Greater Sage-grouse Record of Decision for

Idaho and Southwest Montana, Nevada and Utah

and Land Management Plan Amendments for the

Amendment #13 Humboldt National Forest
Amendment #17 Toiyabe National Forest

Prepared by: USDA Forest Service

Signed by Nora Rasure, September 16, 2015

To view a fully copy of the Record of decision go to

http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3855559.pdf

ATTACHMENT B – GREATER SAGE-GROUSE NEVADA PLAN AMENDMENT

Forest Service Plan Components[1]

Desired condition - A description of specific social, economic, and/or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed. Desired conditions must be described in terms that are specific enough to allow progress toward their achievement to be determined, but do not include completion dates.

Objective - A concise, measurable, and time-specific statement of a desired rate of progress toward a desired condition or conditions. Objectives should be based on reasonably foreseeable budgets.

Standard - A mandatory constraint on project and activity decision making, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

Guideline – A constraint on project and activity decision making that allows for departure from its terms, so long as the purpose of the guideline is met. Guidelines are established to help achieve or maintain a desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

The direction in the following standards and guidelines will be applied consistent with applicable valid existing rights, laws, and regulations.

General Greater Sage-grouse

GRSG-GEN-DC-001-Desired Condition – The landscape for greater sage-grouse encompasses large contiguous areas of native vegetation, approximately 6 to 62 square miles in area, to provide for multiple aspects of species life requirements. Within these landscapes, a variety of sagebrush-community compositions exist without invasive species, which have variations in subspecies composition, co-dominant vegetation, shrub cover, herbaceous cover, and stand structure, to meet seasonal requirements for food, cover, and nesting for greater sage-grouse.

GRSG-GEN-DC-002-Desired Condition – Anthropogenic disturbance is focused in non-habitat areas outside of priority and general habitat management areas and sagebrush focal areas[2]. Disturbance in general habitat management areas is limited, and there is little to no disturbance in priority habitat management areas and sagebrush focal areas except for valid existing rights and authorized uses.

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[1] Plan component definitions are based on generally accepted meanings under the 1982 rule and the Forest Service Plan Wording Style Guide 2009, http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5260265.pdf.

[2] Priority habitat management areas and general habitat management areas may contain areas of non-habitat, and management direction would not apply to those areas of non-habitat. However, management direction would apply to all areas within sagebrush focal areas including non-habitat.

GRSG-GEN-DC-003-Desired Condition – In greater sage-grouse habitats, including all seasonal habitats, 70% or more of lands capable of producing sagebrush have 10 to 30% sagebrush canopy cover and less than 10% conifer canopy cover. In addition, within breeding and nesting habitat, sufficient herbaceous vegetation structure and height provides overhead and lateral concealment for nesting and early brood rearing life stages. Within brood rearing habitat, wet meadows and riparian areas sustain a rich diversity of perennial grass and forb species relative to site potential. Within winter habitat, sufficient sagebrush height and density provides food and cover for greater sage-grouse during this seasonal period. Specific desired conditions for greater sage-grouse based on seasonal habitat requirements are in tables 1a and 1b.

Table 1a. *Seasonal Habitat Desired Conditions for Greater Sage-grouse at the Landscape Scale. (Generally applies in Ecoregion 342[1], although may be applied outside of Ecoregion 342[1] based on local ecological site conditions.)*

ATTRIBUTE	INDICATORS	DESIRED CONDTION
BREEDING AND NESTING [2,3,4] (Seasonal Use Period March 1 to June 30) (Within the Breeding and Nesting Period - Lekking Period: March 1 to May 15; Nesting Period: April 1 to June 30) Apply 4.0 miles from active leks.[5]		
Lek Security	Proximity of trees [6]	Trees or other tall structures are absent to uncommon within 3 miles (5 km) leks [7,8,16]
	Proximity of sagebrush to leks [7]	Adjacent protective sagebrush cover within 328 feet of lek [7]
Cover	Seasonal habitat extent [8] (Percent of seasonal habitat meeting desired conditions.)	>80% of the breeding and nesting habitat
	Sagebrush canopy cover [7,8,9]	>15%
	Sagebrush height [8] Arid sites [7,8,10] Mesic sites [7,8,11]	 > 12 inches >16 inches
	Predominant sagebrush shape [7]	>50% in spreading [12]
	Perennial grass cover [7,8] Arid sites [8,10] Mesic sites [8,11]	 ≥10% ≥15%
	Perennial grass height [7,8,9]	Provide overhead and lateral concealment from predators [8, 16]
	Perennial forb canopy cover [7,8,9] Arid sites [10] Mesic sites [11]	 ≥5% [7,8] ≥10% [7,8]

ATTRIBUTE	INDICATORS	DESIRED CONDTION
BROOD-REARING/SUMMER[2] (Seasonal Use Period May 15 to September 15)		
Cover	Seasonal habitat extent [8] (Percent of seasonal habitat meeting desired conditions.)	>40% of the brood-rearing/summer habitat
	Sagebrush canopy cover [7,8,9]	10 to 25%
	Sagebrush height [8,9]	> 16 inches
	Perennial grass and forb canopy cover [7,8]	>15%
	Riparian areas/mesic meadows	Proper Functioning Condition [13]
	Upland and riparian perennial forb availability [6,7]	Preferred forbs are common with several preferred species present [14]
	Sagebrush cover adjacent to riparian areas/mesic meadows [7]	Within 328 feet (100 meters)
Security	Riparian Area/Meadow Interspersion with adjacent sagebrush	Has adjacent sagebrush cover [6, 7]
FALL/WINTER[2] (Seasonal Use Period September 16 to February 28) (Fall: September 16 to October 31; Winter: November 1 to February 28)		
Cover and Food	Seasonal habitat extent [7,8,9] (Percent of seasonal habitat meeting desired conditions.)	>80% of the winter habitat
	Sagebrush canopy cover above snow [7,8,9]	>10%
	Sagebrush height above snow [7,8,9]	>10 inches [15]

[1]Bailey, R. G.; Avers, P. E.; King, T.; McNab, W. H., eds. 1994. Ecoregions and subregions of the United States (map). Washington, DC: USDA Forest Service. 1:7,500,000. With supplementary table of map unit descriptions, compiled and edited by W. H. McNab and R. G. Bailey.

[2]Seasonal dates can be adjusted; that is, start and end dates may be shifted either earlier or later, but the amount of days cannot be shortened or lengthened by the local unit. Seasonal dates are based on dates used by Nevada Department of Wildlife (NDOW) to designate sage-grouse seasonal use. These dates overlap to allow for localized variation across the state.

[2] Doherty, K. 2008. *Sage-grouse and Energy Development: Integrating Science with Conservation Planning to Reduce Impacts*. University of Montana. Missoula, MT.

[4] Holloran and Anderson. 2005. *Spatial Distribution of Greater Sage-grouse nests in relatively contiguous sagebrush habitats*. Condor 107:742-752.

[5] Buffer distance may be changed only if 3 out of 5 years if peer reviewed and published telemetry studies indicate the 4 miles is not appropriate.

