Areas during fire operations.

1.1.1.9 Management Action: Use wildland fire strategically to accomplish resource management objectives. Fire may not have to be suppressed in all instances. Resource and fire managers should consider beneficial fire use if located in areas that may benefit sage-grouse habitats, but only if:

- it would not risk the net spread of invasive plants;
- human lives, property, and important natural resource functions are not at risk;
- wildland fires exhibit prescribed/desired fire behavior characteristics and are located in designated sage-grouse habitats appropriate for beneficial fire use.

1.1.1.10 Management Action: Manage wildland fires in sage-grouse habitat to retain as much habitat as possible. Interior unburned islands of vegetation in areas of habitat should be protected through follow-up mop-up of the island's perimeter and interior, when fire crew safety is not at risk.

Post-Fire Restoration/ Rehabilitation

Emergency stabilization (ES) and burned area rehabilitation (BAR) funding streams are instrumental in the process of stabilizing soils and reestablishing adapted perennial vegetation on federal lands post-fire. Currently, these programs provide funding for rehabilitation treatment immediately post-fire, which does not reflect the need to accommodate for poor initial success due to lack of precipitation and other environmental variables.

1.1.1.11 Management Action: Work with federal, tribal, and local governments to develop dedicated funding sources that allow for up to five years of additional post-fire restoration treatments in order to better ensure projects meet goals and objectives.

1.1.1.12 Management Action: Until such time as dedicated funding sources for multi-year post-fire restoration treatments can be developed, federal, state, tribal, and local governments should submit budget requests and projections that reflect the need for funding that will cover actual and contingent yearly costs associated with successful multiyear post-fire rehabilitation efforts.

1.1.1.13 Management Action: Use the concepts of resistance and resilience and products developed by BLM's FIAT (Fire and Invasives Assessment Team) group to determine if post-fire restoration actions are necessary to trend towards sage-grouse desired habitat conditions (see Section 4.0).

1.1.1.14 Management Action: Control the spread of invasive plants post-fire.

1.1.1.15 Management Action: Use collaborative and strategic approaches in post-fire rehabilitation efforts in sage-grouse habitat. Federal, state, tribal and local agencies should coordinate and collaborate on rehabilitation projects in sage-grouse habitat where responsibilities and land ownership interests intersect.

1.1.1.16 Management Action: Design post-fire restoration treatments in Priority, and General, and Other Habitat Management Areas to trend towards sage-grouse desired habitat conditions (see Section 4.0). Consider the use of native plant materials based on availability and probability

of success. When native plant materials are not available or the probability of success is low, use non-native plant materials that will best work towards achieving sage-grouse desired habitat conditions. All seed used on rehabilitation and restoration projects must be labeled source identified or certified seed, as appropriate. All mulch, straw or gravel/earth materials used in rehabilitation and restoration projects must be certified weed free to the North American Invasive Species Management Association (NAISMA) standards.

1.1.1.17 Management Action: Monitor post-fire restoration treatments to ensure long term persistence of restored habitat, and that the monitoring continues at least until treatment objectives are met.

Invasive plants

While wildfire is commonly the facilitator for the domination of invasive plants, such as cheatgrass, invasive plants are currently widespread throughout the Great Basin and can spread without the aid of wildfire. In order to address the general threat of invasive plants, the State will pursue a strategy of Prevent, Detect, Control, Restore, and Monitor, using the best available science. The Nevada Department of Agriculture (NDA) will utilize its EDDMapS program to assist the State in the implementation of these efforts.

1.1.1.18 Management Action**:** *Prevent* the establishment of invasive plants into uninvaded sage-grouse habitat. This will be achieved by conducting systematic and strategic detection surveys, data collection, and mapping of these areas and engaging in early response efforts if invasion occurs. This will be achieved by further developing federal and state partnerships and working with counties, cities, and local groups, such as Weed Control Districts, Cooperative Weed Management Areas, and Conservation Districts. This is a priority for invasive plant control in the state of Nevada.

1.1.1.19 Management Action: Apply Design Features to proposed anthropogenic disturbance (see Appendix A) in order to minimize land disturbance and prevent the spread of invasive plants.

1.1.1.20 Management Action: Require anthropogenic disturbance proponents to monitor for the existence of invasive plants pre-disturbance and to report all findings to the NV EDDMapS database. Pre- and post-disturbance activities must include prevention strategies prior to entering sites, control, restoration, and monitoring for a minimum of three years or until the site is deemed noxious and invasive weed free following the disturbance. All sites must be certified weed free prior to any relinquishment of obligations that authorized the disturbance.

1.1.1.21 Management Action: *Detect* new invasive plant infestations, whether it is a single plant or a small patch. If it can be detected and mapped early in the invasion and control begins immediately, then the likelihood for eradication will increase dramatically. NDA will use its EDDMapS program to assist in the effective and efficient implementation of this action.

1.1.1.22 Management Action: Within sage-grouse habitat, and where funding may be a limiting factor, prioritize the control of invasive plants that are compromising attainment of sage-grouse desired habitat conditions (see Section 4.0).

1.1.1.23 Management Action: Rehabilitate sites that are ecologically functioning, but at risk of crossing an ecological threshold and becoming nonfunctional due to already being compromised by invasive plants, to trend towards sage-grouse desired habitat conditions(see Section 4.0). Rehabilitation may include re-vegetating sites with native plants cultivated locally or locally adapted, or non-native plant species where appropriate. Any rehabilitation project where invasive plants already occur or may be found in close proximity should include an invasive plant treatment and monitoring component within the plan.

1.1.1.24 Management Action: Use ecological site descriptions and associated state and transition models to identify target areas for resiliency enhancement or restoration. Maintaining or enhancing resilience should be given top priority. In the Great Basin sagebrush-bunchgrass communities, invasion resistance and successional resilience following disturbance are functions of a healthy perennial bunchgrass component. Therefore a combination of active and passive management will be required to ensure this functionality. Areas that are in an invaded state that will likely transition to an annual grass monoculture if a disturbance occurs and are located within or near sage-grouse habitat should be prioritized for pre-fire management favoring native and adapted perennials and post-fire restoration efforts to increase resistance and resilience.

1.1.1.25 Management Action: Engage climatological and meteorological professionals and their agencies to identify opportunities to increase both effectiveness and efficiency in the timing of restoration activities. Additional activities could include weather augmentation through cloud seeding, and assistance with both short term and longer term weather prediction model guidance or shorter term weather indicators.

1.1.1.26 Management Action: Monitor and adaptively manage to ensure effectiveness of efforts to prevent, detect, control and restore. Use the resource mapping functions within EDDMapS to identify and map infestations as well as any prevention, restoration, or rehabilitation efforts.

Long term objectives and management actions:

1.1.2a Objective: Maintain an ecologically healthy and intact sagebrush ecosystem that is resistant to the invasion of non-native species and resilient after disturbances, such as wildfire.

1.1.2b Objective: Restore wildfire return intervals to within a spatial and temporal range of variability that supports sustainable populations of sage-grouse and other sagebrush obligate species.

1.1.2.1 Management Action: Develop consistent and dedicated funding sources in order to provide a consistent commitment to pre-suppression, suppression, post-fire restoration, and invasive plant management actions described above.

1.1.2.2 Management Action: Work collaboratively with federal, state, tribal, and local governments, as well as private entities to consistently implement the management actions described above.

1.1.2.3 Management Action: Monitor all management actions to evaluate and assess their effectiveness at achieving objectives and use this knowledge to adapt management plans.

1.1.2.4 Management Action: Emphasize continued research and provide funding for research and monitoring to enhance knowledge and understanding of how to further reduce the prevalence of catastrophic wildfire. Minimize the risk of crossing ecological thresholds due to the invasion and subsequent potential domination by invasive annual grasses, use fire behavior prediction to optimize fire management, and improve rehabilitation/ restoration techniques.

7.2 Pinyon-Juniper Encroachment

In Nevada, pinyon and juniper (P-J) woodlands are composed of single leaf pinyon pine (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*). In northwestern Nevada pinyon and Utah juniper are replaced with western juniper (*J. occidentalis*). P-J woodlands currently cover 13% of Nevada (Figure 7), or approximately 9.1 million acres (Mitchell and Roberts 1999). Of the 9.1 million acres in Nevada, approximately 64% is found on BLM land, 26% on USFS land, 5% on private land, and the remaining 5% on other lands (DOD, NRC, USFWS, BIA, etc.) (DCNR-NDF 2010).

From a historical standpoint, the area occupied by pinyon or juniper has increased 125 to 625 percent since 1860. The increase in trees is a result of infill into shrub-steppe communities that contained low numbers of trees, and expansion of P-J into areas that previously did not support trees. (Miller et al. 2008). Potential reasons for the expansion may include: altered fire regimes, improper livestock grazing, natural range expansion, and changing climate (Romme et al. 2009).

In Nevada, P-J encroachment is ranked as the second highest threat to sage-grouse, after fire and invasive plants. This continued woodland expansion is a challenge for land and wildlife managers, with two primary concerns being the continuing steady conversion of sagebrush habitat to woodland and increased risk of large area destructive wildfires that may convert woodlands to monocultures of invasive annual grasses and other weedy species.

Pinyon – Juniper Woodland Encroachment into Sagebrush Communities – Characterization
P-J woodland encroachment is characterized by three phases (Miller et al 2005):

- Phase I – Trees are present but shrubs and herbaceous vegetation are the dominant vegetation that influences ecological processes on the site;
- Phase II – Trees are co-dominant with shrubs and herbaceous vegetation and all three vegetation layers influence ecological processes on the site; and
- Phase III – Trees are the dominant vegetation and the primary plant layer influencing ecological processes on the site.

If a wildfire occurs before Phase III is reached, the original vegetation community has an opportunity to return to the site via successional pathway that is dependent upon the fire's surviving plant species, seed produced by the remaining shrubs, surviving herbaceous vegetation, or their viable seed remaining in the soil seed bank. This return to the original community is also dependent on the native plants being abundant enough to out compete any on-site invasive annual grasses like cheatgrass or medusahead grass (*Taeniatherum caput-medusae*) and perennial invasive weeds (e.g. knapweeds, etc.) following the fire.

With time, and little or no fire, these invaded brush communities become Phase III woodlands, characterized by very little understory, the only evidence of the former plant community being skeletons of sagebrush and other woody brush species and a sparse population of weakened herbaceous plants . At this point, run-off from the soil surface of spaces between trees increases, due to the loss of herbaceous ground cover. In turn, the increased rate and speed of soil erosion can trigger

difficult to reverse changes to the biogeochemical cycles of the plant community. If a fire burns through the woodland at this point, the potential for the area to return to a sagebrush plant community is greatly reduced, particularly if cheatgrass, medusahead, or perennial invasive weeds are present in the understory.

The risk of conversion to annual and perennial invasive plants increases as trees grow from phase II to phase III, with the threshold occurring at about >40% relative cover of trees compared to <60% cover of shrubs and herbaceous plants. Prior to this threshold, fire sustains long-term sagebrush ecosystem resilience. After this threshold, fire leads to potential domination by invasive annuals or perennials without effective re-vegetation by perennial grasses (Miller et al. 2005).

In the Great Basin there are approximately 100,000 + acres a year moving into Phase III woodlands. (Miller et al. 2008). At this rate of encroachment, management of sagebrush habitats becomes a race between a potentially permanent loss of sagebrush habitat to P-J woodland versus how much Phase I and II woodlands can reasonably be treated each year before they reach Phase III.

Land managers have to consider removal of trees from areas that historically have been sagebrush dominated as a priority activity. Numerous studies have documented the expansion of P-J woodlands into sagebrush communities (Cottam and Stewart 1940; Adams 1975; Burkhardt and Tisdale 1976; Tausch et al. 1981; Tausch and West 1988, 1995; Gedney and others, 1999; Miller and Rose 1995, 1999; Miller et al. 2005). In recent years, research has looked at woodland dynamics and new approaches to measure the extent that P-J has replaced or are encroaching sagebrush communities, versus dynamics on sites that have supported woodlands in the past (Miller et al.2008).

Another area of recent research increasing land managers understanding of vegetation dynamics and increasing decision making options is the inclusion of concepts of resistance and resilience. These concepts can be used in conjunction with sage-grouse habitat requirements to develop lists of appropriate management actions and to identify effective management strategies at landscape scales (Wisdom and Chambers 2009 & Chambers et al. 2014).

Pinyon – Juniper Woodland Encroachment into Sagebrush Communities – Greater Sage-grouse Impacts
The continued expansion of woodland has become a primary threat to greater sage-grouse and other sagebrush obligate wildlife species. In the instance of sage-grouse, woodland expansion contributes to the loss of important seasonal habitats. It also increases raptor presence and predation associated with the coniferous trees (Commons et al. 1999). Several studies demonstrate that sage-grouse avoid areas encroached by P-J, show that P-J removal will increase sage-grouse habitat quality, and provide some evidence that sage-grouse will return to an area once P-J is removed:

- During both the breeding and summer seasons, sage-grouse preferred cover types with less than 5% juniper canopy cover compared to those same cover types with greater than 5% juniper canopy cover. (Freese 2009).

- Juniper can also indirectly influence sage-grouse avoidance of habitats through its influences on plant community compositional and structural changes, such as a reduction in the herbaceous understory (Knapp and Soule 1998, Miller et al. 2000).

- Sage-grouse avoided conifers at the 0.65 km scale (850m x 850m). Sage-grouse avoided mixed sagebrush/tree (≤40 trees/ha) at scales of 7.3 and 159.2 ha. Avoidance was most statistically supported when patch widths exceeded 200 m (Doherty 2008).

- Sage-grouse avoid areas encroached by P-J at scales of 7.9 ha to 226.8 ha (Casazza et al 2011).

- Recent modeling efforts by the Sage-grouse Initiative have shown that no leks remained active when P-J cover exceeded >4% and recommended focusing P-J removal treatments in Phase I stands (Baruch-Mordo et al 2013).

- Research focused on treatment effectiveness indicated that mechanical tree thinning increased native understory biomass by 200 percent (Brockway et al 2002).

- Removal, by cutting, of pinyon- juniper trees/shrubs in association with brush-beating to reduce height of mountain big sagebrush and deciduous brush resulted in doubling numbers of male sage grouse counted on treatment leks in years 2 and 3 post-treatment (Commons 1999).

Goals, Objectives, and Management Actions

2.1 Goal: Establish and maintain a resilient sagebrush ecosystem and restore sagebrush vegetation communities in order to provide for the conservation of sage-grouse and their habitat.

2.1.1 Objective: Reduce the expansion of P-J woodlands into otherwise suitable sage-grouse habitat.

2.1.1.1 Management Action: Inventory and prioritize areas for treatment of Phase I and Phase II encroachment that is contiguous with suitable sage-grouse habitat in Priority, General, and Other Habitat Management Areas in order to achieve sage-grouse desired habitat conditions (Table 4.1). Treat areas that have the greatest opportunity for recovery to suitable sage-grouse habitat based on ecological site potential.

2.1.1.2 Management Action: Prioritize areas for treatment of Phase III pinyon-juniper encroachment in strategic areas only to break up continuous, hazardous fuel beds, create movement corridors, or connect habitats. Treat areas that have the greatest opportunity for recovery to suitable sage-grouse habitat based on ecological site potential. Old growth trees should be protected on woodland sites.

2.1.1.3 Management Action*:* Aggressively implement plans to remove Phase I and Phase II encroachment in areas contiguous with suitable sage-grouse habitat. Only treat areas in Phase III encroachment to reduce the threat of severe conflagration, create movement corridors, or connect habitats. Phase III treatments may need additional rehabilitation/restoration actions if perennial understory vegetation is absent.

2.1.1.4 Management Action: Allow temporary road access to P-J encroached treatment areas. Construct temporary access roads where access is needed with minimum design standards to avoid and minimize impacts. Remove and restore temporary roads upon completion of treatment.

2.1.1.5 Management Action: Seek sufficient resources to address habitat loss and degradation in the next ten years.

2.1.1.6 Management Action: Share project funding among all appropriate agencies and jurisdictions by designing and completing NEPA for large-scale, watershed-based treatments over a period of years.

***2.1.1.7 Management Action*:** Incentivize and assist in the development of bio-fuels and other commercial uses of pinyon and juniper resources, where utilization is appropriate and can expand site-specific restoration and rehabilitation goals and objectives

2.1.1.8 Management Action: Increase the incentives for private industry investment in biomass removal, land restoration, and renewable energy development by authorizing stewardship contracts for up to 20 years.

2.1.1.9 Management Action: Work with federal, state, local, tribal, and private partners to treat at least 100,000 acres annually. Monitor, adaptively manage, and report progress to the Nevada Sagebrush Ecosystem Council.

2.1.1.10 Management Action: Use pre-suppression fuels management treatments in strategic areas so fire in P-J areas can be managed appropriately.

2.1.1.11 Management Action: Work with federal, state, and local fire management partners to pre-plan for fire use and prescribed natural fire where and when appropriate.

7.3 Predation

Predation is a natural factor operating on all sage-grouse populations. Historically, given appropriate quality and quantity of habitat, sage-grouse populations have persisted despite naturally high levels of predation with which they evolved (Schroeder and Baydack 2001, Hagen 2011). Prey species have evolved ways to avoid predation such as coloration that conceals them, behavioral adaptations, and specialized reproductive strategies. Sage-grouse populations typically mitigate impacts of predation through cryptic nesting, increased chick production, re-nesting efforts, and response to annual habitat variation. When population levels become depressed below a particular threshold, quantity and quality of habitat may be diminished, or predator populations may become abundant enough to serve as a limiting factor, the behaviors and life-history strategies of prey species may not be able to compensate for losses from predators depending on numerous factors influencing predator densities and effects. These factors include: predator search efficiency, prey switching, and food subsidies (Cote and Sutherland 1997, Schroeder and Baydack 2001, Hagen 2011).

Predator Species

Predators can affect sage-grouse during various life stages in three ways: 1) nesting success, 2) survival of chicks during the first few weeks after hatch, and 3) annual survival of breeding age birds (Schroeder and Baydack 2001). Table 7-1 outlines potential predator species in Nevada that may influence each life stage.

Table 7-1 Potential Sage-grouse Predator Species in Nevada

	Life Stage		
Predator Species	**Nest**	**Chick**	**Juvenile and Adult**
American badger (*Taxidea taxis*)	X		X
Bobcat (*Lynx rufus*)	X		
Coyote (*Canus latrans*)	X		X
Fox (*Vulpes* spp.)	X		
Great Basin gopher snake (*Pituophis catenifer*)		X	
Raptors (*Buteo* spp., *Aquila* spp. *Circus* spp., etc.)			X
Common raven (*Corvus corax*)	X	X	
Weasels (*Mustela* spp.)	X	X	

(Connelly et al. 2004, Coates et al. 2008, Lockyer et al. 2013)

None of these predators depend on sage-grouse as their primary prey species. Many depend primarily on rodents or lagomorphs but will opportunistically consume sage-grouse, especially during specific life phases (e.g. badgers during the nesting season (Coates and Delehanty 2010)).

The common raven (*Corvus corax*) is identified as the most frequent predator during nesting season in sage-grouse predator studies conducted recently in the Great Basin (Coates et al. 2008, Lockyer et al. 2013). Raven populations have increased over 200 percent from 1992 to 2012 in both the Great Basin and in Nevada, based upon USGS Breeding Bird Survey results (Sauer et al. 2014). Subsidized food sources such as landfills and road kill; elevated nest platforms provided by transmission lines; and landscape alterations such as transitions to annual grasses, can increase raven populations (Boarman 2003, Boarman and Heinrich 1999, Webb et al. 2004). Raven abundance is often tied to habitat quality, particularly in areas where recently burned areas abut unburned habitat (Howe et al. 2014, Coates et al., In Review). Raven control has been shown to be an effective, short-term, tool during the early nesting season to gain increased survival through the nesting and early brood life cycle stages (Coates et al. 2007) when ravens are the limiting factor affecting nest success. Long-term effects at the population level are still not understood.

Given that ravens have been found to be increasing across the West and juvenile survival of ravens is tied to anthropogenic subsidies (Webb et al. 2004), localized lethal efforts are not likely to be successful in reducing state-wide populations (Webb et al. 2004). Thus, effective raven management needs to also include efforts to reduce food, water, and nesting subsidies.

Current State Predation Management Efforts for Sage-grouse

The following presents information on the State of Nevada's current predator control efforts to benefit sage-grouse populations.

Predator control

NDOW is partnered with USDA-APHIS-Wildlife Services for predator control focusing on carnivores (primarily badgers and coyotes) and ravens. NDOW currently has a depredation permit from the FWS for 2,500 ravens. Much of the take under this permit is conducted using poisoned eggs (hard-boiled chicken eggs that contain DRC-1339, an avicide). Poisoned eggs are placed at specific leks for ravens as a means of limiting raven populations during the sage-grouse nesting season. (See Appendix B for additional details regarding FWS depredation permits for ravens.)

Road kill removal

In cooperation with NDOT, county road crews, USFWS, and UNR, NDOW has hired wildlife technicians to experimentally remove road carrion from three treatment areas in northern Nevada, in and around priority sage-grouse nesting habitat.

Landfill management

NDOW is working in cooperation with city and county municipalities, private entities, and the USFWS in Eureka, Humboldt, and Lander Counties to improve waste stream policies to minimize access by predator species and to increase the frequency of food waste and dead animal pit burials.

Goals, Objectives, and Management Actions

3.1 Goal: Reduce sage-grouse mortality due to predation where predation mortality is likely additive or is a limiting factor influencing sage-grouse population.

The following three objectives should be carried out concurrently as part of an integrated predator management plan.

The management actions identified under Objective 3.1.1 should be carried out at the state-wide level, or at a more localized, targeted scale, as appropriate.

3.1.1 Objective: Reduce anthropogenic subsidies to ravens, such as food sources (e.g. road kill, landfills), and nesting substrates (e.g. power lines), especially cognizant in landscapes with heterogeneous land cover, such as burned and unburned areas.

3.1.1.1 Management Action: Coordinate with NDOT and local governments to identify high density road kill areas to focus interagency road kill removal efforts. Provide information to agency staff that explains the need for the effort and outlines disposal options and procedures.

3.1.1.2 Management Action: Work with city and county governments to develop and adopt procedures that minimize availability of refuse in the urban interface that acts as food and water sources for predators.

3.1.1.3 Management Action: At landfills and waste transfer facilities, work with Nevada Division of Environmental Protection and facility managers to develop and adopt procedures that eliminate food and water sources for predators.

3.1.1.4 Management Action: Work with livestock owners, land managers, and regulatory authorities to develop and implement effective methods to reduce or eliminate exposed animal carcasses or other livestock by-products that may provide a food subsidy for predators.

3.1.1.5 Management Action: Collaborate with and provide informational material to stakeholders, such as Nevada Association of Counties, League of Cities, sportsmen's groups, Nevada Cattlemen's Association, and the general public on raven subsidy issues; such as refuse in urban areas, livestock carcasses and by-products, and wildlife carcasses (coyote, squirrels, rabbits).

3.1.1.6 Management Action: Research and develop management techniques to limit or reduce the availability of water subsidies to ravens. This may be very challenging and will likely require new technologies and techniques given Nevada's arid environment, distance between natural water sources, and the need for anthropogenic watering sites accessible to both livestock and wildlife.

3.1.1.7 Management Action: Reduce and eliminate artificial hunting perches and nesting substrate for aerial predators (e.g., removal of non-operational fences and power lines, installation of anti-perch devices on new power lines). Consideration for retrofit of existing power lines can be done on a case by case basis, where technology and economic factors allow.

3.1.1.8 Management Action: Encourage continued research in the development of more effective perching and nesting deterrent options.

3.1.1.9 Management Action: Monitor the effects of efforts to reduce anthropogenic subsidies on raven populations and adapt management accordingly.

Objectives 3.1.2 and 3.1.3 should be implemented in localized areas where predation has been identified as a limiting factor on sage-grouse population. Use the "Process to Prioritize Integrated Predator Management Projects" (See Appendix C) before engaging in Objectives 1.2 and 1.3.

3.1.2 Objective: Maintain or improve habitat integrity by increasing visual cover to reduce detection by predators or by reducing fragmentation to limit habitat for ravens.

3.1.2.1 Management Action: Maintain a mosaic of shrub cover conditions with areas of nesting habitat having ≥20% sagebrush cover and ≥30 percent total shrub cover to provide increased cover for nesting and escape (Gregg et al. 1994, Coates and Delehanty 2010) and decrease opportunities for large fires using pre-suppression strategies.

3.1.2.2 Management Action: Maintain residual grass cover in nesting habitat to provide cover for nesting and escape (Gregg et al. 1994, Gregg and Crawford 2009, Coates and Delehanty 2008). This factor is more important if shrub cover is low.

3.1.2.3 Management Action: Where appropriate, begin recovery of degraded sites to reduce fragmentation by decreasing edge of non-native annual grasses next to intact Priority or General Habitat Management Areas and to reduce fragmentation.

3.1.2.4 Management Action: Minimize disturbance activities near leks during lek season (i.e., when males are inattentive and most vulnerable to predation) and near nest sites during nesting season that may result in adults flushing off nests or away from young. (In this instance, disturbance activities are anything that may cause birds to flush such as startling noise [explosions], road traffic, human presence, etc.). Use seasonal restrictions on activities, when appropriate, to minimize disturbances.

3.1.3 Objective: Conduct targeted predator control, based on monitoring and adaptive management. Objective 1.3 should be implemented pursuant to steps to achieve objectives 1 and 2.

3.1.3.1 Management Action: From the outcome of the Process to Prioritize Integrated Predator Management Projects (see Appendix C), establish a predator control program based on biological assessments appropriate to local conditions. Conduct predator control to coincide with the life stage impacted by predation. Program development needs to include specific goals and objectives and identification of triggers or endpoints for management practices. Monitor pre- and post-treatment predator numbers or densities as appropriate, and effects of predator control on sage-grouse vital rates (e.g. nest success, chick survival) and adapt control strategies accordingly.

3.1.3.2 Management Action: When conducting raven control programs using DRC-1339, the methods outlined in Coates et al. (2007) should be followed. The following points should be evaluated when conducting raven control programs:

- The assumed ratio of number of ravens removed to baited eggs placed
- Need for pre-baiting to accustom ravens to their presence
- Length of time eggs should be left in the environment
- Spacing of egg and number of eggs placed together
- Consideration to implement treatment yearly, based on monitoring of raven population response
- Treatment should be conducted early in sage-grouse incubation period (within the first 40 days following first average nest initiation for the season) to coincide with greatest raven predation period (Coates and Delehanty 2008, Lockyer 2013)

The SETT will work with subject experts (USGS, NDOW, Wildlife Services) to develop a standardized protocol for effective raven removal efforts.

***3.1.3.3 Management Action**:* Consider option to oil or addle eggs in nests of territorial ravens found on anthropogenic structures as part of raven control program, when appropriate.

3.1.3.4 Management Action: Document success through a rigorous monitoring, analysis, and reporting of population responses to control efforts. For raven control programs, if there is a demonstrated benefit to sage-grouse via scientifically valid documentation, submit a request to USFWS for increased allowable take of ravens, assuming personnel availability from NDOW and Wildlife Services to appropriately identify locations and conduct work.

7.4 Wild Horses and Burros Management

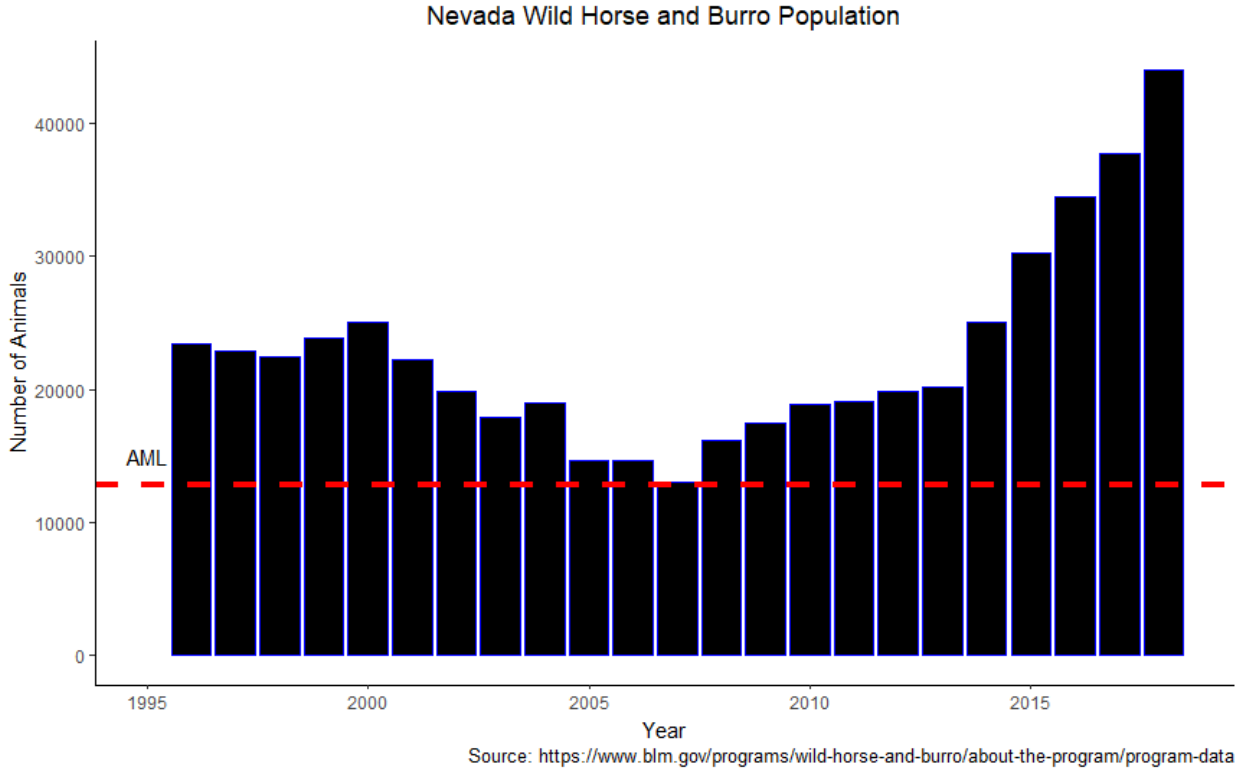
The State of Nevada supports multiple uses on public lands and the responsible and active management of those lands uses, including wild horses and burros, which are protected by the Wild Free-Roaming Horses and Burros Act (the Act) of 1971. While that Act protects them from harassment and unjustified removal or destruction, it also allows for the proper management of wild horse and burro populations within the Herd Management Areas (HMA) on BLM land and Wild Horse and Burro Territories (WHBT) on USFS land that are within Herd Areas (HA). Proper management of herd populations serves to protect their health as well as that of the habitat they and other species rely upon. The Act acknowledges the need to maintain the wild horses and burros within established Appropriate Management Levels (AML). The Act authorizes the BLM to remove and dispose of animals through adoption, sale, and euthanasia. Subsequent legislation has resulted in the BLM being restricted from selling, or euthanizing animals in a way that may result in the loss of ordinarily healthy animals. This State supports the Act as it was initially authorized and offers recommendations for alternative management actions necessary to attain and maintain herd sizes that promote the continued health and diversity among wild horses and burros and allows for a sustainable sagebrush ecosystem that is mutually beneficial to all land uses and users.

How HA, HMA, WHBT, and AML were established

Under the Act, BLM and USFS are required to manage wild horses and burros only in HA where they were found when the Act passed in 1971. Through land use planning, the BLM and USFS evaluated each HA to determine if it had adequate food, water, cover, and space to sustain healthy and diverse wild horse and burro populations over the long-term. The areas which met these criteria were then designated as HMA and WHBT (BLM 2013, BLM 2018) (Figure 8).

