Appendix 3

Greater Sage-Grouse Habitat Management Area State-by-State Mapping Strategies

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Appendix 3. Greater Sage-Grouse Habitat Management Area State-by-State Mapping Strategies

New spatial information published since 2015 provided additional data for revision of habitat management area boundaries that may provide for increased conservation of GRSG. This information included GRSG habitat persistence Wann et al., 2022), habitat and genetic connectivity (Cross et al., 2018, Row et al., 2018, Cross et al., 2022, Oyler-McCance et al., 2022), GRSG distribution (Doherty et al., 2016, Coates et al., 2021) and likelihood of sagebrush habitat persistence under changing climatic conditions (Palmquist et al., 2021, Rigge et al., 2021). The BLM reviewed this new data and coordinated with state wildlife agencies to consider adjustments to the habitat management areas to enhance GRSG conservation. Some states (OR, NV, WY) were already in the process of updating habitat management area delineations based on local data and the BLM worked closely with these states to consider all data in these revisions. Descriptions of efforts in each state within the planning area are provided below.

3.1 COLORADO

The BLM has incorporated Habitat Management Area (HMA) boundaries submitted by Colorado Parks and Wildlife (CPW) into the mapping efforts for the Greater Sage-Grouse Resource Management Plan Amendment effort. BLM Colorado relies on CPW's expertise as the state wildlife agency to map greater sage-grouse (GRSG) habitat using the best available science. The revised habitat Priority Habitat Management Area (PHMA) and General Habitat Management Area (GHMA) boundaries currently represent the best-known habitat delineations of GRSG habitat in Colorado.

The definitions of PHMA and GHMA have not changed since initially defined in the 2015 ARMPA. PHMAs have been identified as having the highest conservation value to maintaining sustainable GRSG populations. they include breeding, late brood-rearing, and winter concentration areas. The BLM has identified these areas in coordination with CPW. GHMAs are areas of seasonal or year-round GRSG habitat outside of priority habitat. The BLM has identified these areas in coordination with CPW. In Colorado, the BLM and CPW incorporate an additional category, Linkage Management Areas (LMA) which were previously referred to as Linkage Connectivity Habitat Management Areas (LCHMAs) in the 2015 and 2019 ARMPAs. LMAs have been identified as broader regions of connectivity important to facilitate the movement of GRSG and maintain ecological processes, though they are not considered occupied habitat (Colorado Greater Sage-grouse Steering Committee, 2008). The BLM has removed the terms 'connectivity' and 'habitat' from the classification to reduce confusion with other applications of the term connectivity. Similarly, these areas are not considered occupied habitat though they might still contain sagebrush or associated vegetation communities that could serve as stop over points for grouse moving between populations. More information on the background and mapping methodology for LMAs can be found in the Colorado Sage-Grouse Conservation Plan (Colorado Greater Sage-grouse Steering Committee, 2008).

Prior to the current planning process, the BLM and CPW adopted refined HMA maps based on the modeling efforts of Olsson Consultants on behalf of the Associated Governments of Northwest Colorado (DOI-BLM-CO-S000-2020-0003-CX). The multi-year (2016-2019) collaborative mapping process refined the previously mapped areas to remove non-habitat in HMAs or expand areas with documented GRSG use. The 2019 re-

mapping effort incorporated state-specific, timely research and mapping tools. For the full methodology, see Olsson Project No. 016-516 (2019).

The refined HMA (2019) dataset was created by preparing fine-scale population-specific Species Distribution Models (SDMs) to map revised PHMA and GHMA areas for each of the six GRSG populations within the current occupied range of Colorado. First, known presence locations of marked GRSG were used to train Random Forest and Resource Selection Function (RSF) models to estimate seasonal (e.g., breeding, summer-fall and winter) habitat suitability. Secondly, the seasonal model results were classified into high or low habitat suitability categories and subsequently compiled to produce a year-round habitat suitability map. Third, the resulting year-round habitat suitability maps were used to develop revised PHMA and GHMA areas for each population. All areas classified as highly suitable habitat in each population's year-round classified habitat layer were classified as PHMA, while the remaining low habitat suitability areas were classified as GHMA. Finally, the current occupied range for each population was modified to exclude areas identified as unsuitable habitats (Olsson 2019). CPW reviewed the dataset and made minor modifications to include areas outside of previously mapped occupied range where evidence of GRSG occupancy exists. The BLM made slight modifications to the dataset by incorporating a minimum mapping unit and snapping the GIS layers to the state boundary. The 2019 mapping update did not model or adjust LMA boundaries.

During the current planning effort, the BLM coordinated with CPW to review the previous HMA compared to new data that became available since 2015. The BLM and CPW also coordinated with the wildlife agencies from Wyoming and Utah to determine if there was relevant cross-border information. The BLM and CPW revised two areas in the Northwest CO population to incorporate new (2017-2022) lek count data and to incorporate GRSG location data provided by Utah Division of Wildlife Resources. The updates resulted in approximately 49,000 acres of previously mapped GHMA becoming PHMA and 1,400 acres of previously unmapped areas becoming GHMA.

Alternative 1 uses the refined HMA (2019) dataset that was incorporated into the 2015 Northwest Colorado GRSG ARMPA via plan maintenance action. Alternative 2 uses the previous HMA dataset that was originally used for the 2015 and 2019 ARMPAs. Because of the timing of the preliminary injunction for the 2019 ARMPA, the BLM only applied the maintenance action and updated maps to the 2015 ARMPA.

Alternatives 4, 5, and 6 incorporate the most recent lek count and telemetry data from both Colorado and adjacent states. Based on these data, approximately 49,000 acres of previously mapped GHMA would be classified as PHMA and 1,400 acres of previously unmapped areas would be classified as GHMA. Both changes occur in the Northwest Colorado population. They difference between alternative 1 and alternatives 4, 5, and 6 is a 4.2% increase of PHMA in Northwest Colorado resulting in a 2.6% increase of PHMA in all of Colorado. The portion of previously unmapped area that would be classified as GHMA represents a 0.05% increase of total habitat management area extent in the Northwest Colorado population.

Alternative 3 represents the total habitat management area extent of alternatives 4, 5, and 6 but PHMA and GHMA would both be classified as PHMA. Alternative 3 includes the 1,400 acres of previously unmapped area in the Northwest Colorado population and therefore has a larger spatial extent than Alternative 1.

Compared to all other alternatives, alternative 2 includes the highest acreage because many of the interior areas of non-habitat had not been removed. However, there are some areas where the most recent data indicate GRSG use that would not be captured by the alternative 2 HMAs. Using the HMAs in alternative 2 would require more on-the-ground verification and more plan criteria that addresses non-habitat.

Alternatives 1, 4, 5, and 6 still require implementation-level verification but represent a more accurate depiction of GRSG habitat in Colorado. Alternatives 3, 4, 5, and 6 incorporate the most recent GRSG data.

3.2 IDAHO

BLM Idaho reviewed and revised HMAs for Alternatives 3, 4, 5, and 6 due to the availability of new data on GRSG, vegetation, and new range wide science on GRSG. BLM Idaho worked closely with Idaho's Governor's Office of Species Conservation (OSC), the Idaho Department of Fish and Game (IDFG), and other cooperating agencies during the review and revisions. First, IDFG worked to revise the extent of HMA based on biology, i.e. GRSG observations and habitat. Second, BLM Idaho reviewed HMA revisions as well as new range wide science and made HMA designations based on the 2015 Idaho-Southwest Montana Approved Resource Management Plan Amendment (ARMPA) for Alternatives 3 and 4. Third, the State of Idaho (OSC, IDFG) independently reviewed 2015 HMAs and new information including the modified HMA extent from Alternatives 3 and 4 and solicited input from stakeholders and other State agencies. The State provided BLM Idaho an initial draft in early May and a final draft in late September, taking into account the above input and assigning HMA designations based on definitions from the Idaho 2021 Plan (State of Idaho 2021). BLM used the State of Idaho's final draft for HMA designations for Alternatives 5 and 6.