[6] Baruch-Mordo, S. J.S. Evans, J.P Severson, D.E. Naugle, J. D. Maestas, J.M. Kiesecker, M.J. Falkowski. C.A. Hagen, and K.P. Reese. . 2013. *Saving sage-grouse from trees*: A proactive solution to reducing a key threat to a candidate species. Biological Conservation 167: 233-241.

[7] Stiver, S.J., E.T. Rinkes, D.E. Naugle, P.D. Makela, D.A. Nance, and J.W. Karl, eds., 2015. Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. BLM and Western Association of Fish and Wildlife Agencies, Denver, Colorado.

[8] Connelly, J. M. A. Schroweder, A.R. Sands, and C.E. Braun.2000. Guidelines to manage sage-grouse populations and their habitats. Wildlife Society Bulletin 28 (4): 967-985.

[9] Connelly, J. K. Reese, and M. Schroder. 2003. *Monitoring of Greater sage-grouse habitats and populations*. Station Bulletin 80, Contribution 979. University of Idaho, College of Natural Resources Experiment Station. Moscow, ID.

[10] 10–12 inch precipitation zone; *Artemisia tridentata wyomingensis* is a common big sagebrush sub-species for this type site (HAF 2014).

[11] ≥12 inch precipitation zone; *Artemisia tridentata vaseyana* is a common big sagebrush sub-species for this type site (HAF 2014).

[12] Sagebrush plants with a spreading shape provide more protective cover than sagebrush plants that are more tree- or columnar shaped (HAF 2014).

[13] Existing LMP desired conditions for riparian areas/mesic meadows (spring seeps) may be used in place of properly functioning conditions, if appropriate for meeting greater sage-grouse habitat requirements.

[14] Preferred forbs are listed in HAF Table III-2 (HAF 2014). Overall total forb cover may be greater than that of preferred forb cover since not all forb species are listed as preferred in Table III-2.

[15] The height of sagebrush remaining above the snow depends upon snow depth in a particular year. Intent is to manage for tall, healthy, sagebrush stands.

[16] Coates, P. S., M. L. Casazza, E. J. Blomberg, S. C. Gardner, S. P. Espinosa, J. L. Yee, L. Wiechman, and B. J. Halstead. 2013. Evaluating greater sage-grouse seasonal space use relative to leks: implications for surface use designations in sagebrush ecosystems. Journal of Wildlife Management 77: 1598–1609.

Table 1b. *Seasonal Habitat Desired Conditions for Greater Sage-grouse. (Generally applies in Ecoregion 341[1], although may be applied outside of Ecoregion 341[1] based on local ecological site conditions.)*

	INDICATOR	DESIRED CONDITION
GENERAL/LANDSCAPE-LEVEL		
Cover (Nesting)	Seasonal Habitat Needed	>65% of the landscape in sagebrush cover [2]
	Annual Grasses	<5%5 [3]
Security (Nesting)	Conifer encroachment	<3% phase I (>0% to <25% cover) No phase II (25 – 50% cover) No phase III (>50% cover)
Cover and Food (Winter)	Conifer encroachment	<5% phase I (>0% to <25% cover) No phase II (25 – 50% cover) No phase III (>50% cover)
	Sagebrush extent	>85% sagebrush land cover
BREEDING AND NESTING (Seasonal Use Period March 1-June 30) [4] (Within the Breeding and Nesting Period - Lekking Period: March 1 to May 15; Nesting Period: April 1 to June 30) Apply 4.0 miles from pending and active leks. [19]		
Security [6]	Tree cover	<3% landscape canopy cover within 1 km of leks[5]
	Proximity of tall structures (1 meter above shrub canopy, excluding fences)	None within 3 miles (5 kilometers) [18]
Cover	Availability of sagebrush cover	Has adjacent sagebrush cover [9,17]
	Sagebrush canopy cover	≥20% [13,14]
	Residual and live perennial grass cover	≥10% if shrub cover <25%[5,7,8]
	Annual grass cover [7]	<5% [15]
	Perennial grass height	Provide overhead and lateral concealment from predators [9,20]
	Total shrub cover	≥30% [7,13]
BROOD-REARING/SUMMER (Seasonal Use Period May 15 to September 15) [4]		
Cover	Sagebrush canopy cover	10%-25% [9]
	Perennial grass canopy cover and forbs	>15% combined perennial grass and forb canopy cover [9]
	Perennial Grass Height	Provide overhead and lateral concealment from predators [9,20]
Cover and Food	Perennial forb canopy cover	≥5% arid (<10 inches precipitation) ≥15% mesic (> 10 inches precipitation or within meadow system) [6]

	INDICATOR	DESIRED CONDITION
Food	Riparian Areas/Meadows	Proper Functioning Condition [17]
	Understory species richness (in the vicinity of riparian areas/meadows)	≥5 preferred forb species present [5,6]
Security	Riparian Area/Meadow Interspersion with adjacent sagebrush	Has adjacent sagebrush cover[9,17]
FALL/WINTER (Seasonal Use Period September 16 to February 28) [4] (Fall: September 16 to October 31; Winter: November 1 to February 28)		
Cover and Food	Sagebrush canopy cover	≥10% above snow depth[9]
	Sagebrush height	>10 inches (25 centimeters) above snow depth[9]

[1]Bailey, R. G.; Avers, P. E.; King, T.; McNab, W. H., eds. 1994. Ecoregions and subregions of the United States (map). Washington, DC: USDA Forest Service. 1:7,500,000. With supplementary table of map unit descriptions, compiled and edited by W. H. McNab and R. G. Bailey.

[2] Aldridge, C. L.; Boyce, M. S. 2007. Linking occurrence and fitness to persistence: Habitat-based approach for endangered Greater Sage-Grouse. Ecological Applications, 17: 508 – 526.

[3] Blomberg, E.J., J.S. Sedinger, M.T. Atamian, and D.V. Nonne. 2012. Characteristics of climate and landscape disturbance influence the dynamics of greater sage-grouse populations. Ecosphere 3(6):55.

[4] Seasonal dates can be adjusted; that is, start and end dates may be shifted either earlier or later, but the amount of days cannot be shortened or lengthened by the local unit. Seasonal dates are based on dates used by Nevada Department of Wildlife (NDOW) to designate sage-grouse seasonal use. These dates overlap to allow for localized variation across the state.

[5] Baruch-Mordo, S., J. S. Evans, J. P. Severson, D. E. Naugle, J. D. Maestas, J. M. Kiesecker, M. J. Falkowski, C. a. Hagen, and K. P. Reese. 2013. Saving sage-grouse from the trees: a proactive solution to reducing a key threat to a candidate species. Biological Conservation 167:233–241.

[6]Casazza, M.L., P.S. Coates, C.T. Overton. 2011. Linking habitat selection to brood success in greater sagegrouse. In: Sandercock, MK, K Martin, G Segelbacher (eds.). Ecology, Conservation, and Management of Grouse. University of California Press. Pp. 151-167.

[7]Coates, P.S., and D.J. Delehanty. 2010. Nest predation of greater sage-grouse in relation to microhabitat factors and predators. Journal of Wildlife Management 74:240-248.