BLM and USFS also evaluated each HMA to determine how much forage is available for use. The available forage is then allocated among wildlife, wild horses and burros and domestic livestock. The number of horses and burros which can graze without causing damage to the range is called the “appropriate management level” (AML) (BLM 2013, BLM 2018).

Nevada's annual AML as compared to Wild Horse and Burro (WHB) population estimates

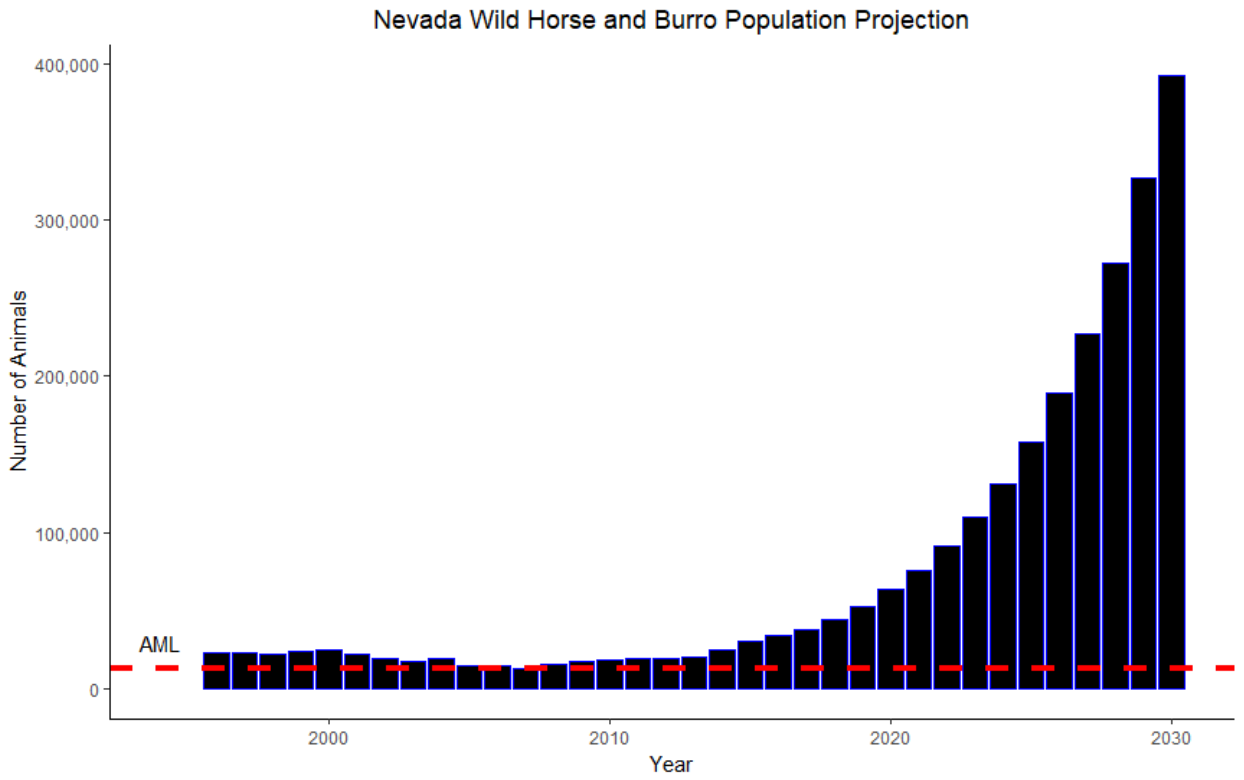


Current estimates of wild horses from the BLM and USFS are as follows (BLM 2018):

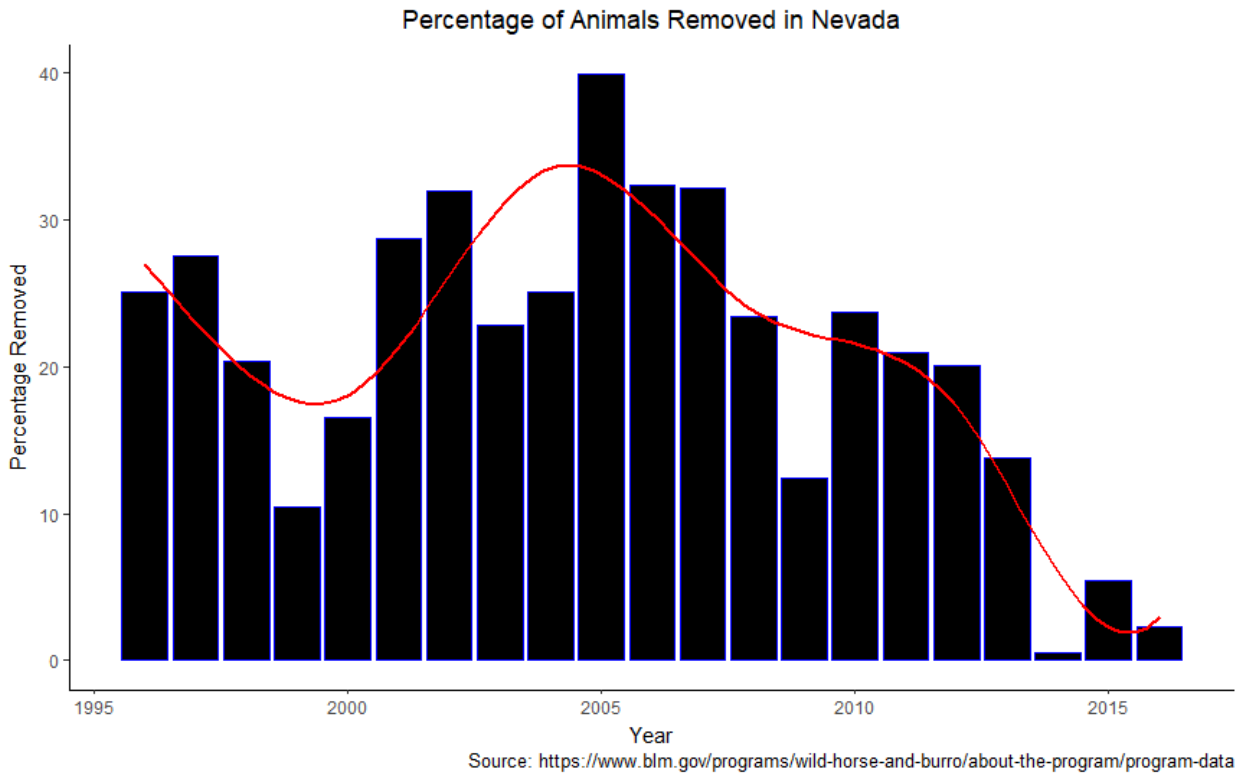
- National: 81,951 (307% of AML)
- Nevada: 44,017 (343% of AML)
- National AML: 26,690
- Nevada AML: 12,811
- 68 of the 83 HMA statewide are exceeding AML
- Nationally, over 44,000 horses are currently held in captivity in either short term holding facilities or long term private pastures

Wild horses are capable of increasing their numbers by 18 percent to 25 percent annually, resulting in the doubling of wild horse populations every 4 years (Wolfe et al. 1989; Garrott et al. 1991). Wild horses are a long-lived species with survival rates estimated between 80 and 97 percent (Wolfe et al. 1980; Eberhardt et al. 1982; Garrott and Taylor 1990) and they are a non-self-regulating species. There are 62 HMA and 14 WHBT that overlap with sage-grouse habitat in Nevada (BLM 2013).

Wild horse and burro populations are expected to continue to grow without an increased effort to control and reduce the number of on-range animals. Assuming a state-wide growth rate of 20% and current management with no limiting factors, horse numbers will approach 400,000 animals in 12 years. Factors such as food and water would eventually limit horse populations, however range condition would be severely impacted before populations began to stabilize.



While nationally more than 220,000 wild horses and burros have been adopted by private citizens since the program began in 1971, the levels of adoption have decreased dramatically since 2007 (Shepherd, personal communication; BLM 2018). The percentage of both burros and horses removed from the range have dropped sharply from a high of 39% in 2005 to a low of 0, 5, and 2 percent in 2014, 2015, and 2016, respectively.



In 2013 in Nevada there were 2,787 horses removed and 89 were adopted or sold (Shepherd 2014). In order to stabilize current growth rates and maintain current population levels in Nevada (most are currently near or exceeding the high range of AML), approximately 6,600 - 8,800 horses would need to be removed annually statewide, in the absence of using effective population growth suppression techniques.

The State of Nevada supports the most comprehensive and effective plan available to achieve and maintain AML in accordance with the Act as originally intended. The State of Nevada will work closely with federal agencies to develop new, and expand on existing strategies, policies, and best management practices to attain sustainable wild horse and burro populations within HMA and WHBT. The State of Nevada will also engage Congressional representatives and their staff to secure assistance in the implementation of the management activities authorized within the Act.

Goals, Objectives, and Management Actions

4.1 Goal: Support, promote, and facilitate full implementation of the Wild Free-Roaming Horses and Burros Act of 1971, as amended, including to preserve and maintain a thriving natural ecological balance and multiple-use relationship, without alteration of its implementation by subsequent Congresses or Presidential administrations.

Recognizing that if action is not taken until herd health has become an issue, the range and water resources are likely to be in a highly degraded and potentially irreversible state. Non-active management (e.g. let nature take its course, wait until horse health or resource conditions are

critical) is not acceptable management. Non-management will negatively impact or potentially create irreversible habitat impacts within the Service Area; therefore, use all tools available to actively manage wild horses and burros within HMA and WHBT.

4.1.1 Objective: Maintain healthy and diverse wild horse and burro populations in the State of Nevada in a manner that maintains or is actively managed to trend towards sage-grouse desired habitat conditions, as applicable (see Table 4.1).

4.1.1.1 Management Action: When needed, the SEC will lend support to preferred management actions submitted by the Wild Horse and Burro Advisory Board, and Federal Land Management Agencies through correspondence to relevant Congressional representatives and leadership within agency departments.

4.1.1.2 Management Action: Focus expenditures of appropriated funds on management of wild horses and burros on public lands over care in captivity.

4.1.1.3 Management Action: Even if current AML is not being exceeded, yet habitat within the Service Area continues to become degraded, at least partially due to wild horses or burros, established AML within the HMA or WHBT should be reduced through the NEPA process and monitored annually to help determine future management decisions. Unless already meeting the lowest established AMLs, during periods of drought, AML should be reduced to remain consistent with the declining levels of available forage.

4.1.1.4 Management Action: Methods that were used to initially establish AML should be reevaluated to determine if they are still sufficient to maintain or achieve sage-grouse desired habitat conditions, as applicable (see Table 4.1).

4.1.1.5 Management Action: Use professionals (botanists, rangeland ecologists, wildlife biologists, hydrologists, etc.) from diverse backgrounds to conduct land health, and riparian proper functioning condition assessments.

4.1.1.6 Management Action: Conduct annual site specific wild horse and burro grazing response indices (Swanson et al. 2006) assessments, and habitat objective assessments.

4.1.1.7 Management Action: When implementing management activities, water developments, or rangeland improvements for wild horses or burros, consider both direct and indirect effects on sage-grouse and use the applicable Site Specific Consultation Based Design Features (Design Features; see Appendix A) to minimize potential impacts or disturbances.

4.1.1.8 Management Action: To expedite recovery time and enhance restoration efforts following wildfire or sage-grouse habitat enhancement projects, consider a significant reduction and temporary removal or exclusion of all wild horses and burros within or from burned areas where HMA and WHBT overlap with sage-grouse Priority, General, and Other Habitat Management Areas. Wild horse grazing behaviors and specialized physiological requirements make unmanaged grazing on recently burned/treated areas problematic for reestablishment of burned or seeded vegetation (Arnold and Dudzinski 1978, Rittenhouse et al. 1982, Duncan et al. 1990, Hanley 1982, Wagner 1983, Menard et al. 2002, Stoddart et al. 1975, Symanski1994).

4.1.1.9 Management Action: If current AML is being exceeded, consider emergency short-term measures to reduce or avoid degradation of sage-grouse habitat from HMAs or WHBTs that are in excess of established AMLs within the Service Area. Plan for and implement an immediate reduction in herd size to a level that would enable the area to trend towards desired habitat conditions in Table 4.1 and to preserve and maintain a thriving natural ecological balance and multiple-use relationship in that area. Consider lowering the AML levels to prevent future damage.

4.1.1.10 Management Action: If monitored sites are not meeting sage-grouse desired habitat conditions, as applicable in Table 4.1, even if AML is being met, and it is determined that wild horses or burros are the primary causal factor, then implement protective measures as applicable in addressing similar emergencies (e.g. fire, flood, drought, etc.).

4.1.1.11 Management Action: Consider exclusionary or controlled use pasture fencing of riparian or other mesic sites and implement water developments (following the Design Features as described in Appendix A) to ensure dispersal or avoidance of sites heavily impacted by wild horses (Feist 1971, Pellegrini 1971, Ganskopp and Vavra 1986, Naiman et al. 1992). A water source should be provided, as horses traditionally do not leave known water sources just because they are fenced.

4.1.1.12 Management Action: As climate data become available, adjust wild horse and burro and rangeland management practices to allow for Priority, General, and Other Habitat Management Areas to sustain or restore the sagebrush ecosystem resiliency and resistance.

4.1.1.13 Management Action: Collaborate with weather and climate professionals and agencies (UNR, DRI, NOAA, etc.) to proactively manage the rangeland resources and adjust, as necessary, the current wild horse and burro management policies. Ensure that sufficient ongoing public and political education is provided.

4.1.2 Objective: Evaluate conflicts with HMA designations in the Service Area and modify LUPs to avoid negative impacts on sage-grouse.

4.1.2.1 Management Action: Even if current AML is not being exceeded, yet habitat within the Service Area continues to become degraded, at least partially due to wild horses or burros, reduce established AMLs within the HMA or WHBT and monitor resource objectives annually to help determine future management decisions. Unless already meeting the lowest established AMLs, during periods of drought, AML should be reduced to levels that are consistent with the declining levels of available forage. *(same as Management Action 1.1.2)*

4.1.2.2 Management Action: Ensure that Herd Management Area Plans and WHBT plans are developed or amended within the Priority, General, and Other Habitat Management Areas, identified in the State's management areas map, taking into consideration the sage-grouse desired habitat conditions (see Table 4.1).

4.1.2.3 Management Action: Conduct herd management activities, as originally authorized, to avoid conflicts between the potential implementation of regulations within the Wild Free-Roaming Horses and Burros Act and the Endangered Species Act

4.2 Goal: As authorized in the Wild Free-Roaming Horses and Burros Act of 1971: Achieve and maintain wild horses and burros at or below established AML within the Service Area and mange for zero horse populations in non-designated areas within the Service Area to reduce impacts to sage-grouse habitat.

4.2.1 Objective: Meet established AML in all HMA and WHBT in Priority, General, and Other Habitat Management Areas within five years.

4.2.1.1 Management Action: Focus expenditures of appropriated funds on management of wild horses and burros on public lands over care in captivity. *(same as Management Action1.1.1)*

4.2.1.2 Management Action: Even if current AMLs are not being exceeded, yet habitat within the Service Area continues to become degraded, at least partially due to wild horses or burros, reduce established AMLs within the HMA or WHBT and monitor resource objectives annually to help determine future management decisions. Unless already meeting the lowest established AML, during periods of drought, AMLs should be reduced to a level that is consistent with maintaining or trending towards sage-grouse desired habitat conditions, as applicable (see Table 4.1). *(same as Management Action 1.1.2)*

4.2.1.3 Management Action: *Reevaluate m*ethods that were used to initially establish AML to determine if they are still sufficient to maintain or trend towards sage-grouse desired habitat conditions, as applicable (see Table 4.1). *(same as Management Action 1.1.3)*

4.2.1.4 Management Action: Given their capability to increase their numbers by 18%-25% annually, resulting in the doubling in population every 4-5 years (Wolfe et al. 1989; Garrott et al. 1991), conduct wild horse gathers to attain the lowest levels of AML. This in combination with continued and expanded use and development of effective forms of population growth suppression techniques will enable AML to be maintained for longer periods and reduce the frequency of gathers and associated cost and effort.

4.2.1.5 Management Action: If current AMLs are being exceeded, consider emergency short-term measures to reduce or avoid degradation of sage-grouse habitat from HMA or WHBT that are in excess of established AML within the Service Area.

Plan for and implement an immediate reduction in herd size to a level that would enable the area to trend towards the desired habitat conditions, as applicable in Table 4.1 and to preserve and maintain a thriving natural ecological balance and multiple-use relationship in that area. Consider lowering the AML to prevent future damage. *(same as Management Action 1.1.7)*

4.2.1.6 Management Action: Prioritize gathers for removal or population growth suppression techniques in HMA, HA, and WHBT first within the State's Priority Habitat Management Areas and then within the General and Other Habitat Management Areas. Additional prioritization should be given for HMA and WHBT that are near AML or where a reduction would serve the most beneficial purpose. Proactively and adaptively manage herd sizes taking into consideration

climate variability and other natural phenomena, similar to the restrictions placed on livestock managers.

4.3 Goal: Support and conduct science based research and monitoring to more efficiently and effectively maintain AML in HMA and WHBT.

4.3.1 Objective: Implement more effective methods to conduct surveys and monitor wild horse and burro activities, populations, and responses to different herd management techniques.

4.3.1.1 Management Action: Work with professionals from other federal and state agencies, researchers at universities, and others to continue to develop, expand, and test more effective population growth suppression techniques, including contraception options.

4.3.1.2 Management Action: Implement a telemetry monitoring program for wild horses. Research regarding the direct interactions between, and indirect effects of wild horses on sage-grouse, has been identified as a need that could further assist the agencies in the development of habitat selection maps (Beever and Aldridge et al. 2011) as well as offer a general understanding of the intensity, timing, and duration of use by wild horses within the Service Area.

4.3.1.3 Management Action: Investigate the use of automated or time-lapse cameras or other monitoring methods to differentiate horse and livestock use impacts at key areas such as late brood-rearing habitats, use appropriate management methods where combined use does not meet resource objectives. Subsequently, make management changes based upon monitoring data and resource objectives.

7.5 Livestock Grazing

Farming and ranching on private lands in unison with authorized livestock grazing on public lands has been a long standing arrangement for many private landowners in the State of Nevada. Historically, many homesteaders began to farm and ranch much of Nevada's riparian and mesic landscapes due to the availability of surface water or springs. Once developed, many of these mesic areas were expanded by the artificial spreading of water or irrigation. These larger, irrigation induced, privately and publicly owned meadows served to support many species of wildlife in addition to livestock. This expansion of late brood rearing habitat and an increase in sagebrush acreage due to an absence of fire after consumption of fine fuels, (Burkhardt and Tisdale 1976) may be causes of sage-grouse population expansion in the late 1800s and early 1900s (Gruel and Swanson 2012). Today, by allowing for the authorized use of proper and targeted livestock grazing on public lands, private landowners and wildlife habitat managers can serve to protect or even benefit each other if managed properly (by reductions in fuels, targeted grazing of specific habitats and cheatgrass, etc.). The State of Nevada recognizes and supports this long standing beneficial relationship and the property interests associated with grazing permits (Figure 9).

Livestock grazing (primarily sheep and cattle) has occurred on the Nevada landscape for over 170 years at varying levels. Many variables have contributed to the growth and reduction of the size and number of homesteads, as well as the number of livestock using the range, over the past century. The State supports the proper management of livestock grazing on allotted public lands in Nevada. Davies et al. (2011, p. 2575) concluded based on literature review that "Though appropriately managed grazing is critical to protecting the sagebrush ecosystem, livestock grazing per se is not a stressor threatening the sustainability of the ecosystem. Thus, cessation of livestock grazing will not conserve the sagebrush ecosystem."

Dependent on many factors, livestock grazing can have a negative effect, a positive effect, or a neutral effect on sage-grouse habitat (Davies et al. 2009; Knopf 1996; Oakleaf 1971; Svejcar et al. 2014; Whitehurst and Marlow 2013). If implemented appropriately, the recommended actions listed in this section will assist landowners and land managers in managing appropriately to avoid or minimize negative impacts to sage-grouse habitat due to livestock grazing. The actions should also help to maintain the existing resistance and resilience of sagebrush communities and to protect the future persistence and sustainability of the diversity of other sage-grouse habitat types within the sagebrush ecosystem for those who depend on it.

The State supports any appropriate grazing practice that incorporates a high level of flexibility through adaptive management to achieve the overall management and resource objectives agreed upon by the permittee and the land manager. The State will provide technical support to landowners through its combined resources and through partnerships with other governmental agencies and private industry. The State will continue to support the further understanding and development of rangeland management, resource conservation, rehabilitation, restoration, and protection that can be applied and supported, at least in part, by permittees and other land managers. Various federal, state, and private partners have developed adaptive management groups that are attempting to manage rangelands in a

holistic manner that uses increased collaboration among stakeholders. In an attempt to increase adaptive management, share conservation efforts, and increase stewardship over public lands the BLM has launched a pilot program called "outcome-based grazing." This effort allows joint management by private landowner and public agency. The program will focus on sustainable ecosystem results and goals that can be unique to local ranches instead of prescriptive and blanket regulations across landscapes. This effort represents an effort to align rangeland management with the most current state of knowledge about ecosystem responses and best conservation practices. This will allow stakeholders to adapt to unique conditions and a dynamic environment in a regulatory context. The State will support outcome based grazing programs to the extent possible. The State will also utilize and support the use of Disturbance Response Groups (DRGs) and State-and-Transition models to make livestock utilization decisions.

The State will also work with federal land managers and livestock owners to develop acceptable procedures to conduct consistent rangeland or resource monitoring with appropriate frequency (Swanson et al. 2006). Rangeland monitoring has historically been a difficult task to achieve given budget, time, and scientific restraints from all stakeholders. Permitting and permit renewals have thus remained untethered to comprehensive information about the health of the range and continually variable climatic conditions. Outcome based grazing programs have the potential to improve monitoring and adaptive management.

The State encourages private landowners to develop and implement conservation plans that serve to maintain or strengthen financial viability that also work to conserve or protect the renewable natural resources of Nevada, including sage-grouse and other wildlife species habitat.

The State will continue to support current, and development of new, public outreach and educational programs that assist with the proper understanding and implementation of the actions listed below to achieve the goals and objectives within this plan.

The State encourages federal agencies to ensure that any loss of grazing allotment rights that were not directly attributable to the permittees actions or inactions are mitigated to attain a no-net-loss of AUMs.

Conservation Goal, Objective, and Management Actions

5.1 Goal: Ensure that existing grazing permits maintain or enhance sage-grouse habitat. Utilize livestock grazing when appropriate as a management tool to improve sage-grouse habitat quantity and quality, or to reduce wildfire threats. Based on a comprehensive understanding of seasonal sage-grouse habitat requirements, and in conjunction with the need for flexibility in livestock operations, make cooperative, timely, seasonal range management decisions to meet vegetation management objectives, including fuels reduction.

5.1.1 Objective: In sage-grouse habitat, manage for vegetation composition and structure that maintains or is actively managed to trend towards sage-grouse seasonal desired habitat conditions, as applicable (see Table 4.1), enhancing resilience and resistance based upon the ability of the

ecological site to respond to management. This objective recognizes spatial and temporal variations across seral stages.

5.1.1.1 Management Action: Within sage-grouse habitat, incorporate sage-grouse desired habitat conditions, as applicable (see Table 4.1), and management considerations into all BLM and Forest Service grazing allotments through allotment management plans (AMP), multiple use decisions, or permit renewals or Forest Service Annual Operating Instructions. Implement appropriate prescribed grazing actions, at scales sufficient to influence a positive response in sage-grouse habitats, such as NRCS Conservation Practice Standard 528 for prescribed grazing (NRCS 2011).

5.1.1.2 Management Action: In sage-grouse habitat, work cooperatively on integrated ranch planning so operations with deeded land, and BLM or Forest Service allotments, can be planned as single units, providing flexibility and adaptive management across all ownerships and not altering stocking rates on operations for progressive management decisions.

5.1.1.3 Management Action: Continue the use of land health assessments on BLM-administered lands or the Sierra and Central/Eastern Nevada Riparian Field Guides and the Resource Implementation Protocol for Rapid Assessment Matrices on Forest Service-administered lands in sage-grouse habitat to evaluate current conditions as compared to sage-grouse desired habitat conditions described in Table 4.1. Incorporate the results of BLM and Forest Service monitoring and land health assessments into future management applications to ensure the maintenance or active management to trend towards sage-grouse desired habitat conditions. Incorporate terms and conditions into grazing permits and adjust these as needed through monitoring and adaptive management to meet sage-grouse desired habitat conditions.

5.1.1.4 Management Action: Where current permitted livestock grazing is identified as the causal factor of not meeting the desired habitat conditions, implement management actions (grazing decisions, Annual Operating Instructions [Forest Service only], AMP/Conservation Plan development, or other agreements) to modify grazing management to trend towards desired habitat conditions, as applicable in Table 4.1. Consider singly, or in combination, changes in:

- Season, timing (duration) or rotation of use;
- Distribution of livestock use;
- Intensity of use;
- Type of livestock (e.g., cattle, sheep, horses, llamas, alpacas and goats; Briske et al. 2011); and
- Numbers/ AUMs of livestock and other ungulates (includes temporary nonrenewable (TNR) use, and nonuse).

Before imposing grazing restrictions or seeking changes in livestock stocking rates or seasons of permitted use, federal agencies in coordination with grazing permittees must identify and implement all economically and technically feasible livestock distribution, forage production enhancement, weed control, prescribed grazing, off-site water development by the water rights

holder, shrub and pinyon/juniper control, livestock salting/supplementing, and riparian pastures and herding. (Eureka County Master Plan 2010)

5.1.1.5 Management Action: At a minimum, use grazing management strategies for riparian areas and wet meadows to maintain or trend towards riparian Proper Functioning Condition (PFC) and promote brood rearing/summer desired habitat conditions, as described in Table 4.1, within sage-grouse habitat. Within sage-grouse habitat, manage wet meadows to maintain a component of available perennial forbs with diverse species richness to facilitate brood rearing and stabilizing riparian species (Burton et al. 2011) near where water flows to achieve or maintain PFC. Use Ecological Site Descriptions (ESD) and Disturbance Response Groups (DRGs) or locally relevant information about soils, hydrology, soil moisture, and site potential to set realistic objectives and evaluate assessments and monitoring data (Swanson et al. 2006). Also conserve or enhance wet meadow complexes to maintain or increase amount of edge and cover near that edge to minimize elevated mortality during the late brood rearing period (Hagen et al. 2007; Kolada et al. 2009a; Atamian et al. 2010) as observed throughout the stream/watershed and not limited to only easily accessible sites. Some defined areas of concentrated livestock use may be necessary to protect and enhance the overall riparian area.

5.1.1.6 Management Action: Authorize new water development for diversion from spring or seep sources only when sage-grouse habitat would not be net negatively affected by the development. This includes developing new water sources for livestock as part of an AMP/conservation plan to improve sage-grouse habitat.

5.1.1.7 Management Action: Analyze springs, seeps and associated pipelines to find mutually beneficial enhancement opportunities for livestock and wildlife that restores functionality to riparian and mesic areas within sage-grouse habitat, and allow them to be developed.

5.1.1.8 Management Action: In sage-grouse habitat, encourage and allow vegetation treatments that conserve, enhance, or adaptively restore resilience and resistance over time. This includes adaptive management as part of an AMP/Conservation Plan to improve sage-grouse habitat.

5.1.1.9 Management Action: Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses that are in and adjacent to sage-grouse habitat to determine if additional efforts should be made to restore sagebrush or to improve habitat quality for sage-grouse. If these seedings are part of an AMP/Conservation Plan or if they provide value in conserving, enhancing, or protecting the rest of the sage-grouse habitat, then no restoration may be necessary. Assess the compatibility of these seedings for sage-grouse habitat or as a component of a grazing system during the land health assessments (Davies et al. 2011), or other analyses such as the Humboldt-Toiyabe Resource Implementation Protocol for Rapid Assessment Matrices (USDAFS - HTNF 2007).

5.1.1.10 Management Action: In sage-grouse habitat, ensure that the design of any new structural range improvements and the location of supplements (salt or protein) to enhance sage-grouse habitat or minimize impacts in order to maintain or trend towards sage-grouse

desired habitat conditions, as applicable (see Table 4.1). Structural range improvements, in this context, include but are not limited to: cattle guards, fences, exclosures, corrals or other livestock handling structures; pipelines, troughs, storage tanks (including moveable tanks used in livestock water hauling), windmills, ponds/reservoirs, solar panels and spring developments. Potential for invasive species establishment or their increase following construction must be considered in the project plan and then monitored, treated, and rehabilitated post-construction.

5.1.1.11 Management Action: Locate salting and supplemental feeding locations, and temporary or mobile watering and new handling facilities (corrals, chutes, etc.) at least 1/2-mile from riparian zones, springs, meadows, or 1 mile from active leks in sage-grouse habitat, unless the pasture is too small or another location offers equal or better habitat benefits. The distance should be based on local conditions.

5.1.1.12 Management Action: To reduce sage-grouse strikes and mortality, remove, modify or mark fences in high risk areas within sage-grouse habitat based on proximity to lek, lek size, and topography (Christiansen 2009; Stevens 2011). Consideration of the utility of the fence should also be taken into consideration to ensure that its removal does not promote degradation of the overall management for habitat or other desired conditions (Swanson et al. 2006).

5.1.1.13 Management Action: In sage-grouse habitat, monitor, treat and, if necessary, restore sites with invasive species associated with existing range improvements (Gelbard and Belnap 2003; Bergquist et al. 2007). State listed noxious weeds (NRS Chapter 555) should be given the highest priority. In general, monitor, map, treat (using integrated pest management and associated tools), and restore sites that have invasive and noxious weed species, especially those associated with disturbance activities.

5.1.1.14 Management Action: Consider all options to allow responsible management of livestock grazing on an allotment before any voluntary withdrawal of a grazing permit is considered, in conformance with the multiple use sections of the Taylor Grazing Act. All permit relinquishments should be voluntary.

5.1.1.15 Management Action: Prior to implementation, establish project monitoring sites where vegetation treatment is planned and monitor at least annually during the recovery period. To ensure effective recovery, monitoring should continue for a number of years immediately following the livestock exclusion period and following livestock reintroduction, depending on local site conditions.

5.1.1.16 Management Action: When conditions, i.e., climatic variations (such as drought) and wildfire, require unique or exceptional management, work to protect sage-grouse habitat on a case by case basis and implement adaptive management to allow for vegetation recovery that meets resistance, resilience, and sage-grouse life cycle needs in sage-grouse habitat as needed on an individual allotment basis.

5.1.1.17 Management Action: During the annual grazing application, work with permittees to avoid consistent concentrated turn-out locations for livestock within approximately 3 miles of known lek locations during the March 1 to May 15 period. During the March 1 to May 15

period, avoid domestic sheep use, bedding areas, and herder camps within at least 1.24 miles (2 kilometers) of known lek locations. Utilize land features and roads on maps provided to the permittee to help demarcate livestock use avoidance areas. Require terms and conditions language for affected livestock grazing permits regarding livestock turnout locations during the lekking period. During the lekking period, use best management practices to avoid livestock aggregation around the lekking grounds.

5.1.1.18 Management Action: Strive to improve and maintain regular communication at the allotment level between land management agency and the permittee to encourage proper management techniques. Land management agencies should coordinate with relevant state, local and tribal government agencies and permittees to conduct regular trend monitoring at the allotment level. Actively pursue and implement cooperative permittee monitoring, such as described in Perryman et al. 2006, Swanson et al. 2006.