3.2.1 Data Sources

Data sources used during HMA review and revisions for all alternatives included:

- **GRSG observations and population data:**
  - Lek survey data
  - Idaho breeding bird density (IDFG 2020)
  - GPS and VHF radiotelemetry studies, including individual movements and connectivity areas between seasonal ranges
  - Other reliable observations of unmarked birds since 2000 (e.g. incidental observations during targeted sage-grouse surveys and big game aerial surveys, falconry reports)
- **GRSG habitat models:**
  - General Habitat Suitability Index (HSI; seasons pooled) (IDFG 2018, 2019a)
  - Winter habitat suitability model (IDFG 2019b)
  - Late Brood-rearing (LBR) habitat suitability model (IDFG 2019b)
  - Spring habitat suitability model (IDFG 2019b)
  - GRSG breeding habitat (Doherty et al. 2016)
  - Craters of the Moon (CRMO) Sage-Grouse Habitat (Univ of Idaho and NPS 2018)
- **Remote sensing habitat models:**
  - Sagebrush cover (Rangeland Condition Monitoring Assessment and Projection [RCMAP] 2020, 2021)
  - Tree canopy cover (Rangeland Analysis Platform [RAP] 2021; Allred et al. 2021)
  - Annual grass cover (RCMAP 2020)
- **Other data:**
  - Fire history; perimeters through 2021 (BLM, NIFC data)
  - Visual interpretation of ortho-imagery (e.g., 2021 NAIP [OCM Partners 2023], Google Earth imagery)
  - Anthropogenic features from the Idaho Sage-grouse Habitat Quantification Tool

Additional data sources used for Alternative 4 included:

- **New range wide science on GRSG**
  - GRSG breeding bird density (Doherty et al. 2016)
  - GRSG lek persistence (Wann et al. 2023)
  - Genetic connectivity (Row et al. 2018, Cross et al. 2023)
  - Sagebrush Conservation Design tool (Doherty et al. 2022)

3.2.2 Methods

HMA background for Alternatives 3, 4, 5, and 6

First, IDFG revised the extent of HMA using the 2015 HMA as a base map and revised HMA based on direct evidence of habitat use (i.e., locations of observations) or a body of evidence that predicts GRSG space use irrespective of land ownership. Habitat was delineated using the best available science from the data sources listed above.

HMA Additions. In general, HMA was added if an area met one or more of the following criteria: documented GRSG observations, ≥ 3 models predicted suitable habitat, known winter or summer seasonal distributions, suitable (≥ 8%) sagebrush cover, and low (< 30%) tree canopy cover. With few exceptions, additions were located within a 10-km buffer of occupied and pending leks (i.e., 2022 management status). This criterion was a means to exclude seemingly good sagebrush habitat that appeared to be unoccupied.

HMA Subtractions. Areas that were subtracted from the 2015 HMA map generally lacked GRSG observations, had low habitat model agreement (< 3 models), low sagebrush cover and/or high tree canopy cover and annual grass cover (> 20%). Non-habitat areas were generally removed from the margins, whereas some small gaps of non-habitat within existing HMAs were filled, particularly if near GRSG observations. Occupied areas subject to more recent disturbance were not subtracted, particularly if they were expected to recover naturally or through restoration and are adjacent to quality habitat.

A concerted effort was made to consistently represent habitat across the state, and rationales were developed to justify additions and subtractions. Local experts were consulted as needed. The new 'biology map' was used for the HMA extent for Alternatives 3 and 4 and an early draft of Alternatives 5 and 6.

HMA for Alternative 4

For HMA designations under Alternative 4, BLM Idaho evaluated the GRSG biology map's proposed additions and subtractions, and the new range wide science on GRSG and designated HMA based on the 2015 ARMPA definitions:

PHMA (Priority): BLM-administered lands identified as having the highest value to maintaining sustainable GRSG populations. Areas of PHMA largely coincide with areas identified as priority areas for conservation in the United States Fish and Wildlife (USFWS) Conservation Objectives Team (COT) report. These areas include breeding, late brood-rearing, winter concentration areas, and migration or connectivity corridors.

IHMA (Important): BLM-administered lands that provide a management buffer for PHMA and connect patches of PHMA. IHMA encompass areas of generally moderate to high conservation value habitat and populations but that are not as important as PHMA.

GHMA (General): BLM-administered lands where some special management will apply to sustain GRSG populations; areas of occupied seasonal or year-round habitat outside of PHMA or IHMA.

Efforts were made to protect PHMA by a) avoiding isolating or fragmenting large blocks of PHMA, and b) applying new range-wide science, i.e. lek persistence, breeding bird density, genetic connectivity. To focus on areas with high conservation value based on the new science, BLM Idaho combined the following data layers: lek persistence (medium or high; Wann et al 2022), breeding bird density (50 and 25 relative percentage of the population and the highest densities of breeding birds; Doherty et al. 2016); and genetic connectivity (> 90% or > 95%; Cross et al. 2023). This resulted in a raster layer with values ranging from 0 to 6. Any areas classified as 3 or higher by this model were compared with the existing HMA designation. If these areas were not in PHMA, new polygons were drawn, generally following the extent of values ≥ 4, or corresponding to either two of the three layers (lek persistence, breeding bird density, Priority Genetic Pathways). In some instances, the polygon boundary was refined with information from the Key Habitat map or aerial imagery. Areas with high tree cover (≥ 30%) or high annual grass cover (≥ 20%) were excluded from additional areas of high conservation value and were not added to PHMA.

HMA for Alternatives 5 and 6

For these alternatives, the BLM used HMA boundaries for GRSG provided by the State of Idaho for consideration in the LUP effort. This map was created by the IDFG and OSC to assist the BLM in their land use planning effort initiated in 2021 (86 FR 66331).

Consistent with the other alternatives, the State's map for alternative 5 (and alternative 6) adopts a 3-tiered habitat zoning strategy – PHMA, IHMA, and GHMA - to represent a management continuum strategy for GRSG conservation (see the 2021 Idaho Plan for more details, available at https://species.idaho.gov/wildlife-species/greater-sage-grouse/).

This HMA map was based on IDFG's "Biology Map" (version 03/08/2023), which describes GRSG habitat extent (i.e., space use) in Idaho, with the BLM's 2019 GRSG HMA applied. Between draft and final HMA maps, the State of Idaho refined the HMA extent further. HMAs were updated using new science and state policy direction. HMA types reflect breeding bird density (indexed by male lek attendance), habitat quality (suitability, the extent, configuration, and degree of fragmentation), GRSG occupancy and movements patterns. Data sources used are those listed under GRSG observations, Habitat suitability models, and remote sensing habitat models (see details listed above).

In general, PHMA encompassed high and medium-high BBD (25-50%), large areas of intact, habitat (medium and high HSI, high sagebrush cover (>8%), low tree canopy cover (<30%), and low annual herbaceous cover (<20%)), important connectivity and seasonal habitat, especially winter, as evidenced by telemetry locations, and a lack of disturbance (e.g., fire, anthropogenic features). IHMA serves to connect and buffer PHMA and encompassed slightly lower quality and/or more fragmented habitat, with lower BBD (50-100%). GHMA encompassed the lowest quality habitat and BBD (100% or outside the 10km occupied lek buffers) and mesic habitats used in summer (e.g., wet meadows, alfalfa fields).

When information was lacking, best professional judgments were made. There were a few exceptions to these general rules concerning policy (e.g., special community values) and land ownership. Other science products were referenced, e.g., lek persistence, landscape importance, sagebrush ecological integrity, and genetic connectivity models, but these were not primary decision support tools.

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3.3 MONTANA/DAKOTAS

In the Montana-Dakotas portion of their range, GRSG are found in southwestern Montana and across eastern Montana from the Canadian to the Wyoming border, as well as in northwestern South Dakota, and southwestern North Dakota. In Montana, there are about 1,000 confirmed active GRSG leks, out of 1,892 known lek locations (MT FWP 2022). The number of confirmed active leks has grown since 2002 as survey efforts have identified new leks and have been able to identify the status of unconfirmed leks. The Dakotas are on the far eastern edge of GRSG range and the two states' populations are considered at a higher risk of extirpation because of their small numbers and isolation. GRSG in the Dakotas form a population connected to areas in eastern Montana and northeast Wyoming, though it is unclear how many birds move between the states (Cross et al. 2016, Row et al. 2018, Oyler-McCance et al. 2022). In addition, GRSG may reside near (within a handful of miles) their spring breeding grounds, leks, or undertake migratory movements between seasonal habitats. Differences between seasonal movements across the range may be driven by weather, juxtaposition of seasonal habitats, and other factors. Therefore, to account for differences between states and GRSG populations, the strategy for identifying HMAs, in cooperation with state natural resource entities, varies both among the three states, and across Montana.