[8]Coates, P. S., M. L. Casazza, E. J. Blomberg, S. C. Gardner, S. P. Espinosa, J. L. Yee, L. Wiechman, and B. J. Halstead. 2013. Evaluating greater sage-grouse seasonal space use relative to leks: implications for surface use designations in sagebrush ecosystems. Journal of Wildlife Management 77: 1598–1609.

[9]Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to manage sage-grouse populations and their habitats. Wildlife Society Bulletin 28:967-985.

[10]Connelly, J.W., Reese, K.P., M.A. Schroeder. 2003. Monitoring of Greater Sage-Grouse Habitats and Populations. Station Bulletin 80.

[11]Doherty, K.E., Naugle, D.E., Walker, B.L., and J.M. Graham. 2008. Greater Sage-Grouse Winter Habitat Selection and Energy Development. Journal of Wildlife Management: 72(1):187-195. 2008.

[12]Hagen, C.A., Connelly, J.W. & Schroeder, M.A. 2007: A meta-analysis of greater sage-grouse (Centrocercus urophasianus) nesting and brood-rearing habitats. - Wildlife Biology: 13 (Suppl. 1): 42-50.

[13]Kolada, E.J., J.S. Sedinger, M.L. Casazza. 2009a. Nest site selection by greater sage-grouse in Mono County, California. Journal of Wildlife Management 73:1333-1340.

[14]Kolada, E.J., J.S Sedinger, M.L. Casazza. 2009b. Ecological factors influencing nest survival of greater sage-grouse in Mono County, California. Journal of Wildlife Management 73:1341-1347.

[15]Lockyer, Z., P.S. Coates, M.L. Casazza, S. Espinosa, D.L. Delehanty. In review. Linking nest site selection to nest survival in greater sage-grouse.

[16]Nevada Governor's Sage-grouse Conservation Team. 2010. Nevada energy and infrastructure development standards to conserve greater sage-grouse populations and their habitats. Pp 9-11.

[17]Stiver, S.J., E.T. Rinkes, D.E. Naugle, P.D. Makela, D.A. Nance, and J.W. Karl, eds. [In press]. Sage-Grouse Habitat Assessment Framework: A Multiscale Assessment Tool. Technical Reference 6710-1. BLM and Western Association of Fish and Wildlife Agencies, Denver, Colorado.

[18] Gibson, D., E. Blomberg, and J. Sedinger. 2013. Dynamics of Greater Sage-grouse (Centrocercus urophasianus) Populations in Response to Transmission Lines in Central Nevada. Progress Report: Final December 2013of Land Management, Idaho State Office, Boise, Idaho.

[19] Buffer distance may be changed only if 3 out of 5 years of telemetry studies indicate the 4 miles is not appropriate.

[20] Projects will be designed to provide overhead and lateral concealment of nests on a site specific basis.

GRSG-GEN-ST-004-Standard – In priority habitat management areas and sagebrush focal areas, do not issue new discretionary written authorizations unless all existing discrete anthropogenic disturbances cover less than 3% of the total greater sage-grouse habitat within the Biologically Significant Unit and the proposed project area, regardless of ownership, and the new use will not cause exceedance of the 3% cap. Discretionary activities that might result in disturbance above 3% at the Biologically Significant Unit and proposed project area would be prohibited unless approved by the forest supervisor with concurrence from the regional forester after review of new or site-specific information that indicates the project would result in a net conservation gain at the Biologically Significant Unit and proposed project area scale. Within existing designated utility corridors, the 3% disturbance cap may be exceeded at the project scale if the site specific NEPA analysis indicates that a net conservation gain to the species will be achieved. This exception is limited to projects that fulfill the use for which the corridors were designated (e.g., transmission lines, pipelines) and the designated width of a corridor will not be exceeded as a result of any project co-location. Consider the likelihood of surface disturbing activities as a result of development of valid existing rights when authorizing new projects in priority habitat management areas.

GRSG-GEN-ST-005-Standard – In priority and general habitat management areas and sagebrush focal areas, only allow new authorized land uses, if after avoiding and minimizing impacts, any remaining residual impacts to greater sage-grouse or their habitats are fully offset by compensatory mitigation projects that provide a net conservation gain to the species, subject to valid existing rights, by applying beneficial mitigation actions. Any compensatory mitigation will be durable, timely, and in addition to what would have resulted without the compensatory mitigation as addressed in the Mitigation Framework (Appendix B).

GRSG-GEN-ST-006-Standard – Do not authorize new surface disturbing and disruptive activities that create noise at 10dB above ambient measured at the perimeter of an occupied lek during lekking (March 1 to May 15) from 6 pm to 9 am. Do not include noise resulting from human activities that have been authorized and initiated within the past 10 years in the ambient baseline measurement.

GRSG-GEN-GL-007-Guideline – During breeding and nesting (March 1 to June 30), surface disturbing and disruptive activities to nesting birds should be avoided.

GRSG-GEN-GL-008-Guideline – In priority and general habitat management areas and sagebrush focal areas, conduct surveys during the breeding season during pre-planning operations. Use protocols such as those established by State Fish and Wildlife agencies. The surveys should encompass all suitable greater sage-grouse habitats within 4 miles of the proposed activities.

GRSG-GEN-GL-009-Guideline – When breeding and nesting habitat overlaps with other seasonal habitats, habitat should be managed for breeding and nesting desired conditions in tables 1a and 1b.

GRSG-GEN-GL-010-Guideline – Development of tall structures within 3.0 miles from the perimeter of occupied leks, as determined by local conditions (e.g., vegetation or topography), with the

potential to disrupt breeding or nesting by creating new perching/nesting opportunities for avian predators or by decreasing the use of an area, should be restricted within nesting habitat.

Adaptive Management

GRSG-AM-ST-011-Standard – If a hard trigger is identified based on either population monitoring or habitat monitoring, immediate action is necessary to stop a severe deviation from GRSG conservation objectives. The hard trigger responses are identified in tables 1 and 2 of the Adaptive Management Appendix C for both priority and general management areas.

GRSG-AM-ST-012-Standard – If a soft trigger is identified based on either population monitoring or habitat monitoring, apply more conservative or restrictive implementation measures (e.g., extending seasonal restrictions for seasonal surface disturbing activities, modifying seasons of use for livestock grazing, and applying additional restrictions on discretionary activities) for the specific causal factor in the decline of populations and/or habitats, with considering local knowledge and conditions. (Appendix C)

Lands and Realty

Special Use Authorizations (non-recreation)

GRSG-LR-SUA-O-013-Objective – In nesting habitats, retrofit existing tall structures (e.g., power poles, communication tower sites) with perch deterrents or other anti-perching devices within 2 years of signing the ROD.