5.1.1.19 Management Action: Promote and implement proper livestock grazing practices that promote the health of the perennial herbaceous vegetation component. Perennial grasses, especially, are strong competitors with cheatgrass (Booth et al. 2003; Chambers et al. 2007; Blank and Morgan 2012). Field research has demonstrated that moderate levels of livestock grazing can increase the resiliency of sagebrush communities, reduce the risk and severity of wildfire, and decrease the risk of exotic weed invasion (Davies et al. 2009 and Davies et al. 2010).

5.1.1.20 Management Action: To reduce the risk of fire and enhance restoration in large contiguous blocks of cheatgrass-dominated sagebrush or sage-grouse habitats that are next to highly flammable cheatgrass dominated lands, create local NEPA documented plans to use tools (e.g. dormant season TNR AUM authorizations and stewardship contracted grazing), to reduce fuels in areas dominated by invasive plants (Schmelzer et al. 2014) especially after high production growing seasons with favorable moisture. Use adaptive management to allow the use of TNR during other seasons, if science emerges demonstrating effectiveness of such practices. Planning should be conducted on an allotment specific basis, and may be contained in AMPs, multiple use decisions, or permit renewals.

5.1.1.21 Management Action: To aid in planning adaptive management for the purpose of maintaining health of important forage plants (perennials needed for resilience and resistance), cooperatively strategize how various areas in sage-grouse habitat allotments can be managed differently each year to achieve positive grazing response index scores (Perryman et al. 2006; Reed et al. 1999; Wyman et al. 2006; and USDA USFS 1996) and meet resource objectives.

7.6 Anthropogenic Disturbances

Anthropogenic disturbances, as defined in Section 3.0 of this State Plan, are a threat to sage-grouse and their habitat in Nevada; however these activities are a vital part of Nevada's economy. The State of Nevada seeks a balanced approach that allows for the preservation of Nevada's economy, while conserving and protecting sage-grouse populations and the sagebrush ecosystem upon which they need to survive. Nevada's strategy is to provide consultation for project planning to first avoid and minimize impacts to sage-grouse (see Section 3.0) and then to offset residual impacts through compensatory mitigation via the Conservation Credit System (CCS) (see Section 8.0). The latest versions of the Conservation Credit System Manual and The Habitat Quantification Tool Scientific Methods Document (HQT) define anthropogenic disturbances and how they are addressed within the CCS. The documents also outline how their direct and indirect impacts are accounted for when determining habitat values and mitigation obligations.

Anthropogenic disturbances can negatively impact sage-grouse both directly and indirectly, and through various mechanisms. Anthropogenic disturbances can directly impact sage-grouse by causing direct loss of habitat, avoidance behavior to infrastructure (Doherty et al. 2008) and to otherwise suitable habitat (Lyon and Anderson 2003, Holloran 2005, Kaiser 2006, Doherty et al. 2008), direct mortality through collision with infrastructure (Beck et al. 2006, Stevens et al. 2012) and mosquitos carrying the West Nile virus (Walker and Naugle 2011) associated with certain artificial ponds created by development (Zou et al 2006), and negative impacts to survival and reproduction (Lyon and Anderson 2003, Holloran 2005, Kaiser 2006, Aldridge and Boyce 2007, Holloran et al. 2007). Indirect impacts on sage-grouse demographics can be caused by noise produced from operations (Braun et al. 2002, Holloran 2005, Kaiser 2006, Blickley et al. 2012), vehicle traffic on associated roads (Lyon and Anderson 2003), and increased predation by raptors perching on associated power lines (Ellis 1984). Moreover, anthropogenic disturbances can lead to an increase in the presence of cheatgrass and other invasive plant species (Bradley and Mustard 2006, Manier et al. 2014). In addition, habitat fragmentation resulting from cumulative effects of multiple anthropogenic disturbances across the landscape has been shown to have long term negative impacts on sage-grouse populations (Johnson et al. 2011, Knick and Hanser 2011, Knick et al. 2013).

Mining

Mining is a vital part of the State of Nevada's economy both currently and historically. The initial discovery of the Comstock Lode silver ore deposit in Virginia City in the 1850s was central to the settling and development of Nevada, as well as a major reason for Nevada's admission into the United States in 1864. The Nevada Department of Taxation currently estimates the net assessed mineral value in the State to be approximately $5.1 billion (State of Nevada 2014) and the Nevada Bureau of Mines and Geology (NBMG) estimates the total production value at $10.76 billion (NBMG 2014)[4]. The annual tax revenue collected in fiscal year 2013 was approximately $236 million (State of Nevada 2014). It is

[4] The State of Nevada 2014 estimate is for FY 12-13 (June 2012 – July 2013) and the NBMG estimate is for calendar year 2012. Both estimates also include geothermal energy and petroleum production.

estimated that Nevada's mining economic output contributes a 6% share of Nevada's statewide GDP (Nevada Mining Association 2011).

The primary type of mineral exploration and development in the state of Nevada is locatable minerals, including gold, silver, and copper. Locatable mineral development and exploration is governed under the General Mining Law of 1872 and is a non-discretionary activity on federal lands. Additional federal, state, and local laws also govern locatable minerals. Salable and non-energy leasable mineral exploration and development also occurs, though to a lesser extent. Salable mineral materials, which are common varieties of construction materials and aggregates, such as sand, stone, and gravel are governed under the Materials Acts of 1947. Government and non-profit organizations may obtain these resources free of charge for community purposes on BLM and USFS administered lands. The Nevada Department of Transportation and local governments are the primary users of gravel and sand resources on federal lands in Nevada. Non-energy leasable minerals, such as potassium and sodium, which are governed under the Mineral Leasing Act of 1920 are also present, however there are currently no leases in sage-grouse habitat in Nevada (BLM 2013).

The extent of mining activities across the state of Nevada overlaps with the range of sage-grouse habitat. There are approximately 2 million acres of locatable mineral claims in sage-grouse habitat in Nevada (BLM 2013). The total "footprint" of mining in Nevada is estimated at 169,029 and 181,340 acres by BLM and NDEP respectively (Johnson personal communication 2014, Holmgren personal communication 2014). Mining and its associated facilities and infrastructure may result in habitat fragmentation, direct habitat loss, and indirect impacts decreasing the suitability of otherwise suitable habitat (USFWS 2013). The specific impacts of mining on sage-grouse and their habitat have not been studied in the peer reviewed literature (Manier 2013).

Non-Renewable Energy Production

There is currently little oil and gas development in Nevada. Oil production in Nevada has been on a steady decline and is currently limited to approximately 336,000 barrels of oil production annually (Nevada Division of Minerals 2014a). Within sage-grouse habitat it is limited to two major basins, including the Railroad Valley and Pine Valley, with Railroad Valley being the predominant oil-producing valley in Nevada (BLM 2013). However, with recent federal approval of oil and gas exploration in, Nevada (BLM 2014), coupled with the emergence of new technologies, there may be potential for increased oil and gas production in the State pending results of exploration.

In a comprehensive literature review of the impacts of energy development, principally oil and gas, on sage-grouse conducted by Naugle et al (2011), all studies reported negative effects, while no positive impacts to sage-grouse populations or habitat were reported. Negative responses of sage-grouse were consistent regardless of whether lek dynamics or demographic rates were studied (Naugle et al. 2011). The specific direct and indirect impacts are described above.

Renewable Energy Production

The development, transmission, and distribution of renewable and non-renewable energy are a high priority for the state of Nevada. Shifting national and state energy policies, as well as Nevada's

favorable conditions for different types of renewable energy resources, renewable energy development is likely to increase in the State. The SEP supports Nevada's Renewable Portfolio Standard goal of 25% of Nevada's energy coming from renewable sources by 2025. In addition, the Nevada Public Utilities Commission this year ruled in accordance with Nevada S.B. 123 requiring the retirement of no less than 300 MW of coal-fired electrical generating capacity on or before December 31, 2014, and not less than 250 MW of coal-fired electrical generating capacity on or before December 31, 2017 (Public Utilities Commission of Nevada 2014).

Renewable energy resources in Nevada include geothermal, wind, solar, and biomass. Nevada has vast geothermal resources and is leading the way in geothermal energy development in the United States. As of the end of 2013, of the 3442 MW of installed generating capacity in the U.S. (Matek 2014), Nevada contributes 586 MW (Nevada Division of Minerals 2014b), representing approximately 17% of total installed capacity in the U.S. Nevada is outpacing the rest of the country in developing geothermal projects. Nevada accounted for approximately 41% of the total number of projects under development in the U.S. since 2011 (Matek 2014). Nevada currently has 22 operating geothermal plants at 14 different locations (Nevada Division of Minerals 2014b). There are significant geothermal resources in northern Nevada that coincide with the sage-grouse habitat range. Recent geothermal projects that coincide with sage-grouse habitat include the Tuscarora, McGinness Hills, and Jersey Valley Geothermal Power Plants.

Wind energy is one of the fastest growing renewable energy sectors in the U.S.; however the potential viability for development of this resource in Nevada is currently limited. Analysis conducted as part of BLM's Wind Energy Development Programmatic EIS showed most of Nevada's wind power classification rated as poor to fair, with only small pockets classified as good to outstanding (BLM 2005). Some of those pockets however, overlap with sage-grouse habitat. Currently there is one wind generation facility in Nevada, the Spring Valley Wind Project; an approximately 150 MW facility located approximately 30 miles east of Ely, NV.

The BLM, as part of a Programmatic EIS for Solar Energy Development, developed Solar Energy Zone (SEZ), defined as an area well suited for utility scale production of solar energy. Five SEZs were identified for Nevada; all located in Clark, southern Nye, and Lincoln counties, outside the range of sage-grouse (BLM 2012). There are currently no solar energy rights of ways within sage-grouse habitat in Nevada (BLM 2013).

There is currently no significant commercial conifer biomass energy economy in Nevada (BLM 2013); however considering that pinyon-juniper expansion is one of the major threats facing sage-grouse in Nevada, the SEP encourages exploring and incentivizing biomass energy development in the State.

Renewable energy development can negatively impact sage-grouse both directly and indirectly through various mechanisms. Impacts to sage-grouse from geothermal energy development have not been assessed in the scientific literature because the development has been too recent to identify immediate and lag effects (Knick et al. 2011). There are currently no commercial solar projects operating in sage-grouse habitats at this time, so the impacts cannot be assessed. There has been one study on the

effects on sage-grouse from wind energy developments recently completed in south-central Wyoming, which demonstrated that the relative probabilities of sage-grouse nest and brood success decreased with proximity to wind turbines (LeBeau 2012). Wind energy generation also requires tall structures, which can provide artificial nesting and perching substrate for sage-grouse predators (Knight and Kawashima 1993). Renewable energy development requires many of the same features for construction and operation as non-renewable energy, so it is anticipated that the potential impacts from direct habitat loss, habitat fragmentation through roads and power lines, noise, and increased human presence would most likely be similar to those for non-renewable energy production (USFWS 2010).

Infrastructure

Infrastructure, whether related to energy production, mining, or any other purpose, can adversely impact sage-grouse. Infrastructure can result in habitat loss and fragmentation as well as sage-grouse avoidance of otherwise suitable habitat. In addition, infrastructure can provide a source for the spread of invasive species and provide artificial subsidies for predators (USFWS 2013). Infrastructure most common in Nevada includes transmission lines, distribution lines and roads. Other types of infrastructure may also include, but is not limited to, pipelines, communication towers, and fences.

Transmission and distribution lines (hereafter collectively referred to as power lines) are necessary for transmitting energy from power production facilities and distributing that power to homes and businesses. Power lines may directly impact sage-grouse through habitat loss and fragmentation (Knick et al. 2013), as well as direct mortality due to collisions (Beck et al. 2006). Indirect habitat loss due to avoidance of vertical structures, presumably due to increases in predator populations is also a concern (Manier 2013). Power lines have been shown to decrease male lek attendance (Ellis 1985) and probability of lek persistence (Walker et al. 2007), as well as causing avoidance behavior of brood-rearing habitat (LeBeau 2012). Power lines have been shown to increase predator distributions and hunting efficiency resulting in increased predation on sage-grouse (Connelly et al. 2004). Preliminary results from a ten-year study on the impacts of the Falcon-Gonder transmission line on sage-grouse population dynamics in Eureka County, Nevada show a significant negative effect of the transmission line on nest success and female survival, weak negative effect on male survival, and no support for impacts on nest site selection and female nesting propensity (Gibson et al. 2013). Nest success and female survival, along with chick survival, are the demographic rates that have been shown to be important for population growth (Taylor et al. 2012).

Roads are widespread through the sage-grouse range and can impact sage-grouse through a variety of mechanisms. A study along I-80 in Wyoming and Utah between 1970 and 2003 found no leks within 1.25 miles of the interstate, and fewer birds on leks within 4.7 miles of the interstate, than further distances (Connelly et al. 2004). Roads can negatively impact sage-grouse through direct mortality due to vehicle collision, decreased male lek attendance due to increased traffic (Holloran 2005), avoidance behavior (Lyon and Anderson 2003, LeBeau 2012), and reduced nest initiation rates (Lyon and Anderson 2003). Roads can also facilitate the spread of invasive species (Gelbard and Belnap 2003).

Goals, Objectives, and Management Actions

6.1 Goal: Manage anthropogenic disturbance development in a manner that provides for the long-term conservation of sage-grouse and their habitat, while balancing the need for continued development of the resources.

6.1.1 Objective: Achieve net conservation gain of sage-grouse habitat due to new anthropogenic disturbances and any associated facilities and infrastructure within the Service Area that impact habitat in order to maintain stable or increasing sage-grouse populations.

6.1.1.1 Management Action: All new proposed anthropogenic disturbances within the Service Area will trigger timely SETT Consultation for application of the "avoid, minimize, mitigate" process (see Section 3.0). This will serve as a centralized impact assessment process that provides consistent evaluation, reconciliation and guidance for project development.

6.1.1.2 Management Action: Avoid new anthropogenic disturbance activities and its associated facilities and infrastructure within the Service Area. Locate activities, facilities, and infrastructure in non-habitat wherever possible. Avoidance of a disturbance within sage-grouse habitat is the preferred option. If avoidance cannot be reasonably accomplished, the project proponent must demonstrate why it cannot be reasonably accomplished in order for the SETT to consider minimization and mitigation alternatives. The process to demonstrate that avoidance cannot be reasonably accomplished (the "avoid process") is determined by the four management categories. (See Table 3-1 for more details on the avoid process.) If development cannot be sited in non-habitat, it should occur in the least suitable habitat.

6.1.1.3 Management Action: If adverse impacts to sage-grouse and their habitat cannot be avoided, require project proponents to minimize impacts by employing Site Specific Consultation-Based Design Features (Design Features; see Appendix A) appropriate for the project. This may include seasonal operational restrictions, noise restrictions, clustering disturbances, and placing infrastructure in previously disturbed locations.

6.1.1.4 Management Action: Technically evaluate and where reliability is not adversely impacted, seek to site new linear features in existing corridors (Figure 11) or, at a minimum, co-locate with existing linear features in Priority, General, and Other Habitat Management Areas.

6.1.1.5 Management Action: Reduce and eliminate artificial hunting perches and nesting substrate for aerial predators. This can be achieved by installing anti-nesting and anti-perching devices on new power lines (see Section 7.3) or burying power lines. Bury distribution power lines of up to 35kV where ground disturbance can be minimized, and where technically and economically feasible. Where technology and economic factors allow, bury higher kV power lines (see Appendix A). Sage-grouse desired habitat conditions (see Section 4.0) will be incorporated when reclaiming the site.

6.1.1.6 Management Action: Encourage continued research in the development of more effective perching and nesting deterrent options (see Section 7.3).

6.1.1.7 Management Action: Aggressively engage in rehabilitation/weed control efforts during pre- and post-project construction.

6.1.1.8 Management Action: If impacts from anthropogenic disturbances cannot be avoided and after minimization options have been exhausted, residual adverse impacts are required to be offset through compensatory mitigation. Mitigation obligations will be determined through the Conservation Credit System (see Section 8.0).

6.1.2 Objective: Explore options to minimize impacts from existing and abandoned anthropogenic disturbances and associated infrastructure.

6.1.2.1 Management Action: While SETT Consultation and the "avoid, minimize, mitigate" process do not apply retroactively to existing anthropogenic disturbances, encourage existing operators to incorporate the Design Features outlined in Appendix A and contact the SETT for timely input on techniques and practices to avoid and minimize existing impacts to sage-grouse and their habitat.

6.1.2.2 Management Action: Inventory abandoned mine sites within sage-grouse habitat, where practical, and reclaim sites to trend towards sage-grouse desired habitat conditions (see Section 4.0). Coordinate with the Abandoned Mine Lands Program on this effort.

6.1.2.3 Management Action: Work with the energy industry to explore opportunities to install anti-nesting and anti-perching devices on existing power lines and tall structures and to bury existing power lines where technology and economic factors allow.

6.1.2.4 Management Action: Inventory power lines and utility structures that are no longer in use and look for opportunities to decommission the lines and reclaim the sites to trend towards sage-grouse desired habitat conditions (see Section 4.0).

7.7 Recreation & Off-Highway Vehicle Activities

Nevada offers some of the most robust recreational and OHV experiences in the nation due, in large part, to its high percentage of accessible federally managed public lands. Recreation, in all of its forms, creates a significant benefit to local and statewide economies. Extensive networks of roads and trails offer recreationists excellent access to most of Nevada's expansive basin and range high desert ecosystems. This extensity of roads and trails may also create impacts on sagebrush habitats and sage-grouse that may be difficult to measure.

While recreational and off-highway vehicle use is one of the many acceptable multiple-uses on our federal public lands, it also requires frequently reviewed and updated policies that allow for greater adaptive management. This may assist in ongoing efforts to protect and preserve sensitive land forms, plants, and animals from levels or types of disturbance that create unnatural or unduly negative impacts. Potential impacts on sage-grouse and their habitat associated with recreational activities include but are not limited to: increases in noise levels, distribution of invasive plants, generation of fugitive dust, and effects on predator prey relationships (Manier 2013).

In Nevada, the recent creation of the Commission on Off-Highway Vehicles provides a mechanism and a funding source to educate users on how to responsibly use off-highway vehicles. Educational efforts will focus on minimizing adverse effects due to uses in or near sage-grouse habitats during certain seasons and times of day. It may also provide a funding source to allow the State to join with the federal agencies to better plan, develop, and manage a coordinated and designated system of off-road vehicle trails in Nevada. The off-highway vehicle registration system allows state law enforcement personnel to access vehicle registration information and identify vehicle titleholders in instances where state or federal laws pertaining to off-road access or use are violated.

Conservation Goals, Objectives, and Management Actions

7.1 Goal: Conserve sage-grouse and their habitat while allowing for continued recreational access to public lands.

***7.1.1 Objective*:** Avoid or minimize recreation and OHV negative direct and indirect impacts to sage-grouse and their habitats and monitor sites for potential impacts.

7.1.1.1 Management Action: Establish appropriate ambient noise levels for undisturbed sage-grouse leks. Noise restrictions should generally apply between the hours of 6:00 p.m. to 9:00 a.m. as these are the hours most critical for communications of sage-grouse and auditory detection of predators (Patricelli et al. 2010, Blickley et al. 2012, Patricelli et al. 2013).

7.1.1.2 Management Action: Take measures to minimize or reduce activities and to avoid an ambient noise level increase >10 dB at the edge of leks during the lekking season generally, March 1 through May 15 from one hour before sunrise until 9:00 a.m.

7.1.1.3 Management Action: Assist in efforts to enhance collaborative monitoring through volunteer organizations, recreational groups, etc., to collect data that would assist in the protection, enhancement, or restoration of sage-grouse habitats.

7.1.1.4 Management Action: Support studies that further the understanding of the relationship between recreational uses and their potential impacts on sage-grouse.

***7.1.1.5* Management Action:** Utilize sage-grouse habitat mapping to inform state and federal recreation management plans.

***7.1.1.6* Management Action:** Where feasible locate recreation trails strategically to create or augment fuel breaks in the margins of sage-grouse habitats and landscapes and not create roads or trails where they cause net negative direct and indirect impacts.

***7.1.2 Objective*:** Support and implement efforts to reduce the potential for additional sage-grouse habitat fragmentation from unauthorized 'trail making'.

7.1.2.1 Management Action: Support and promote efforts by state, local, and federal agencies and recreational groups to promote educational campaigns that encourage responsible OHV and recreation activities that avoid or minimize negative impacts to sage-grouse and their habitat, including the spread of invasive species.

7.1.2.2 Management Action: Work with state, local, and federal agencies and recreational groups to inventory unauthorized trails in Priority, General, and Other Habitat Management Areas and where feasible restore trails to trend towards sage-grouse desired habitat conditions (see Table 4-1).

***7.1.3 Objective*:** Promote the leveraging of funding from all sources when addressing sage-grouse habitat enhancement, restoration, or preservation projects.

7.1.3.1 Management Action: Develop a database to share with interested agencies and groups to maximize efforts and leverage funding.

7.1.3.2* Management *Action: Encourage and support the Commission on Off-Highway Vehicles to expend OHV registration funds to enhance, restore, or protect sage-grouse habitat.

8.0 CONSERVATION CREDIT SYSTEM

The Nevada Conservation Credit System (CCS)[5] is a pro-active solution that provides net conservation benefits for sage-grouse, while balancing the need for continued human activities vital to the Nevada economy and way of life. The CCS creates new incentives for private landowners and public land managers to preserve, enhance, restore, and reduce impacts to important habitat for the species.

The CCS is a market-based mechanism that quantifies conservation outcomes (credits) and impacts from new anthropogenic disturbances (debits), defines standards for market transactions, and reports the overall progress from implementation of conservation actions throughout the sage-grouse range within Nevada. The CCS establishes the policy, operations, and tools necessary to facilitate effective and efficient conservation investments. The CCS is intended to provide regulatory certainty for industries by addressing compensatory mitigation needs whether or not the species is listed under the ESA.

Goal and Scope

The goal of the CCS is to achieve net conservation gain of sage-grouse habitat due to new anthropogenic disturbances impacting habitat through compensatory mitigation within the Service Area (Figure 1), in order to stop the decline of sage-grouse populations. Proposed anthropogenic disturbances, as defined in Section 3.0 of this plan, must seek to avoid, minimize, and mitigate impacts to sage-grouse habitat. After all practicable economically and technically feasible possibilities to avoid and minimize impacts to sage-grouse habitat have been exhausted, residual adverse impacts are required to be offset by mitigation requirements as determined through the CCS.

Anthropogenic disturbances occurring on BLM and USFS lands within the Service Area require timely consultation with the SETT. Private landowners are not required to mitigate anthropogenic disturbances on their land, but are welcome to voluntarily generate, sell, or purchase credits in the CCS. The CCS scope can be expanded in the future to support additional conservation needs or to include other states within the sage-grouse range.

Roles and Responsibilities

The *DCNR Division of State Lands* holds ultimate authority over CCS design, operations, and management. The *SEC* oversees CCS operations and approves changes to the program. *The Administrator* manages the CCS's day-to-day operations, ongoing program improvements, facilitates transactions, and reports programmatic results. CCS operations are also informed by *Resource Managers* (e.g. BLM, NDOW, USFS, USFWS) and by a *Science Committee* to ensure it functions according to current laws, policies, and regulations and is consistent with the best available science.

Credit Developers are landowners, land managers, organizations, or agencies, that generate, register, or sell credits in the CCS. *Credit Buyers* are entities that purchase mitigation credits to offset impacts from new anthropogenic disturbances or to meet other conservation objectives.

[5] For more information please refer to *The Nevada Conservation Credit System Manual* on the Sagebrush Ecosystem Program's Website: http://sagebrusheco.nv.gov/CCS/ConservationCreditSystem/

What are Credits and Debits?

Credits are the currency of the CCS. A credit represents a verified *"functional acre"* that meets the durability criteria defined by the CCS, such as committing to a Customized Management Plan that outlines actions to maintain habitat performance and to limit risks from future impact for the duration of the project. A functional acre is based on habitat quality ("function") relative to optimal conditions, and quantity (acres). This is determined through the Habitat Quantification Tool (HQT; see below).

Debits are similar to credits, but are the quantified and verified units of functional acres lost due to a new anthropogenic disturbance.

Generating and Purchasing Credits

The steps for generating and purchasing credits are depicted below. Blue chevrons signify the steps undertaken to generate credits and green chevrons represent the purchase of credits. These processes are defined in detail in the Conservation Credit System Manual.

Calculating Credits and Debits

Habitat Quantification Tool (HQT)[6]

The HQT is a method to estimate habitat quality and quantify debits and credits. The HQT uses a set of metrics, applied at multiple spatial scales, to evaluate vegetation and environmental conditions related to sage-grouse habitat quality and quantity. The HQT enables the CCS to create incentives to generate credits in the most beneficial locations for the sage-grouse, and to minimize impacts to existing high quality habitat.

The HQT is used to calculate scores for each type of seasonal habitat. Habitat condition is expressed in functional acres, relative to optimal conditions. The functional acre score is adjusted to account for indirect effects of the local area surrounding the site. Mitigation ratios are then applied.

Mitigation Ratios

Mitigation ratios incorporate biologically significant factors that cannot currently be incorporated into the HQT. They enable offset transactions to achieve a net benefit for the species by ensuring the functional acres of credit acquired is greater than the functional acres of debit. The mitigation ratios create incentives for avoidance of impacts and preservation, enhancement, and restoration of habitat in important areas. This includes avoiding and protecting seasonal habitats that are scarce for a particular population. Mitigation ratios are determined by the:

- Management Importance Factor: The value is influenced by the location of a credit or debit site in Priority, General, or Other Management Areas (Figure 3)

[6] For more information please refer to *The Habitat Quantification Tool Scientific Methods Document* on the Sagebrush Ecosystem Program's Website: http://sagebrusheco.nv.gov/CCS/ConservationCreditSystem/

- Meadow Habitat Power Factor: In order to more appropriately incorporate the immense value of meadow habitat into the calculation of credits and debits, a power factor is applied to all map units made up of meadow habitat.
- Conifer Removal Factor: The conifer removal factor will be applied to the local-scale habitat function of areas with identified phases of conifer cover to calculate credits for immediate uplift, after confirmation that pinyon-juniper has been totally removed from the site.

Debits are adjusted based on proximity to potential credit sites (Proximity Factor) to determine the credit obligation that must be purchased to offset a debit project. Credit obligation increases if the credits purchased are located outside the same population as the debits. This incentivizes mitigation in close proximity to debit sites.

Regulatory Assurances

Verification

Credit and debit projects require verification to ensure that calculations represent a true and accurate account of on-the-ground implementation and habitat function and assurances that projects are maintained over time. *Third-party Verifiers*, trained and certified by the Administrator, conduct independent checks using the HQT methods. *Credit Verification* is required before credit release and every fifth year. *Debit Verification* is required before the project begins, during project implementation, and when debits end or decrease. Periodic spot checks and audits are also required.

Reserve Account

The *Reserve Account* is a pool of credits, functioning like an insurance fund, that replace credits that are invalidated due to a force majeure event, mismanagement, or competing land uses. A percentage of credits from each credit transaction are deposited into the reserve account. Factors that determine the Reserve Account contribution are: base contribution, probability of wildfire, and probability of competing land uses. In the case of unintentional credit reversal due to force majeure or competing land use events, the Administrator withdraws credits from the reserve account to cover the invalidated credits at no cost to the Credit Developer for a limited duration until the original credits are replaced.

Additionality and Stacking of Multiple Payments

Projects that generate credits must be additional to activities that would occur in the absence of the CCS. On private and public lands, a credit project is additional if the land manager is not already performing or planning to perform conservation actions using funding sources other than the CCS. *Stacking* allows a Credit Developer to receive multiple payments for conservation actions on the same area of land, but only receive credit for the additional conservation benefits.

Durability

The CCS uses *performance assurances* on private and public lands to ensure the durability of credits generated throughout the life of the credit project. Performance assurances are implemented through contract terms and financial instruments. To the extent possible, ensure that the *durability of projects on public lands* is safeguarded using land protection mechanisms (e.g. right-of-ways), financial instruments (e.g. contract performance bonds) and the Reserve Account.

Additional Policy Considerations

The *Service Area*, the area in which credits can be exchanged within the CCS, is consistent with the current Biologically Significant Unit (BSU) mapped area and depicts the general range of sage-grouse.

Baseline is the starting point from which credits and debits are measured. Credits and debits represent the change from baseline that results from implementing a project. *Credit baseline* is a state-wide standard for each seasonal habitat type equivalent to the average habitat functionality. Project sites must be at the credit baseline, at a minimum to begin generating credits. *Debit baseline* is the pre-project habitat function value for each seasonal habitat type for a proposed debit project.

Credit release occurs when performance criteria milestones which increase habitat function are achieved on a credit site. Specific performance criteria are defined in each project's *Customized Management Plan*. Credit release can occur in single or multiple increments depending on credit project type; including: *preservation projects*, *enhancement projects*, and *restoration projects*.

The CCS requires that the *project life* of a credit project must be the duration of the impacts of the debit project it is offsetting plus ten years.

Credit variability may occur due to annual climatic or other natural conditions affecting habitat functionality. As a result, a *variability tolerance threshold* of above or below 10% habitat function is applied.

Non-CCS Mitigation

As of December 6, 2018 debit projects permitted through federal agencies are not required to use the Credit System to fulfill their compensatory mitigation obligations. However, the Credit System is expected to be included in the BLM/USFS Land Use Plans for the Northeastern California-Nevada Sub Region as a tool for defining and fulfilling compensatory mitigation requirements for anthropogenic disturbances to greater sage-grouse habitat on BLM and USFS lands in the State of Nevada. If the Credit System is not chosen, the State expects the HQT to be used to analyze the direct and indirect effects to sage grouse habitat as well as the habitat function of the mitigated area to ensure net conservation gain.

9.0 MONITORING AND ADAPTIVE MANAGEMENT

Monitoring and adaptive management are key components of successful resource management plans in order to derive the greatest environmental benefit given limited agency resources. Incorporation of these strategies in the planning process will help ensure management actions identified in this State Plan are implemented and effective at achieving the intended goals and objectives for the benefit of sage-grouse. Adaptive management allows for information learned through monitoring to be integrated into iterative decision making that can be adjusted as outcomes from management actions become better understood (Williams et al. 2009). Management that does not achieve intended goals and objectives can be modified through adaptive management and contribute to the emerging understanding of management action response, sage-grouse habitat requirements, sage-grouse behavior, and sagebrush ecosystem processes.

Monitoring

Two main categories of monitoring will occur for the State Plan: 1) inventory monitoring and 2) management action monitoring. These are described below. Within each of these categories, additional concepts will need to be considered: short and long-term monitoring, monitoring at multiple scales (e.g., site, landscape) (Swanson et al. 2018), and, for management action monitoring, monitoring for implementation and for effectiveness.

Inventory monitoring assesses the status/extent/condition of sage-grouse populations (e.g., sage-grouse population trends over time), sage-grouse habitats (e.g., gain/loss of sage-grouse habitats over time), and of the threats to sage-grouse (as identified in the State Plan, e.g., how many acres of P-J encroachment are occurring each year). Inventory monitoring provides a quantified understanding of changes in condition and extent of sage-grouse populations, habitat, and threats over time and space, can help prioritize efforts, and can help evaluate success in meeting short and long-term goals and objectives. Many of the state and federal agencies already provide a level of inventory monitoring appropriate for the needs of the state plan and this will be incorporated into the state's monitoring plan- more detail is provided below.

This State Plan identified many management actions to address specific threats. Monitoring of management actions is necessary to ensure that individual actions are accomplishing what they are intended to do. The state will require that monitoring plans be developed for all management actions that occur under direction of the State Plan, including those intended to ameliorate threats outlined in Section 7.0. These plans will include monitoring for implementation and monitoring for effectiveness. Monitoring associated with the Conservation Credit System (see Section 8.0) is detailed in the Habitat Quantification Tool Scientific Methods Document[7].

