Greater Sage-Grouse Adaptive Management - Population and Habitat

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:

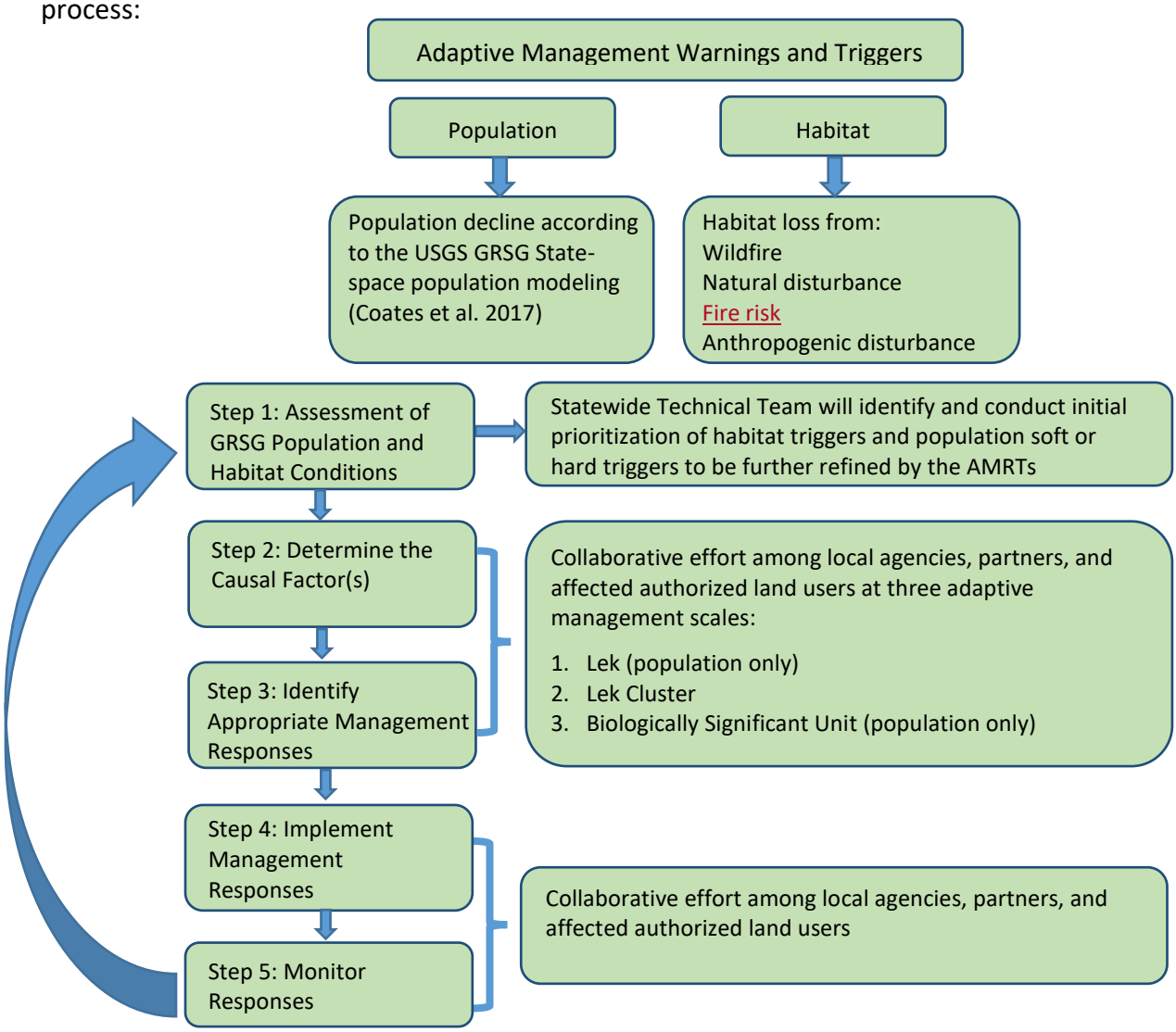

Figure 1. Flowchart of the adaptive management process.

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 2). 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.