GRSG-LR-SUA-ST-014-Standard – In priority habitat management areas and sagebrush focal areas, restrict issuance of new lands special use authorizations for infrastructure, such as high-voltage transmission lines, major pipelines, distribution lines, and communication tower sites. Exceptions may include co-location and must be limited (e.g., safety needs) and based on rationale (e.g., monitoring, modeling, or best available science) that explicitly demonstrates that adverse impacts to greater sage-grouse will be avoided by the exception. If co-location of new infrastructure cannot be accomplished, locate it adjacent to existing infrastructure, roads, or already disturbed areas and limit disturbance to the smallest footprint or where it best limits impacts to greater sage-grouse or their habitat. Existing authorized uses will continue to be recognized.

GRSG-LR-SUA-ST-015-Standard – In general habitat management areas, new lands special use authorizations may be issued for infrastructure, such as high-voltage transmission lines, major pipelines, distribution lines, and communication tower sites, if they can be located within existing designated corridors or rights-of-way and the authorization includes stipulations to protect greater sage-grouse and their habitats. Existing authorized uses will continue to be recognized.

GRSG-LR-SUA-ST-016-Standard – In priority and general habitat management areas and sagebrush focal areas, do not authorize temporary lands special uses (i.e., facilities or activities)

that result in loss of habitat or would have long-term (i.e., greater than 5 years) negative impact on greater sage-grouse or their habitats.

GRSG-LR-SUA-ST-017-Standard – In priority and general habitat management areas and sagebrush focal areas, require protective stipulations (e.g., noise, tall structure, guy wire removal, perch deterrent installation) when issuing new authorizations or during renewal, amendment, or reissuance of existing authorizations that authorize infrastructure (e.g., high-voltage transmission lines, major pipelines, roads, distribution lines, and communication tower sites).

GRSG-LR-SUA-ST-018-Standard – In priority and general habitat management areas and sagebrush focal areas, locate upgrades to existing transmission lines within the existing designated corridors or right-of-way unless an alternate route would benefit greater sage-grouse or their habitats.

GRSG-LR-SUA-ST-019-Standard – In priority and general habitat management areas and sagebrush focal areas, when a lands special use authorization is revoked or terminated and no future use is contemplated, require the authorization holder to remove overhead lines and other surface infrastructure in compliance with 36 CFR 251.60(i).

GRSG-LR-SUA-GL-020-Guideline – In priority habitat management areas and sagebrush focal areas, outside of existing designated corridors and rights-of-way, new transmission lines and pipelines should be buried to limit disturbance to the smallest footprint unless explicit rationale is provided that the biological impacts to greater sage-grouse and its habitat are being avoided. If new transmission lines and pipelines are not buried, locate them adjacent to existing transmission lines and pipelines.

GRSG-LR-SUA-GL-021-Guideline – The best available science and monitoring should be used to inform infrastructure siting in GRSG habitat.

Land Ownership Adjustments

GRSG-LR-LOA-ST-022-Standard – In priority and general habitat management areas and sagebrush focal areas, do not approve landownership adjustments, including land exchanges, unless the action results in a net conservation gain to greater sage-grouse or it will not directly or indirectly adversely impact greater sage-grouse conservation.

GRSG-LR-LOA-GL-023-Guideline – In priority and general habitat management areas and sagebrush focal areas with minority Federal ownership, consider landownership adjustments to achieve a landownership pattern (e.g., consolidation, reducing fragmentation) that supports improved greater sage-grouse population trends and habitats.

Land Withdrawal

GRSG-LR-LW-GL-024-Guideline – In priority and general habitat management areas and sagebrush focal areas, use land withdrawals as a tool, where appropriate, to withhold an area from activities that will be detrimental to greater sage-grouse or their habitats.

Wind and Solar

GRSG-WS-ST-025-Standard – In priority and general habitat management areas and sagebrush focal areas, do not authorize new solar utility-scale and/or commercial energy development except for on-site power generation associated with existing industrial infrastructure (e.g., mine site).

GRSG-WS-ST-026-Standard – In priority habitat management areas and sagebrush focal areas, do not authorize new wind energy utility-scale and/or commercial development.

GRSG-WS-GL-027- Guideline – In general habitat management areas, new wind energy utility-scale and/or commercial development should be restricted. If development cannot be restricted due to existing authorized use, adjacent developments, or split estate issues, then ensure that stipulations are incorporated into the authorization to protect greater sage-grouse and their habitats.

Greater Sage-grouse Habitat

GRSG-GRSG-DC-028-Desired Condition – Sagebrush vegetation communities provide contiguous habitat for greater sage grouse, which is resistant and resilient to disturbances such as fire and invasives.

GRSG-GRSGH-O-029-Objective – Every 10 years for the next 50 years, improve greater sage-grouse habitat by removing invading conifers and other undesirable species within the number of acres shown in table 2.

Table 2. *Treatment Acres per Decade.*[1]

	ACRES		
FOREST	**MECHANICAL**[2]	**PRESCRIBED FIRE**[3]	**GRASS RESTORATION**[4]
Humboldt-Toiyabe Total	202000	0	43000
Population Area 15	200000	0	26000
Population Area 26	2000	0	17000

[1]These are estimates of treatments required to achieve and/or maintain desired habitat conditions over a period of 10 years. There are many dynamic and highly variable disturbances that may happen over that period of time that could have a significant effect on the amount, type, and timing of treatment needed. Those disturbances are factored into the 10-year simulation using stochastic, not deterministic, techniques. Probabilities of events such as large wildfires are used in the model to make the simulation as realistic as possible, given empirical data about such events in the past, but the results of the simulation cannot be used to predict the future occurrence of such events, including their timing, size, or location, which are essentially random.

[2]Removal of conifers that have invaded sagebrush including phase one juniper that is 10% or less and reducing sagebrush cover in areas over 30% canopy cover

[3]Acres are those that are greater than 30% sagebrush canopy cover and/or invaded by 10% or greater conifer.

[4]Acres presently dominated by annual grasses that could be improved by herbicide application and seeding of perennial vegetation.

GRSG-GRSGH-ST-030-Standard – Design habitat restoration projects to move towards desired conditions (table 1a or 1b).

GRSG-GRSGH-GL-031-Guideline – When removing conifers that are encroaching into greater sage-grouse habitat, avoid persistent woodland (i.e., old growth relative to the site or more than 100 years old).

GRSG-GRSGH-GL-032-Guideline – In priority and general habitat management areas and sagebrush focal areas, actions and authorizations should include design features to limit the spread and effect of undesirable non-native plant species.

GRSG-GRSGH-GL-033-Guideline – To facilitate safe and effective fire management actions, in priority and general habitat management areas and sagebrush focal areas, fuel treatments in high-risk areas (i.e., areas likely to experience wildfire at an intensity level that might result in movement away from the greater sage-grouse desired conditions in table 1) should be designed to reduce the spread and/or intensity of wildfire or the susceptibility of greater sage-grouse attributes to move away from desired conditions (table 1a and table 1b).

GRSG-GRSGH-GL-034-Guideline – In priority and general habitat management areas and sagebrush focal areas, native plant species should be used, when possible, to maintain, restore, or enhance desired habitat conditions (table 1a or 1b).

GRSG-GRSGH-GL-035-Guideline – In priority habitat management areas and sagebrush focal areas, vegetation treatment projects should only be conducted if they maintain, restore, or enhance desired habitat conditions (table 1a or 1b).