Management Action monitoring for implementation includes: 1) a brief description of the project and the work completed, 2) pre- and post-project photographs, 3) short term monitoring of weather

[7] For more information please refer to The Habitat Quantification Tool Scientific Methods Document on the Sagebrush Ecosystem Program's Website: http://sagebrusheco.nv.gov/CCS/ConservationCreditSystem/

(especially precipitation and when it occurs) and other events (e.g., fire, floods, insects, infestations, etc.) and on-going management (e.g., season of livestock use or livestock, horse, and wildlife population levels) (Swanson et al. 2018), 4) lessons learned during implementation, 5) discussion of impacts to uses and other resources, 6) recommendations on the implementation of future projects, 7) maintenance performed, and 8) accounting of expenditures.

Management Action monitoring for effectiveness can play a key role in demonstrating the accountability, success, and value of management investments. Effectiveness monitoring is designed to determine if the project is effective at meeting its biological and ecological goals and objectives. Project-scale effectiveness monitoring measures environmental parameters to ascertain whether management actions were effective in creating the desired change(s) in habitat conditions and species response. There are at least three important reasons to conduct project-scale effectiveness monitoring on a management action or a change in management: 1) to determine the biotic and abiotic changes resulting on, and adjacent to, the treatment area; 2) to determine if treatment and management actions were effective in meeting the objective(s); and 3) to learn from the management actions and to incorporate new knowledge in future treatment design.

The following concepts should be addressed in all monitoring plans:

- Identify the site conditions and the reasons for implementing management action(s) at the site.
- Set monitoring objectives and indicators – these should quantitatively or qualitatively evaluate the project objectives that will be used to evaluate project implementation and effectiveness in meeting objectives. Effectiveness in meeting objectives will need to be evaluated for both habitat changes and when appropriate and feasible, sage-grouse response.
- Identify anticipated site attribute changes in response to the management action, target values, and time frame under which changes are anticipated. Swanson et al. (2018) explain characteristics of useful and effective resource objectives (**S**pecific, **M**easureable, **A**chievable, **R**elevant, and **T**rackable).
- Select monitoring sites and determine appropriate, effective methods. Include control or reference sites in method design. Baseline data on these will allow before, after, with, and without comparisons.
- Monitoring will be conducted for a minimum of three years or until management objects are met. If, as part of the treatment, grazing was restricted for a time period, post-treatment, monitoring should be conducted for three year following resumption of grazing practices. In addition, monitoring will be conducted at 10 years post-treatment as a follow-up for long-term monitoring.
- Any monitoring plans will be prepared jointly between a project proponent, relevant stakeholders (such as permittees), and land management agency, with final approval from the land management agency.

See resources listed at end of this section for development on monitoring plans.

Adaptive Management

Adaptive management as it relates to sage-grouse and their habitats is a structured, iterative process of robust decision making in the face of uncertainty, with an aim to reduce uncertainty over time through continued monitoring. Because adaptive management is based on a learning system, it improves long term management outcomes. The challenge in using the adaptive management approach lies in finding the correct balance between gaining knowledge to improve management in the future and achieving the best short-term outcomes based on current knowledge (Allan and Stankey 2009).

> "An adaptive management approach involves exploring alternative ways to meet management objectives, predicting the outcomes of alternatives based on the current state of knowledge, implementing one or more of these alternatives, monitoring to learn about the impacts of management actions, and then using the results to update knowledge and adjust management actions" (Williams et al. 2009).

Adaptive management takes monitoring to the next level by establishing, prior to implementation, a framework from which an iterative implementation and learning process can be instituted. Adaptive management implements "learning by doing" and provides flexibility to act in the face of uncertainty.

The following are additional steps to monitoring that need to be addressed to successfully implement adaptive management (Adapted from Williams et al. 2009):

- Identify and record potential drivers of change in the system, threats to the system, and opportunities for beneficial actions. These should be incorporated in the model of response for each management action.
- Development of "models" or hypotheses of the expected response and rationale.
- Development of how management actions should be adjusted following results from monitoring (this should include a set of potential alternatives to management based on the outcome of specific monitoring, allowing for flexibility while based on best available science).
- Implementation of iterative adjustments to management actions following implementation of actions and results of monitoring, following the process outlined in previous bullet.
- Project and management plans should incorporate the ability to change methods when monitoring of the projects or management actions indicate or when new science from research or other monitoring project emerges.

Consideration of when adaptive management is appropriate:

- Decision making must be able to be made in an iterative process
- Monitoring data must be available to decision makers
- It is not appropriate when risks associated with learning based-decision making are too high (i.e., if risk of management action is unknown and worst case scenario has irreversible consequences) in comparison to the risks of not doing so (i.e., the consequences of doing nothing).

Incorporation of Monitoring and Adaptive Management into the State Plan

A multi-scale monitoring approach is necessary as sage-grouse are a landscape species and conservation is scale dependent to the extent that management actions are implemented within or across seasonal habitats to benefit populations. The state should track the extent of threats to sage-grouse (e.g., fire, pinyon-juniper encroachment, etc.), through inventory monitoring, as well as the efforts to manage the threats (e.g., number of acres of pinyon-juniper treated), through management action monitoring to promote effective species management and understand whether the state is making progress towards the goals and objectives outlined in this plan. Many of the components of inventory monitoring are already being monitored by state and federal agencies. The SETT will work to compile annual monitoring reports that provide a synopsis of these monitoring efforts and metrics relevant to the state plans goals and objectives. The state will engage with stakeholders responsible for these components to facilitate when possible and ensure monitoring occurs. For components that are not currently under the purview of other state and federal agencies, the SETT will work to engage relevant stakeholders to develop a monitoring program. The SETT will develop a comprehensive database to store all monitoring information which will be accessible to the public.

To meet the need for the management action monitoring requirement, all management actions overseen by the SEP will develop monitoring plans following guidance provided in this section. If participating in projects developed by BLM/USFS, NDOW, NDA, NDF, or other agencies, projects should include similar aspects to those outlined here, if not all. As well, all management actions should be reviewed and those appropriate for the adaptive management process should additionally develop an adaptive management plan in coordination with the monitoring plan.

Table 9.1 presents the components (sage-grouse threats, habitats, and populations) that will be monitored to be able to better understand the level of threat to sage-grouse and sagebrush ecosystems and what can be done to respond to the threat for sage-grouse. Elements for inventory monitoring and management action monitoring are outlined as well as the relevant agencies from which monitoring information will be gathered. Monitoring information will be collected across the extent of Service Area and provided at the site, landscape, PMU and state levels and by Priority, General, and Other Habitat Management Areas. In addition, known changes in extent between years will be documented and total extent of treatments will be summarized.

Additional monitoring components may be identified in the future for inclusion in the annual monitoring report (above and beyond those monitoring components listed in Table 9.1). As additional threats to sage-grouse and sage-grouse habitats are identified, components and leading indicators should be included in inventory monitoring and management action monitoring to better assess and understand the severity of threat and progress in ameliorating the threat.

Table 9.1. Inventory and Management Action Monitoring for the State Plan

Monitoring Component	Agency/Entity	Inventory Monitoring Elements	Management Action Monitoring Elements[8]
Sage-grouse Parameters			

[8] Scale of Management Action Monitoring is dependent on management action details specified in Section 7.0

Monitoring Component	Agency/Entity	Inventory Monitoring Elements	Management Action Monitoring Elements[8]
Sage-grouse habitats	NDOW, BLM, USFS, SETT CCS	• Land Health Assessments (BLM) (site, landscape, and state scale) • Resource Implementation Protocol for Condition Assessment Matrices (USFS) • Sagebrush landscape cover (BLM EIS)[9] (landscape scale) • CCS- functional acres lost due to debit projects, functional acres gained due to credit projects (concept of net conservation gain)	• Treatment conducted and effectiveness of treatments (these would be treatments not included in subsequent monitoring components, e.g., meadow restoration)
Sage-grouse populations	NDOW, BLM, USGS	• Lek, lek cluster, PMU counts, populations and trends (all scales) • Telemetry data collection (site to landscape scale-project dependent)	• At this point, the state plan does not outline management actions directly influencing sage-grouse numbers. Management actions outlined directly affect habitat and indirectly affect populations.
Threat			
Fire	BLM, USFS, NDF, NDOW[10]	• Number of fire starts per year • Number and size of fires in each vegetation community, and resistance and resilience classes	• Number of fires "successfully" suppressed (<1,000 acres) • Number of catastrophic fires • Fuels management treatments (conducted and effectiveness of treatments) • Rehabilitation efforts for each fire (implementation and effectiveness of treatments) • Document coordination efforts that aid in efficient and effective fire pre-suppress and suppression management
Cheatgrass	SETT will coordinate with researchers to determine extent BLM, USFS, NDOW, Nevada Cheatgrass Action Team	• Extent (spatial distribution, acres, and density of invasion)	• Treatments conducted and effectiveness of treatments (includes restoration efforts or efforts to improve resilience/resistance)
Noxious weeds[11] Medusahead Hoary cress (*Cardaria*	NDA, NDOW, University of Nevada Cooperative Extension, and SETT	• Extent (spatial distribution, acres, and density of invasion)	• Treatments conducted and effectiveness of treatments

[9] As part of the Greater Sage-grouse Northern California and Nevada Sub-regional EIS/LUPA, the BLM/USFS have developed a Monitoring Framework (Appendix E of that document) that outlines monitoring for habitat loss, habitat degradation, and population trend (in coordination with NDOW) at the 1st, 2nd, and 3rd order scale (Stiver et al. 2010).

[10] NDOW is engaged with BLM on post -fire treatment monitoring and provides monitoring in conjunction with these agencies post ES&R efforts.

[11] Weed species in Nevada identified as having, generally, greatest impact to sage-grouse habitats (S. Espinosa, B. Schultz personal communication

Monitoring Component	Agency/Entity	Inventory Monitoring Elements	Management Action Monitoring Elements[8]
draba) Russian knapweed (*Acroptilon repens*) Leafy spurge (*Euphorbia esula*) Perennial pepperweed (*Lepidium latifolium*) Canada thistle (*Cirsium arvense*) Rush skeleton weed (*Chondrilla juncea*) Yellow starthistle (*Centaurea solstitialis*) Musk thistle (*Carduus nutans*) Spotted knapweed (*Centaurea maculosa*) Scotch thistle (*Onopordum acanthium*) Mediterranean sage (*Salvia aethiopis*) **Other weeds** Red Brome (*Bromus rubens*) Rattlesnake chess (*Bromus briziformis*) Halogeton (*Halogeton gomeratus*) Purple mustard (*Chorispora tenella*)			
Pinyon-Juniper encroachment	BLM, USFS, NDF, NDOW, SETT, all stakeholders (including researchers at University of Nevada, Reno, and USGS)	• Extent (spatial distribution, acres, and density of invasion)	• Treatments conducted and effectiveness of treatments
Predation	NDOW, Wildlife Services, NDA, and SETT,	• Baseline data collected prior to treatments- data will likely be site specific, not Service Area wide (road kill inventories, raven counts, habitat parameters, etc.)	• Treatments conducted and effectiveness of treatments • Documentation of coordination efforts with city counties, landfills waste managers, livestock owners, research on perching and nest deterrent technology
WHB populations	BLM, USFS	• HMA/WHBT populations • Extent of resources damaged by WHB • Understand their timing of use on seasonal habitats • Trend monitoring regarding maintenance of a thriving natural ecological balance for adjusting AML (BLM 2010)	• Gathers conducted • Treatments conducted and effectiveness of treatments
Livestock grazing	BLM, USFS, permittees and stakeholders	• Allotment standards and guidelines • Dates of use or intensity of	• Documentation of changes in management prescriptions to improve management, when

Monitoring Component	Agency/Entity	Inventory Monitoring Elements	Management Action Monitoring Elements[8]
		use by allotment • Monitoring of attainment of management objectives (Swanson et al. 2018)	appropriate
Anthropogenic disturbances	SETT, BLM, USFS, other federal agencies, all stakeholders	• CCS- functional acres lost due to debit projects, functional acres gained due to credit projects (concept of net conservation gain) • Surface acres impacted • Indirect acres impacted • Identification of existing infrastructure that could be retrofitted, as appropriate (inclusion on the list does not require retrofitting, simply identifying the opportunity)	• Management actions to mitigation for anthropogenic disturbances will be accounted for under the appropriate threat or under habitat and in reporting will be noted as credit projects. • Documentation of implementation of Site Specific Consultation Based Design Features
Recreation and OHVs	SETT, BLM, USFS, Commission on Off-Highway Vehicles and other stake holders	• Permitted activities • Extent of authorized and unauthorized recreational trails and facilities	• Treatments conducted to restore areas impacted by recreational activities and effectiveness of treatments • Documentation of coordination efforts with recreational groups
Weather Variability	NOAA, DRI, State Climatologist, NRCS Water and Climate Center, USGS BLM, USFS, and other stakeholders	• U.S. Drought Monitor • Hydrologic Report • Climate data records (current and historic)	• Tracking changes in management actions due to weather variability
Land Ownership	All agencies	• Tracking of land ownership changes	• Tracking of how changes in management actions due to land ownership affects habitat

Greater Sage-grouse Adaptive Management Process – Population and Habitat

In addition to the annual monitoring report and database, The State has collaborated with the federal land management agencies (BLM and Forest Service) and incorporated guidance from Science Work Groups to develop adaptive management strategies pertaining to sage-grouse thresholds and responses relating to both population and habitat. The Sagebrush Ecosystem Council (SEC) requested that the Sagebrush Ecosystem Team (SETT) develop a strategy to address these thresholds and responses at their May 2018 meeting.

Introduction

Adaptive management is an intuitive, scientific, and social decision process that promotes flexible resource management decision making in the face of knowledge with uncertainty. A collaborative approach including a wide variety of knowledge from local participants and management agencies can pool ways of knowing and resources across multiple disciplines and perspectives. This approach can leverage efforts and resources into a framework that guides and targets management efficiently for

optimum outcomes. This collaborative approach can enable problem solving from a wider viewpoint than is possible from an agency-specific analysis. Through monitoring management efforts, and evaluating results and strategies, subsequent decisions can be adjusted as results from actions become better understood. A true adaptive management process can result in iterative changes that become more targeted, focused, and effective through time. A team assembled of agency and local expertise can calibrate a plan with outcomes to improve conditions for the GRSG in impacted areas. Carefully monitoring outcomes advances scientific understanding for improved stewardship on intermixed public and private lands.

The focusing nature of the adaptive management process will hopefully enable forecasting management successes. Statewide and local teams will coordinate, prioritize, and implement specific habitat restoration efforts targeted at multiple spatial scales. This adaptive management strategy calls for a large, concentrated and collaborative effort that will result in recommended management responses and strategies for declining GRSG populations or identified areas of impacted habitat. These recommendations and strategies will be focused based on discussion of how threats impact the GRSG, and the relative importance of various conservation actions. Due to the importance of a functional sagebrush ecosystem to the State of Nevada it is important to put forth the best effort possible. The outcomes will be used to assist local efforts in identifying and prioritizing areas to enable efficiencies and pools resources. This will increase the likelihood that GRSG population and habitat decline can be addressed effectively in the spirit of teamwork, stewardship, and conservation. The principles of adaptive management will be incorporated into the conservation measures that lessen threats to GRSG and its habitat.

This adaptive management strategy includes warnings, soft and hard triggers and responses. Triggers are not specific to any particular project, but identify GRSG population and habitat thresholds outside of natural fluctuations or variations (with the exception of wildfires). Triggers are based on the two key metrics that are being monitored; population status and habitat loss. Adaptive management, with specific triggers, provides additional certainty that the management actions are robust and able to respond to a variety of conditions and circumstances quickly and effectively to conserve GRSG habitat and populations. Reaching a trigger will initiate a local-state-federal interagency dialogue in collaboration with affected authorized land users (e.g., grazing permittee) to evaluate causal factor(s) and recommend adjustments to implementation-level activities to reverse the trend. The State will use a collaborative and consensus based process with stakeholders, appropriate state and local agencies, and affected authorized land users when developing and implementing management responses when a trigger has been identified.

The following figure shows the overall process and flow of the State's adaptive management process:

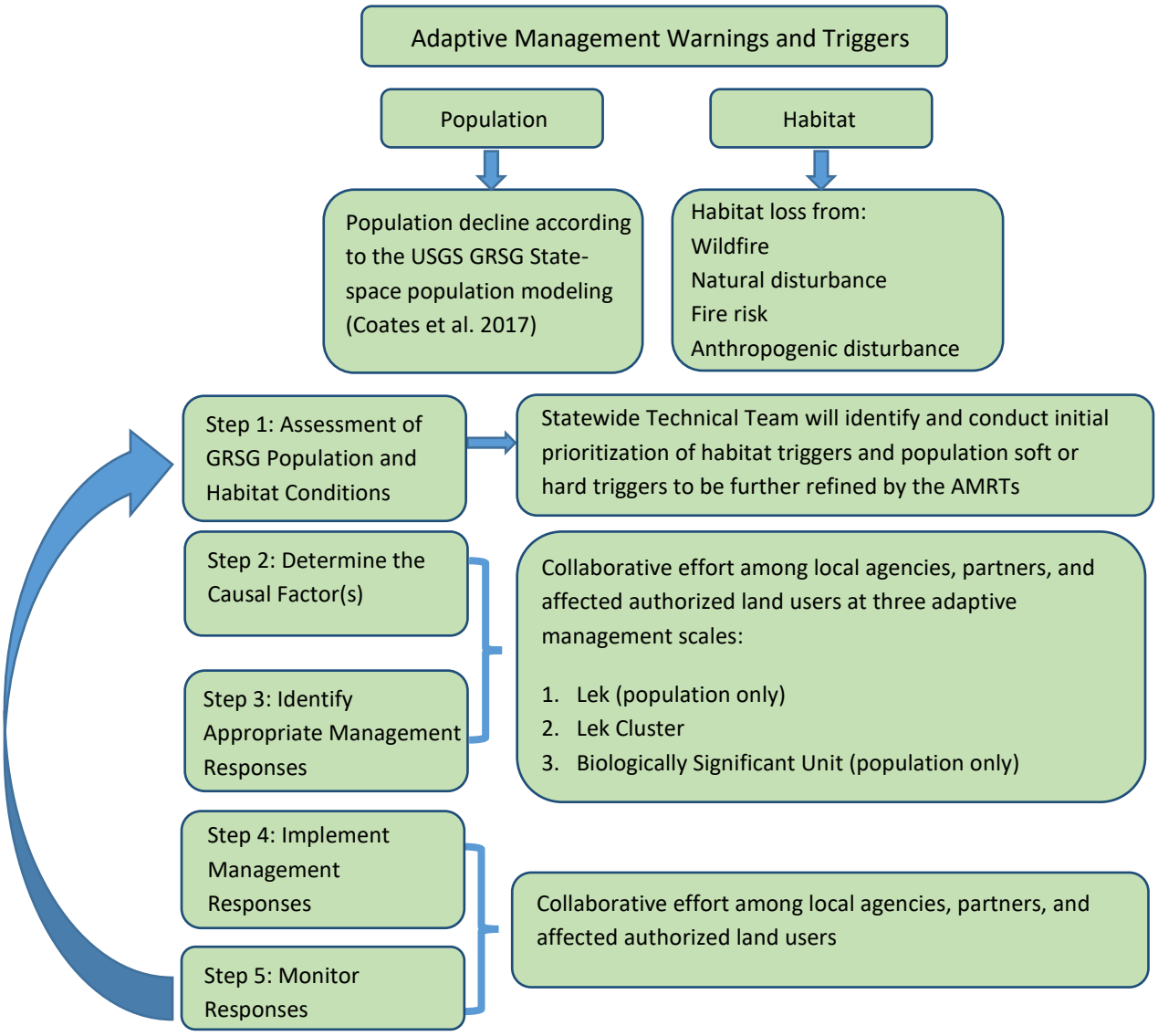


Figure 10. Flowchart of the adaptive management process.

Adaptive Management Analysis Scales

The scales used to analyze population triggers and apply management responses are at the individual lek, lek cluster, and biologically significant units (BSU) as defined below (Figure 11). Adaptive management responses will only apply to habitat management areas (HMAs), which includes PHMA, GHMA, OHMA, within these scales. Habitat adaptive management warnings and triggers will be analyzed only at the lek cluster scale. The boundaries of the BSU and lek clusters may be adjusted over time, based on the understanding of local GRSG population interactions, genetic sampling and climate variation. Population and habitat analyses used to identify warnings and triggers may be updated based on new science and advances in technology (e.g., integrated population models).

The hierarchy of GRSG population and habitat scales is as follows:

- Lek—Individual breeding display site where male and female GRSG congregate, with males performing courtship displays to gain mating opportunities with females.
- Lek cluster—A group of leks in the same vicinity, among which GRSG may interchange over time and representing a group of closely related individuals.
- BSU—Represents nested lek clusters with similar climate and vegetation conditions.

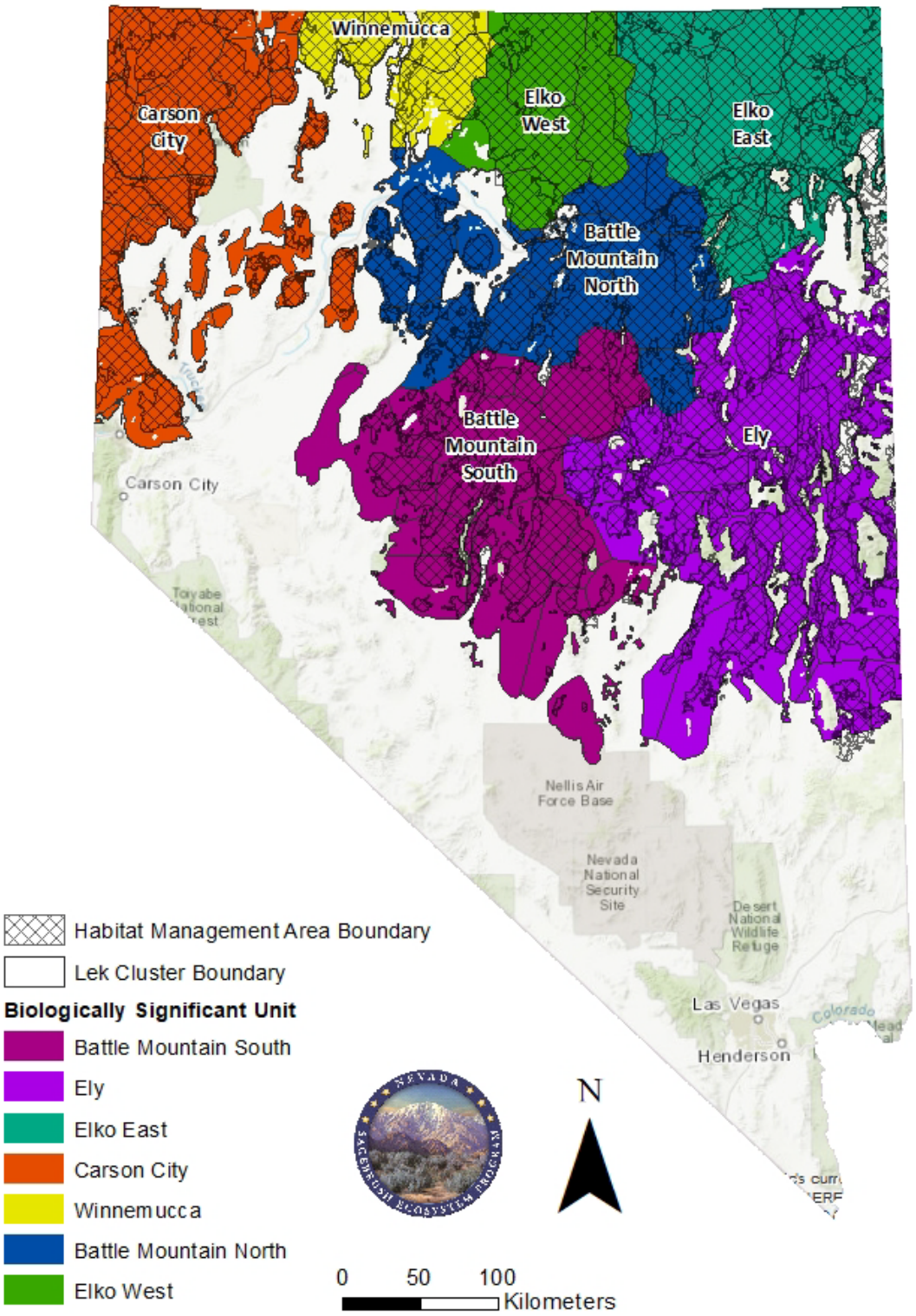


Figure 11. Biological Significant Units and Lek Clusters for GRSG in the Nevada and Northeastern California Sub-region

DEFINITIONS OF WARNINGS, SOFT TRIGGERS, HARD TRIGGERS, AND MANAGEMENT RESPONSE

Population

Warnings

Warnings represent pre-cursors to triggers that indicate a change to populations that could result in a trigger being reached. Population warnings are identified within the GRSG state-space model (Coates et al., 2017) (described below) that could lead to reaching a population soft or hard trigger[12]. Warnings are the result of cumulative factors that negatively affect population growth rate. A warning could be seen when population rate of change (lambda) within any of the three analyzed spatial scales is below an established threshold as defined in Coates et al. (2017).

Soft Triggers

Soft triggers represent a threshold that indicates that management actions should be considered at the project or implementation level to address GRSG population declines.

Hard Triggers

Hard triggers represent a threshold that indicates that immediate action needs to be considered to address significant deviation from GRSG population declines.

Habitat

Warnings

Adaptive management habitat warnings include the occurrence of wildfire or natural disturbance (e.g., sagebrush die-off) larger than 1,000 acres, fire risk (e.g. fine (annual and perennial) or woody fuel loads, fire risk models, etc.), or new anthropogenic disturbance that results in direct and indirect effects as determined using the Habitat Quantification Tool (HQT) within an HMA lek cluster.

Fire risk will be analyzed using various applicable data sources and support tools including but not limited to current vegetation composition and biomass, precipitation, fire regime condition class, fire risk or predictive models, and other applicable resources to identify areas that have the potential for high fine or woody fuel loads or have a high probability for burning again. The Great Basin Coordination Center and appropriate fuels management specialists will also be consulted to refine areas of high fire potential.

Disturbances of any size could have significant impacts to GRSG habitat. Due to the complexity of identifying the extent and severity of habitat disturbances in a consistent process, this effort

[12] The USGS analysis uses the term ‘signals’ which is synonymous with ‘triggers’. ‘Triggers’ is the term that will be used throughout the State Plan

will focus on disturbances to sage-grouse habitat as reported by State and Federal agencies (e.g., wildfires > 1,000 acres) that will be considered warnings in order to assess the magnitude of each disturbance (as identified below in Triggers).

Triggers

Warnings evaluated by a statewide technical team of specialists (as defined in the Adaptive Management Analysis section) that are determined to warrant significant management responses to address GRSG habitat declines. Generally, a management response will be warranted if an action could be taken that could effectively improve conditions for GRSG.

Management Responses

If a trigger is reached, the appropriate land management agency(ies) will evaluate appropriate management responses to address the known or probable causes of the decline in GRSG habitats or populations, with consideration of local knowledge and conditions in coordination with appropriate federal, state, and local agencies, and affected authorized land users. See Step 3 below for examples of potential management responses.

ADAPTIVE MANAGEMENT POPULATION ANALYSIS

Population Rate of Change Calculation for Triggers

The USGS GRSG state-space model (Coates et al. 2017) will be used to estimate the rate of GRSG population change (lambda) and the number of males at three hierarchically nested spatial scales: individual lek, lek cluster, and BSU. Lek count data provided by NDOW would inform the state-space model and be used to determine thresholds for population stability and decoupling from higher-order scales. Some lek clusters may need additional monitoring of leks to gain adequate sampling data in order to be modeled (Coates et al. 2017).

In addition to analyzing annual trend data, the benefit of using the USGS state-space model is that it differentiates whether a population decline is likely due to localized disturbances that may be more manageable, or connected to a larger scale, regional environmental or climactic conditions that are typically less manageable. A trigger is less likely to be reached at smaller spatial scales (e.g., lek, lek cluster) if regional environmental (e.g., BSU) conditions are influencing population decline (Figure 12). The framework also accounts for natural variations in populations, which will allow managers to target populations that can be most affected by adaptive management responses.

Population Soft and Hard Triggers

On an annual basis as lek data are finalized by NDOW, the USGS GRSG state-space model will be used to establish population rates of change at the lek, lek cluster, and BSU levels. The rate at which a population trend destabilizes (population decline) and decouples from the trend at the associated higher-order scale will dictate whether or not a soft or hard trigger is reached. Thresholds for stability and decoupling for soft and hard triggers were determined from simulation analyses that used 17 years

of lek data (2000-2016). These simulations estimated the range of values where management actions would have an effect on stabilizing population change or synchronizing decoupled scales. The threshold value for each criteria represents the most likely threshold value (from a range of values), that if crossed, would associate most strongly with continued decline or decoupling if management action is not taken (Coates et al. 2017).

The methods to determine triggers and the specific quantitative soft and hard triggers for the lek, lek cluster, and BSU spatial scales are identified in the USGS state-space model *Hierarchical population monitoring of greater sage-grouse (Centrocercus urophasianus) in Nevada and California—Identifying populations for management at the appropriate spatial scale*: U.S. Geological Survey Open-File Report 2017-1089, in the Evaluation Process Section.

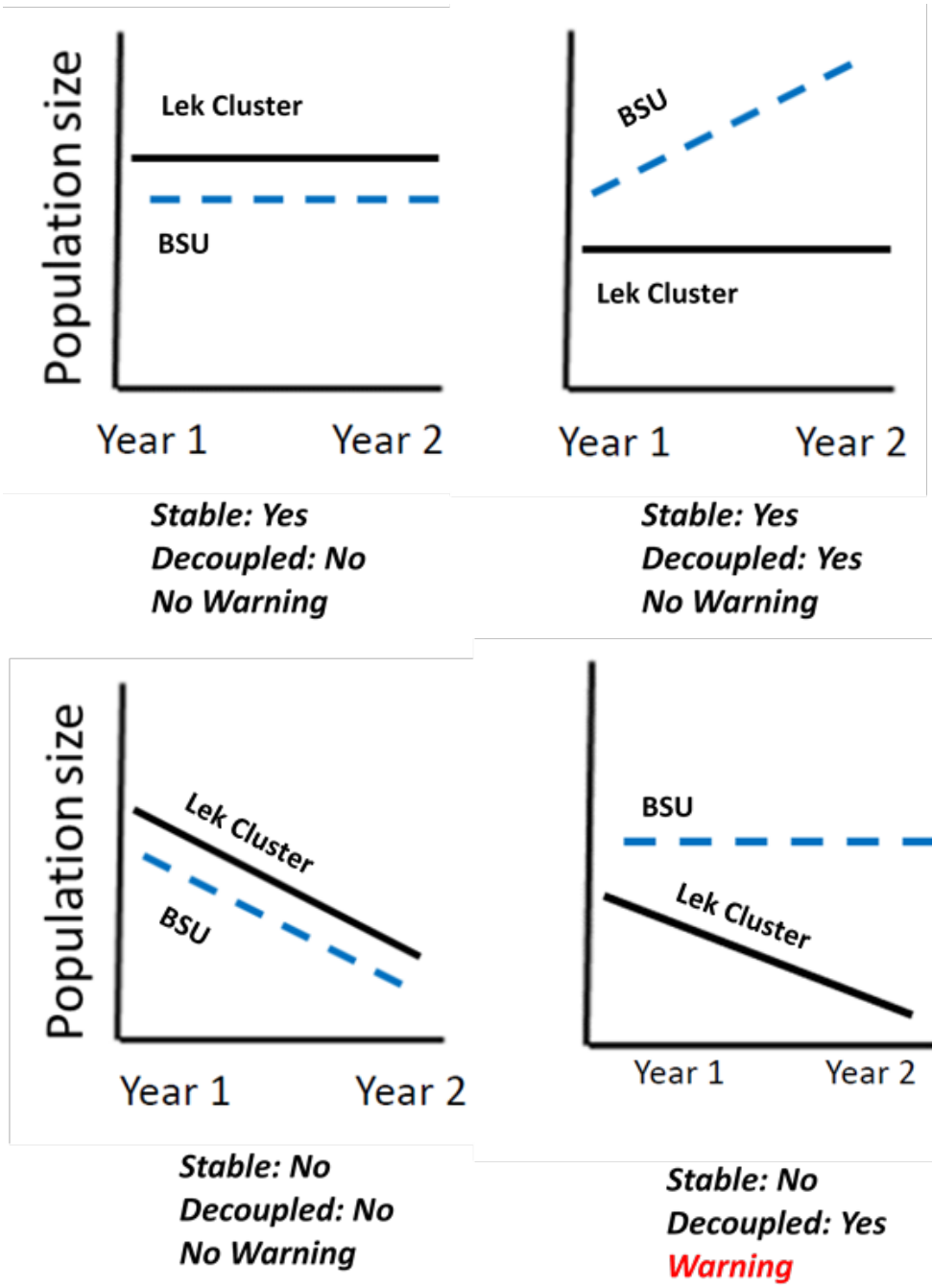


Figure 12. Scenarios depicting population stability (trend) and decoupling from the higher-order spatial scales (Coates et al. 2017). A population that is destabilized and decoupled is considered a warning at that spatial scale. Multiple annual warnings are required to reach a soft or hard population trigger.