In Montana, the Governor's Executive Order (EO) 12-2015 delineated core areas, general habitat, and connectivity habitat. Core areas capture the leks for 75-80% of displaying males and associated breeding and other seasonal habitats. These areas are considered the highest conservation priority. General Habitat, therefore, contains about 1/5 of the displaying males and is also an important component. The EO states, "Development scenarios in General Habitat are more flexible than in Core Areas, but should still be designed and managed to maintain populations, habitats, and essential migration routes, since this Conservation Strategy requires habitat connectivity and movement between populations in Core Areas." The Montana EO also identifies connectivity habitat, specifically a corridor where birds move from spring and summer areas close to the Canadian border to wintering areas farther south in Valley County.

Conversely, both North and South Dakota use a different approach than Montana to account for fewer leks, small populations sizes, and being found on the periphery of the range. Both states included all active leks (known breeding population) in their core areas. In South Dakota, active leks were buffered by 4 mi (6.4km) and in North Dakota 5.3m (8.5km) to capture breeding areas and habitat (SD GF&P 2022, NDG&F 2014). Then these buffered areas were refined to account for large areas of non-habitat, bird location information, resource selection functions, and expert opinion (along with collaboration with neighboring states and the BLM). In 2022, the State of SD Game, Fish, and Parks released a new GRSG Action Plan with update core areas accounting for new GRSG movement data.

In the 2015 GRSG Plans in MT-Dakotas, BLM used the core areas from the three states and general habitat from Montana as a starting point to identify HMAs. BLM designated Priority, Restoration, and General HMAs

(PHMA, RHMA, and GHMA). Primarily PHMA is equivalent to the state identified core areas. Two main differences exist, first small adjustments were made during the planning process based on cooperating agency and public input to identify PHMA in some areas. Second, the BLM designated some core areas as RHMA, where there were ongoing or imminent impacts to these high-quality habitats to emphasize the long-term restoration needs. The objectives for these areas include restoring habitat in order to provide the ability for establishing or enhancing GRSG populations. In Montana the EO general habitat was used as a starting point to identify GHMA, and individual plans worked with local experts and stakeholders to refine these, as needed. To identify general habitat in North and South Dakota the BLM used the current occupied range, along with local vegetation mapping and biologists' opinion, to account for areas where there is limited evidence of breeding habitat but known seasonal or sporadic use by GRSG.

To create HMAs for this current planning effort the BLM built off these prior efforts and again engaged cooperating agencies and stakeholders in the process. The BLM combined local knowledge, experience since the 2015 plans, and updated state information to compliment and provide context to new range wide and management zone habitat modeling efforts. The new GRSG science was used to identify areas to consider emphasizing based on management zone or range wide importance, and to refine the type, quality, and location of habitat areas. Throughout the process the BLM sought consistency, as appropriate and supported, with state natural resource entity core and general (also connectivity in MT) habitat areas. The two types of possible changes to be made in the range of alternatives by considering new information since prior planning efforts are: First, areas that should be added (or omitted) that provide (or do not) habitat for GRSG; and Second, what changes to HMA types should be made across Montana-Dakotas. HMAs are delineated as approximate boundaries and representations of habitat, utilize models and coarse grain data, and don't account for the dynamic nature of GRSG populations. Therefore, habitat characteristics should be verified with local data and efforts and there may be areas of non-habitat contained within HMAs.

The BLM considered designating (including new areas and adjustments) four types of HMAs. These include the 2015 types, PHMA, RHMA, and GHMA, and an additional HMA called Connectivity (CHMA) to capture unique, potential migration areas, particularly in silver sage habitat. Priority habitat (PHMA) includes areas with relatively limited impacts and containing substantial and high-quality habitat. These areas have been identified as having the highest conservation value to maintaining sustainable GRSG populations or maintaining the extent of the GRSG range. Restoration Habitat (RHMA) are areas with ongoing or imminent impacts that recently (i.e., in the 21st Century) contained substantial and high-quality GRSG habitat. In general, these areas differ from other HMAs as the BLM is identifying separate management actions to emphasize restoring habitat to establish or enhance GRSG populations. General habitat (GHMA) are areas with or without ongoing or imminent impacts containing seasonal or year-round habitat outside other HMA, including for the purpose of promoting movement and genetic diversity. Finally, Connectivity Habitat (CHMA) are areas that provide regions of connectivity important to facilitate the movement of GRSG and maintain ecological processes. While typically unoccupied or with inactive leks, this HMA boundary represents where stopover sites may exist, likely within a matrix of degraded or converted habitat or non-habitat, particularly in silver sagebrush habitats in northern Montana.

In both Alternatives 1 and 2 HMAs are the 2015 designations, as MT/Dak was not part of the 2019 plan amendments. In these alternatives two areas of the state with known GRSG habitat do not have designated HMAs because the Butte Field Office and the Upper Missouri River Breaks National Monument (UMRBNM) were not part of the 2015 planning effort. While there are no designated HMAs for Butte and UMRBNM these RMPs contain GRSG related objectives and management actions. While there are some differences between the MT EO habitat boundaries and the BLM 2015 GRSG Plan HMAs, the proportion of birds found

in different habitat types remains similar. BLM PHMA and RHMA boundaries encompass 75-80% of known displaying males (similar to core areas) with the remaining 1/5 to 1/4 of the state population found in GHMA (similar to general habitat). In North and South Dakota BLM PHMA matches the core habitat identified by those states at the time, capturing the majority of breeding habitat for all known active leks.

Alternative 3 considers HMA boundary adjustments to the 2015 plans, utilizing those HMAs as a starting point. Changes account for areas of GRSG habitat or leks identified since 2015, removal of areas that are not, and highly unlikely to be, occupied in the future and state identified connectivity habitats in Montana. This alternative would consider the same management across all HMAs, (i.e., all occupied HMAs as PHMA), therefore changes are focused on refining the extent of habitat. Through the planning process the BLM identified that in North Dakota and South Dakota GRSG habitat extent has not changed since 2015 Records of Decision (RODs). In Montana the BLM added in areas of habitat mapped by MT FWP where there is evidence of use, while also removing areas designated by the BLM in 2015 but are not considered GRSG habitat by MT Fish, Wildlife, and Parks (FWP) or based on multiple lines of evidence are not GRSG habitat. In addition, habitat in Butte and UMRBNM was included as HMAs. Finally, due to the unique behavior of GRSG in silver sage habitat (in the Havre, Malta, and Glasgow Field Offices under the HiLine RMP) the BLM mapped and designated Connectivity habitat (CHMA). These areas included state connectivity habitat as well as additional areas that may also provide for GRSG movement between known populations. All changes were made by considering local knowledge, cooperating agency input, and multiple sources of information, e.g., based on the preponderance of evidence.

For Alternative 4, 5 and 6 the outer boundaries (extent) for these alternatives remains the same as determined in Alternative 3. In addition, HMA designation do not vary between the alternatives 4, 5 and 6. The CHMA areas identified in Alternative 3 were included in 4, 5 and 6 as well. The criteria used to consider adjustment from prior HMA designations was to improve consistency between BLM field offices, between BLM and state delineations, and between states (including Idaho and Wyoming), while accounting for new science and on-the-ground knowledge to consider adjustments to HMA boundaries. In some instances, meeting all criteria was not possible, as aspects were in conflict (e.g., consistency between multiple entities). The BLM weighed these various inputs and utilized the preponderance of evidence to designate HMA types. Overall, the goal is that changes are supported with a sound rationale including relevant biological and/or management considerations. The types of changes made in comparison with Alternative 1 and 2 HMAs include switching between RHMA and PHMA (where different management was not needed or for consistency across boundaries), changing GHMA to PHMA (areas of regional importance and for consistency with the state core areas or across state borders), switching GHMA to CHMA or identifying new CHMA (areas where habitat remains that may be important for movement), and changing PHMA to GHMA (improved consistency with state core areas). The proportion of breeding birds in HMAs among the three states remain about the same as Alternatives 1 and 2, with around 80% of birds (breeding habitat) in PHMA in Montana, whereas all known leks are within PHMA in North and South Dakota.

Consistent definitions are needed for HMAs in Montana/Dakotas due to variations in language between existing plans, lack of CHMA definitions in Alternatives 1 and 2, and to apply HMA definitions in the Upper Missouri River Breaks National Monument and Butte RMPs. HMAs would be defined in all applicable action alternatives as:

PHMA: Areas with limited impacts containing substantial and high quality GRSG habitat that have been identified as having the highest conservation value to maintaining both sustainable sage-grouse populations and the range of GRSG. Management actions would emphasize the protection and enhancement of GRSG.