GRSG-GRSGH-GL-036-Guideline – Vegetation treatment activities in lentic riparian areas (i.e., seeps, springs, and wet meadows) in priority and general habitat management areas and sagebrush focal areas, should only be authorized if they maintain or improve conditions to meet greater sage-grouse desired conditions (table 1a or 1b).

GRSG-GRSGH-GL-037-Guideline – When authorizing vegetation management treatments in priority and general sage grouse habitat management areas and sagebrush focal areas, priority should be given to treatments in Phase I and early Phase II pinyon and/or juniper stands in areas with a sagebrush component. Pinyon-Juniper treatments in Phase I and Phase II condition should be designed to maintain or enhance sagebrush in the treatment areas. Treatments in late Phase II or Phase III condition should only be authorized to create movement corridors, connect habitats, or reduce the potential for catastrophic fire.

GRSG-GRSGH-GL-038-Guideline – In priority and general habitat management areas and sagebrush focal areas, treatment methodologies should be based on the treatment areas' resistance to annual invasive grasses and the resilience of native vegetation to respond after disturbance. Use mechanical treatments (i.e., do not use fire) in areas with relatively low resistance to annuals and treat areas in early- to mid-phase pinyon-juniper expansion.

Livestock Grazing

GRSG-LG-DC-039-Desired Condition – In priority and general habitat management areas, sagebrush focal areas, and within lek buffers, livestock grazing is managed to maintain or move towards desired conditions. (tables 1a and 1b)

GRSG-LG-ST-040-Standard – In priority and general management areas and sagebrush focal areas, do not approve construction of water developments unless beneficial to greater sage-grouse habitat and consistent with State approved water rights.

GRSG-LG-ST-041-Standard – When vertical embankments in water troughs or open water facilities pose a drowning risk to birds, wildlife escape ramps should be installed and maintained.

GRSG-LG-GL-042-Guideline – Grazing guidelines should be applied in each of the seasonal habitats in table 3. If values in table 3 guidelines cannot be achieved based upon a site-specific analysis using Ecological Site Descriptions, long-term ecological site potential analysis, or other similar analysis, adjust grazing management to move towards desired habitat conditions in table 1a or 1b consistent with the ecological site potential. Do not use drought and degraded habitat condition to adjust values. Grazing guidelines in table 3 would not apply to isolated parcels of National Forest System lands that have less than 200 acres of greater sage-grouse habitat.

Table 3. *Grazing Guidelines for Greater Sage-grouse Seasonal Habitat.*

SEASONAL HABITAT	GRAZING GUIDELINES
Breeding and nesting [1] within 4 miles of occupied leks	Perennial grass height: [2] When grazing occurs during breeding and nesting season (March 1 to June 30) manage for upland perennial grass height of 7 inches.[3,5] Measure average droop height, assuming current vegetation composition has the capability to achieve these heights. Heights will be measured at the end of the nesting period (Connelly et al., 2000). When grazing occurs post breeding and nesting season but before fall (July 1 to September 15) manage for 4 inches of upland perennial grass height.[5,6]
Brood rearing and summer [1]	When grazing occurs post breeding and nesting season but before fall (July 1 to September 15), retain an average stubble height of 4 inches for herbaceous riparian/mesic meadow vegetation in all[7] greater sage-grouse habitats. [5,8,9]
Winter/Fall [1]	≤35% utilization of sagebrush

[1] For descriptions of Seasonal Habitat and Seasonal Periods of greater sage-grouse see table 1a and 1b.

[2] Grass heights only apply in breeding and nesting habitat with ≥10% sagebrush cover to support nesting.

[3] Holloran, M. J., B. J. Heath, A. G. Lyon, S. J. Slater, J. L. Kuipers, and S. H. Anderson. 2005. Greater sage-grouse nesting habitat selection and success in Wyoming. Journal Wildlife Management 69:638-649.

[5] Hagen C., J.W. Connelly, and M.A. Schroeder. 2007. *A meta-analysis of greater sage-grouse Centrocercus urophasianus nesting and brood-rearing habitats*.

[6] Stubble height to be measured at the end of the growing season.

[7] All GRSG habitat with greater than 10% sagebrush cover irrespective of lek buffers and designated habitat management areas.

[8] In riparian brood-rearing habitat, sage-grouse prefer the lower vegetation (5–15 cm vs. 30–50 cm; Oakleaf 1971, Neel 1980, Klebenow 1982, Evans 1986) and succulent forb growth stimulated by moderate livestock grazing in spring and early summer (Neel 1980, Evans 1986); moderate use equates to a 10-cm residual stubble height for most grasses and sedges and 5-cm for Kentucky bluegrass (Mosley et al. 1997, Clary and Leininger 2000) (Crawford et al. 2004. Ecology and Management of sage-grouse grouse habitat).

[9] Stubble height to be measured in the meadow areas used by greater sage-grouse for brood-rearing (not on the hydric greenline). These meadows typically have sagebrush within 328 feet of the meadow.

GRSG-LG-GL-043-Guideline – In priority and general habitat management areas and sagebrush focal areas, when grazing permits are waived without preference or obtained through permit cancellation, consider the agency's full range of administrative authorities for future allotment management, including, but not limited to allotment closure, vacancy status for resource protection, establishment of forage reserve, re-stocking, or livestock conversion as management options to maintain or achieve desired habitat conditions (table 1).

GRSG-LG-GL-044-Guideline – Bedding sheep and placing camps within 2.0 miles from the perimeter of a lek during lekking (March 1 to May 15) should be restricted.

GRSG-LG-GL-045-Guideline – During the breeding and nesting season (March 1 to June 30), trailing livestock through breeding and nesting habitat should be minimized. Specific routes should be identified, existing trails should be used, and stopovers on active leks should be avoided.

GRSG-LG-GL-046-Guideline – Fences should not be constructed or reconstructed within 1.2 miles from the perimeter of occupied leks, unless the collision risk can be mitigated through design features or markings (e.g., mark, laydown fences, or other design features).

GRSG-LG-GL-047-Guideline – New permanent livestock facilities (e.g., windmills, water tanks, corrals) should not be constructed within 1.2 miles from the perimeter of occupied leks.

Fire Management

GRSG-FM-DC-048-Desired Condition – In priority and general habitat management areas and sagebrush focal areas, protect sagebrush sage grouse habitat from loss due to unwanted wildfires or damages resulting from management related activities while using agency risk management protocols to manage for fire fighter and public safety and other high priority values. In all fire response, first priority is the management of risk to firefighters and the public. Sage grouse habitat will be prioritized as a high value resource along with other high value resources and assets.

GRSG-FM-ST-049-Standard – In priority and general habitat management areas and sagebrush focal areas, do not use prescribed fire in 12-inch or less precipitation zones unless necessary to facilitate restoration of greater sage-grouse habitat consistent with desired conditions in table 1a or 1b or for pile burning.