ADAPTIVE MANAGEMENT HABITAT ANALYSIS

Habitat Trends for Warnings and Triggers

Warnings and triggers for habitat will only be evaluated at the lek cluster scale based on annual habitat loss within HMAs.

Habitat Warnings and Triggers

At the lek cluster scale:

a. Habitat warnings will be evaluated annually by a statewide technical team of specialists (similar to a science work group) from the BLM, Forest Service, NDOW, SETT, USGS, FWS, UNR, and other appropriate local, state or federal partners to determine the ecological impact and magnitude of the habitat warnings. The statewide technical team will determine which habitat warnings warrant a management response or not. Within a lek cluster, habitat warnings that warrant a significant GRSG focused management response can be considered triggers and prioritized based on available science, site-specific conditions (context), and ecological criteria (e.g., ecological site description, current state, resistance and resilience, state and transition models, disturbance response group, cheatgrass dominance, etc.). The statewide technical team would make a recommendation to the appropriate agency's authorizing official responsible for addressing the trigger(s). More information on prioritization is included under Step 2.

b. Habitat triggers that had insufficient funds and resources available to implement projects will remain on the habitat trigger list and could be re-prioritized in the next annual evaluation by the statewide technical team. The statewide technical team will also review the trigger list annually and determine whether a habitat trigger remains on the list or should be removed; if inadequate funding or other resources are continually not available to implement appropriate management responses for habitat triggers, the SEC will support efforts to request additional resources.

c. If a population soft trigger is reached within a lek cluster that has a habitat trigger present, this may result in a population hard management response for that lek cluster, as determined by the statewide technical team.

CAUSAL FACTOR ANALYSIS AND MANAGEMENT RESPONSES PROCESS

Step 1-Assessment of GRSG Population and Habitat Conditions: The statewide technical team and other appropriate state and federal agency partners would use the processes outlined above to evaluate population and habitat data to identify population and habitat warnings and triggers that have been reached. The statewide technical team would meet semi-annually during the spring and late summer or fall of each year to evaluate population data using the results of the USGS GRSG state-space model (Coates et al. 2017), habitat data from the land and resource management agencies (BLM, Forest

Service, and other state and local agencies), and data sources to identify the potential for high fine or woody fuel loads that indicate a high probability for burning again. The data sources may be adapted as new information becomes available from appropriate partners. Some applicable data sources are outlined in the habitat warnings definitions section.

Habitat warnings that warrant a significant GRSG focused management response are elevated to the level of a trigger. Following the identification of habitat triggers, a list of criteria and a ranking system that considers available science, site-specific conditions (context), ecological criteria (e.g., ecological site descriptions, current ecological state, resistance and resilience, cheat grass dominance), and available resources will be used to consistently prioritize and rank habitat triggers among lek clusters. This habitat trigger prioritization is only an initial evaluation. As the adaptive management process progresses local information and expertise will be used to further refine the priority list for habitat triggers. The prioritization will consider biological need, most benefit for cost, and estimated effectiveness. Questions such as the following will be assessed:

- What is the magnitude of the impact to GRSG population or habitat? (e.g., what is the current anthropogenic disturbance in the area and how will these changes impact GRSG populations or habitat?)
- Can GRSG populations or habitat recover on its own without intervention?
- What is the expected length of the recovery period?
- Can management actions planned or already in place accelerate recovery or are different actions necessary?

Once the annual population and habitat information have been assessed and triggers have been identified, the SETT will provide and present the results, at least annually, to the SEC and provide the public with an opportunity to assess the information. The SEC may choose to take action to provide further guidance into the process.

Step 2-Determine the Causal Factor(s): Within four weeks (or sooner if possible) after Step 1 is completed and population and habitat triggers have been identified, the SETT will initiate an interdisciplinary team to include the appropriate land management agency, the statewide technical team, and federal, state and local agencies and partners (including but not limited to local area conservation groups, grazing permittees, and other affected authorized land users) to participate, comment, and provide input during the causal factor analysis. This group will henceforth be referred to as the 'Adaptive Management Response Team' (AMRT). The casual factor analyses at each scale are as follows:

a. Lek (population only): GRSG seasonal habitats associated with the lek. An individual lek boundary is defined as a minimum of a four mile buffer except in cases where known seasonal habitats associated with that lek occur beyond the four mile boundary surrounding the lek;

b. Lek cluster: GRSG seasonal habitats associated with the lek cluster. A lek cluster boundary is defined by minimal GRSG movement between clusters so demographic rates are influenced by birth/death rates rather than immigration/emigration;

c. BSU (population only): GRSG seasonal habitats associated with the BSU. A BSU boundary is defined by similar environmental conditions where GRSG population dynamics are likely more driven by larger scale variations (e.g. climate).

The causal factor(s) for habitat triggers could be wildfire, natural causes, fire risk, or anthropogenic disturbances based on the analysis conducted in Step 1. To identify the causal factor(s) of a population trigger, the AMRT would consider all available information and examine potential causal factor(s). Questions to be answered may include, but are not limited to the following:

- Did factors and events outside the triggered scale contribute to the population or habitat decline? (e.g., are there previously burned areas within the lek cluster or BSU that have not recovered?)
- Did the event or outcome arise from the interaction of more than one potential causal factor(s)?
- What natural and human-caused events have occurred within the causal factor analysis area?
- What additional GRSG threats exist in the area?

Findings from the causal factor analysis process will be documented in a report, which would be prepared by the AMRT. The AMRT report may also include recommendations for additional analyses or data collection. If the causal factor(s) can't be determined, the AMRT should address threats that were identified in this process and continue to explore opportunities for conservation in areas where impacts have occurred, when warranted.

Step 3-Identify Appropriate Management Responses: The AMRT will identify and recommend appropriate management responses to be applied to the individual lek (population only), lek cluster, and/or BSU (population only) that reached a trigger. Recommended management responses should be included in the AMRT report.

Management responses will only be applied within HMAs. Both reactive and pro-active management responses may be applied to address existing or anticipated threats in areas where warnings or triggers have been reached. In either case they should be strategically targeted to address the causal factor(s) of the existing disturbance or to address similar threats that led to a warning or trigger within a lek, lek cluster, or BSU. This plan identifies two main response groups to address fine and woody fuel loads that may require different management responses with varying spatial and temporal scales associated with the response. :

1) Short term management – Identify areas of high fine fuel loads that would benefit from targeted grazing (e.g. season specific grazing, fuel break maintenance, etc.) of annual grasses and other fuels management.

2) Long term management – Identify areas of high woody fuel loads to strategically target areas for appropriate fuel breaks and vegetation treatments to better manage wildfires.

Types of short and long term management or implementation actions that the appropriate land management agency(ies) could evaluate or consider applying within an individual lek (population only), lek cluster, or BSU (population only) to address triggers may include, but not be limited to the following:

- Delaying issuance of new or adjusting existing permits and authorizations (e.g. geothermal, solar, wind, oil and gas, etc.);
- Delaying issuance of new or pending ROWs outside of existing designated corridors;
- Requiring new permits and authorizations to include an adaptive management process pertaining to mitigation if additional impacts to populations or habitat are identified including monitoring thresholds and responses;
- Use of tools and techniques within the BLM Programmatic Environmental Assessment (EA) for targeted grazing (in development);
- Proactively apply targeted grazing to reduce fine fuels (e.g., use of BLM free use permits, TNR permits, etc.);
- Use of BLM PEISs for Fuel Breaks and Restoration Management (in development) to strategically place fuel breaks depending on landscape/habitat continuity, vegetation composition, fuel loads, accessibility, etc.;
- (Forest Service to identify tools related to fuels management and targeted grazing)
- Use existing or develop new predictive tools to forecast and plan for anticipated plant growth based on annual and seasonal precipitation in unison with existing (from previous growing season(s)) fine and woody fuels data and correspondence;
- Implement temporary closures for certain types of activities (i.e. target shooting) (in accordance with 43 CFR Part 8364.1, and as directed under BLM Instruction Memorandum No. 2013-035);
- Implement responses to a causal factor(s) that resulted in a catastrophic event (i.e., excessive fuel loads);
- Halting or delaying planned prescribed fire;
- Increasing fire prevention patrols;

- Increasing fire prevention inspections of motorized equipment;
- Prohibiting open campfires outside of established fire pits and outside of stoves in designated recreation areas and during risky fire seasons;
- Increasing inspections to ensure Required Design Features for limiting the spread of invasive plants are being followed;
- Increasing surveys to detect and treat new infestations of invasive plants, especially invasive annual grasses;
- Delaying certain planned vegetation treatments until after the breeding and brood-rearing season;
- Halting, delaying, accelerating, or stimulating planned fuels treatments in GRSG winter habitat, depending on conditions and needs;
- Installing anti-perching devices on tall structures;
- Installing bird flight diverters on guy wires and fences;
- Delaying planned construction of new recreation facilities (e.g., kiosks, toilets, and signs);
- Increasing litter patrols in and around heavily used recreation areas;
- Increasing educational contacts with visitors concerning the role of litter and garbage in attracting GRSG predators;
- Increasing enforcement efforts on travel restrictions;
- Limiting noise and/or light pollution;
- Voluntary written agreements for items outside of BLM jurisdiction (such as activities on adjacent non-BLM land);
- Habitat improvement projects including pinyon or juniper removal, weed treatments, sagebrush restoration, or wet meadow restoration;
- Developing Allotment Management Plans;
- Conducting emergency wild horse and burro gathers;
- Targeted and/or strategic grazing;
- Off-site water development by the water rights holder; and/or
- Voluntary establishment of livestock herding/stockmanship.

The appropriate land management agency district or field offices will consider whether approval of pending authorizations within the affected adaptive management response area (lek, lek cluster or BSU) will exacerbate the trigger or will be otherwise inconsistent with the management responses. The State will coordinate with appropriate federal, state and local agencies, and affected authorized land users for any action completed under this step.

In addition, the AMRT report could also identify an emergency/contingency plan that would outline immediate management actions that would take place, in the event the trigger is exacerbated. Such a plan should include goals, objectives, management actions and monitoring requirements developed specifically for the appropriate geographic area and/or population being affected (e.g., lek (population only), lek cluster, and/or BSU (population only)).

If a population hard trigger or a catastrophic habitat trigger is reached, a much more aggressive management response may be anticipated. The Federal land management agency(ies) local offices may implement the site specific actions outlined in the emergency/contingency response plan (which could be a component of the AMRT report) . The emergency/contingency response could also recommend that the Federal land management agency no longer permit exceptions to allocation decisions in areas (e.g., lek (population only), lek cluster, or BSU (population only)) that have reached a hard trigger and may delay issuance of new permits and authorizations until population or habitat triggers have been determined to be adequately addressed by the process outlined below (Adaptive Management to Management Responses).

Management objectives in response to triggers should be SMART (Specific, Measurable, Achievable/Attainable, Relevant/Realistic, and Trackable/Timely or time specified).

Step 4-Implement Management Responses: The appropriate land management agency in coordination with the AMRT may implement the recommended management responses (e.g., implementation of Service First Agreements) within the affected response area or at the scale in which the trigger was reached (e.g., lek (population only), lek cluster, and/or BSU (populations only)).

Step 5-Monitor Responses: The appropriate land management agency in coordination AMRT may continue to monitor (e.g., monitoring guidance within the Nevada Rangeland Monitoring Handbook) the lek(s), lek cluster(s) and/or BSU(s) or affected area in which a recommended management response is being applied to determine if the responses are adequately addressing the reason for the population and/or habitat decline. This information would be used in Step 1 above, “Assessment of GRSG Population and Habitat Conditions” the following year.

ADAPTIVE MANAGEMENT TO MANAGEMENT RESPONSES

The appropriate land management agency will work with the statewide technical team to develop criteria that will be used to evaluate whether a lek (populations only), lek cluster, and/or BSU (populations only) that reached a trigger has recovered sufficiently or is trending in a positive direction. Longevity of a management response should be appropriate and apply to the type of management action being implemented.

For population or habitat triggers that resulted in management responses focused on habitat treatments, restoration, rehabilitation, or other activities including predator control or increased fire prevention, should be evaluated annually to determine their effectiveness. If implementation activities are successful or are improving population or habitat conditions, these actions should be continued or re-prioritized the AMRT using information from annual evaluation and monitoring. The federal land management agency will work with the AMRT to determine when a population or habitat trigger has been adequately addressed to remove the management response.

The process for evaluating population and habitat management responses may include, but not limited to the following:

- Identification of upward population trends, based on an annual analysis of the GRSG state-spaced model.
- Response of vegetation community and habitat following fire or other disturbance (including habitat trending towards desired conditions);
- Changes in GRSG HMAs based on periodic mapping updates;
- Evaluation of habitat or population response based on an adaptive management process to determine what management actions are successful, what actions are unlikely to be successful and should be discontinued, what objectives should be modified to better reflect an achievable goal, and what actions should be changed to achieve the desired outcome;
- Evaluation of assessments completed following *Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool*. Technical Reference 6710-1 (Stiver et al., 2015).
- In cases where efforts to improve habitat or alleviate threats become infeasible, the AMRT may decide to recommend removal of triggers.

Additional monitoring and adaptive management plans and methods

There are several key plans and methods that have been developed for use in Nevada and across the range of the sage-grouse. These should be referenced in the development of resource objectives, management action monitoring plans, and adaptive management plans. The following are recommended for consideration in the State Plan:

<u>Monitoring</u>

Swanson, S., Schultz, B., Novak-Echenique, P., Dyer, K., McCuin, G., Linebaugh, J., . . . McGowan, K. (2018). Nevada Rangeland Monitoring Handbook, Third Edition. *University of Nevada Cooperative Extension Bulletin-18-MONTH*, p. 120.

Stiver, S., Rinkes, E., and Naugle, D. 2010. Sage-grouse Habitat Assessment Framework. U.S. Bureau of Land Management. Unpublished Report. U.S. Bureau of Land Management, Idaho State Office,

Boise, Idaho. Available at: http://sagemap.wr.usgs.gov/docs/rs/SG%20HABITAT%20ASESSMENT%202010.pdf

Bureau of Land Management. 2010 Wild Horses and Burros Management Handbook. H-4700-1. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.11148.File.dat/H-4700-1.pdf

BLM AIM Strategy

Toevs, G., Karl, J., Taylor, J., Spurrier, C., Karl, M., Bobo, M., and Herrick, J. 2011. Consistent Indicators and Methods and a Scalable Sample Design to Meet Assessment, Inventory, and Monitoring Information Needs Across Scales. Rangelands: 14-20.

Toevs, G., Taylor, J., Spurrier, C., MacKinnon, W., and Bobo, M. 2011. Bureau of Land Management Assessment, Inventory, and Monitoring Strategy: For Integrated Renewable Resources Management. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/ib_attachments/2012.Par.53766.File.dat/IB2012-080_att1.pdf

BLM AIM Monitoring Methods

Herrick, J., Van Zee, J., Havstad, K., Burkett, L., and Whitford, W. 2009. Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems. Volume I: Quick Start. Department of Agriculture, Agricultural Research Service, Jornada Experimental Range, Las Cruces, NM. Available at: http://www.ntc.blm.gov/krc/uploads/281/Monitoring%20Manual%20for%20Grassland,%20Shrubland%20and%20Savanna%20Ecosystems%20Vol.%20I_Quick%20Start.pdf

Herrick, J., Van Zee, J., Havstad, K., Burkett, L., and Whitford, W. 2009. Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems. Volume II: Design, Supplementary Methods and Interpretation. Department of Agriculture, Agricultural Research Service, Jornada Experimental Range, Las Cruces, NM. Available at: http://www.ntc.blm.gov/krc/uploads/281/Monitoring%20Manual%20for%20Grassland,%20Shrubland%20and%20Savanna%20Ecosystems%20Vol.%20.II.pdf

Adaptive Management

Williams, B., Szaro, R., and Shapiro, C. 2009. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC. Available at: http://www.doi.gov/initiatives/AdaptiveManagement/TechGuide.pdf

Cooperative monitoring

The state of Nevada recognizes the value of monitoring as well as the time and effort required to do so. Given limiting staffing and resources of agencies, the SETT will encourage and facilitate cooperative monitoring by interested stakeholders. The BLM has established a cooperative monitoring agreement for grazing allotment permittees to help conduct rangeland health assessments on their permitted allotments (See Appendix D). In compilation of the first annual monitoring report and through discussions with stakeholders, the SETT will work to develop similar cooperative monitoring agreements for additional resources with additional agencies and will facilitate development of such to meet the needs for training and quality control.

See resources below for monitoring guides for ranchers and other stakeholders.

Oregon Cattlemen's Association (2014). Oregon Resources Monitoring Guide: The Rancher's Guide to Improved Grazing.

Peterson, E. 2010. Implementing a Cooperative Permittee Monitoring Program. Sublette County Extension. University of Wyoming Cooperative Extension Service. B-1169. 28 pp. Available at: http://www.wyoextension.org/agpubs/pubs/B1169.pdf

Swanson, S., Bruce, B., Cleary, R., Dragt, B., Brackley, G., Fults, G., Linebaugh, J., McCuin, G., Metscher, V., Perryman, B., Tueller, P., Weaver, D. and Wilson, D. 2006. Nevada rangeland monitoring handbook. Second Edition. Educational Bulletin 06-03. University of Nevada Cooperative Extension, Natural Resources Conservation Service, Bureau of Land Management, U.S. Forest Service. USA. 84 pp. Available at: https://www.unce.unr.edu/publications/files/ag/2006/eb0603.pdf

Perryman, B., Bruce, L., Swanson, S., and Tueller, P. (2006). *Rancher's Monitoring Guide*, Educational Bulletin 06-04. University of Nevada Cooperative Extension, University of Nevada, Reno, College of Agriculture, Biotechnology and Natural Resources. USA. 48 pp. Available at: http://www.unce.unr.edu/publications/files/ag/2006/eb0604.pdf

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Beck, J., Reese, K., Connelly, J., & Lucia, M. (2006). Movements and survival of juvenile greater sage-grouse in southeastern Idaho. *Wildlife Society Bulletin*, 34:1070–1078.

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Bergquist, E., Evangelista, P., Stohlgren, T., & Alley, N. (2007). Invasive Species and Coal Bed Methane Development in the Powder River Basin, Wyoming. *Environmental Monitoring and Assessment*, 28:381-394.

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APPENDICES

Appendix A:

Site Specific Consultation Based Design Features

Site Specific Consultation Based Design Features

Site Specific Consultation Based Design Features (here after Design Features) are used to minimize impacts to sage-grouse and its habitat due to disturbances on a project by project and site by site basis. Design Features in the State of Nevada's plan apply to all newly proposed projects and modifications to existing projects. Existing projects within the Service Area are not currently subject to Design Features; however all Design Features listed below, according to program area, are required to be considered as part of the SETT Consultation process. The State of Nevada recognizes that all Design Features may not be practical, feasible, or appropriate in all instances considering site conditions and project specifications, nor is this list completely exhaustive. Therefore, the SETT in coordination with the project proponent, will consider all of the listed Design Features on a site-specific basis taking into consideration the best available science references for guidance in planning and implementation. If certain Design Features are determined to not be practical, feasible, or appropriate for the specific project site, the SETT will document the reasons the Design Features were not selected. The SETT may also consider additional Design Features that may minimize impacts to sage-grouse and its habitat that are not specifically listed here and document the reasons for selecting the additional Design Features.

Roads

These Design Features apply to all new roads, whether a component of a mining/ energy project or for any other purpose.

• Do not construct new roads where roads already in existence, could be used or upgraded to meet the needs of the project or operation.

• Design roads to an appropriate standard, no higher than necessary, to accommodate their intended purpose and level of use.

• Locate roads outside of key sage-grouse seasonal habitat, such as leks and late brood rearing habitat areas. New roads that are located within 3 miles of a lek should have seasonal restrictions from March 1 to May 15 from 1 hour before sunrise to 9 a.m.

• Coordinate road construction and use among ROW or SUA holders.

• Avoid constructing roads within riparian areas and ephemeral drainages (note that such construction may require permitting under section 401 and 404 of the Clean Water Act).

• Construct road crossings at right angles to ephemeral drainages and stream crossings.

• Work with local governments to enforce speed limits and design roads to be driven at speeds appropriate to minimize vehicle/wildlife collisions.

• Establish trip restrictions (Lyon and Anderson 2003) or minimization through use of remote access technology, such as telemetry and remote well control if applicable (e.g., Supervisory Control and Data Acquisition).

• Restrict vehicle traffic to authorized users on newly constructed routes by employing traffic control devices such as signage, gates, fencing etc.

• Dust abatement on roads and pads will be based on road use, road condition, season, and other pertinent considerations.

• Close and rehabilitate duplicate roads by restoring original landform and establishing desired vegetation, in cooperation with landholders and where appropriate authority exists to do so.

Mineral Resources

Fluid Minerals

Operations

• Cluster disturbances associated with operations and facilities as close as possible, unless site specific conditions indicate that disturbances to sagebrush habitat would be reduced if operations and facilities locations would best fit a unique special arrangement.

• Minimize site disturbance though site analysis and facility planning.

• Use directional and horizontal drilling to reduce surface disturbance.

• Place infrastructure in already disturbed locations where the habitat has not been restored.

• Apply a phased development approach with concurrent reclamation through a coordination process among relevant parties.

• Place liquid gathering facilities outside of Priority Habitat Management Areas. Have no tanks at well locations within Priority Habitat Management Areas to minimize truck traffic, and perching and nesting sites for ravens and raptors.

• Pipelines should be under or immediately adjacent to the road.

• Reduce motor vehicle travel during field operations through development and implementation of remote monitoring and control systems plans.

To reduce predator perching, limit the construction of vertical facilities and fences to the minimum number and amount needed.

• Site or minimize linear ROWs or SUAs to reduce disturbance to sage-grouse habitats.

•Co-locate new utility developments (power lines, pipelines, etc.) and transportation routes with existing utility or transportation corridors where adequate spacing separation can be achieved in order to preserve grid reliability and ongoing maintenance capability.

• Bury distribution power lines of up to 35kV where ground disturbance can be minimized. Where technology and economic factors allow, bury higher kV power lines.

• Power lines, flow lines, and small pipelines should be co-located under or immediately adjacent to existing roads.

• Permanent structures, which create movement (e.g., pump jack) should be designed or sited to minimize impacts to sage-grouse.

• Preclude sage-grouse access to pits and tanks through use of practical techniques (e.g. covers, netting, birdballs, location, etc.).

• Equip tanks and other above-ground facilities with structures or devices that discourage nesting or perching of raptors, corvids, and other predators.

• Control the spread and effects of non-native, invasive plant species Nevada Department of Agriculture listed noxious weeds (NAC 555.010, classes A through C, inclusive) and undesirable non-native plant species (Gelbard and Belnap 2003, Bergquist et al. 2007) (e.g., by washing vehicles and equipment, minimize unnecessary surface disturbance). All projects within the Service Area should have a noxious weed management plan in place prior to construction and operations.

• Use only closed-loop systems for drilling operations and no reserve pits.

• Reduce the potential for creating excessive or unintended mosquito habitat and associated risk of West Nile Virus impacts to sage-grouse. This can be implemented through minimizing pit and pond construction and, where necessary, size of pits and ponds (Doherty 2007).

• Remove or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus. If surface disposal of produced water continues and West Nile virus has been identified as a concern in the project area, use the following steps for reservoir design to limit favorable mosquito habitat (Dohery 2007):

– Overbuild size of ponds for muddy and non-vegetated shorelines.

– Build steep shorelines to decrease vegetation and increase wave actions. Ponds with steep shorelines will be equipped with NDOW approved wildlife escape ramps.

– Avoid flooding terrestrial vegetation in flat terrain or low lying areas.

– Construct dams or impoundments that restrict down slope seepage or overflow.

– Line the channel where discharge water flows into the pond with crushed rock.

– Construct spillway with steep sides and line it with crushed rock.

– Treat waters with larvicides to reduce mosquito production where water occurs on the surface if necessary.

• Limit noise to less than 10 decibels above ambient measures one hour before sunrise until 9:00 a.m. within 3 miles of a lek during active lek season, March 1 to May 15 (Patricelli et al. 2010, Blickley et al. 2012, Patricelli et al. 2013).

• Require noise shields when drilling during the lek, nesting, brood-rearing, or wintering season.

• Fit new transmission towers with anti-perch devices (Lammers and Collopy 2007).

• Design and construct fences consistent with NRCS fence standards and specifications Code 382 and, where appropriate, use fence markers (Sage Grouse Initiative 2013).

• Locate new compressor stations outside Priority Habitat Management Areas. Otherwise design them to reduce noise that may be directed towards Priority Habitat Management Areas.

• Implement site keeping practices to preclude the accumulation of debris, solid waste, putrescible wastes, and other potential anthropogenic subsidies for predators of sage-grouse (Bui et al 2010).

• Locate man camps outside of Priority Habitat Management Areas.

Reclamation

• Include objectives for ensuring habitat rehabilitation to meet sage-grouse habitat needs in reclamation practices/sites (Pyke 2011). Address post reclamation management in reclamation plans such that goals and objectives are to protect and improve sage-grouse habitat needs.

•Reseed all areas requiring reclamation with a seed mixture appropriate for the soils, climate, and landform of the area to ensure recovery of the ecological processes and habitat features of the potential natural vegetation, and to prevent the invasion of noxious weeds or other exotic invasive species. Long-term monitoring is required to determine success.

• Maximize the area of interim and concurrent reclamation on long-term access roads and well pads, including reshaping, topsoiling and re-vegetating cut-and-fill slopes. In coordination with appropriate agencies, consider development of fuel breaks in reclamation design.

•Restore disturbed areas at final reclamation to the near pre-disturbance landforms and the desired plant community.

• Irrigate interim reclamation if necessary for establishing seedlings more quickly and if water rights are available.

• Utilize mulching techniques to expedite reclamation and to protect soils.

• Ensure that all authorized ground disturbing projects have vegetation reclamation standards suitable for the site type prior to construction and ensure that reclamation to appropriate sage-grouse standards are budgeted for in the reclamation bond.

Locatable Minerals

For consistency, sage-grouse Design Features for locatable minerals shall be considered in association with state and federal permitting requirements including bonding, if applicable.

Operations

• Cluster disturbances associated with operations and facilities as close as possible unless site specific conditions indicate that disturbances to sagebrush habitat would be reduced if operations and facilities locations would best fit a unique special arrangement.

• Minimize site disturbance though site analysis and facility planning.

• Place infrastructure in already disturbed locations where the habitat has not been restored.

• Apply a phased development approach with concurrent reclamation through a coordination process among relevant parties.

• Reduce motor vehicle travel during field operations through development and implementation of remote monitoring and control systems plans.

• To reduce predator perching, limit the construction of vertical facilities and fences to the minimum number and amount needed.

• Site or minimize linear ROWs or SUAs to reduce disturbance to sage-grouse habitats.

• Co-locate new utility developments (power lines, pipelines, etc.) and transportation routes with existing utility or transportation corridors where adequate separation can be achieved in order to preserve grid reliability and ongoing maintenance.

• Bury distributive power lines of up to 35 kV where ground disturbance can be minimized. Where technology and economic factors allow, bury higher kV power lines.

• Preclude sage-grouse access to pits and tanks through use of practical techniques (e.g. covers, netting, birdballs, location, etc.).

• Equip tanks and other above ground facilities with structures or devices that discourage nesting or perching of raptors, corvids, and other predators.

• Control the spread and effects of Nevada Department of Agriculture listed noxious weeds (NAC 555.010, classes A through C, inclusive) and undesirable non-native plant species (Gelbard and Belnap 2003, Bergquist et al. 2007). All projects within the Service Area should have a noxious weed management plan in place prior to construction and operations.

• Reduce the potential for creating excessive or unintended mosquito habitat and associated risk of West Nile Virus impacts to sage-grouse. This can be implemented through minimizing drill and process pit and pond construction and, where necessary, size of drill and process pits and ponds (Doherty 2007).

• Reduce habitat for mosquitoes that vector West Nile virus. If West Nile virus has been identified as a concern in the project area, limit favorable mosquito habitat.

• Limit noise to less than 10 decibels above ambient measures one hour before sunrise until 9:00 a.m. within 3 miles of a lek of a lek during active lek season, March 1 through May 15 (Patricelli et al. 2010, Blickley et al. 2012, Patricelli et al. 2013).

• Require noise shields when drilling during the lek, nesting, brood-rearing, or wintering season.

• Fit new transmission towers with anti-perch devices (Lammers and Collopy 2007).

• Design and construct fences consistent with NRCS fence standards and specifications Code 382 and, where appropriate, use fence markers (Sage Grouse Initiative 2013).

• Implement site keeping practices to preclude the accumulation of debris, solid waste, putrescible wastes, and other potential anthropogenic subsidies for predators of sage-grouse (Bui et al 2010).

• Locate man camps outside of Priority Habitat Management Areas.

Reclamation

• Include objectives for ensuring habitat rehabilitation to meet sage-grouse habitat needs in reclamation practices/sites (Pyke 2011). Address post reclamation management in reclamation plans such that goals and objective are to protect and improve sage-grouse habitat needs.

•Reseed all areas requiring reclamation with a seed mixture appropriate for the soils, climate, and landform of the area to ensure recovery of the ecological processes and habitat features of the potential natural vegetation, and to prevent the invasion of noxious weeds or other exotic invasive species. Long-term monitoring is required to determine success.

• Maximize the area of interim and concurrent reclamation on infrastructure related disturbances through reshaping/regrading, topsoiling and re-vegetating cut and fill slopes. In coordination with appropriate agencies, consider development of fuel breaks in reclamation design.

• Ensure that all authorized ground disturbing projects have vegetation reclamation standards suitable for the site type prior to construction and ensure that reclamation to appropriate sage-grouse standards are budgeted for in the reclamation bond.

• Irrigate interim reclamation as necessary during dry periods when valid water rights exist.