Areas are delineated using mapped state core areas, GRSG density/habitat models, genetic connectivity information, and other resource information that the BLM has identified in coordination with respective state and federal agencies. HMAs are delineated as approximate boundaries and representations of habitat, and therefore there may be areas of non-habitat contained within.

RHMA: Areas with ongoing or imminent anthropogenic impacts that recently (i.e. in the 21st Century) contained substantial and high-quality GRSG habitat and/or supported high density sustainable GRSG populations. Management actions would emphasize restoring habitat in order to provide the ability for establishing or enhancing GRSG populations to sustainable, dense levels. Areas are delineated using mapped state core areas, GRSG density/habitat models, genetic connectivity information other resource information, and human disturbance/footprint data. HMAs are delineated as approximate boundaries and representations of habitat, and therefore there may be areas of non-habitat contained within.

GHMA: Areas with or without ongoing or imminent impacts containing seasonal or year-round habitat outside other habitat management areas, including for the purpose of promoting movement and genetic diversity. Management actions will maintain, enhance, or restore habitat for GRSG. HMAs are delineated as approximate boundaries and representations of habitat, and therefore include potential or unoccupied habitat and may contain areas of non-habitat.

CHMA: Areas that provide regions of connectivity important to facilitate the movement of GRSG and maintain ecological processes, including between priority populations, adjacent states, and across international borders. This HMA boundary represents where stopover sites may exist, likely within a matrix of degraded or converted habitat or non-habitat. Areas are delineated using results from analyses of seasonal migratory movements and habitat characteristics conducive to movements, particularly between silver sagebrush and big sagebrush habitats.

3.4 NEVADA/CALIFORNIA

Greater Sage-Grouse Habitat Management Area (HMA) delineation in BLM's resource management plans (RMPs) in Nevada and northeastern California is informed by a science-based modeling process. As a summary, the model is informed by the following: resource selection information informed by telemetry locations from radio-marked greater sage-grouse (GRSG); the relationship of those telemetry points with associated habitat characteristics such as land cover composition, water resources, habitat configuration, elevation, and topography (each at multiple spatial scales related to the observed GRSG movement patterns); and a space use index based on GRSG breeding densities at leks. The modeled combination of these habitat characteristics and site use resulted in a model output of potential management prioritization scenarios (e.g., Priority, General and Other Habitat Management Area categories). The strength of using this model to identify the Habitat Management Areas (HMAs) is that it can be updated as new data become available.

Following the USFWS 2010 finding (75 Fed. Reg. 13910 [Mar. 23, 2010]) that the listing of GRSG was warranted but precluded and that regulatory mechanisms to protect the species were lacking, both the BLM and State of Nevada began planning processes to increase conservation and management of GRSG and its habitat. In 2013, there was a coordinated decision between the BLM, State of Nevada and US Forest Service (USFS) to develop a single science-based HMA delineation process (https://www.blm.gov/press-release/greater-sage-grouse-maps-available-public-comment) that coalesced in 2014 with the USGS publication: Spatially explicit modeling of greater sage-grouse (Centrocercus urophasianus) habitat in Nevada and northeastern California: a decision-support tool for management (Coates et al. 2014).

Mapping efforts prior to this publication varied widely as seen in the 2013 Nevada and Northeastern California GRSG Proposed Land Use Plan Amendment and Draft Environmental Impact Statement (2013 DEIS). In that document, the HMA maps in the BLM's Preferred Alternative and the State's Alternative differed by over 34 million acres in the management categories that were to become Priority, General and Other HMAs and included a nearly 5-million-acre difference for Priority and General HMAs (combined). This was due to each agency using differing strategies to identify the important GRSG areas, as well as lack of a consistent mapping approach. Following the release of the 2013 DEIS, the Sagebrush Ecosystem Program provided BLM with the 2014 Nevada Greater Sage-grouse Conservation Plan, which included an HMA map for use in the State's Alternative and for consideration by BLM and USFS in developing the Proposed Alternative in the 2015 Final EIS (2015 FEIS). Ultimately, the state and federal maps were both based on the 2014 USGS model and associated publication and were similar, but not identical. The main differences between these maps were the naming convention for HMA categories and inclusion of Sagebrush Focal Areas in the BLM's Proposed Alternative. In terms of HMA acres, the Proposed Alternative included about 1.2 million, or five percent, more than the State's Alternative within the 23-million-acre management area.

A central strength of adopting a science-based strategy, and challenge for management, is that science continues to improve over time as additional information is collected and new mapping products and techniques become available. The need to update the map as new information became available was disclosed and discussed throughout the 2013 DEIS, 2015 FEIS and ROD, and Nevada's Sage-grouse Conservation Plan. Following September publication of BLM's 2015 ROD, the Sagebrush Ecosystem Program (SEP) adopted a new State map (on December 11, 2015) that included the results of an updated version of the 2014 HMA model (Coates et al., 2016) and removed modeled HMA that fell outside of the Nevada Department of Wildlife's Population Management Unit boundaries.

On September 23, 2015, Western Exploration LLC and several additional plaintiffs filed a complaint seeking judicial review of the BLM and USFS actions under the Administrative Procedure Act, 5 U.S.C. § 706. While litigation continued, BLM was not able to update the HMA map included in the 2015 ROD to reflect changes made in the State of Nevada's HMA map. On March 31, 2017, the court ordered the BLM to conduct supplemental NEPA analysis to evaluate substantial changes between the 2013 DEIS and 2015 FEIS, including the addition of SFAs and their management, while not supporting other claims.

On October 11, 2017, BLM released a Notice of Intent to consider the possibility of amending some, all or none of the BLM land use plans that were amended or revised in 2014 and 2015 regarding GRSG conservation. This effort resulted in targeted amendments to BLM RMPs through the March 2019 ROD. Through this planning effort, the Nevada and Northeastern California Sub-region updated BLM's HMA map to match the State of Nevada's map within Nevada. However, these updates could not be completed in California where updated satellite imagery was not available during the USGS 2016 model update. USGS later updated the model to include new imagery of lands in California (Brussee et al., 2019).

On October 16, 2019, the U.S. District Court for the District of Idaho issued a preliminarily injunction, temporarily preventing the BLM from implementing the 2019 amendments, but did not vacate them. Since the 2019 plans were temporarily enjoined, the BLM reverted to the HMA map included in the 2015 ARMPA. Consistent with the intent of the BLM's decision to identify GRSG HMAs using the USGS model, the BLM updated the HMA map for Nevada and California through a plan maintenance action in 2022. This action allowed the Nevada BLM and the State of Nevada to use the same HMA map and for the California BLM to incorporate the 2019 model results into HMAs in California.

In late 2022, the BLM worked with the USGS and other state, local, and federal partners to begin updating the 2016 HMA model. This update is consistent with the approach from the previous two efforts while also incorporating new data and information related to habitat selection and space use. It also includes survival rates during reproductive life stages and specific seasons (e.g., brood-rearing or winter) and identifies corridors that link seasonal habitats. This update allows areas of high importance to current population dynamics (i.e., source areas) to be mapped. The final version of the USGS HMA model was not published in time for inclusion in the BLM's 2024 Draft EIS. However, USGS provided BLM with unpublished results for use in preparing the Draft EIS range of alternatives and impact analyses. This ensured that the BLM was using the best science available at the time.

Within this EIS, the HMA maps for NV/CA differ by Alternative. The HMA map in Alternative 1 displays management areas as identified in the maintained 2015 ARMPA. Maintenance Action # 5 (BLM 2022) updated the 2015 ARMPA HMA with information USGS published in 2016 and 2019 (Coates et al., 2106, Brussee et al., 2019). Alternative 2 uses HMA delineations as presented in the 2019 ARMPA. Alternative 3 uses the draft results of the updated model (Milligan et al. 2024 (in review)) but treats all categories of HMA as PHMA. Alternative 4 also uses the draft results of the updated model and includes all three HMA categories (areas identified as PHMA+ by USGS are merged with PHMA). Alternative 5 takes into consideration the Population Management Units (PMUs) defined by NDOW and uses the same HMA results as Alternative 4 within these units. Areas identified by the USGS model that are outside of PMUs have not been occupied by grouse for decades and are not included in the State's management of the population. Despite providing landscapes characteristics that are likely consistent with GRSG habitat, these areas are not considered important to population persistence. In terms of HMA, Alternative 6 is the same as Alternative 5. The difference between Alternatives 5 and 6 is the inclusion of ACEC in Alternative 6.