GRSG-FM-ST-050-Standard – In priority and general habitat management areas and sagebrush focal areas, if it is necessary to use prescribed fire for restoration of greater sage-grouse habitat consistent with desired conditions in tables 1a and 1b, the associated NEPA analysis must identify how the project would move towards greater sage-grouse desired conditions, why alternative techniques were not selected, and how potential threats to greater sage-grouse habitat would be minimized.

GRSG-FM-GL-051-Guideline – In wintering or breeding and nesting habitat, sagebrush removal or manipulation, including prescribed fire, should be restricted unless the removal strategically reduces the potential impacts from wildfire or supports the attainment of desired conditions.

GRSG-FM-GL-052-Guideline – In planned fuels management activities or part of an overall vegetative management strategy to mitigate the impacts of wildfire in priority and general habitat management areas and sagebrush focal areas, when reseeding in fuel breaks, fire resistant native plant species should be used if available, or consider using fire resistance non-native species, if analysis and/or best available science demonstrates that non-native plants will not degrade greater sage-grouse habitat in the long-term.

GRSG-FM-GL-053-Guideline – In priority and general habitat management areas and sagebrush focal areas, fuel treatments should be designed to maintain, restore, or enhance greater sage-grouse habitat.

GRSG-FM-GL-054-Guideline – Locating temporary wildfire suppression facilities (e.g., incident command posts, spike camps, helibases, mobile retardant plants) in priority and general habitat management areas and sagebrush focal areas should be avoided. When needed to best provide for firefighter or public safety or to minimize fire size in sage grouse habitat, impacts to greater sage grouse should be considered and removal of sagebrush should be limited.

GRSG-FM-GL-055-Guideline – In priority and general habitat management areas and sagebrush focal areas, cross-country vehicle travel during fire operations should be restricted. When needed to best provide for firefighter or public safety or to minimize fire size in sage grouse habitat, impacts to sage grouse should be considered and removal of sagebrush should be limited.

GRSG-FM-GL-056-Guideline – In priority and general habitat management areas and sagebrush focal areas, use fire management tactics and strategies that seek to minimize loss of existing sagebrush habitat. The safest and most practical means to do so will be determined by fireline leadership and incident commanders.

GRSG-FM-GL-057-Guideline – In priority and general habitat management areas and sagebrush focal areas, prescribed fire prescriptions should minimize undesirable effects on vegetation and/or soils (e.g., minimize mortality of desirable perennial plant species and reduce risk of hydrophobicity).

GRSG-FM-GL-058-Guideline – In priority and general habitat management areas and sagebrush focal areas, roads and natural fuel breaks should be incorporated into planned fuel break design to improve effectiveness and minimize loss of existing sagebrush habitat.

GRSG-FM-GL-059-Guideline – In priority and general habitat management areas and sagebrush focal areas, where practical and available, all fire-associated vehicles and equipment should be inspected and cleaned using standardized protocols and procedures and approved vehicle/equipment decontamination systems before entering and exiting the area beyond initial attack activities to minimize the introduction of invasive annual grasses and other invasive plant species and noxious weeds.

GRSG-FM-GL-060-Guideline – Unit-specific greater sage-grouse fire management related information should be added to wildland fire decision support systems (currently, the Wildland Fire Decision Support System), local operating plans and resources advisor plans to be used during

fire situation to inform management decision, aid in development of strategies and tactics and for the prioritization of resources.

GRSG-FM-GL-061-Guideline – Localized maps of priority and general habitat management areas and sagebrush focal areas should be made available to fireline, dispatch and fire support personnel.

GRSG-FM-GL-062-Guideline – In or near priority and general habitat management areas and sagebrush focal areas, a greater sage-grouse resource advisor should be assigned to all extended attack fires.

GRSG-FM-GL-063-Guideline – On critical fire weather days, protection of greater sage-grouse habitat should receive high consideration, along with other high values, for positioning of resources.

GRSG-FM-GL-064-Guideline – Line officers should be involved in setting pre-season wildfire response priorities and, prioritizing protection of priority and general habitat management areas and sagebrush focal areas, along with other high values. During periods of multiple fires or limited resource availability fire management organizational structure (local, regional, national) will prioritize fires and allocation of resources in which sage grouse habitat is a consideration along with other high values.

GRSG-FM-GL-065-Guideline – In priority and general habitat management areas and sagebrush focal areas, consider using fire retardant and mechanized equipment only if it is likely to result in minimizing burned acreage, preventing the loss of other high value resources, or increasing the effectiveness of other tactical strategies. Agency administrators, or their designee, or fireline leadership should consider fire suppression effects while determining suppression strategy and tactics; the use of fire retardant and mechanized equipment may be approved by agency administrators, or their designee, or fireline leadership.

GRSG-FM-GL-066-Guideline – In priority and general habitat management areas and sagebrush focal areas, to minimize sagebrush habitat loss, consider using the full range of suppression techniques to protect unburned islands, doglegs, and other sage grouse habitat features that may exist within the perimeter of wildfires. These suppression objectives and activities should be prioritized against other wildland fire suppression activities and priorities.

Wild Horse and Burro

GRSG-HB-DC-067-Desired Condition – In priority and general habitat management areas, wild horse and burro populations are within established appropriate management levels.

GRSG-HB-ST-068-Standard – In priority and general habitat management areas, consider adjusting appropriate management levels, consistent with applicable law, if greater sage-grouse management standards are not met due to degradation that can be at least partially be attributed to wild horse or burro populations.

GRSG-HB-ST-069-Standard – In priority and general management areas, remove wild horses and burros outside of a wild horse and burro territory.

GRSG-HB-GL-070-Guideline – In priority and general habitat, herd gathering should be prioritized when wild horse and burro populations exceed the upper limit of the established appropriate management level.

GRSG-HB-GL-071-Guideline – In priority and general habitat, wild horse and burro population levels should be managed at the lower limit of established appropriate management level ranges, as appropriate.

GRSG-HB-GL-072-Guideline – In priority and general habitat, consider exclusion of wild horse or burros immediately following emergency situation (e.g., fire, floods, and drought).

Recreation

GRSG-R-DC-073-Desired Condition – In priority and general habitat management areas and sagebrush focal areas, recreation activities are balanced with the ability of the land to support them, while meeting greater sage-grouse seasonal habitat desired conditions (table 1a and 1b) and creating minimal user conflicts.

GRSG-R-ST-074-Standard – In priority and general habitat management areas and sagebrush focal areas, do not authorize temporary recreation uses (i.e., facilities or activities) that result in loss of habitat or would have long-term (i.e., greater than 5 years) negative impacts on greater sage-grouse or their habitats.

GRSG-R-GL-075-Guideline – In priority and general habitat management areas and sagebrush focal areas, terms and conditions that protect and/or restore greater sage-grouse habitat within the permit area should be included in new recreation special use authorizations. During renewal, amendment, or reauthorization, terms and conditions in existing permits and operating plans should be modified to protect and/or restore greater sage-grouse habitat.

GRSG-R-GL-076-Guideline – In priority and general habitat management areas and sagebrush focal areas, new recreational facilities or expansion of existing recreational facilities (e.g., roads, trails, campgrounds), including special use authorizations for facilities and activities, should not be approved unless the development results in a net conservation gain to greater sage-grouse or their habitats or the development is required for visitor safety.