• Utilize mulching techniques to expedite reclamation.

Salable and Non-Energy Minerals

Operations

• Cluster disturbances associated with operations and facilities as close as possible unless site specific conditions indicate that disturbances to sagebrush habitat would be reduced if operations and facilities locations would best fit a unique special arrangement.

• Minimize site disturbance though site analysis and facility planning.

• Place infrastructure in already disturbed locations where the habitat has not been restored.

• Apply a phased development approach with concurrent reclamation through a coordination process among relevant parties.

• Reduce motor vehicle travel during field operations through development and implementation of remote monitoring and control systems plans.

• To reduce predator perching, limit the construction of vertical facilities and fences to the minimum number and amount needed.

• Site or minimize linear ROWs or SUAs to reduce disturbance to sage-grouse habitats.

• Co-locate new utility developments (power lines, pipelines, etc.) and transportation routes with existing utility or transportation corridors where adequate separation can be achieved in order to preserve grid reliability and ongoing maintenance.

• Bury distributive power lines of up to 35 kV where ground disturbance can be minimized. Where technology and economic factors allow, bury higher kV power lines.

• Preclude sage-grouse access to pits and tanks through use of practical techniques (e.g. covers, netting, birdballs, location, etc.).

• Equip tanks and other above ground facilities with structures or devices that discourage nesting or perching of raptors, corvids, and other predators.

• Control the spread and effects of Nevada Department of Agriculture listed noxious weeds (NAC 555.010, classes A through C, inclusive) and undesirable non-native plant species (Gelbard and Belnap 2003, Bergquist et al. 2007).. All projects within the Service Area should have a noxious weed management plan in place prior to construction and operations.

• Reduce the potential for creating excessive or unintended mosquito habitat and associated risk of West Nile Virus impacts to sage-grouse. This can be implemented through minimizing pit and pond construction and, where necessary, size of pits and ponds Where West Nile virus has been identified as a

concern, restrict pond and impoundment construction to reduce or eliminate threats from West Nile virus (Doherty 2007).

• Remove or re-inject produced water to reduce habitat for mosquitoes that vector West Nile virus. If surface disposal of produced water continues and West Nile virus has been identified as a concern in the project area, use the steps described under "Fluid Minerals" for reservoir design to limit favorable mosquito habitat (Doherty 2007).

• Limit noise to less than 10 decibels above ambient measures one hour before sunrise until 9:00 a.m. within 3 miles of a lek during active lek season, March 1 through May 15 (Patricelli et al. 2010, Blickley et al. 2012, Patricelli et al. 2013).

• Require noise shields when drilling during the lek, nesting, brood-rearing, or wintering season.

• Fit new transmission towers with anti-perch devices (Lammers and Collopy 2007).

• Design and construct fences consistent with NRCS fence standards and specifications Code 382 and, where appropriate, use fence markers (Sage Grouse Initiative 2013) around sumps.

• Implement site keeping practices to preclude the accumulation of debris, solid waste, putrescible wastes, and other potential anthropogenic subsidies for predators of sage-grouse (Bui et al. 2010).

• Locate man camps outside of Priority Habitat Management Areas.

Reclamation

• Include objectives for ensuring habitat rehabilitation to meet sage-grouse habitat needs in reclamation practices/sites (Pyke 2011). Address post reclamation management in reclamation plans such that goals and objective are to protect and improve sage-grouse habitat needs.

•Reseed all areas requiring reclamation with a seed mixture appropriate for the soils, climate, and landform of the area to ensure recovery of the ecological processes and habitat features of the potential natural vegetation, and to prevent the invasion of noxious weeds or other exotic invasive species. Long-term monitoring is required to determine success.

• Reclamation In coordination with appropriate agencies, consider development of fuel breaks in reclamation design.

• Maximize the area of interim and concurrent reclamation on infrastructure related disturbances through reshaping/regrading, topsoiling and re-vegetating cut and fill slopes. In coordination with appropriate agencies, consider development of fuel breaks in reclamation design.

• Ensure that all authorized ground disturbing projects have vegetation reclamation standards suitable for the site type prior to construction and ensure that reclamation to appropriate sage-grouse standards are budgeted for in the reclamation bond.

• Restore disturbed areas at final reclamation to near pre-disturbance landform and the desired plant community.

• Irrigate interim reclamation as necessary during dry periods when valid water rights exist.

• Utilize mulching techniques to expedite reclamation.

Fuels and Fire Management and Post-Fire Rehabilitation

• Fire and fuels operations should focus on protecting and enhancing occupied sage-grouse habitats. This includes taking into account the feasibility and cost of future rehabilitation efforts during Wildland Fire Decision Support Tree planning and general fire operations in all occupied sage-grouse habitats

Fuels Management

• Design fuels treatment objective to protect existing sagebrush ecosystems, modify fire behavior, restore ecological function, and create landscape patterns which most benefit sage-grouse habitat.

• Incorporate resilience and resistance and other best available science concepts into fuels treatment planning activities

• Provide training to fuels treatment personnel on sage-grouse biology, habitat requirements, and identification of areas used locally.

•Fuels treatment project design in sagebrush and pinyon-juniper encroached sagebrush habitats must be based on the best available science. At a minimum, project proponents will consider best available science including: use of site appropriate state and transition models; ecological site characteristics; and, the evaluation of resilience to disturbance and resistance to invasive annual grasses.

• Ensure the proposed prescription burning plans meet the need of the resource via a comprehensive review by proponents, fire managers, wildlife biologists and resource managers, at a minimum.

• Use prescriptive fire use on project sites where state and transition models, ecological site descriptions and existing high site resilience/resistance are used as principle components of the prescription planning process. The desired outcome of all prescription fire use in appropriate sagebrush habitat is to minimize undesirable long-term effects on vegetation or soils (e.g., minimize mortality of desirable perennial herbaceous species and reduce risk of annual grass invasion).

• Ensure proposed sagebrush treatments are planned with full interdisciplinary input pursuant to NEPA and coordination with NDOW and SETT, and that treatment acreage is optimal in the context of surrounding sage-grouse seasonal habitats and landscape.

• Ensure that treatments are configured in a manner that promotes use by sage-grouse.

• Incorporate roads and natural fuel breaks into fuel break design

• Utilize supervised livestock grazing as a tool to reduce fuels and control non-native species. Targeted grazing needs to be conducted within the framework of the sage-grouse desired habitat conditions (Table 4-1).

• Power-wash all vehicles and equipment involved in fuels management activities prior to entering the area to minimize the introduction of undesirable or invasive plant species.

• Design vegetation treatments in areas of high fire frequency, which facilitate firefighter safety, reduce the potential acres burned, and reduce the fire risk to sage-grouse habitat. Additionally, develop maps for sage-grouse habitat, which spatially display existing fuels treatments that can be used to assist suppression activities.

• For implementing specific sage-grouse habitat rehabilitation projects in annual grasslands, first give priority to sites which are adjacent to or surrounded by Priority Habitat Management Areas or that reestablish continuity between Priority Habitat Management Areas. Annual grasslands are a second priority for rehabilitation when the sites are not adjacent to Priority Habitat Management Areas, but within two miles of Priority Habitat Management Areas. The third priority for annual grassland habitat restoration projects are sites beyond two miles of Priority Habitat Management Areas. The intent is to focus restoration outward from existing, intact habitat. Within these criteria, projects should be prioritized based on probability of success based on current condition, ecological site and state-and-transition modeling if available.

• As funding and logistics permit, rehabilitate annual grasslands to a species composition characterized by perennial grasses, forbs, and shrubs with the goal of establishing a functional ecological site based on state-and-transition modeling and ecological site descriptions..

• Emphasize the use of native plant species, recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions

• Based on ecological site descriptions, remove encroaching pinyon and juniper trees from areas within at least 3 kilometers (1.86 miles) of occupied sage-grouse leks (Connelly et al. 2000) and from other limiting habitats at least 850 meters (e.g., nesting, wintering and brood rearing) to reduce the availability of perch sites for avian predators, as resources permit (Connelly et al 2000, Casazza et al. 2011).

• Protect wildland areas from wildfire originating on private lands, infrastructure corridors, and recreational areas.

• Reduce the risk of vehicle- or human-caused wildfires and the spread of invasive species by installing and maintaining fuel breaks or planting perennial vegetation (e.g., green-strips) paralleling road rights-of-way. Strategically place and maintain pre-treated strips/areas (e.g., mowing, herbicide application, targeted grazing, etc.) to aid in controlling wildfire, should wildfire occur near the Service Area or important restoration areas (such as where investments in restoration have already been made).

• All fuels management projects should include short and long term monitoring to ensure success and provide for adaptive management. Multiple re-vegetation entries may be required to ensure success.

Fire Management

• Compile state and local government/District/Forest level information into state-wide sage-grouse tool boxes. Tool boxes will contain maps, listing of state and local resource advisors, contact information, local guidance, and other relevant information for each state and local government/District/Forest, which will be aggregated into a state-wide document. Update the toolbox annually or continually.

• Provide localized maps to dispatch offices and extended attack incident commanders for use in prioritizing wildfire suppression resources and designing suppression tactics.

• Assign a state or local resource advisor with sage-grouse expertise, or who has access to sage-grouse expertise, to all extended attack fires in or near sage-grouse habitat. Prior to the fire season, provide training to sage-grouse resource advisors on wildfire suppression organization, objectives, tactics, and procedures to develop a cadre of qualified individuals. Involve state wildlife agency expertise in fire operations through:

– instructing resource advisors during preseason trainings;

– qualification as resource advisors;

– coordination with resource advisors during fire incidents;

– contributing to incident planning with information such as habitat features or other key data useful in fire decision making.

• On critical fire weather days, pre-position additional local, state, and federal fire suppression resources to optimize a quick and efficient response in sage-grouse habitat areas.

• Encourage local resources (volunteer fire departments and country equipment) to respond to initial attack efforts and further encourage these agencies to obtain required ICS training to be able to run incidents for longer periods when needed during critical fire periods.

• During periods of multiple fires, ensure line officers, in consultation with state and local resource advisors are involved in setting priorities.

• To the extent possible, locate wildfire suppression facilities (i.e., base camps, spike camps, drop points, staging areas, heli-bases, etc.) in areas where physical disturbance to sage-grouse habitat can be minimized. These include disturbed areas, grasslands, near roads/trails or in other areas where there is existing disturbance or minimal sagebrush cover.

• Power-wash all firefighting vehicles, to the extent possible, including engines, water tenders, personnel vehicles, and all-terrain vehicles (ATV) prior to deploying in or near sage-grouse habitat areas to minimize noxious weed spread. Minimize unnecessary cross-country vehicle travel during fire operations in sage-grouse habitat.

• Minimize burnout operations in key sage-grouse habitat areas by constructing direct fire line whenever safe and practical to do so.

• Utilize retardant, mechanized equipment, and other available resources to minimize burned acreage during initial attack.

• As safety allows, conduct mop-up where the black adjoins unburned islands, dog legs, or other habitat features to minimize sagebrush loss.

• Adequately document fire operation activities in sage-grouse habitat for potential follow-up coordination activities.

• Coordinate and utilize local fire suppression resources to the maximum extent possible.

- Eliminate "burning out" islands and fingers of unburned sage-grouse habitat, unless lives and property are at risk.

Post-Fire Rehabilitation

- Emphasis should be on fall re-vegetation to ensure greatest likelihood of success.
- All post-fire rehabilitation projects should include short- and long-term monitoring to ensure success and provide for adaptive management. Multiple re-vegetation entries may be required to ensure success. Emphasize the use of native plant species in post-fire rehabilitation, recognizing that non-native species may be necessary depending on the availability of native seed and prevailing site conditions. Selected species maintain site ecological function based on pre-burn conditions and anticipated threat of invasive and noxious weed establishment. Use ecological site descriptions and state-and-transition models if available.
- Reseed all burned areas requiring rehabilitation with a seed mixture appropriate for the soils, climate, and landform of the area to ensure recovery of the ecological processes and habitat features of the potential natural vegetation, and to prevent the invasion of noxious weeds or other exotic invasive species. Long-term monitoring is required to determine success.
- Power-wash all vehicles and equipment prior to entering sage-grouse habitat rehabilitation/restoration areas to minimize noxious weed spread. Minimize unnecessary cross-country vehicle travel during rehabilitation/restoration operations in sage-grouse habitat.
- Consider Integrated Pest Management (IPM) practices to ensure greater initial control of invasive and noxious plant species.
- Sage-grouse seasonal habitat requirements must be considered when selecting re-vegetation materials in all burned potential and current sage-grouse habitat.
- Prioritize shrub island plantings in large burn areas which may lack sufficient shrub seed sources, in order to ensure the reestablishment of the shrub component.

Vegetation Management

- Avoid sagebrush removal in sage-grouse breeding or wintering habitats.

• Maintain all remaining large intact sagebrush patches, particularly at low elevations, through active management, in order to increase resistance and resilience to reduce the risk of being lost to wildfire.

• Limit habitat treatments in winter ranges to actions that maintain or expand current or needed levels of sagebrush available in winter, while also considering relevant risks without the proposed treatment

Lands and Realty

Leases and Permits

• Permits and leases must include stipulations to minimize impacts to sage-grouse and sage-grouse habitats based upon the specific activity and ensure no net loss of sage-grouse habitat.

Right-of-Ways (ROWs)

• Work with existing rights-of-way holders to encourage installation of perch guards on all poles where existing utility poles are located within 5 km (3.2 miles) of known leks (Coates et al. 2013).

• Use existing utility corridors and consolidate rights-of-way to reduce habitat loss, degradation, and fragmentation. Install new power lines within existing utility corridors.

• Where sage-grouse conservation opportunities exist, BLM field offices and Forests should work in cooperation with rights-of-way holders to conduct maintenance and operation activities, authorized under an approved ROW grant, to avoid and minimize effect on sage-grouse habitat.

• When renewing or amending ROWs, assess the impacts of ongoing use of the ROW to sage-grouse habitat and incorporate stipulations, which minimize such impacts to the extent allowed by law.

• Conduct pre-application meetings with the BLM or Forest Service and SETT for all new ROW proposals consistent with the ROW regulations (43 CFR 2804.10) and consistent with current renewable energy ROW policy guidance (WO-IM-2011-061, issued February, 2011). Assess the impact of the proposed ROW on sage-grouse and its habitat, and implement the following: Ensure that reasonable alternatives for siting the ROW outside of sage-grouse habitat or within a BLM designated utility corridor are considered and analyzed in the NEPA document; and identify technically feasible best management practices, conditions, (e.g., siting, burying power lines) that may be implemented in order to eliminate or minimize impacts.

• Maximize the area of interim reclamation on long-term access roads and well pads including reshaping, top-soiling and re-vegetating cut and fill slopes.

• Authorize ROWs for wind energy development projects by applying appropriate Design Features as specified in the BLM Wind Energy Development EIS (BLM 2005), land use restrictions, stipulations, and mitigation measures.

• Bury distribution power lines of up to 35kV where ground disturbance can be minimized. Where technology and economic factors allow, bury higher kV power lines.

• Where existing leases or rights-of-way (ROWs) have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features, without interfering with valid pre-existing rights, and restoring the habitat.

• Within designated ROW corridors encumbered by existing ROW authorizations: new ROWs should be co-located to the extent practical and feasible with the entire footprint of the proposed project adjacent to or within the existing disturbance associated with the authorized ROWs taking into account operational requirements and safety.

• Subject to valid, existing rights, where new ROWs associated with valid existing rights are required, co-locate new ROWs within existing ROWs or where it best minimizes sage-grouse impacts. Use existing roads, or realignments as described above, to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the minimum standard necessary.

• Upon project completion, roads used for commercial access on public lands would be reclaimed, unless, based on site-specific analysis, the route provides specific benefits for public access and does not contribute to resource conflicts.

• Construct new power lines outside of sage-grouse habitat wherever possible. If power lines cannot be sited outside of sage-grouse habitat, site power lines in the least suitable habitat possible or bury power lines, where technology and economic factors allow.

• Remove power lines that traverse important sage-grouse habitats when facilities being serviced are no longer in use or when projects are completed.

• Install anti-perching and anti-nesting measures on new tall structures, such as power lines, commensurate with the design of the structures.

Travel and Transportation

• Work with local government to enforce speed limits and design roads to be driven at speeds appropriate to minimize vehicle/wildlife collisions.

• Conduct rehabilitation of roads, primitive roads, and trails not designated in travel management plans where such plans exist and have been approved for implementation. This also includes primitive route/roads that were not designated in wilderness study areas and within lands managed for wilderness characteristics that have been selected for protection, with due consideration given to any historical significance of existing trails.

• When reseeding roads, primitive roads, and trails, use appropriate seed mixes and consider the use of transplanted sagebrush in order to trend towards achieving sage-grouse desired habitat conditions (Table 4-1). Where invasive annual grasses are present, herbicides may be used to enhance the effectiveness of any seeding and to also establish islands of desirable species for dispersion.

• Use existing roads, or realignments to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then any new roads would be constructed to the minimum standard necessary to support the intended use.

• Work with local governments to minimize upgrading of existing routes that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on sage-grouse habitat, is necessary for motorist safety, or eliminates the need to construct a new road, while providing for the intended use.

• Manage on-road travel and OHV use in key grouse areas to avoid disturbance during critical times such as winter and nesting periods.

• Consider road removal, realignment, or seasonal closures where appropriate to avoid degradation of habitat and /or to avoid disturbance during critical periods of the sage-grouse life cycle.

Recreation

• Special recreation permits must have stipulations to minimize impacts to sage-grouse and sage-grouse habitat based upon the specific activity and ensures net conservation gain of sage-grouse habitat.

• Issue special recreation permits with appropriate distance and timing restrictions to minimize impacts to seasonal sage-grouse habitat.

• Develop trail mapping, and educational campaigns to reduce recreational impacts on sage-grouse, including effects of cross country travel.

• Where feasible, locate recreation trails strategically to create or augment fuel breaks in the margins of sage-grouse habitats and landscapes and not create roads or trails where they cause net negative direct and indirect impacts.

• Take measures to minimize or reduce activities and to avoid an ambient noise level increase >10 dB at the edge of leks during the lekking season generally, March 1 through May 15 from one hour before sunrise until 9:00 a.m. (Patricelli et al. 2010, Blickley et al. 2012, Patricelli et al. 2013).

Energy Development and Infrastructure

• Adopt standards outlined in *Nevada Energy and Infrastructure Development Standards to Conserve Greater Sage-grouse Populations and Their Habitats,* April 2010, pgs. 25-29 (Appendix G).

Wild Horses and Burros

• When conducting NEPA analysis for wild horse and burro management activities, water developments or other rangeland improvements for wild horses in sage-grouse habitat, address the direct and indirect effects to sage-grouse populations and habitat. Implement any water developments or rangeland improvements using the criteria for wild horses and burros year around use and ensure that it is consistent with the necessary rights and right of ways in sage-grouse habitats. Incorporate the NRCS

water development standards and additional criteria listed below, including Codes 614, 574, 533, 642, and 516.

Livestock Grazing and Range Management

• Where applicable and as part of a ranch management plan, use the Natural Resource Conservation Service (NRCS) Conservation Practice Standards and Specification listed below[13]. In addition, use the recommendations additions to the standards developed by NRCS and NDOW as part of NRCS' Sage-grouse Initiative and further expanded by the state of Nevada in this document:

- Code 645: Upland Wildlife Habitat Management
- Code 528: Prescribed Grazing
    - Emphasize rest periods or seasonal deferment when appropriate as part of the grazing management plan and restoration.
- Code 614: Water Facilities
    - Avoid placement where existing sagebrush cover will be reduced near a lek, in nesting habitat, or winter habitat whenever possible. NDOW recommends structures be at least 1 mile from a lek.
- Code 574: Spring Development
    - Springs may be developed as long as valid water claims or rights exist and development shows a net benefit to overall habitat management within the Service Area.
- Code 533: Pumping Plant
    - NDOW recommends the structure should not be placed within 3 miles of a lek to avoid disturbance to nesting sage-grouse.
- Code 642: Water Well
    - Well placement should encourage dispersion of livestock or the management of grazing and recovery periods, and provide for a neutral or no net negative impact to habitat within the Service Area. Further water developments will decrease negative livestock and wildlife impacts and further protect habitats.
- Code 516: Livestock Pipeline
    - Pipelines shall be replaced as needed to provide for better dispersion of livestock.
    - Pipelines shall be replaced along existing pipelines, roadways, or fences.
    - Replacement and maintenance of pipelines shall use the least invasive techniques and extensive work requiring heavy equipment shall be done in a manner consistent with season of use by the sage-grouse (i.e. replacing improvements in sage-grouse winter habitat during the summer and replacing improvements in breeding and nesting habitat during the fall)
    - Replacement of improvements shall be allowed in order to not jeopardize existing and valid claims and rights.
- Code 410: Grade Stabilization Structure
    - If possible, avoid the installation of these structures during the late summer brood rearing period. NDOW recommends structure placement in mid-September through late November.
- Code 382: Fence

[13] These USDA; NRCS Conservation Practice Codes as well as others can be found at: http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/references/?cid=nrcs143_026849

- If possible, fencing should not be constructed near a lek and should be avoided in winter habitats near ridges. To make a fence more visible, use white tipped metal fence posts, securing flagging or reflectors to the top fence wires, or slide sections of PVC pipe over the top wire (Stevenson and Reece 2012).

• Relocate or modify existing water developments (including locating troughs to further disperse livestock) that are having a net negative impact on sage-grouse habitats. Any changes to existing water developments must be conducted in accordance with State Water Law and in close consultation with the water right owner in order to avoid a "taking" of private property water rights.

• All troughs should be outfitted with the appropriate type and number of wildlife escape ramps.

• All field and district offices should apply the current BLM IM methods or similar methodology related to drought management planning.

Surface Disturbing Activities – General

• During the period specified, based upon site-specific conditions manage discretionary surface disturbing activities and uses to prevent disturbance to sage-grouse during life cycle periods. Seasonal protection is identified for the following:

-Seasonal protection within three (3) miles of active sage-grouse leks from March 1 through June 15 during lekking hours of 1-hour before sunrise until 9:00 a.m.

-Seasonal protection of sage-grouse suitable wintering areas from November 1 through March 31;

-Seasonal protection of sage-grouse suitable brood-rearing habitat from May 15 to August 15.

• Implement appropriate time-of-day or time-of year restrictions for future construction or maintenance activities in known sage-grouse habitat

• Reseed all areas requiring reclamation with a seed mixture appropriate for the soils, climate, and landform of the area to ensure recovery of the ecological processes and habitat features of the potential natural vegetation, and to prevent the invasion of noxious weeds or other exotic invasive species. Long-term monitoring is required to determine success.

• Minimize the footprint of disturbances to avoid or minimize the potential for invasive plant infestations. When possible, do not remove native vegetation. Monitor, report, and treat all disturbance sites that become occupied by invasive plants, primarily cheatgrass, and all state listed noxious weeds. Pre- and post-disturbance activities must include prevention strategies prior to entering sites. Treatments, restoration, and monitoring are required for a minimum of three years or until the site is deemed noxious and invasive weed free following the disturbance. Reporting should be sent to the Nevada Department of Agriculture via the EDDMapS link on their website.

• Maximize the area of interim reclamation on long-term surface disturbing activities to including reshaping, top-soiling and re-vegetating areas no longer being disturbed within the overall project foot print.

Miscellaneous

• In Wilderness and Wilderness Study Areas (WSA), the state of Nevada will work with the federal land management agencies to investigate the use of mechanized equipment in those areas in conformance with the Wilderness Act, Federal Land Policy and Management Act, and National Forest Management Act. The State will also support congressional efforts to investigate and responsibly use additional techniques (including mechanized) to protect or restore areas that exhibit unique or emergency circumstances (fire, P/J expansion, invasive weeds infestations, excessive fuels, etc.) in order to protect the area from long term resource damage..

• Work with federal, state, and local governments and project proponents to minimize anthropogenic subsidies for predators, including ravens.

Appendix B:

Inter-Tribal Council of Nevada Resolution

Aug. 1. 2012 2:57PM No. 8788 P. 1

INTER-TRIBAL COUNCIL OF NEVADA, INC.

680 GREENBRAE DR., SUITE 265 - SPARKS, NV 89431
P.O. BOX 7440 - RENO, NV 89510
PHONE (775) 355-0800 - FAX (775) 355-0948

RESOLUTION NO. 12-ITCN-06

BATTLE MOUNTAIN BAND COUNCIL
CARSON COLONY COMMUNITY COUNCIL
DRESSLERVILLE COMMUNITY COUNCIL
DUCK VALLEY SHOSHONE-PAIUTE BUSINESS COUNCIL
DUCKWATER SHOSHONE TRIBAL COUNCIL
ELKO BAND COUNCIL
ELY SHOSHONE COUNCIL
FALLON BUSINESS COUNCIL
FT. MCDERMITT PAIUTE-SHOSHONE TRIBES
GOSHUTE BAND COUNCIL
LAS VEGAS PAIUTE TRIBAL COUNCIL
LOVELOCK TRIBAL COUNCIL
MOAPA BUSINESS COUNCIL
PYRAMID LAKE TRIBAL COUNCIL
RENO-SPARKS TRIBAL COUNCIL
SOUTH FORK BAND COUNCIL
STEWART COMMUNITY COUNCIL
SUMMIT LAKE PAIUTE COUNCIL
TE-MOAK TRIBAL COUNCIL
TIMBISHA SHOSHONE TRIBE
WALKER RIVER PAIUTE TRIBAL COUNCIL
WASHOE TRIBAL COUNCIL
WELLS BAND COUNCIL
WINNEMUCCA COLONY COUNCIL
WOODFORDS COMMUNITY COUNCIL
YERINGTON PAIUTE TRIBAL COUNCIL
YOMBA TRIBAL COUNCIL

RESOLUTION
OF
INTER-TRIBAL COUNCIL OF NEVADA, INC.

SAGE GROUSE MANAGEMENT AREA ON TRIBAL LANDS

WHEREAS, The Inter-Tribal Council of Nevada, Inc., is organized and operates in accordance with its Constitution and By-Laws, amended in November 1974; and

WHEREAS, the purposes of Inter-Tribal Council of Nevada, Inc. (ITCN), are stated in its Constitution, Preamble; and

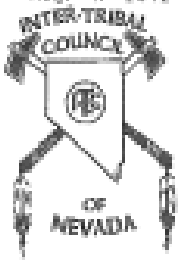
WHEREAS, the Executive Board, a body comprised of the twenty-seven (27) representatives of the federally recognized member tribes in the State of Nevada and whose Charter is ratified by these same tribes; and

WHEREAS, the Inter-Tribal Council of Nevada has a continuing interest in the health, education and well-being of their Indian people; and

WHEREAS, the Inter-Tribal Council of Nevada respects the sovereign to sovereign relationship between the Tribes and the State of Nevada and the federal government; and

WHEREAS, a Memorandum of Agreement may be sought on behalf of each individual Tribe to further develop the efforts needed for the management, monitoring, and surveying for sage grouse.

Aug. 1. 2012 2:57PM No. 8738 P. 2



INTER-TRIBAL COUNCIL OF NEVADA, INC.

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BATTLE MOUNTAIN BAND COUNCIL
CARSON COLONY COMMUNITY COUNCIL
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YOMBA TRIBAL COUNCIL

WHEREAS, the sage grouse (*Centrocercus urophasianus*) is a valued native avian species with declining populations that have been severely impacted by habitat degradation, by declining big sage populations, by invasive plants, by increased predation, by mining interest, by recreational use, and by livestock grazing; and

WHEREAS, the ITCN recognizes the need for tribes to protect and conserve, to the greatest extent possible, the existing wildlife habitat of sage grouse within and/or adjacent to the boundaries of all tribal lands within Nevada; and

WHEREAS, the cooperative efforts will involve survey and monitoring activities, conservation planning, and protecting key habitat areas to assist with all sage grouse life stages which include brooding, migration and lek habitat; and

WHEREAS, the sage grouse is recognized by Nevada tribes traditional song and dance, language, and stories/legends and there is presence of Traditional Ecological Knowledge (TEK) regarding sage grouse and their habitat be protected for tribes' value and conservation efforts; and

WHEREAS, the ITCN acknowledges the valiant effort to protect existing sage grouse populations through the development of a Sage Grouse Conservation Plan for the State of Nevada; and

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PYRAMID LAKE TRIBAL COUNCIL
RENO/SPARKS TRIBAL COUNCIL
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WELLS BAND COUNCIL
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WOODFORDS COMMUNITY COUNCIL
YERINGTON PAIUTE TRIBAL COUNCIL
YOMBA TRIBAL COUNCIL

WHEREAS, the ITCN Executive Board endorses the attachment 1 of approved language that would be updated into the final State of Nevada Sage Grouse Conservation Plan.

NOW THEREFORE BE IT RESOLVED that the Executive Board, on behalf of their membership, hereby supports the statewide Sage Grouse Conservation Plan effort by including any applicable Nevada tribal lands within Sage Grouse Management Areas through a Memorandum of Agreement for direct involvement for the purposes of monitoring, surveying, developing recommended conservation measures, funding, and protecting the sage grouse and its sagebrush habitat.

CERTIFICATION

The foregoing resolution was adopted by poll vote of the Inter-Tribal Council of Nevada's Executive Board, completed on the 25th day of July, 2012, by a

Vote of __12__ FOR, __0__AGAINST, and__0__ ABSTENTIONS.

Daryl Crawford, ITCN Executive Director
for
Bryan Cassadore, Secretary
ITCN Executive Board

Appendix C:

Cooperation of State and Federal Agencies for Depredation Permits for Common Raven

Cooperation of State and Federal Agencies for Depredation Permits for Common Raven

The USFWS can authorize depredation permits for the 'take' of common ravens, which are protected under the Migratory Bird Treaty Act. Currently in the State of Nevada, there are permits that authorize the 'take' of approximately 5,000 ravens annually, which constitutes five percent of the estimated 100,000 resident ravens (2003 estimate, Wildlife Services) in Nevada. NDOW is authorized to take 2,500 ravens; USDA-APHIS-Wildlife Services (WS) is authorized to take 1,500, and other private sources around 1,000. NDOW's permit is specifically authorized for the protection of sage-grouse and other game species. WS' permit is authorized for the protection of livestock. Other permits are authorized for the protection of property, public health and welfare (power companies, landfills, etc.). The most recent population estimate for Nevada is 190,000 ravens (2013 estimate, WS). This may potentially lead to an increase in permit allocations in the future if they can be justified

WS is a federal agency that works cooperatively with the Nevada Department of Agriculture's Division of Animal Industry. Its primary objective is to protect livestock and farming interests from damage caused by predators or other nuisance species. WS is authorized to perform their duties on federal land and may enter into agreements with state, tribal, county, or private landowners to conduct their business. Predator control is a major component of their duties.

Specific to ravens, WS certified applicators are the only ones authorized by the EPA to either apply or directly supervise those applying the avicide DRC-1339 to execute the federal depredation permit authorized by the USFWS for the taking of migratory birds.

Currently, WS and NDOW are working jointly to reduce raven densities with the aim to enhance sage-grouse recruitment rates, which can be affected by raven predation of sage-grouse eggs and chicks. NDOW designates priority areas for treatment and WS treats hard-boiled chicken eggs with DRC-1339 and places them within the priority areas. Monitoring and data collection is done by both agencies as well as other partners to inform future implementation of the program and determine the efficacy of the protocols used.

Appendix D:

Process to Prioritize Integrated Predator Management Projects

Process to Prioritize Integrated Predator Management Projects

The following frame work will be used to prioritize where Objective 1.1, 1.2, and 1.3 are implemented across the state.