The unpublished results that BLM used for this Draft EIS includes more than six years of additional field data collected since the last published version (Coates et al., 2016) and advances in methodology to produce the HMA model (Milligan et al. 2024 (in review)). It represents an estimate of how HMA model results may change as the model continues to be refined. It is anticipated that the final published model, associated maps, and documentation will be available during the spring of 2024; the BLM intends to incorporate the final published version into the Final EIS. There will likely be differences in the spatial distribution of HMAs between the Draft EIS version and the final published version. This iterative evolution is anticipated as addressed in both the 2015 and 2019 RODs that focus on using the results of the model as the primary tool to identify alignment of GRSG HMAs. These anticipated updates are also consistent with the BLM using the best available information to consider decisions, as well as Congress' direction that the BLM maintain and use updated inventories of public land resources as part of the planning process.

Not all areas within HMAs will include characteristics associated with GRSG habitat. For example, areas of connectivity between seasonal habitats or areas recovering from fire might not support vegetation used by GRSG but these areas will be included in HMAs. Mapping errors are also anticipated to occur with HMA maps and the BLM provides mechanisms to correct those errors when encountered within this current planning process (2024 DEIS).

Within the USGS modeling framework, Priority HMA is defined as: 1) areas with relatively high habitat selection index (HSI) and relatively high likelihood of occupancy, or 2) source areas, which were defined as high selection and high survival during reproductive life stages, that were outside of areas of high occupancy. General HMA includes those areas of: 1) relatively high HSI but low occupancy, 2) relatively low HSI but high occupancy, or 3) relatively low HSI corridors that connect seasonal priority habitats (i.e., nesting areas

around leks to brood-rearing source areas). Areas with moderate to low HSI and low evidence of occupancy were included as Other HMA.

The BLM's definitions for HMA are as follows:

Priority HMA: Areas that have been identified as having the highest conservation value to maintaining sustainable Greater Sage-Grouse populations. These areas are occupied seasonally or year-round and include breeding, late brood-rearing, and winter concentration areas.

General HMA: An area that is likely to be occupied seasonally or year-round outside of a Priority Habitat Management Area and where management will apply to sustain the Greater Sage-Grouse populations. GHMA may include active leks, seasonal habitats, and fragmented or marginal habitat, as well as areas identified as corridors connecting seasonal habitats.

Other HMA: Areas with appropriate environmental conditions for Greater Sage-Grouse that are less used by Greater Sage-Grouse or have marginal habitat suitability.

3.4.1 Literature Cited

Brussee, B.E., Coates, P.S., Ricca, M.A., Chenaille, M.P., 2019, Spatially explicit modeling of annual and seasonal habitat for greater sage-grouse (Centrocercus urophasianus) in northeastern California: U.S. Geological Survey data release, https://doi.org/10.5066/P99E64Y4.

3.5 OREGON

The definitions of PHMA and GHMA have not changed since initially defined in the 2015 ARMPA. PHMA and GHMA are defined as follows:

PHMA: BLM-administered lands identified as having the highest value to maintaining sustainable GRSG populations. Areas of PHMA largely coincide with areas identified as Priority Areas for Conservation in the USFWS's COT report. These areas include breeding, late brood-rearing, winter concentration areas, and migration or connectivity corridors.

GHMA: BLM-administered lands where some special management will apply to sustain GRSG populations; areas of occupied seasonal or year-round habitat outside of PHMA.

IM 2012-044 directed the BLM to collaborate with state wildlife agencies to identify and map GRSG Preliminary Priority Habitat and Preliminary General Habitat. In Oregon, the BLM developed maps for these habitats based on the Oregon Department of Fish and Wildlife's (ODFW) GRSG core and low-density habitat maps (Hagen 2011) for the 2015 BLM Oregon Greater Sage-Grouse Approved Resource Management Plan Amendment. The ODFW core and low-density habitats were initially delineated in 2011 and had not been updated since this initial mapping. Since 2011 Oregon has discovered over 150 new leks, acquired over a million locations from radio- and GPS- marked GRSG, and has benefitted from improved habitat suitability models. Additionally, there are many GRSG leks used in the 2011 mapping process that are no longer occupied by GRSG. Hence, in March 2022 ODFW notified the BLM, other partners, and the public that they would be reviewing and revising Oregon's GRSG core and low-density habitat designations and Oregon's Greater Sage-grouse Conservation Assessment and Strategy using new information and again using the methods and process published in Hagen 2011.

The ODFW's draft GRSG core and low-density habitat designation maps were not available for BLM's Draft EIS analysis needs in early 2023. After coordinating with ODFW, Oregon BLM followed the steps described

in the ODFW Greater Sage-grouse Conservation Assessment and Strategy for Oregon (Hagen 2011 pp. 79-83) using data collected up through the 2022 field season. The BLM developed maps that are conservative (i.e., few areas are clipped or reduced to omit non-habitat and therefore likely to show more habitat than the ODFW map will), and were rough estimates of expected core and low-density areas that were anticipated in the draft ODFW maps.

For alternative 3 all BLM identified core and low-density habitat from the model was considered draft Priority HMA. In addition to habitat identified by the model, the spring and summer kernel density estimates (90% utilization) from radio- or GPS-tagged GRSG marked in Oregon from 2000 to present provided by ODFW was included as priority habitat. The areas defined as General HMA in the 2015 BLM Oregon Greater Sage-Grouse Approved Resource Management Plan Amendments, based on combining ODFW low density habitat layer with the Durtsche et al. 2010 model layer, were not edited and were added as Priority HMA.

For alternatives 4, 5, and 6, all BLM newly modeled core habitat was considered Priority PHMA minus non-habitat clipped areas. For alternative 4 the areas defined as General HMA in the 2015 BLM Oregon Greater Sage-Grouse Approved Resource Management Plan Amendments were not edited and were included as General HMA in addition to the newly modeled low-density habitat.

However, for alternatives 5 and 6 the areas defined as General HMA used the newly modeled low-density habitat and Habitat Assessment Framework (HAF) mapped seasonal habitats (rather than the Durtsche 2010 model used in alternatives 1 through 4). The seasonal habitat maps BLM developed with ODFW provide more accurate boundaries for GRSG distribution than maps generated from ODFW low density and Durtsche et al (2010). Not all Oregon GRSG areas had HAF seasonal habitats mapped as of February 2023, but all areas are expected to be completed in time to be included in the BLM Final EIS.

ODFW completed their GRSG core and low-density habitat designation map update, and the Oregon Fish and Wildlife Commission approved it in December 2023, which was not in time for incorporation into the BLM's Draft EIS analysis. Oregon BLM anticipates using the final ODFW habitat designation maps to the maximum extent possible as a replacement of our draft PHMA and GHMA in the action alternatives in the BLM Final EIS.

3.6 UTAH

HMA definitions are defined below for both the 2015 and 2019 GRSG planning efforts. For HMA designations under Alternatives 3, 4, 5, and 6, BLM Utah evaluated the GRSG new range wide science and the State of Utah's 2019 SGMA boundaries to propose additions and subtractions consistent with the concepts for each alternative as identified below in each alternative discussion, and designated HMAs based on the 2019 ARMPA definition for PHMA and the 2015 definition for GHMA.

BLM Utah 2015 PHMA: BLM-administered lands identified as having the highest value to maintaining sustainable GRSG populations. Areas of PHMA largely coincide with areas identified as Priority Areas for Conservation in the USFWS's COT Report. These areas include breeding, late brood-rearing, winter concentration areas, and migration or connectivity corridors.

BLM Utah 2015 GHMA: BLM-administered lands where some special management will apply to sustain GRSG populations. Areas of occupied seasonal or year-round habitat outside of PHMA.

BLM Utah 2019 PHMA: Areas prioritized for managing Greater Sage-Grouse populations (management is only applicable to actions on BLM-administered lands). These management areas include high-quality habitat, and may also include areas with poor quality, potential habitat, and non-habitat. PHMA largely

coincides with the State of Utah's Sage-Grouse Management Areas (SGMAs). In the SGMA, the State identified areas of seasonal habitat, non-habitat, and opportunity areas, though management is focused on the habitat. PHMA are areas that include all the seasonal habitats for the corresponding Greater Sage-Grouse populations, including breeding, late brood-rearing, winter areas, and migration or connectivity corridors.