GRSG-R-GL-077-Guideline – During breeding and nesting (March 1 to June 30), outfitter-guide activities within 0.25 mile from the perimeter of active leks should not be authorized.

Roads/Transportation

GRSG-RT-DC-078-Desired Condition – In priority and general habitat management areas and sagebrush focal areas, within the forest transportation system and on roads and trails authorized under a special use authorization, greater sage-grouse experience minimal disturbance during breeding and nesting (March 1 to June 30) and wintering (November 1 to February 28) periods.

GRSG-RT-ST-079-Standard – In priority and general habitat management areas and sagebrush focal areas, do not conduct or allow new road or trail construction (does not apply to realignments for resource protection) except when necessary for administrative access to existing and authorized uses, public safety, or to access valid existing rights. If necessary to construct new roads and trails for one of these purposes, construct them to the minimum standard, length, and number and avoid, minimize, and mitigate impacts.

GRSG-RT-ST-080-Standard – Do not construct or allow road and trail maintenance activities within 2 miles from the perimeter of active leks during lekking (March 1 to May 15) from 6 pm to 9 am.

GRSG-RT-ST-081-Standard – In priority habitat management areas and sagebrush focal areas, do not allow public motor vehicle use on temporary energy development roads.

GRSG-RT-GL-082-Guideline – In priority habitat management areas and sagebrush focal areas, new roads and road realignments should be designed and administered to reduce collisions with greater sage-grouse.

GRSG-RT-GL-083-Guideline – In priority habitat management areas and sagebrush focal areas, road construction within riparian areas and mesic meadows should be restricted. If not possible to restrict construction within riparian areas and mesic meadows, roads should be designed and constructed at right angles to ephemeral drainages and stream crossings, unless topography prevents doing so.

GRSG-RT-GL-084-Guideline – In priority and general habitat management areas and sagebrush focal areas, when decommissioning roads and unauthorized routes, restoration activity should be designed to move habitat towards desired conditions (table 1a or 1b).

GRSG-RT-GL-085-Guideline – In priority and general habitat management areas and sagebrush focal areas, dust abatement terms and conditions should be included in road-use authorizations when dust has the potential to impact greater sage-grouse.

GRSG-RT-GL-086-Guideline – In priority and general habitat management areas and sagebrush focal areas, road and road-way maintenance activities should be designed and implemented to reduce the risk of vehicle or human-caused wildfires and the spread of invasive plants. Such activities include but are not limited to the removal or mowing of vegetation a car-width off the edge of roads; use of weed-free earth-moving equipment, gravel, fill, or other materials; and blading or pulling roadsides and ditches that are infested with noxious weeds only if required for public safety or protection of the roadway.

GRSG-RT-GL-087-Guideline –In priority and general habitat management areas and sagebrush focal areas, during breeding and nesting (March 1 to June 30), consider seasonal road closures on motorized travel routes with high traffic volume, speeds, or noise levels.

GRSG-RT-GL-088-Guideline – In priority and general habitat management areas and sagebrush focal areas, from November 1 to February 28, consider limiting over-snow motorized vehicles in wintering areas.

Minerals

Fluid Minerals – Unleased

GRSG-M-FMUL-ST-089-Standard – In priority habitat management areas, any new oil and gas leases must include a no surface occupancy stipulation. There will be no waivers or modifications. An exception could be granted by the authorized officer with unanimous concurrence from a team of agency greater sage-grouse experts from the Fish and Wildlife Service, Forest Service, and State wildlife agency if:

- There would be no direct, indirect, or cumulative effects to greater sage-grouse or their habitats or
- Granting the exception provides an alternative to a similar action occurring on a nearby parcel and
- The exception provides a clear net conservation gain to greater sage-grouse.

GRSG-M-FMUL-ST-090-Standard – In general habitat management areas, any new leases must include appropriate controlled surface use and timing limitation stipulations to protect sage-grouse and their habitat.

GRSG-M-FMUL-ST-091-Standard – In sagebrush focal areas, there will be no surface occupancy and no waivers, exceptions, or modifications for fluid mineral leasing.

GRSG-M-FMUL-ST-092-Standard – In priority habitat management areas outside of sagebrush focal areas, proposed geothermal projects may be considered if:

- A team of agency greater sage-grouse experts from the Fish and Wildlife Service, Forest Service, BLM, and State wildlife agency advises on project-mitigation measures, including lek buffer distances, using the best available science;
- Mitigation actions are consistent with the Mitigation Strategy; and
- The footprint of the project is consistent with the disturbance protocols identified in GRSG-GEN-ST-004.

GRSG-M-FMUL-ST-093-Standard – In priority and general habitat management areas and sagebrush focal areas, only allow geophysical exploration or similar type of exploratory

operations that are consistent with vegetation objectives in table 1a or 1b, as appropriate, and include applicable seasonal restrictions.

Fluid Minerals – Leased

GRSG-M-FML-ST-094-Standard – In priority habitat management areas and sagebrush focal areas, when approving the Surface Use Plan of Operation portion of the Application for Permit to Drill on existing leases that are not yet developed, require that leaseholders avoid and minimize surface disturbing and disruptive activities consistent with the rights granted in the lease.

GRSG-M-FML-ST-095-Standard – In priority and general habitat management areas and sagebrush focal areas, when facilities are no longer needed or leases are relinquished, require reclamation plans to include terms and conditions to restore habitat to desired conditions as described in table 1a or 1b.

GRSG-M-FML-ST-096-Standard – In priority and general habitat management areas and sagebrush focal areas, authorize new transmission line corridors, transmission line right-of-ways, transmission line construction, or transmission line-facility construction associated with fluid mineral leases with stipulations necessary to protect greater sage-grouse and their habitats, consistent with the terms and conditions of the permit.

GRSG-M-FML-ST-097-Standard – Locate compressor stations on portions of a lease that are non-habitat and are not used by greater sage-grouse, and if there would be no direct, indirect, or cumulative effects on sage-grouse or their habitat. If this is not possible, work with the operator to use mufflers, sound insulation, or other features to reduce noise, consistent with GRSG-GEN-ST-006-Standard.

GRSG-M-FML-ST-098-Standard – In priority and general habitat management areas and sagebrush focal areas, when authorizing development of fluid mineral resources, work with the operator to minimize impacts to greater sage-grouse and their habitat, such as locating facilities in non-habitat areas first and then in the least suitable habitat.

GRSG-M-FML-GL-099-Guideline – In priority and general habitat management areas and sagebrush focal areas, operators should be encouraged to reduce disturbance to greater sage-grouse habitat. At the time of approval of the Surface Use Plan of Operation portion of the Application for Permit to Drill, terms and conditions should be included to reduce disturbance to greater sage-grouse habitat, where appropriate and feasible and consistent with the rights granted to the lessee.