Step 1: State level mapping for ravens and sage-grouse. This should be an ongoing process updated every few years.

a. Contract with USGS to conduct landscape level modeling to estimate location of high raven occupancy (following methods for Raven Selection Probability Function (RSPF) as described in Coates et al., In Review).
   If funding is not available to conduct modeling, regional biologists would submit areas of concern for evaluation.

b. Conduct modeling of sage-grouse nesting habitat

c. Intersect areas of raven concern with areas of sage-grouse nesting habitat. Select 5-15 sites to be evaluated at the site level. Until map of nesting habitat for sage-grouse in Nevada is available, the Priority Habitat Management Area should be used.

Step 2: Site level analysis. This step should be conducted annually.

a. Conduct raven surveys at 5-15 sites identified during Step 1 following a selected raven survey protocol to determine raven densities.
b. Evaluate sage-grouse demographic data, as available, to determine if nest success is a limiting factor. Areas identified for potential raven removal should be prioritized for sage-grouse demographic data collection as feasible.
c. Use information from the above two steps to identify 2-5 project sites for Integrated Predator Management around the State. Sites that have identified nest success as limiting to the populations due to raven predation should be prioritized for treatment. Sites that have greater than 0.46 ravens per km^2 should be prioritized for treatment (Coates et al., In Review). Exact number of project locations should be determined by number of raven take permits available, funding for projects, and personnel to carry out work.

Once Prioritized Integrated Predator Management Project locations are identified, the following steps should be completed.

1. Develop Integrated Predator Management Program for each project location.
    a. Develop anthropogenic subsidies control plan for project location following recommendations in Predation Goal 1 Objective 1.
    b. Develop habitat integrity improvement plan for project location recommendations in Predation Goal 1 Objective 2.
    c. Develop predator control plan for project location following recommendations in Predation Goal 1 Objective 3.
        i. Develop treatment regime for project area

1. Determine/set parameters of predator control area (where damage is occurring)
2. Determine/set parameters of predator control project timing (when resource is vulnerable)
3. Establish species to be targeted and methods/techniques which are acceptable
4. Determine what constitutes a "corrected" situation (when does project end, e.g. stop lethal control once raven density is below density thresholds or a lack of population response to actions is determined)

ii. Establish predator monitoring regimes
    1. Pre-treatment monitoring of predator numbers (frequency, number & type).
    2. Treatment monitoring of predator numbers (frequency, number & type).
    3. Post-treatment monitoring of predator numbers (frequency, number & type).

iii. Establish sage-grouse monitoring regimes
    1. Monitor sage-grouse population trends/demographic rates to determine effectiveness of predator control practices.

Appendix E:

Template Cooperative Monitoring Agreement

COOPERATIVE MONITORING AGREEMENT

1. Introduction

The Joint Cooperative Monitoring Agreement is instituted under the authority of the Memorandum of Understanding between the U.S. Department of the Interior, Bureau of Land Management (BLM) and the Public Lands Council dated January 30, 2004.

The BLM and _____ [*cooperator*] enter into this agreement with the intent to strengthen their partnership in monitoring of the _____ Allotment. Resource objectives will be a central feature of this agreement because they will become the target and guide regarding what and how to monitor, and for what reasons. Resource objectives will be measurable and attainable statements of the desired resource attributes.

The BLM and _____ [*cooperator*] expect the monitoring plan to evolve over time. New data will provide input on how to better interpret and apply the monitoring results. This will enable the parties to optimize the application of cooperative techniques throughout the monitoring partnership. The parties will work together to determine how the monitoring results will be used to refine and redirect the strategies and tactics for both the monitoring and management plans.

2. Existing Management Objectives

The _____ Allotment was evaluated through a Rangeland Health Evaluation and Assessment document in _____ [*year*]. Allotment-specific objectives were brought forward through the Final Multiple Use Decision (FMUD) for each key management area for upland areas, riparian zones, wildlife habitat, and wild horse and burro management. These objectives were established to be in conformance with the current Land Use Plan (LUP) and the Standards for Rangeland Health. Objectives under the LUP, Rangeland Program Summary, and Allotment Evaluation are attached. Also attached are the _____ Resource Advisory Council Standards and Guidelines (RAC S&Gs).

3. Existing Monitoring Data/Information and Additional Data Needs to Address Established Resource Objectives

a. Established Monitoring Methodologies

Short-term	**Long-term**
Actual Use Information	Trend (Frequency study)
Use Pattern Mapping	Production/Composition/Ecological Status
Key Species Utilization at long-term	Cover

upland monitoring sites	
Riparian Utilization	Weed Inventory
	Water Quality
	Climate data
	Wild Horse & Burro Census
	Riparian Proper Functioning Condition (PFC) Assessment

b. Additional Studies Needed

Short-term	Long-term
None	Upland Soil Site Stability
	Photo Trend Monitoring
	Riparian Multiple Indicator Monitoring (MIM)

4. Future Monitoring Attributes and Protocols

a. Key Management Areas, Critical Area, or Designated Management Areas have been selected for the _____ Allotment utilizing BLM protocols. The site(s) will be reconfirmed jointly. If a site is not reconfirmed as an appropriate monitoring site, consideration must be given to the historical data associated with the site and a determination should be made whether or not to continue monitoring this site to retain trend information.

b. Monitoring by the BLM and the cooperator will be consistent with BLM protocol and technical references. Short and long-term monitoring studies will allow for measurement(s) towards specific objective(s).

c. Any updates to technical references/BLM protocol will be incorporated for use under this cooperative monitoring agreement in the future. If additional monitoring studies become available that will supplement studies already occurring for measuring an objective, this cooperative monitoring agreement will be updated.

5. Frequency and Timing of Monitoring (cooperator/agency specific for each cooperative monitoring agreement and cooperator interest)

a. Short-term monitoring will be collected on an annual or semi-annual basis, unless otherwise stipulated. Long-term monitoring will be measured at 3-10 year intervals unless otherwise stipulated or if observations indicate a more rapid than expected rate of change. Observers will be consistent in the plant phenology or time of year in which data are collected. If new

sites are established, data collection will follow BLM protocol, BLM technical references, and this Cooperative Agreement.

b. The following monitoring studies will be conducted as appropriate in order to measure progress towards meeting the objectives and for determining if the RAC S&Gs are being met.

Short-term monitoring (Upland triggers or indicators):

Study	**Responsible Party**	**Collection Period**
Actual Use	Cooperator	Annually
Trigger Monitoring	Cooperator	Annually
Key Area Utilization	BLM	Semi-annually
Landscape Appearance (Ranchers' Monitoring Guide)	Cooperator	Annually
Use Pattern Mapping	BLM	As grazing management changes, funding, and priorities dictate
Climate	BLM and Cooperator	Annually

Long-term monitoring (Upland objectives):

Study	**Responsible Party**	**Collection Period**
Frequency	BLM	Every 5-10 years
Photo Trend	Cooperator	Annually
Production/Composition	BLM	Every 5-10 years
Line Intercept	BLM	Every 5-10 years
Line-Point Intercept	BLM	Every 5-10 years

Short-term monitoring (Riparian triggers or indicators):

Study	**Responsible Party**	**Collection Period**
Utilization/Stubble Height	BLM	Every 3-5 years
Stream Bank Alteration	BLM	Every 3-5 years

Long-term monitoring (Riparian objectives):

Study	**Responsible Party**	**Collection Period**
PFC (assessment)	BLM	Every 5-10 years
Multiple Indicator Monitoring	BLM	Every 5-10 years

c. Each party will contact the other party prior to collecting monitoring data on the _____ Allotment in order to further promote a cooperative and collaborative working environment.

d. If a cooperator is interested, they may request to collect additional monitoring studies from those assigned above after adequate training and verification by the BLM.

e. Parties are encouraged to conduct monitoring efforts together, where possible.

6. Data Analysis

a. The BLM and the Permittee will meet to discuss the monitoring data collected. Each party will be provided copies of the monitoring data collected each given year for the associated monitoring file.

b. The BLM and the Cooperator will meet periodically to discuss the monitoring data collected.

c. The BLM and the Cooperator will review data analysis jointly and discuss any future changes that may be needed in order to address resource concerns.

7. Agreement Implementation

a. Collection of monitoring data specified in this cooperative agreement will occur at appropriate times immediately upon signature of this agreement. Data share between the parties will occur by the end of each calendar year.

Cooperator _____ Date_____

BLM Authorized Officer_____ Date_____

Appendix F:

Nevada Energy and Infrastructure Development Standards

to Conserve Greater Sage-grouse Populations and their Habitats, excerpt page 25-29

VII. Standards to Avoid or Minimize Impacts to Sage-grouse (All Energy Developments)

It is important to note here that some recommendations differ for non-migratory and migratory populations of sage-grouse. For the purposes of this document, non-migratory populations of sage-grouse are those where the majority of individuals do not make long distance movements between or among seasonal ranges (individuals travel <10 km one way between seasonal ranges). Migratory populations are those in which a preponderance of individual grouse move ≥10 km one way between seasonal ranges (derived from Connelly et al. 2000).

A. Site Selection

1. The NGSCT considers Category 1 habitats (leks and nesting habitat) irreplaceable and Category 2 habitats (quality winter and brood rearing habitats) critical to the long term persistence of sage-grouse populations. Energy or transmission development should be avoided within Category 1 and 2 sage-grouse habitats.
2. Energy development is strongly discouraged from occurring in Category 3 habitats; however, if unavoidable, projects in these habitats should be situated to minimize impact through placement in the least suitable portion of habitat.
3. Renewable energy developers are encouraged to pursue project development activities within Category 4 and 5 habitats within the range of sage-grouse in Nevada.
4. Project proponents should focus on previously disturbed sites in high potential wind resource areas. These areas could be described as those with prior disturbances including, but not limited to, previously burned areas, dense pinyon and juniper woodlands, areas converted to agriculture and areas within existing linear rights of way (transmission corridors).
5. If habitat categories have not been identified for a certain area, energy facilities and transmission lines should not be sited within 3 miles of the nearest active lek location for non-migratory populations[3].
    a. To the greatest extent possible, energy developers should work closely with NDOW and pertinent federal agency biologists to determine important nesting, brood rearing and winter habitats and avoid those areas.
6. Where populations of sage-grouse are considered migratory, energy facilities and transmission lines should not be sited within 3 miles of the nearest active lek location and should not be sited within the associated nesting habitat for that particular population.
    a. Consideration should also be given to movement corridors between breeding, nesting, brood-rearing or winter habitat. These movement corridors may not be well defined unless significant radio marking investigations have been conducted for a particular population. It is recommended that these investigations take place where project proponents are proposing developments in likely movement corridors for sage-grouse.
7. No development should occur within a 0.6 mile (1 km) radius around seeps, springs and wet meadows within identified brood rearing habitats.

[3] Holloran (2005) found that natural gas development within 3 – 5 km (approximately 2 - 3 miles) of active sage-grouse leks led to dramatic declines in breeding populations. Walker et al. (2007) also found that coal-bed natural gas development within 0.8 km and 3.2 km had strong negative effects on sage-grouse and detected effects as far as 6.4 km. Johnson et al. (In Press) found that few leks were located within 5 km (≈3 miles) of developed land and trends in male attendance were lower for those leks with more developed land within 5 km or 18 km.

B. Pre-Development Planning and Survey Requirements (All Energy Related Developments)

Each proposed energy facility requires some level of detailed individual evaluation. Unique habitat conditions can and do exist due to local variations in wildlife populations and movement patterns, habitats, area topography, facility design, and weather (Alberta Fish and Wildlife Division 2005). The level of pre-project planning and the need for certain surveys or monitoring depends on the seasonal habitat that the project is located in and the importance of the particular habitat. It is the intent of the NGSCT to complete mapping of habitat categorizations in 2010. The following are standards recommended by the NGSCT for pre-project planning and surveys:

1. Identify the cover type of habitat and habitat category of proposed development by using R-value classifications, current seasonal habitat delineations and previous telemetry information. These habitat types and categories should be determined on a site specific basis through consultation with NDOW.
2. A remote assessment (utilizing GIS applications) of present habitat condition should be conducted. This assessment should include vegetative classification, seasonal habitat layers, aerial photos, fire polygons and other man-made structures on the landscape including transmission lines, roads or other anthropogenic features.
3. If the project happens to occur in Category 1 or 2 habitats, a comprehensive monitoring plan should be developed and approved by NDOW that addresses demographics and seasonal movement patterns. The Western Agencies Sage and Columbian Sharp-tailed Grouse Technical Committee provides sound recommendations in their Interim Guidelines for Evaluating the Impacts of Energy Development (Appendix A).
4. In Category 3 or 4 habitats, field investigations should be conducted by the applicant to determine the actual condition of the habitat and the approximate extent of use by sage-grouse through consultation with NDOW. The potential for habitat improvement should be identified and a restoration or habitat enhancement plan should be developed.
5. If a project is located in Category 5 habitats, surveys (radio-marking of individuals in adjacent sage-grouse populations or stratified random pellet counts) should be considered to determine if sage-grouse move through the area between seasonal habitat patches. If movement across the area is detected, then recommendations should be made to preserve movement patterns by grouse.

C. Project Development (All Energy Related Developments)

Through this guidance document, we hope to eliminate more direct impacts to sage-grouse populations through avoidance of Category 1 through 3 habitats. However, unless Greater Sage-grouse habitats are afforded increased protection from federal land management agencies such as the BLM, it is likely that some form of renewable energy development will occur within these types of habitats. The NSGCT recognizes that there are projects in the advanced stages of permitting or development which have obtained final or near-final siting approvals from federal, state and/or private entities, and that the siting and/or mitigation commitments for such projects may not be consistent with some of this document's recommendations. Where this is the case, and where the project has worked with federal and state agencies on matters relevant to wildlife prior to the release of this document, the NSGCT respects agreements that have

already been made with regard to siting and mitigation measures. We hope that project proponents in these situations can use the recommended guidance contained in this document to minimize the effects of development where possible. However, if sage-grouse are listed as a threatened or endangered species by the U.S. Fish and Wildlife Service in the future, then projects on federal lands would be subject to section 7 consultation. Prior agreements may be subject to further review.

It is important to note here that some recommendations differ for non-migratory and migratory populations of sage-grouse. For the purposes of this document, non-migratory populations of sage-grouse are those where the majority of individuals do not make long distance movements between or among seasonal ranges (individuals travel <10 km one way between seasonal ranges). Migratory populations are those in which a preponderance of individual grouse move ≥10 km one way between seasonal ranges (derived from Connelly et al. 2000). If a project were approved in Category 1 through 3 habitats, the following represents guidelines suggested by the NGSCT:

1. Where sage-grouse populations are non-migratory energy facilities should not be constructed within 3 miles of the nearest active lek site (see Chapter 1, Section C).
2. Where populations of sage-grouse are considered migratory, energy facilities should not be constructed within 3 miles of the nearest active lek location and should not be sited within the associated nesting habitat for that particular population.
3. If construction within 3 miles of an active sage-grouse lek is absolutely unavoidable, conduct construction activities from 15 July to 30 November to avoid disturbing sage-grouse during the breeding, nesting, early brood rearing and winter periods.
    a. If pumping stations are placed within 3 miles of an active lek, consideration should be given, and attempts made to place these features in an area where noise would least impact the actual lek using topography to help mask noise.
4. Avoid practices that remove sagebrush cover in these habitat categories as they may be the most important areas to sage-grouse using these habitats.
5. No development or infrastructure features should be placed within 0.6 miles (1 km) of identified late brood rearing habitats, especially meadow complexes and springs. These features can provide a competitive advantage for avian predators; therefore increasing sage-grouse mortality during a period when birds may be susceptible.
6. A comprehensive monitoring plan approved by the Nevada Department of Wildlife will be required to monitor sage-grouse demographics, vital rates and movement patterns before, during and after the construction phase within Category 1 – 3 habitats. The Western Agencies Sage and Columbian Sharp-tailed Grouse Technical Committee provide sound recommendations in their Interim Guidelines for Evaluating the Impacts of Energy Development (Appendix D).
7. Within Category 1-3 sage-grouse habitats, a company representative should be on site to oversee compliance during construction and provide environmental training to on-site personnel. This individual is responsible for overseeing compliance with all protective measures and coordination in accordance with the permitting authority and resource agencies should have the authority to issue a “stop work order” if deemed necessary.
8. Human Activity (Daily Operations/Maintenance)
    a. Vehicle trips should be limited to those times that would least impact nesting or wintering grouse:

i. Vehicle trips should not occur on a regular basis within 3 miles of an active lek or in identified nesting habitats from 01 March through 15 May.
   1) If vehicle trips are required during the lekking period, vehicles should only be operated from 10:00 a.m. to 5:00 p.m. daily.
ii. Public access to construction areas should be limited if construction activities are occurring from 01 March through 15 May.

D. Associated Infrastructure (Transmission Lines, Road, Substations, Fences, etc.)

The infrastructure associated with utility scale energy developments can potentially be as detrimental as the facility itself. Roads, transmission lines, substations, fences and vehicle traffic can all eliminate or create disturbance within sage-grouse habitats. Even though a wind generation facility or geothermal power plant may not be constructed in optimal sage-grouse habitats, it is likely that roads and/or transmission lines associated with the facility will be. The following guidelines apply to associated infrastructure:

1. Transmission lines should not be sited within 3 miles of the nearest active lek location or in nesting habitat that occurs outside lek buffers.
   a. In instances where transmission line placement is within 3 miles of the nearest active lek location and cannot be avoided, apply standards 5-9 in this section.
      i. Attempt to place the line in the least suitable habitat within a 3 mile radius of the nearest active lek.
      ii. Consider placing the transmission line to the west of the nearest active lek so that avian predators are at a disadvantage (i.e., looking into the sun) in the early morning hours.
2. Roads and below ground infrastructure (i.e. buried power lines, pipelines) should not be sited within 0.6 miles (1 km) of the nearest lek site. These features are a concern because their construction directly removes potential nesting habitat and act as vectors for invasive plant species establishment (e.g., cheatgrass).
3. To the greatest extent practical, transmission lines should be placed near existing highway corridors at “minimum safe distances” designated by the BLM or project proponent to reduce direct and indirect effects to sage-grouse.
4. In all instances where structures are to be placed in sage-grouse habitat, especially nesting habitat, preliminary surveys should be conducted to identify sage-grouse nesting areas and all attempts should be made to avoid these areas.
5. Structures should be constructed with the least amount of perching or nesting substrate possible by avoiding such things as external ladders and platforms.
6. Use tubular tower designs with pointed tops rather than lattice designs.
   a. This should be applied as a standard design within the range of sage-grouse in Nevada regardless of habitat categorization.
7. In addition to tubular towers, conventional perch and nesting deterrents should be utilized in adherence to the Migratory Bird Treaty Act. Perching and nest deterrents include:
   a. devices installed on support towers;
   b. actual physical maintenance through hazing; and/or
   c. physical removal of nest structures.
8. Avoid removing sagebrush cover whenever feasible, especially in identified winter habitats.
9. Avoid use of guy wires whenever possible.

a. In some circumstances, use of guy wires may facilitate tower design features which minimize perching and nest building (e.g. guyed V tubular tower). The overall benefit to sage-grouse of these designs is likely to compensate for any direct affect to sage-grouse from guy wire strikes; however, guy wires should be marked with devices (e.g. spiral vibration damper, FireFly™ bird flight diverter) to increase the visibility of the wires to avian species, thus minimizing strikes.

10. To reduce the impact of new fences on sage-grouse, new fence proposals (including those for emergency stabilization and rehabilitation) should be carefully evaluated for sage-grouse collision risk (BLM IM 2010-022).
    a. In the process of prioritizing areas for flagging or marking fences, state wildlife agency personnel shall be consulted (BLM IM 2010-022).

E. Post Project Development

1. Monitoring
    a. Within Category 1 through 3 sage-grouse habitats, a comprehensive monitoring plan will be required that addresses demographics, vital rates and seasonal movement patterns. The Western Agencies Sage and Columbian Sharp-tailed Grouse Technical Committee provide sound recommendations in their Interim Guidelines for Evaluating the Impacts of Energy Development (Appendix D).
    b. Information gained from monitoring can be used to help develop future mitigation measures.
2. Noxious Weed Prevention
    a. Roads and the footprint of wind turbine pads, geothermal energy plants, and transmission lines should be monitored at least annually for any noxious weeds and, if found, treated with appropriate techniques.
3. Noise Reduction
    a. Noise levels from geothermal facilities, oil and gas pumping stations or gas pipeline compressor stations should not exceed 55 decibels (dBa) at leks. Several noise muffling techniques and equipment are available.
        i. Noise mufflers should be installed at gas compressor stations;
        ii. Noise barriers should be installed around oil and gas pumping stations;
        iii. Temporary noise shields should be constructed around portions of the drilling rigs and used on standard construction equipment.
4. Decommissioning
    a. Any roads that were built, primarily for construction only, should be decommissioned post construction to deter dispersed vehicle use within sagebrush habitats and the creation of new roads.
        i. Decommissioned roadways should be restored, to the greatest extent practicable, to the pre-existing vegetative condition.
    b. Developers should restore pathways of buried transmission lines or pathways to a desired vegetative condition.

Appendix G:

Figures

FIGURES

Figure 1: Sage-grouse Population Management Units (PMUs).

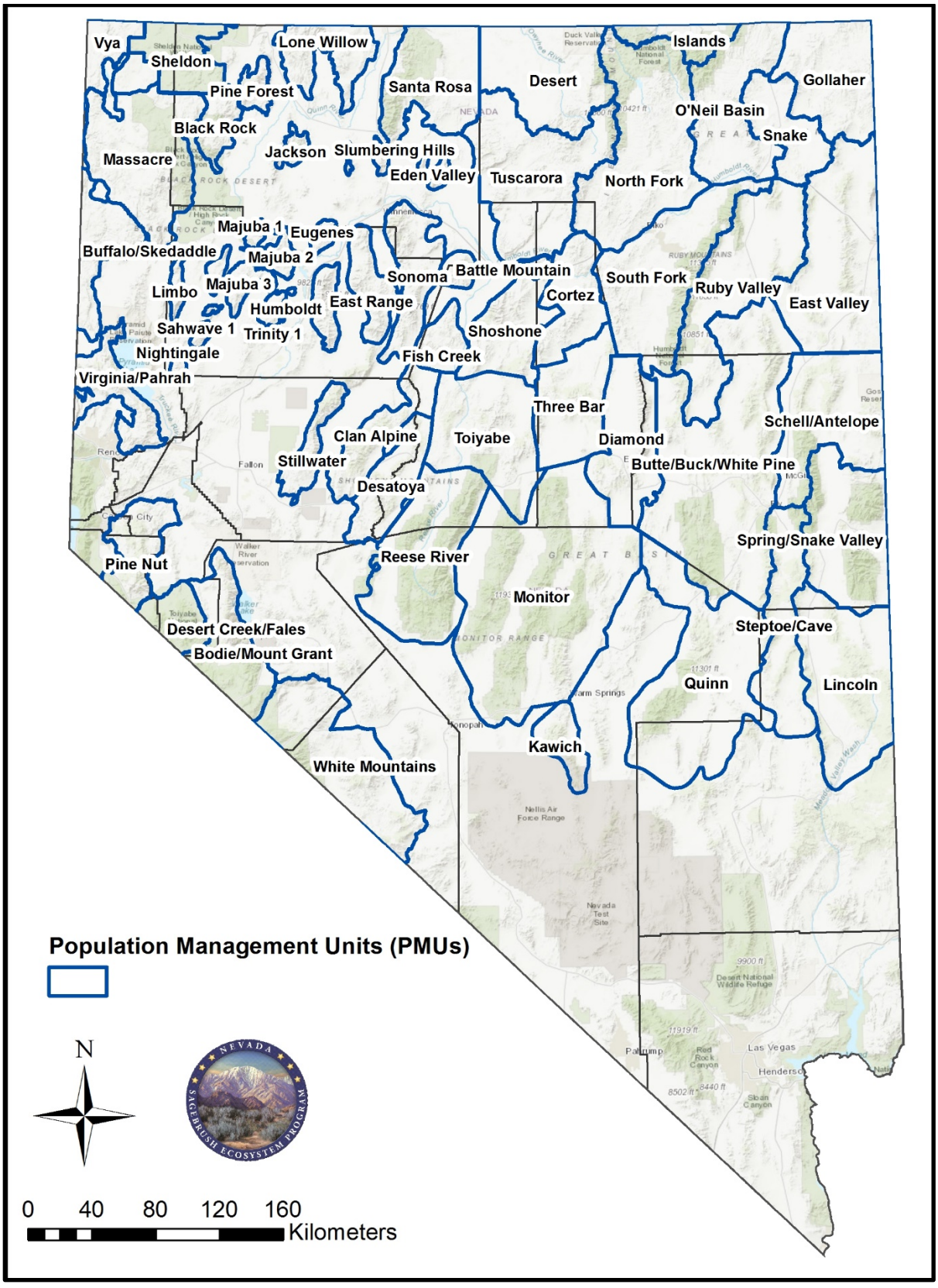

Figure 2: Sage-grouse Biologically Significant Units (BSUs).

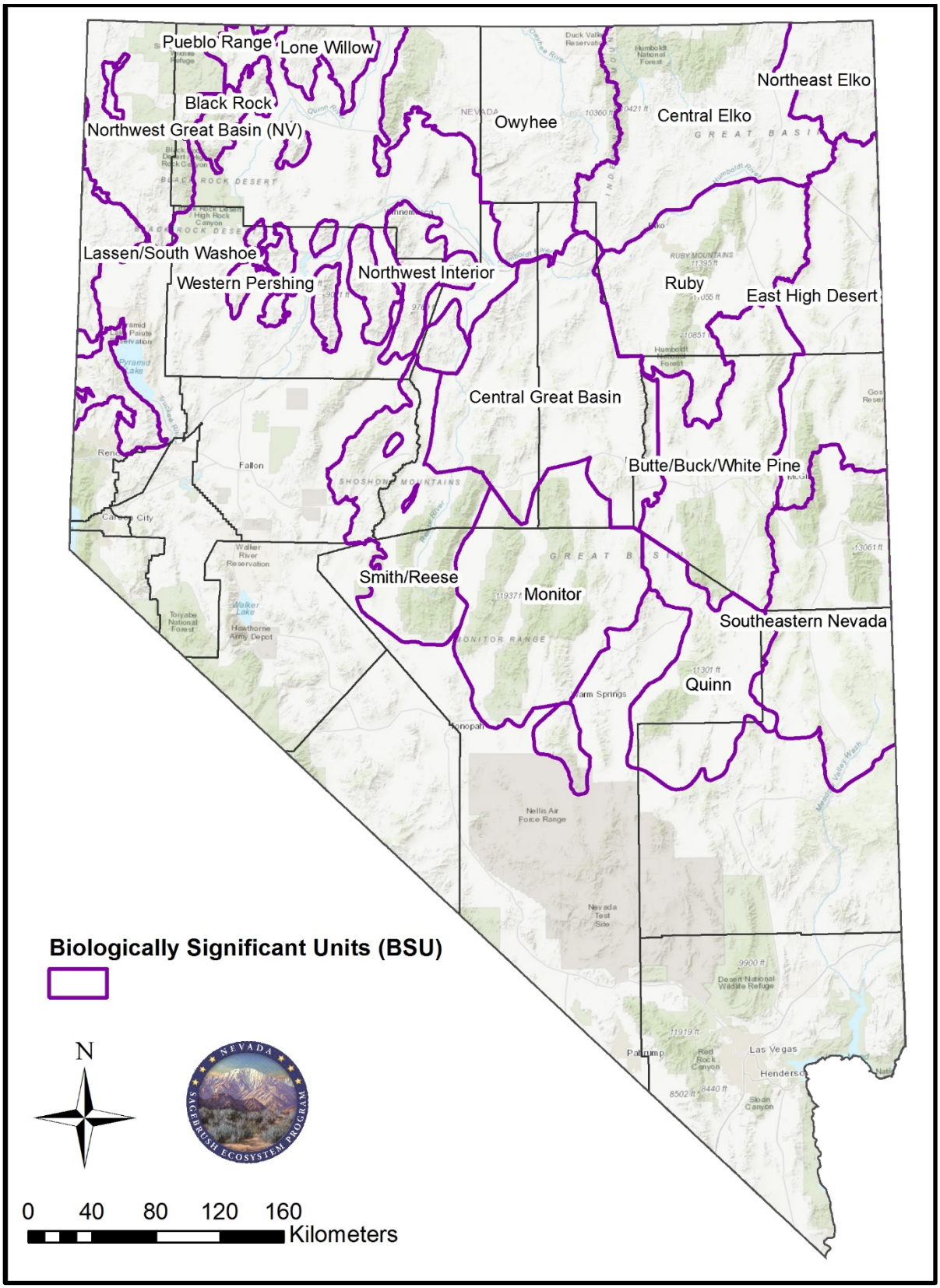

Figure 3: Sage-grouse Habitat Management Categories.

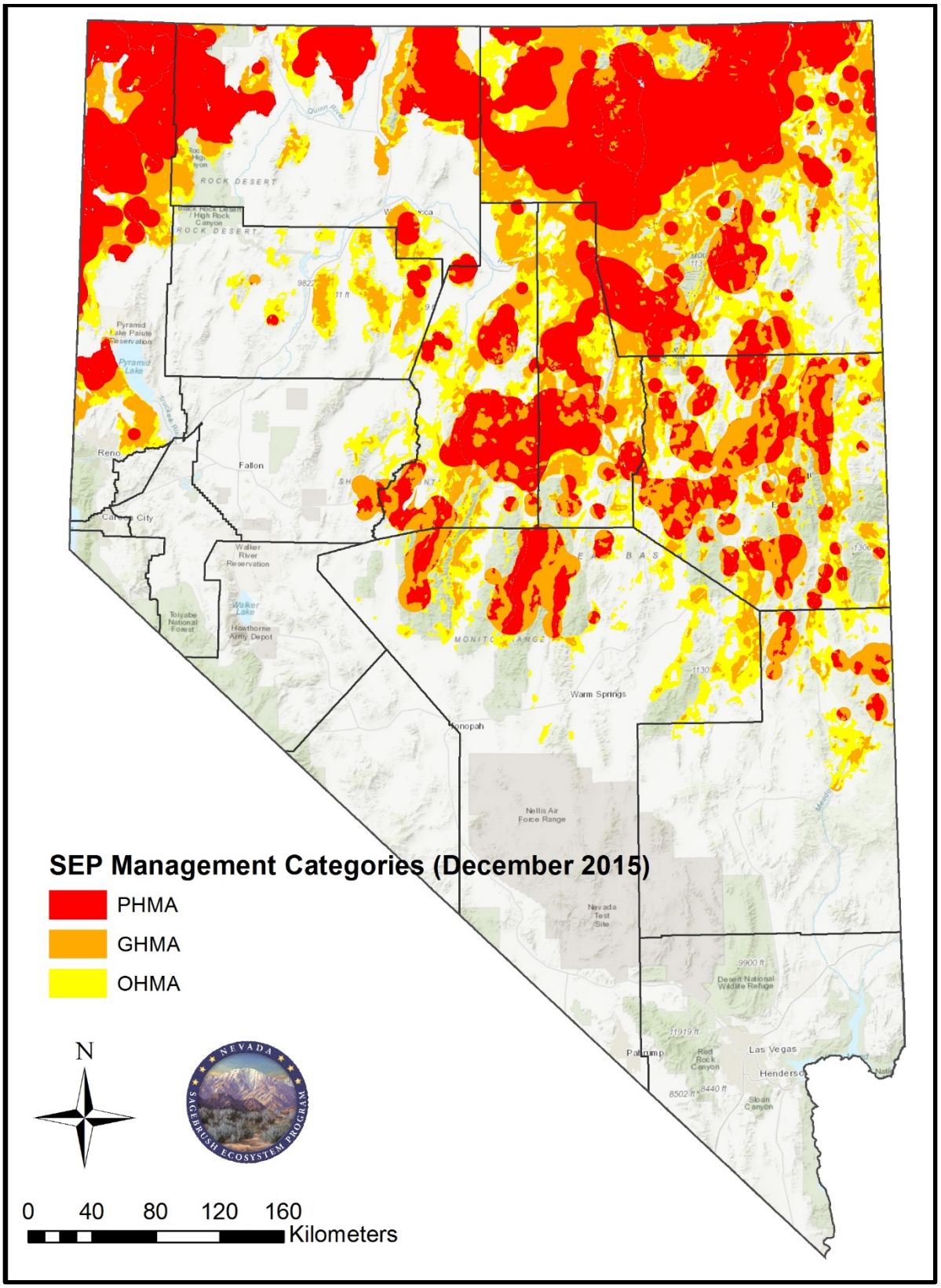

Figure 4: Sage-grouse Habitat Suitability Indices.