BLM Utah 2019 GHMA: Not Applicable since GHMA was removed.

The BLM Utah coordinated closely with the State of Utah in developing HMA maps for this planning process. Both the BLM and the state prioritized GRSG populations and associated habitat into these two categories, though there varying levels of inclusion across the different alternatives. For all alternatives, PHMA represents areas of the highest value to maintaining sustainable GRSG populations, areas of seasonally or year-round occupied habitat, and/or areas where sagebrush restoration or rehabilitation can provide additional GRSG habitat. Based on new science and information discussed in coordination with cooperating agencies, local biologists, etc., GHMA and PHMA was adjusted across alternatives 3, 4, 5, and 6 using various alternative concepts/strategies. One of the primary differences among the alternatives is how GHMA is used. Of the 380 known occupied GRSG leks in Utah, the alternatives include the following within PHMA:

- Alternative 1: 353 (92.8%) are in PHMA
- Alternative 2: 354 (93.1%) are in PHMA
- Alternative 3: 380 (100%) are in PHMA
- Alternative 4: 366 (96.3%) are in PHMA
- Alternatives 5 and 6: 342 (90%) are in PHMA

Alternative 1 in Utah would retain PHMA and GHMA as identified in the 2015 GRSG ARMPA. In that effort, the BLM used the State of Utah's Sage-Grouse Management Areas (SGMA) as the primary tool to identify PHMA (with a few exceptions such as the Tavaputs Plateau), and the State's 2009 occupied GRSG habitat map as the basis of the GHMA. The SGMAs and PHMA focused on managing the most important GRSG populations in the state, regardless of the quality of the habitat associated with those populations.

It is important to note that the State of Utah's 2009 occupied habitat data was very broad in nature, and was developed to identify the general areas of potential habitat where GRSG could potentially be found and may not have reflected where birds were actually known to exist. As such, some areas identified for GHMA in the 2015 GRSG ARMPA have subsequently been identified as non-habitat. This includes areas such as west of Sanpete Valley (west of Ephraim and Mt. Pleasant), Porphyry Bench near Price, and Blue Bench north of Duchesne. While these areas were identified as habitat during the 2015 planning effort and included as GHMA in that effort, they have not had any documented birds using them for over 20 years, have no occupied or historically known leks, are poor-quality habitat, and do not provide connectivity habitat for birds moving between population areas or seasonal habitats. Under Alternative 1, there are five occupied leks that occur outside of PHMA/GHMA boundaries: two are in the Box Elder area, one in Sheeprocks, and two in the Rich area.

In the 2015 ARMPA, 97.5 percent of the BLM's PHMA was contained in areas identified as habitat in the State of Utah SGMAs. Further, 99.5 percent of the state's mapped habitat within SGMAs is within PHMA. The major difference between the BLM and State of Utah maps was how areas of lower priority are depicted. The state chose not to map lower priority areas of occupied GRSG habitat outside SGMAs, whereas the BLM mapped these areas as GHMA. Further, based on the State of Utah's Conservation Plan, SGMAs "encompass more than 90 percent of Utah's breeding populations, seasonal movements and the landscapes that provide the greatest potential to increase sage-grouse "usable space" [through habitat protection and

enhancements]" (State of Utah, 2019). The state determined that GRSG "habitats outside the SGMAs are not required for long-term conservation of the species. Much of this habitat has already been heavily disturbed by human and natural causes, and it is not suitable for enhancement or improvement. Therefore, sage-grouse populations in these areas are not considered essential to perpetuate the species in Utah" and the state did not provide any "specific management actions for this habitat" (State of Utah 2019).

Statewide (Alternative 1) - Habitat Management Area Acres

- 5,548,837 acres in PHMA
  - 2,079,470 of the BLM-administered surface acres are in PHMA
  - 1,197,778 of the BLM-administered mineral estate are in PHMA
- 1,684,818 acres in GHMA
  - 437,737 of the BLM-administered surface acres are in GHMA
  - 403,125 of the BLM-administered mineral estate are in GHMA
- 42,069 acres as Occupied Anthro Mountain (National Forest System lands)

Leks Under Alternative 1 HMAs:

- 353 (92.8%) of the 380 occupied leks in Utah are in PHMA
- 14 (3.7%) of the 380 occupied leks in Utah are in GHMA
- 7 (1.8%)of the 380 occupied leks in Utah are in Occupied Anthro Mountain
- 5 (1.3%) of the 380 occupied leks in Utah are outside any Utah habitat management area

Alternative 2 is based on the BLM's 2019 GRSG ARMPA. In that effort, the BLM sought to increase HMA alignment with the State of Utah's SGMAs and prioritized the importance of management prescriptions on PHMA. This was to focus protection in the State on the seasonal habitats that support over 95 percent of GRSG populations in Utah, while removing the designation and management of GHMA to de-emphasize management in areas that were less important or not habitat. Other than removal of GHMA, there were very few changes in the HMAs under Alternative 2, though some differences in the BLM's PHMA and the State's SGMA remained in the West Tavaputs area, where the BLM maintained PHMA in an area where the State did not include an SGMA. Under Alternative 2, based on 2023 occupied leks, 19 occupied leks would occur outside of PHMA boundaries: 2 in the Box Elder population area, 4 in the Rich County area, 1 in the Sheeprocks area, 5 in Morgan-Summit area, and 7 in South Slope Uintah/Blue Bench. Most of these leks do not occur on BLM-managed lands.

Statewide (Alternative 2) - Habitat Management Area Acres

- 5,548,837 acres in PHMA
  - 2,079,476 of the BLM-administered surface acres are in PHMA
  - 1,235,904 of the BLM-administered mineral estate are in PHMA
- 0 acres in GHMA
- 42,069 acres as Occupied Anthro Mountain (National Forest System lands)

Leks Under Alternative 2 HMAs:

- 354 (93.1%) of the 380 occupied leks in Utah are in PHMA
- 0 of the 380 occupied leks in Utah are in GHMA
- 7 (1.8%) of the 380 occupied leks in Utah are in Occupied Anthro Mountain
- 19 (5%) of the 380 occupied leks in Utah are outside any Utah habitat management area

Alternative 3 HMA boundaries were developed to represent the strongest GRSG management approach within the BLM's jurisdiction. All HMAs in Alternative 3 are managed as PHMA. PHMA under Alternative 3 encompasses a total of 9,802,136 acres. As compared to the other alternatives, the PHMA boundaries under Alternative 3 more closely aligns with the State of Utah's SGMA areas, though the management under Alternative 3 is more restrictive than what the State recommends. The State's SGMAs were developed to be inclusive of a variety of habitat types associated with the various GRSG populations throughout Utah. The State's plan clearly notes that the entirety of the SGMAs do not provide habitat for GRSG, but include areas of habitat, non-habitat, and potential habitat (opportunity areas). In the 2015 and 2019 planning efforts, the BLM focused PHMA in the areas the State coarsely mapped as "habitat" within the SGMAs in the original 2013 GRSG State plan. Under alternative 3, the BLM included the entirety of the SGMAs as PHMA, as well as areas of restoration areas that occurred on the periphery of the 2015 HMAs. The following are additional concepts used to build alternative 3:

- Include in PHMA all areas of GHMA from the 2015 plans.
- Apply new science, especially research on habitat connectivity, resulting in inclusion of the State of Utah's opportunity habitats.
- Include all occupied leks in PHMA.
- Include areas of non-habitat that are encompassed in large parts by PHMA or could provide corridors between valleys and occupied habitat.
- Include areas of GRSG habitat treatments that occur on the periphery of 2015 HMAs.
- Remove municipalities >2,500 acres.

Alternative 3 is the only alternative where the GHMA from alternative 1 becomes PHMA. Expanding the GHMA designation in Alternative 1 to PHMA includes some areas of unoccupied habitat, historic habitat where birds have not been observed in 20 years or more or may have never occurred (e.g., habitat west of Sanpete Valley), areas of non-habitat (e.g., phase 3 pinyon-juniper, rock outcrops), areas which are currently not habitat but could become habitat through significant habitat restoration, etc, which raises the concern of "when applying leasing restrictions, the least restrictive constraint to meet the resource protection objective should be used" (2018 FEIS Appendix 2 p. 2-28). Under Alternative 3, there are no occupied leks that are not encompassed by PHMA.