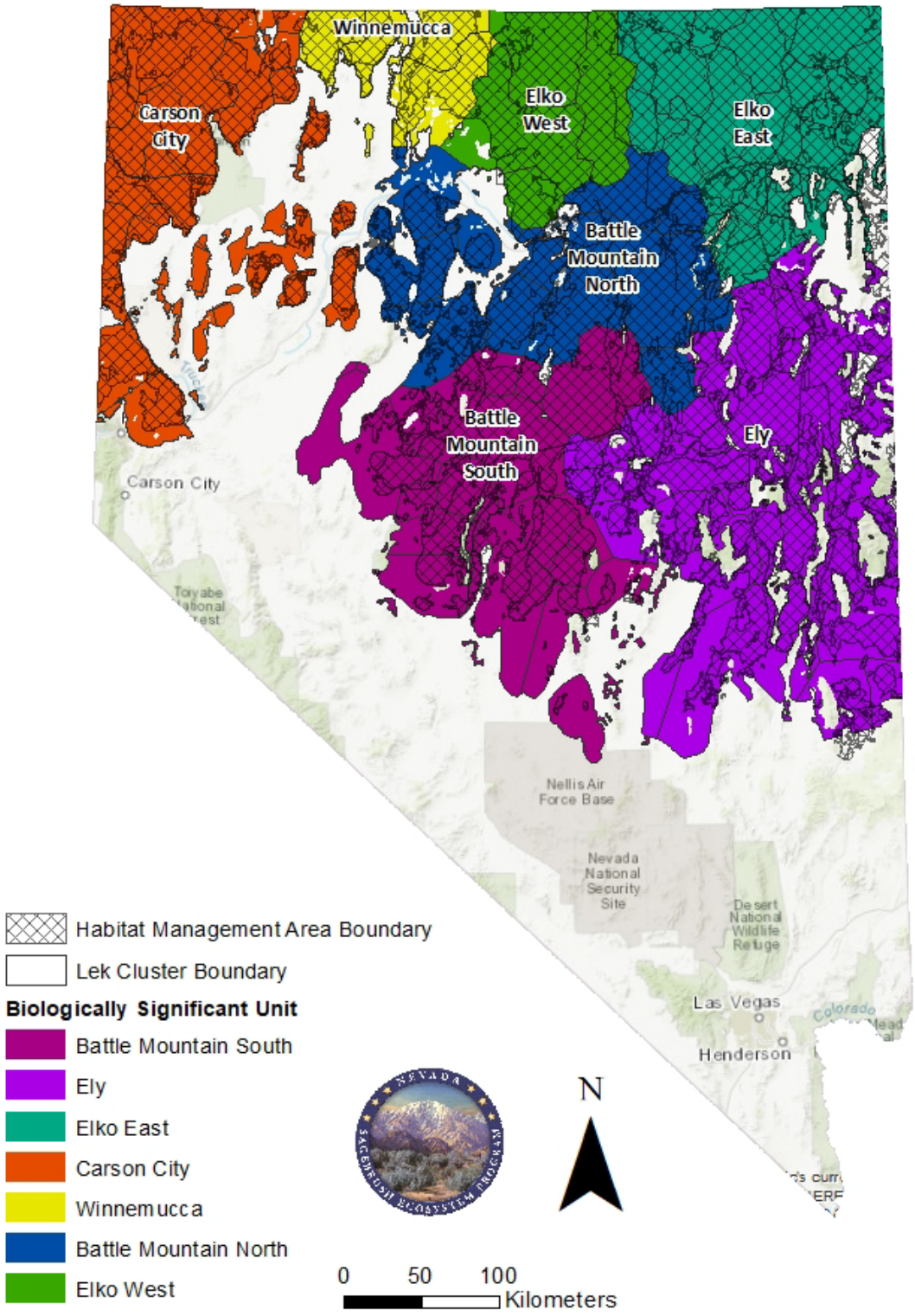

Figure 2. Biological Significant Units and Lek Clusters for GRSG in the Nevada and Northeastern California Sub-region

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[1]. 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

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

complexity of identifying the extent and severity of habitat disturbances in a consistent process, this effort 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 3). 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.