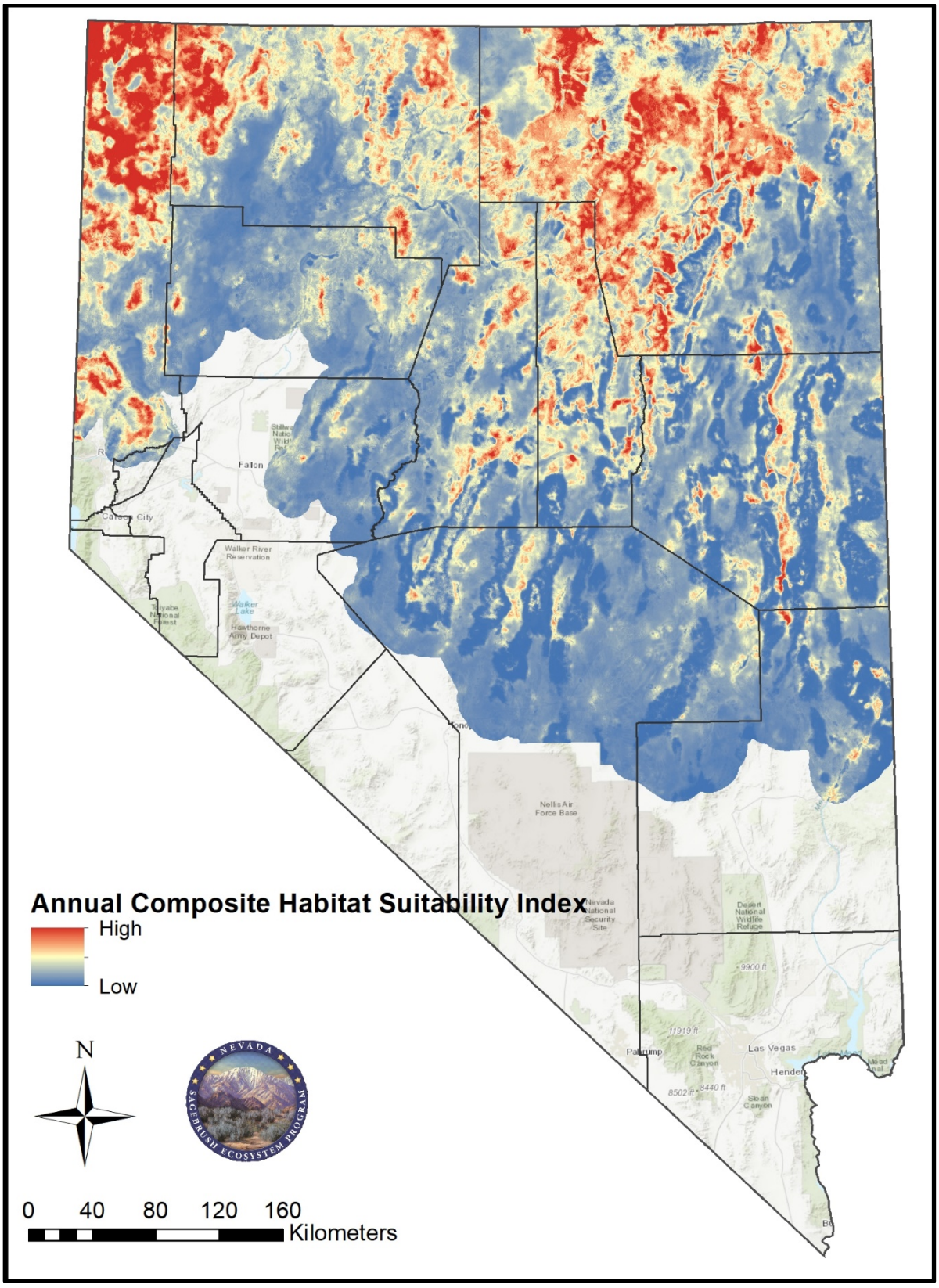

Figure 5: Fire History 1910-2018

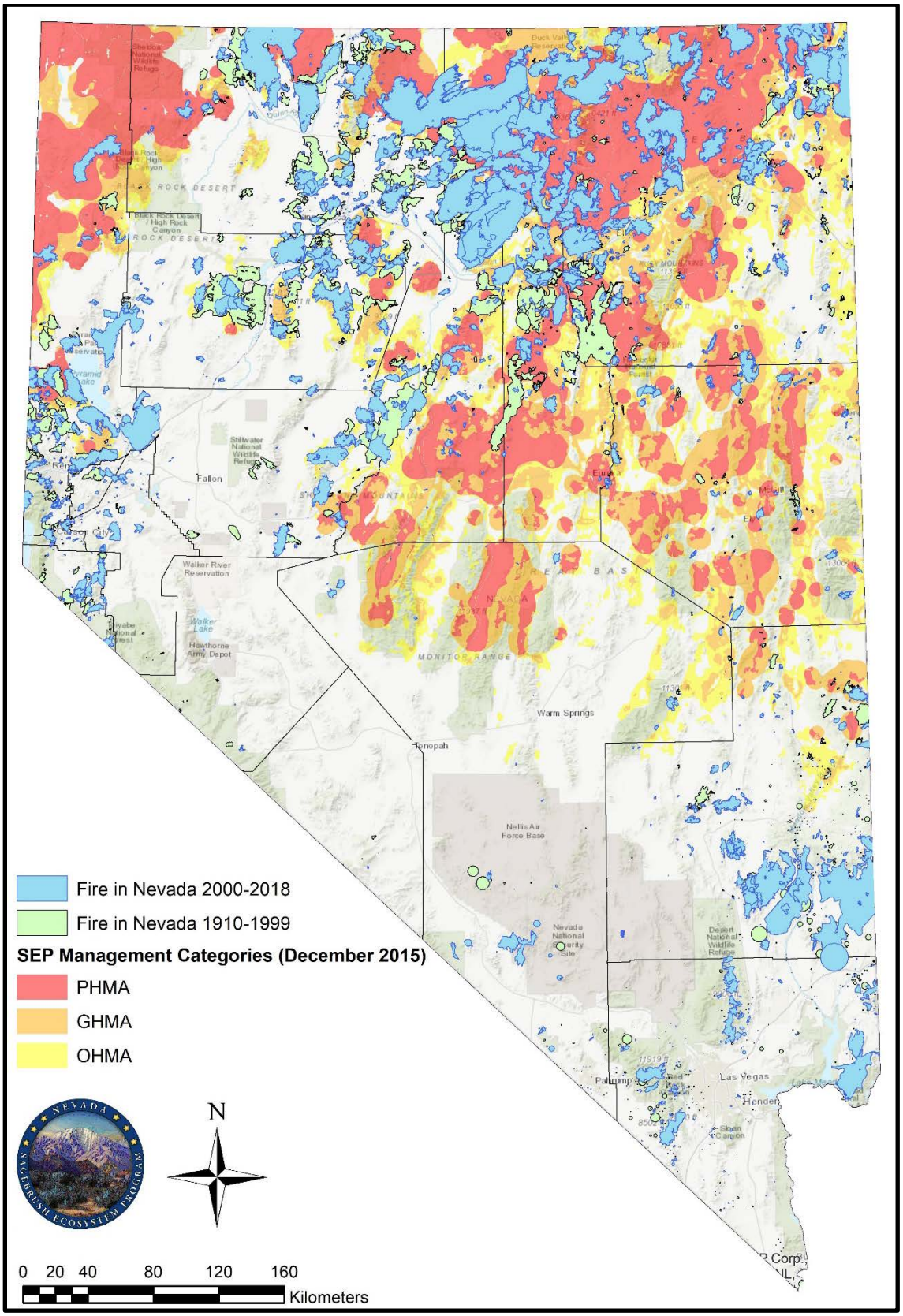

Figure 6: Cheatgrass and Other Invasive Annual Grass Occurrence

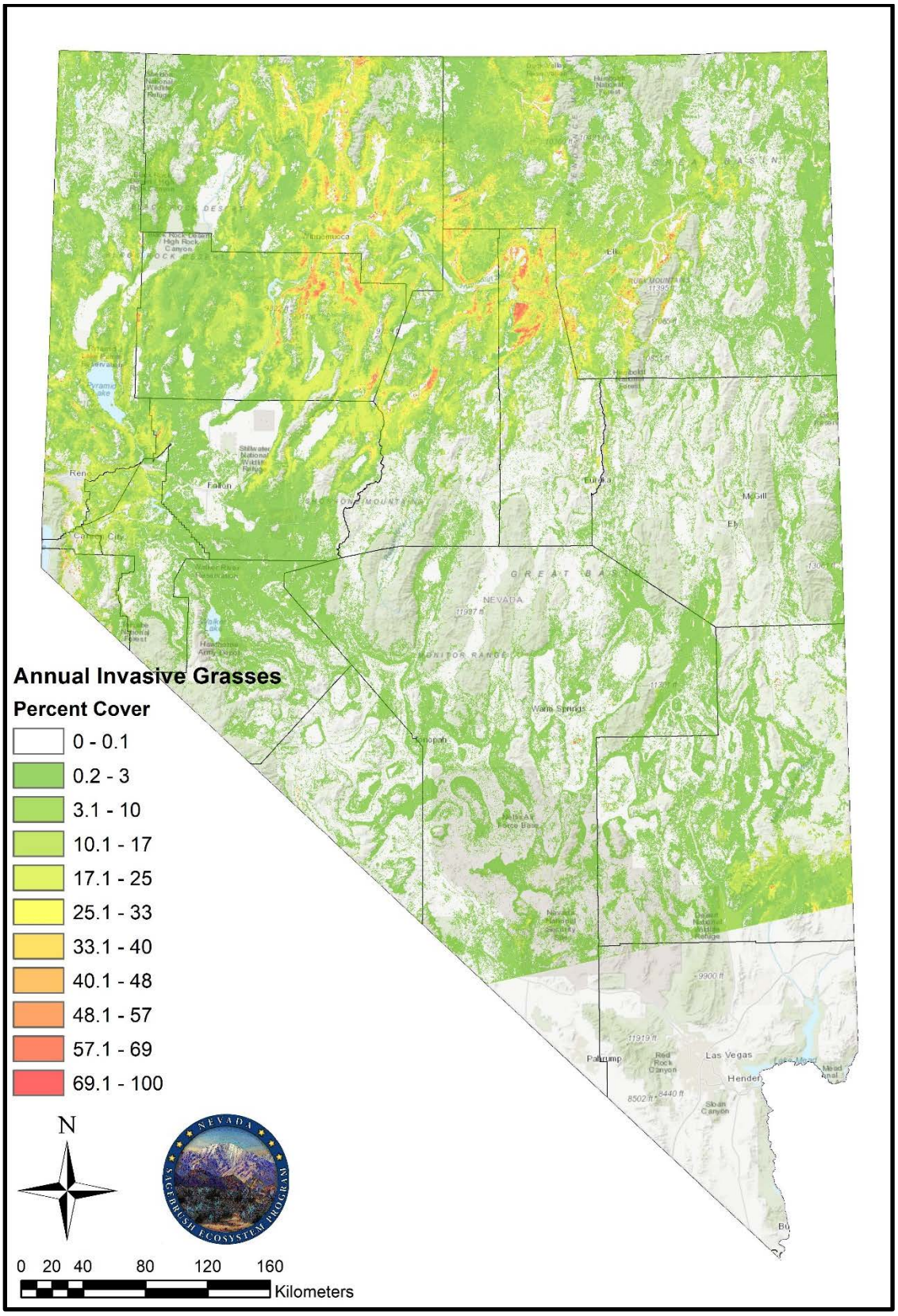

Figure 7: Pinyon-Juniper in Nevada

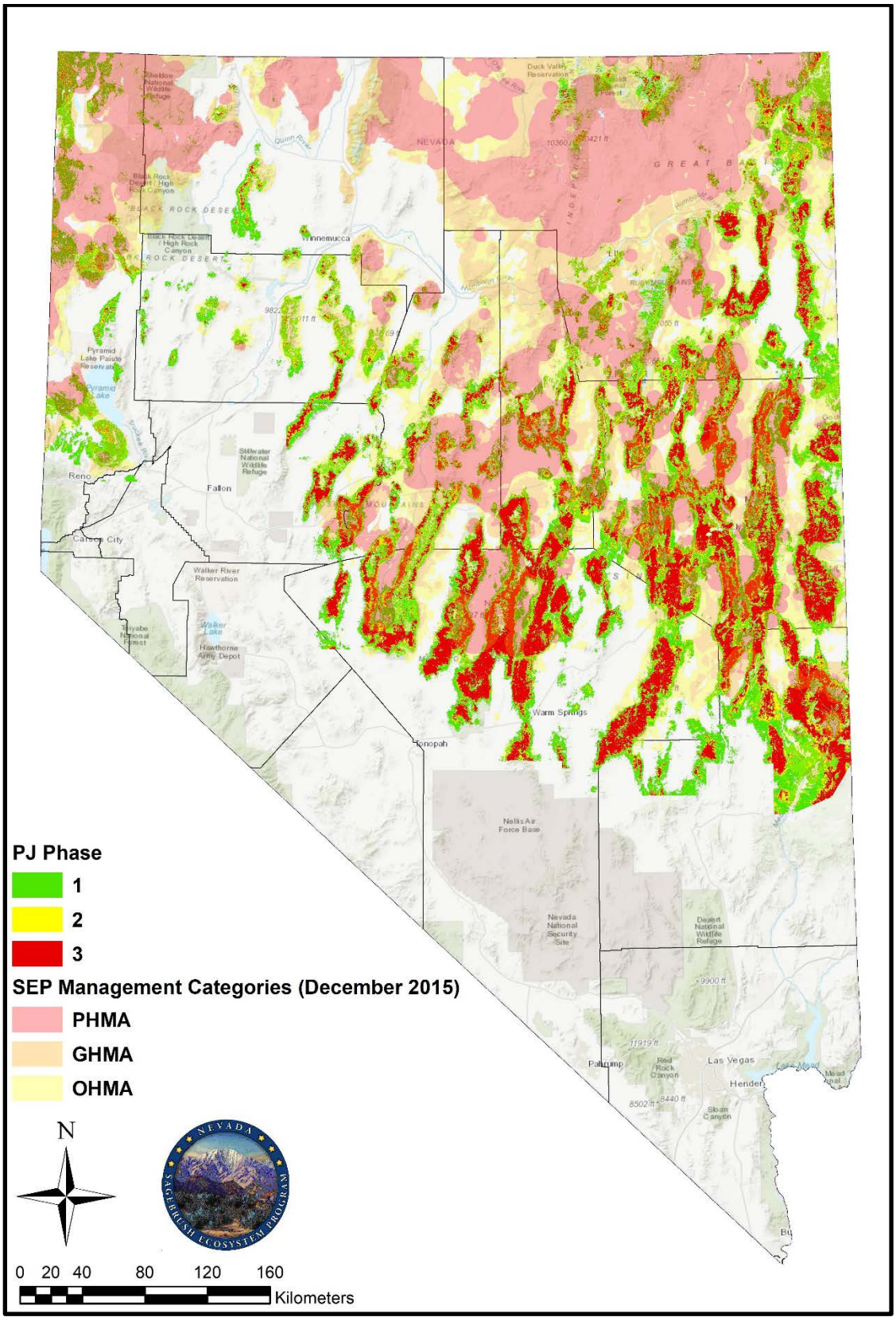

Figure 8: HMAs and HTBTs in Nevada

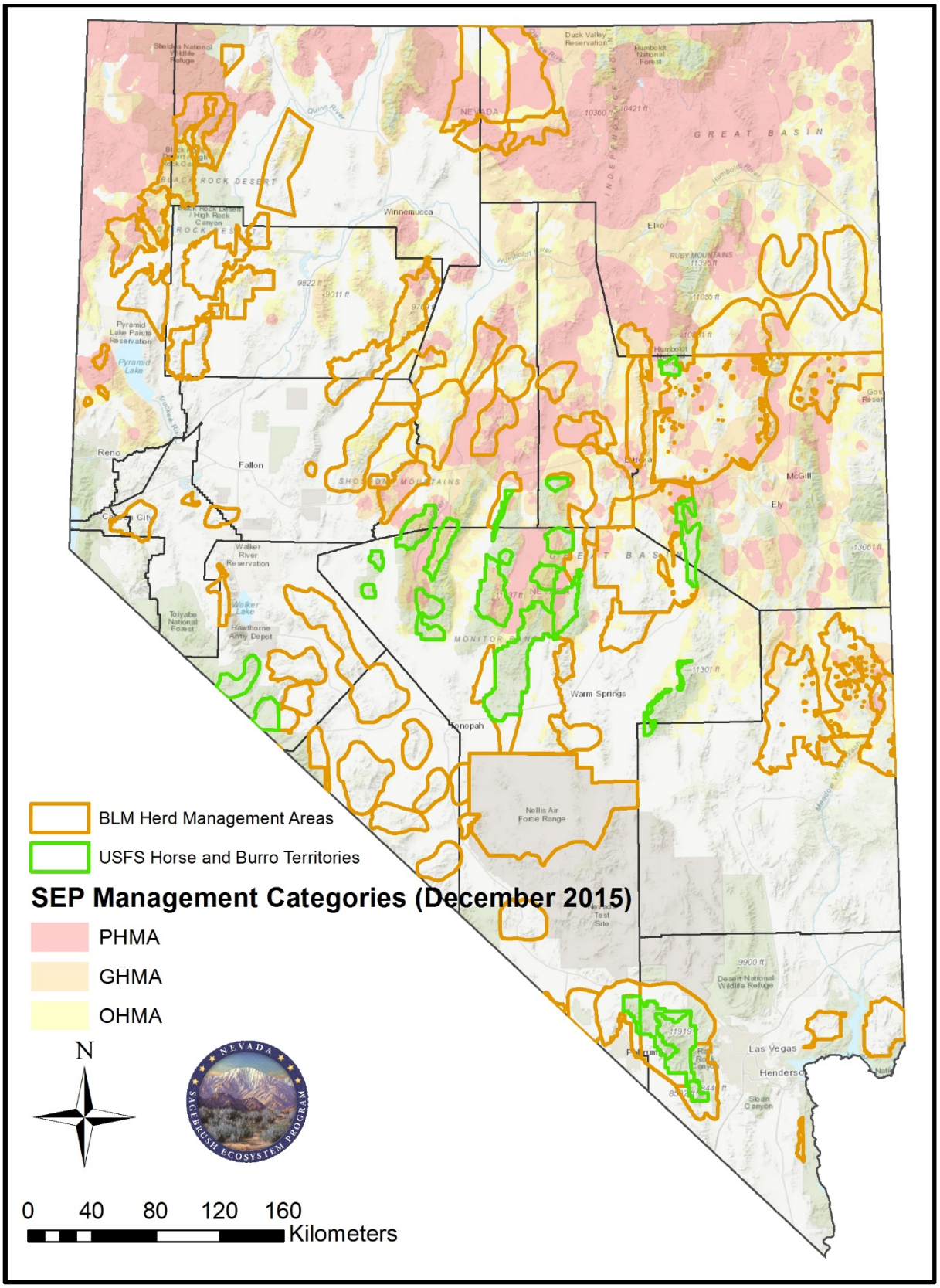

Figure 9: BLM and USFS Grazing Allotments in Nevada

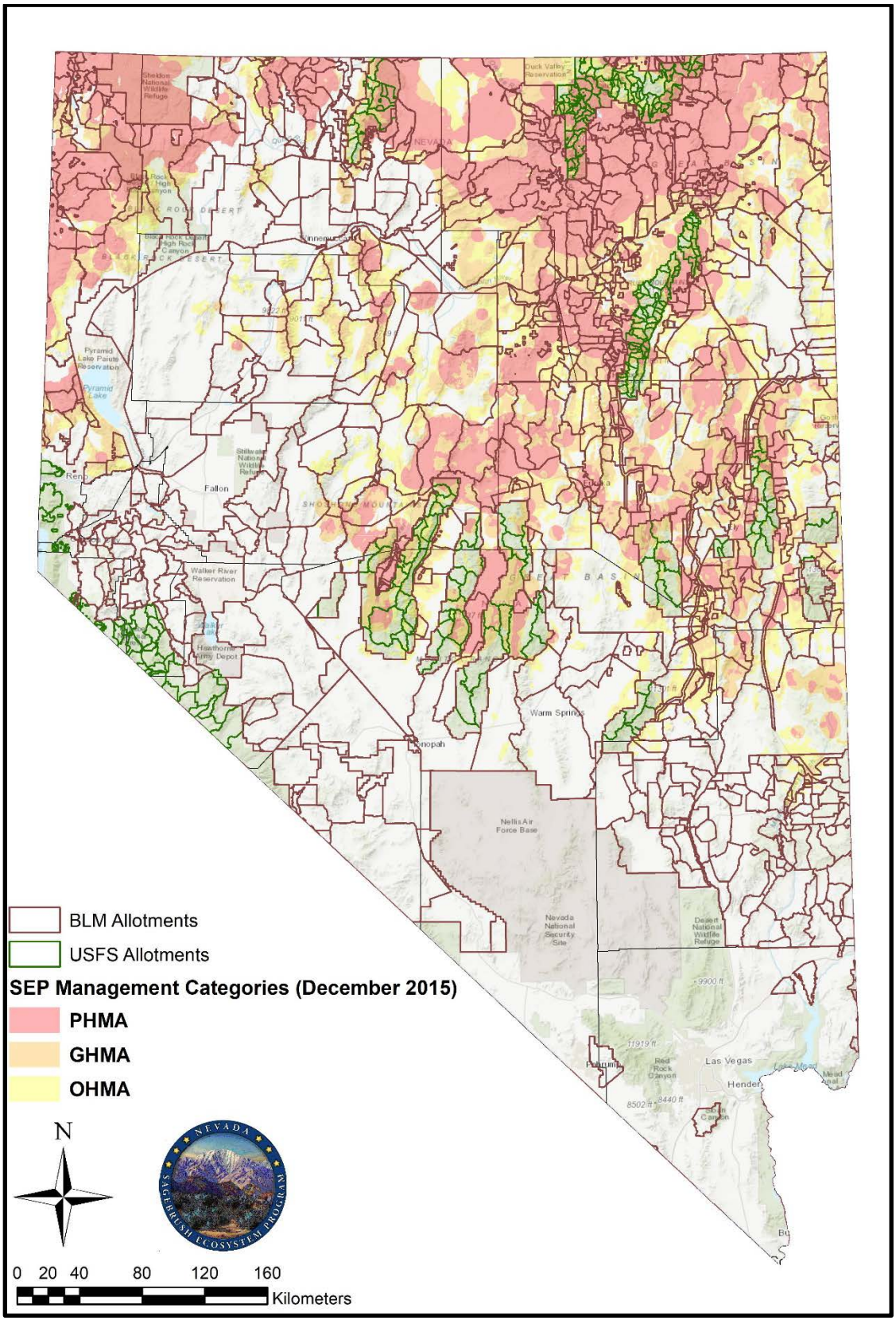

Figure 10: Flowchart of the Adaptive Management Process

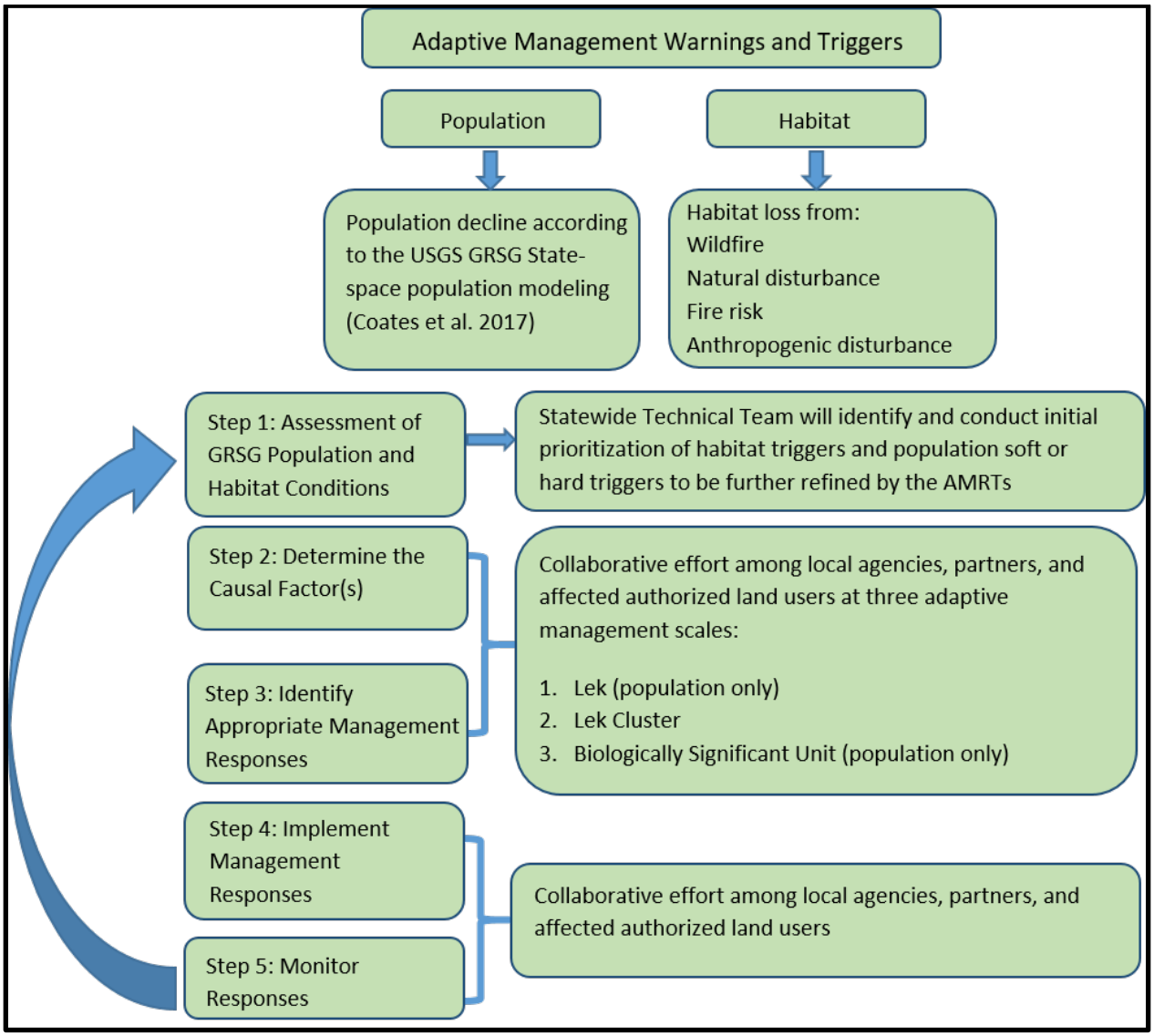

Figure 11: Biological Significant Units and Lek Clusters for GRSG in the Nevada and Northeastern California Sub-region

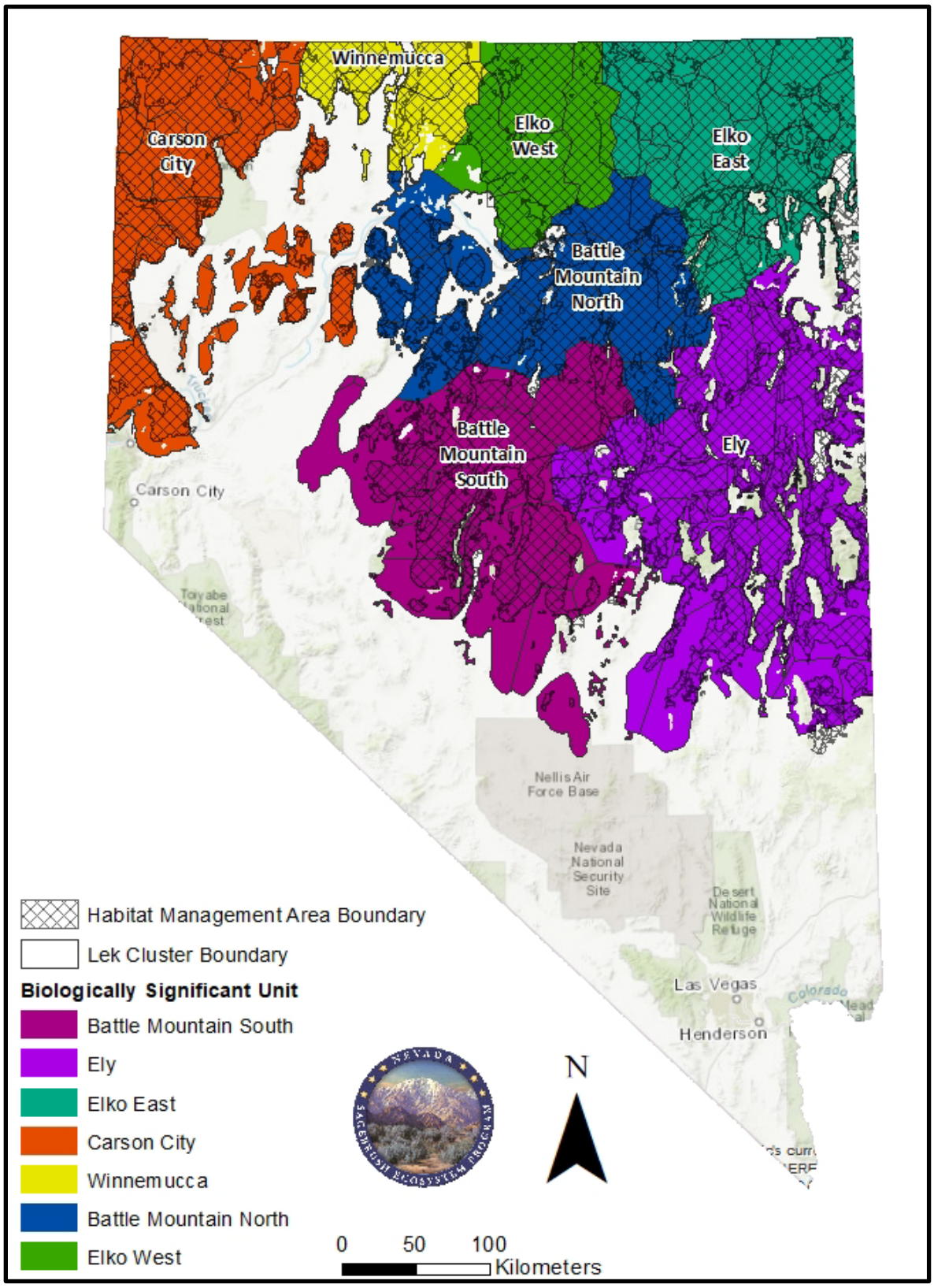

Figure 12: Scenarios depicting population stability (trend) and decoupling from the higher-order spatial scales (Coates et al. 2017)