Statewide (Alternative 3) - Habitat Management Area Acres

- 9,801,294 acres in PHMA
  - 3,567,018 of the BLM-administered surface acres are in PHMA
  - 2,379,058 of the BLM-administered mineral estate are in PHMA
- 0 acres in GHMA

Leks Under Alternative 3 HMAs:

- 380 (100%) of the 380 occupied leks in Utah are in PHMA
- 0 of the 380 occupied leks in Utah are in GHMA
- 0 of the 380 occupied leks in Utah are outside any Utah habitat management area

Alternative 4 would manage for a combination of PHMA and GHMA similar to alternatives 1 and 2. Some areas that were used to expand PHMA in alternative 3 were incorporated in alternative 4, such as the State of Utah's opportunity habitat, occupied leks, connectivity corridors based on the new science, as well as habitat improvement projects completed for the benefit of GRSG. However, many new areas of expansion would become GHMA where occupancy is uncertain or unknown (e.g., restoration areas, connectivity

corridors). Under Alternative 4, there are no occupied leks that occur outside of PHMA or GHMA. The vast majority of leks are within PHMA, except for 2 leks in the Rich population area northeast of Mountain Green, 5 leks in Morgan-Summit area, and 7 leks on Tribal lands in Uintah South Slope-Blue Bench, which are in GHMA. Under Alternative 4, there are no occupied leks that fall outside PHMA or GHMA. The following are additional concepts used to build alternative 4:

- Adjust boundaries for PHMA to include areas where monitoring shows GRSG utilization.
- Remove some areas of GHMA that have not provided habitat for an extended period.
- Refine boundaries on the periphery of HMAs to more closely align with the Utah State University (USU) GRSG Seasonal Habitat Model.
- Remove municipalities >2,500 acres.

Statewide (Alternative 4) - Habitat Management Area Acres

- 5,833,555 acres in PHMA
  - 2,191,844 of the BLM-administered surface acres are in PHMA
  - 1,291,398 of the BLM-administered mineral estate are in PHMA
- 3,314,103 acres in GHMA
  - 1,195,069 of the BLM-administered surface acres are in GHMA
  - 990,776 of the BLM-administered mineral estate are in GHMA

Leks Under Alternative 4 HMAs:

- 366 (96.3%) of the 380 occupied leks in Utah are in PHMA
- 14 (3.7%) of the 380 occupied leks in Utah are in GHMA
- 0 of the 380 occupied leks in Utah are outside any Utah habitat management area

Alternatives 5 and 6 uses HMA boundaries developed, provided, and preferred by the State of Utah. The State incorporated agency biologist and stakeholder feedback to further refine the HMAs from alternative 4 and provide an expanded range of HMA delineation. This alignment prioritizes HMAs that encompass 95.6 percent of the male GRSG counted on leks during 2023 surveys. The following are additional concepts used to build this alternative:

- Expansion of HMAs to include active leks recently added to the state active sage-grouse lek data set;
- Expansion of HMAs to include wildlife management areas and other areas already subject to state-specific sage-grouse management;
- Refinement of HMAs using localized habitat assessment data and knowledge, including cross-state edge-mapping and review of existing BLM boundary adjustments;
- Updated HMAs to reflect changes in municipal boundaries; and
- Removal of large water bodies

Under alternatives 5 and 6, there are 25 occupied leks that are outside of PHMA or GHMA: 5 leks in Morgan-Summit on private lands, 7 leks in South Slope Uintah/Blue Bench on tribal lands, 7 leks in Anthro Mountain on National Forest System lands which are protected under the 2015 USFS Land Management Plan Amendment and Record of Decision, and 6 leks in West Tavaputs (5 on private, 1 on BLM). With this alignment, alternatives 5 and 6 would prioritize habitat management areas (PHMA and GHMA) that encompass 95.6 percent of the male GRSG counted on leks during 2023 surveys (not the percent of leks,

but the percent of males counted on leks). This includes 2,740 (93.8%) males counted within PHMA, 54 (1.8%) counted in GHMA and 127 (4.3%) counted outside of any HMA.

Statewide (Alternatives 5 and 6) - Habitat Management Area Acres

- 4,876,186 acres in PHMA
  - 1,626,862 of the BLM-administered surface acres are in PHMA
  - 1,118,527 of the BLM-administered mineral estate are in PHMA
- 1,499,184 acres in GHMA
  - 645,971 of the BLM-administered surface acres are in GHMA
  - 348,908 of the BLM-administered mineral estate are in GHMA

Leks Under Alternatives 5 and 6 HMAs:

- 342 (90%) of the 380 occupied leks in Utah are in PHMA
- 13 (3.4%) of the 380 occupied leks in Utah are in GHMA (two in the Rich area, and 11 in the Sheeprocks area)
- 25 (6.6%) of the 380 occupied leks in Utah are outside any Utah habitat management area

Alternatives 5 and 6 do not include any HMA designation for portions of the Uintah population area south of Highway 40, including the Deadman's Bench, East Bench, and Book Cliffs areas. The GRSG populations within this area were steadily declining during the preparation of the 2015 FEIS; however, in Deadman's Bench, there were 2 leks that had less than 10 birds since 1989 and suggested that the population was connected to other populations. Same with East Bench at the timing of the 2015 FEIS, "East Bench leks are the only known active leks in the last 10 years. However, it is unknown if there are leks on tribal lands in the western portion of this area because UDWR does not have access." (2015 FEIS p. 3-25). In 2023, the leks in these areas were documented as unoccupied. In coordination with local biologists, there is some limited bird use in these areas; however, the extent of use is largely unknown and the leks are no longer considered occupied by the State of Utah.

Habitats in the South Slope Uintah/Blue Bench and Uintah Population Area (Deadman's Bench, East Bench, and Book Cliffs) have been fragmented due to mineral development activities through much of the area, which has likely contributed to loss of occupied leks within these areas since the 2015 plans. Under alternative 1 development could still occur in GHMA similar to what was analyzed in the 2015 Final EIS, "despite the…[Greater Sage-Grouse] conservation measures, leasing and development in these areas could result in human alteration, direct loss, and fragmentation of seasonal [Greater Sage-Grouse] habitats, which, in most cases, have already been fragmented by mineral development activities. Fragmentation could further limit the amount of usable habitat available for the small and declining population of [Greater Sage-Grouse] that occupy this area [GHMA]" (2015 Final EIS, page 4-119). The limited information available for this area provides little insight into the population movements, important seasonal habitats, and connectivity with other populations. BLM lacks regulatory discretion on resources within the South Slope/Blue Bench and Book Cliffs areas since they are predominantly private and Tribal lands. Split estate in this area is limited; therefore, BLM does not have much regulatory responsibility over the mineral estate. The BLM has more jurisdiction in the Deadman's Bench and East Bench areas, removal of GHMA in these areas could result in further habitat loss, degradation, and direct disturbance to the small population of birds that occupy this area as a result of oil and gas leasing.

In addition to the differences in GHMA identified in Alternatives 5 and 6, Anthro Mountain and West Tavaputs have not been identified as either PHMA or GHMA.

Anthro Mountain-West Tavaputs – The Anthro Mountain area is predominantly National Forest System land and management would remain the same because USFS is not part of this current planning effort; however, there is a small sliver of BLM land (1,397 acres) in the very southern portion near the Bad Land Cliffs and predominantly tribal lands in the very northernmost extent (Cottonwood Canyon/Cottonwood Ridge). Under alternatives 5 and 6, the BLM portion (1,397 acres) would not be managed as PHMA. The majority of telemetry use is on the USFS lands; however, some birds do use the BLM portions. The easternmost portion of Anthro Mountain has 7 occupied leks (all on USFS) and some birds have been documented moving up to 25 miles outside of the Anthro Mountain area.

The West Tavaputs area is a mix of BLM, State of Utah State Institutional Trust Lands Administration (SITLA), and private lands. There are 6 occupied leks in this area. "Telemetry data suggest some birds are moving large distances to separated areas of seasonal habitats, including movements off the plateau. These seasonal movements include Emma Park, West Tavaputs, Fruitland, and Blue Bench and can range between 14 and 33 miles" (2015 FEIS Section 3.3.5, p. 3-27). Similar to what was analyzed in the 2015 FEIS under Alternative E, "SGMAs would not include the Anthro Mountain and West Tavaputs populations. These populations may be important for redundancy and may provide connectivity to northeastern Utah GRSG populations. While there is documented movement between these two areas and other population areas (e.g., Emma Park and portions of the Uintah Population Area on private and tribal lands), it is unknown what level of connectively is necessary to prevent isolation of populations and how important these areas are to maintaining genetic viability." (2015 FEIS, Section 4.3.6, p. 4-99).