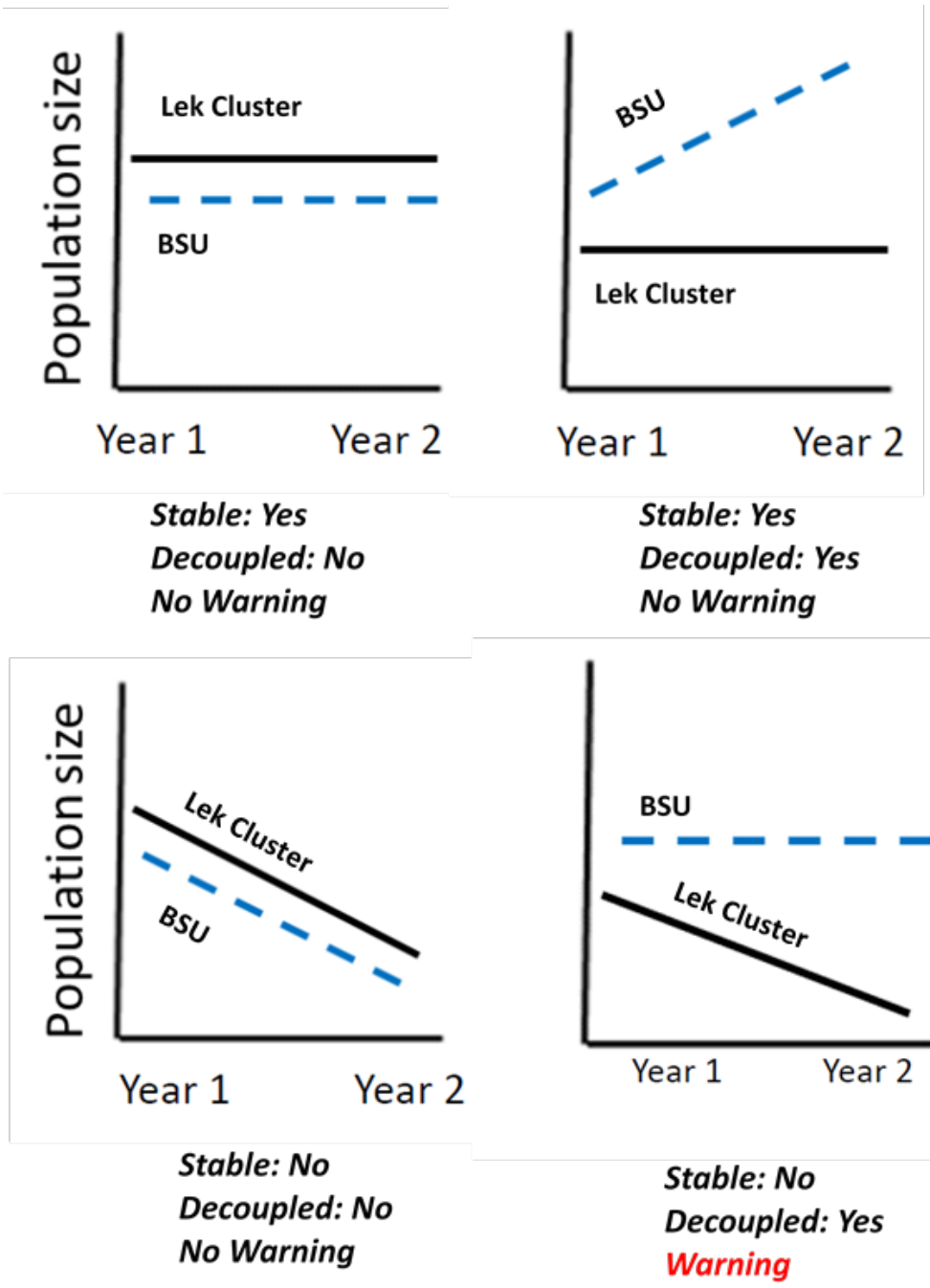

Figure 3. Scenarios depicting population stability (trend) and decoupling from the higher-order spatial scales (Coates et al. 2017). A population that is destabilized and decoupled is considered a warning at that spatial scale. Multiple annual warnings are required to reach a soft or hard population 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), ~~and~~ 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 ~~and have~~ 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~~fall~~ 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 ~~, vegetation~~and vegetation treatments~~,~~ to better manage wildfires ~~when they do occur~~.

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);
- Pro-actively 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.