The 2015 FEIS stated, "a total of 1,417 wells are predicted to be drilled from 709 pads within the occupied habitat of the Carbon Population Area, with a total disturbance estimated to be 6,384 acres. Development of 1,417 wells from 709 pads within occupied habitat in the Carbon Population Area would most likely impact some portions of the population to a greater degree than others. Removing management for Anthro Mountain and West Tavaputs would be similar to Alternative E from the 2015 Final EIS (Section 4.3.6 of the 2015 FEIS), which states "impacts would be the greatest in these areas because they have high oil and gas potential. The majority of the lands have already been leased, and they include GRSG habitat outside of PHMA and GHMA that would not be afforded any protection under this alternative." In the Carbon Population per the 2015 FEIS (4.3.2 p. 4-28 RFD), "most of the development is expected to occur in the Gasco, West Tavaputs, Gordon Creek, Drunkards Wash, and Brundage Canyon development areas. Developing 709 pads, additional wells, and ancillary facilities would likely cause direct habitat loss, functional habitat loss, and fragmentation and may impact the local GRSG population. The development in some of these areas may hinder the function of seasonal habitat for some of the local populations, causing localized population declines. The northern population that uses these areas for most of their life history needs would most likely decline. The population that is centered in the central region of the Carbon Population Area (Emma Park) would be impacted to a lesser degree because development is not currently focused in this area, this habitat would be left more intact, and the local birds are mostly nonmigratory." Potential connectivity for Tavaputs, Emma Park, and Tribal lands is unknown.

Sheeprocks – The Sheeprocks area is predominantly BLM, USFS, SITLA, and private land. There are 11 leks in this area. From 2007 to 2016, the 10-year running mean population of male birds on Sheeprock population area leks was 51 males, with 119 males in 2007 and 21 males in 2016. The 10-year decline went from an estimated 472 birds to 84 birds. Isolation and small-size was identified as a major causal factor in the Causal Factor Analysis [BLM 2021] for the Sheeprocks population. Since 2016 when Sheeprocks hit a hard population trigger under the 2015 ARMPA, the population has been augmented through translocations of sage-grouse from other populations in Utah. Telemetry data has been collected in association with the

translocations. Translocations has led to a heavily augmented population that is isolated and shows no connectivity or movement corridors to other populations.

Under Alternatives 5 and 6, Sheeprocks would be entirely managed as GHMA. The boundary would also remove prior PHMA/GHMA north of Faust/Rush Valley and areas in the Little Sahara Recreation Area south of Old Highway 148 (Weiss Highway), which was identified in the 2019 planning effort. These are two small areas in the Sheeprocks area, which would be "managed as available for cross-country OHV use. Approximately 6,320 acres in the 5 Mile Pass area in GHMA on the northeastern portion of Sheeprocks, and 7,900 acres in the Little Sahara Sand Dunes area in GHMA on the southern portion of the Sheeprocks population would be managed as available for cross-country OHV use. The acres in both areas are directly adjacent to other areas that are also available to cross-country OHV use, and were originally part of the same open areas prior to 2015. The 2015 Final EIS notes that "habitat loss could occur associated with cross-country OHV use" (2015 Final EIS page 4-52). However, a review of GPS tracking data for GRSG in the Sheeprocks area indicates that none of the collared birds (a sub-sample of the total population) used the areas proposed to be made available to cross-country use again (Chelak and Messmer 2017). "Due to the long-term use in both of these areas prior to 2015, these areas have likely already experienced the habitat losses, so this change is not anticipated to result in impacts on Greater Sage-Grouse or its habitat." [2018 FEIS p. 4-22].

3.7 WYOMING

BLM Wyoming used the most current scientific information, GRSG leks, and local expertise to update and revise GRSG HMA's across the state. HMAs in Alternatives 5 and 6 were developed by the State of Wyoming and adopted by the BLM as developed. For Alternatives 3 and 4, BLM first considered the existing HMA boundaries as identified in the 2015 and 2019 plans. The original HMA boundaries were updated and revised using the following data sources: (A) modeled GRSG lek persistence (Wann et al. 2023), (B) modeled sagebrush habitats that currently have high ecological integrity (Doherty et al. 2022), (C) modeled sagebrush habitats that are projected to have high ecological integrity into the near future (2030-2060) (Doherty et al. 2022), (D) genetic connectivity (Row et al. 2018; Cross et al. 2023), (E) sagebrush, invasive annual grass and conifer canopy cover (estimated in 2021; Rigge et al. 2021a,b); (F) terrain ruggedness (i.e., a measure of the variation in terrain slope and aspect; Welty and Jefferies 2018); (G) fire perimeter data from 1985 to 2021 (National Interagency Fire Center); (H) active energy development data (Wyoming Oil and Gas Conservation Commission); (I) GRSG lek activity status (Whitford and Bish 2022); (J) National Agriculture Imagery Program (NAIP) aerial imagery (2019); and (K) local expertise and data.

Wyoming's efforts to update GRSG core areas began in March, 2023. The State generated Draft 1 of proposed changes to core areas the week of May 15. The State's Draft 1 polygons were overlayed with BLM's HMA polygons so that the extent of both efforts was captured in Alternative 4.

Wyoming revised their core area designated habitats several times between release of Draft 1 in May and the final version released October 18, 2023. The final version of the State's core area polygons was adopted by the BLM as Alternatives 5 and 6.

Three tiers of habitat designations were considered for HMAs: (1) Priority Habitat Management Areas (PHMA); (2) Stewardship Habitat Management Areas (SHMA); and (3) General Habitat Management Areas (GHMA). PHMA was the only designation considered in Alternative 3; PHMA and GHMA were designations considered in Alternative 4; and PHMA, SHMA and GHMA were designations considered in Alternatives 5 and 6. Definitions of PHMA and GHMA are the same as those in the 2019 plan, and the definition of SHMA is the same as that provided to BLM by the State of Wyoming for the areas receiving this designation.

Generalized management statements were added to the definitions of PHMA and GHMA for clarity and to align the information provided in these definitions with the definition of SHMA received from the State.

PHMAs: GRSG habitats that have the highest conservation value for maintaining or increasing GRSG populations. The management in these areas is focused towards maintaining, enhancing, and where necessary restoring conditions suitable for GRSG across the seasonal ranges included as PHMA (breeding, brood-rearing, winter, and connectivity).

SHMAs: GRSG habitats that are generally characterized by large percentages of private land, existing disturbance and prior and existing rights, and fragmented landscapes but that continue to support substantial populations of GRSG, provide important connections between populations, and are important for maintaining GRSG populations. Management in SHMA is consistent with GHMA restrictions.

GHMA: used to designate all occupied and potential GRSG habitats not designated as PHMA or SHMA. Management in GHMA is focused on sustaining habitats suitable for GRSG populations using these areas.

Although the total area considered PHMA, SHMA and GHMA combined did not differ between alternatives 3, 4, 5 and 6, different combinations of habitat designations among alternatives were considered to provide a range of alternatives and as such planning flexibility resulting from EIS analyses. Alternative 3 is the conservation-forward alternative and the BLM is analyzing all habitats occupied by GRSG plus habitats that provide suitable habitat conditions for the species in the State as PHMA. The overall extent of PHMA in alternative 3 is considered as the extent of PHMA, SHMA and GHMA combined in alternatives 4, 5, and 6.

Alternatives 4, 5, and 6 considered revisions to the current (Alternatives 1 and 2) PHMA (core area) designated areas. In general, alternative 4 follows closely with the results of the research described above resulting in more habitats in the State being designated as PHMA compared to alternative 5. Alternatives 5 and 6 put more weight on GRSG lek count information and existing and potential anthropogenic disturbance compared to alternative 4 resulting in a more focused application of the PHMA designation to areas identified as being associated with GRSG leks supporting a greater percentage of the State's population of GRSG. An area in northeastern Wyoming was identified following the State's process as supporting high GRSG populations but was designated as SHMA in Alternative 5 because of high levels of existing disturbance and private lands. Revisions to the designation of areas currently considered PHMA (Alternatives 1 and 2) that no longer provide GRSG with suitable habitat conditions were incorporated into alternatives 4, 5, and 6.

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