GRSG-M-FML-GL-100-Guideline – On existing Federal leases in priority and general habitat management areas and sagebrush focal areas, when surface occupancy cannot be restricted due to valid existing rights or development requirements, disturbance and surface occupancy should be limited to areas least harmful to greater sage-grouse based on vegetation, topography, or other habitat features.

GRSG-M-FML-GL-101-Guideline - In priority and general habitat management areas and sagebrush focal areas, where the Federal government owns the surface and the mineral estate is

in non-Federal ownership, coordinate with the mineral estate owner/lessee to apply appropriate stipulations, conditions of approval, conservation measures, and required design features to the appropriate surface management instruments to the maximum extent permissible under existing authorities.

Fluid Minerals – Operations

GRSG-M-FMO-ST-102-Standard – In priority and general habitat management areas and sagebrush focal areas, do not authorize employee camps.

GRSG-M-FMO-ST-103-Standard – In priority and general habitat management areas and sagebrush focal areas, when feasible, do not locate tanks or other structures that may be used as raptor perches. If this is not feasible, use perch deterrents.

GRSG-M-FMO-GL-104-Guideline – In priority and general habitat management areas and sagebrush focal areas, closed-loop systems should be used for drilling operations with no reserve pits, where feasible.

GRSG-M-FMO-GL-105-Guideline – In priority and general habitat management areas and sagebrush focal areas, during drilling operations, soil compaction should be minimized and soil structure should be maintained using the best available techniques to improve vegetation reestablishment.

GRSG-M-FMO-GL-106-Guideline – In priority and general habitat management areas and sagebrush focal areas, dams, impoundments and ponds for mineral development should be constructed to reduce potential for West Nile virus. Examples of methods to accomplish this include:

- Increase the depth of ponds to accommodate a greater volume of water than is discharged.
- Build steep shorelines (greater than 2 feet) to reduce shallow water and aquatic vegetation around the perimeter of impoundments to reduce breeding habitat for mosquitoes.
- Maintain the water level below that of rooted aquatic and upland vegetation. Avoid flooding terrestrial vegetation in flat terrain or low-lying areas.
- Construct dams or impoundments that restrict down-slope seepage or overflow by digging ponds in flat areas rather than damming natural draws for effluent water storage or lining constructed ponds in areas where seepage is anticipated.
- Line the channel where discharge water flows into the pond with crushed rock or use a horizontal pipe to discharge inflow directly into existing open water.
- Line the overflow spillway with crushed rock and construct the spillway with steep sides.
- Fence pond sites to restrict access by livestock and other wild ungulates.
- Remove or re-inject produced water.

- Treat waters with larvicides to reduce mosquito production where water occurs on the surface.

GRSG-M-FMO-GL-107-Guideline – In priority and general habitat management areas and sagebrush focal areas to keep habitat disturbance at a minimum, a phased development approach should be applied to fluid mineral operations, wherever possible, consistent with the rights granted under the lease. Disturbed areas should be reclaimed as soon as they are no longer needed for mineral operations.

Locatable Minerals

GRSG-M-LM-ST-108-Standard – In priority and general habitat management areas and sagebrush focal areas, only approve Plans of Operation if they include mitigation to protect greater sage-grouse and their habitats, consistent with the rights of the mining claimant as granted by the General Mining Act of 1872, as amended.

GRSG-M-LM-GL-109-Guideline – In priority and general habitat management areas and sagebrush focal areas, to keep habitat disturbance at a minimum, a phased development approach should be applied to operations consistent with the rights granted under the General Mining Act of 1872, as amended. Disturbed areas should be reclaimed as soon as they are no longer needed for mineral operations.

GRSG-M-LM-GL-110-Guideline – In priority and general habitat management areas and sagebrush focal areas, abandoned mine sites should be closed or mitigated to reduce predation of greater sage-grouse by eliminating tall structures that could provide nesting opportunities and perching sites for predators.

Non-energy Leasable Minerals

GRSG-M-NEL-GL-111-Guideline – In priority and general habitat management areas and sagebrush focal areas, at the time of issuance of prospecting permits, exploration licenses and leases, or readjustment of leases, the Forest Service should provide recommendations to the BLM for the protection of greater sage-grouse and their habitats.

GRSG-M-NEL-GL-112-Guideline – In priority and general habitat management areas and sagebrush focal areas, the Forest Service should recommend to the BLM that expansion or readjustment of existing leases avoid, minimize, or mitigate the effects to greater sage-grouse and their habitat.

Mineral Materials

GRSG-M-MM-ST-113-Standard – In priority management areas and sagebrush focal areas, do not authorize new mineral material disposal or development.

GRSG-M-MM-ST-114-Standard – In priority habitat management areas and sagebrush focal areas, free-use mineral material collection permits may be issued and expansion of existing active pits may be allowed, except from March 1 to May 15 between 6 pm and 9 am within 2

miles from the perimeter of occupied leks, within the Biologically Significant Unit and proposed project area if doing so does not exceed the disturbance cap.

GRSG-M-MM-ST-115-Standard – In priority and general habitat management areas and sagebrush focal areas, any permit for existing mineral material operations must include appropriate requirements for operation and reclamation of the site to maintain, restore, or enhance desired habitat conditions (table 1a or 1b).

Predation

GRSG-P-DC-116-Desired Condition – Anthropogenic uses on public lands are managed to reduce the effects of predation on greater sage-grouse.

Glossary of Terms as Used in this Plan

Active lek – Any lek that has been attended by male greater sage-grouse during the most recent strutting season.

Adjacent – Installation of new improvements (e.g., equipment or facilities) parallel, near, or next to existing improvements.

Administrative access – Access for resource management and administrative purposes such as wildfire suppression, cadastral surveys, permit compliance, law enforcement, and military in the performance of their official duty, or other access needed to manage National Forest System lands or uses.

Allotment – A designated area of land in which one or more livestock operators graze their livestock. An allotment may include one or more separate pastures. Livestock numbers and periods of use are specified for each allotment.

Ambient (noise level) – Sometimes called background noise level, reference sound level, or room noise level is the background sound pressure level at a given location, normally specified as a reference level to study a new intrusive sound source.

Anthropogenic disturbances – Human-created features including but are not limited to paved highways, graded gravel roads, transmission lines, substations, wind turbines, oil and gas wells and associated facilities, geothermal wells and associated facilities, pipelines, landfills, agricultural conversion, homes, grazing-related facilities and structures, and mines.

Authorize use – An activity (i.e., resource use) occurring on the public lands that is either explicitly or implicitly recognized and legalized by law or regulation. The term may refer to activities occurring on the public lands for which the Forest Service has issued a formal authorization document (e.g., livestock grazing permit, special use authorization, approved plan of operation, etc.). Formal authorized uses can involve both commercial and noncommercial activity, facility placement, or event. These authorized uses are often spatially or temporally limited. Unless constrained or bounded by statute, regulation, or an approved forest plan decision, legal activities involving public enjoyment and use of the public lands (e.g., hiking, camping, hunting, etc.) require no formal Forest Service authorization.

Baseline condition – The pre-existing condition of a defined area and/or resource that can be quantified by an appropriate metric(s). During environmental reviews, the baseline is considered the affected environment that exists at the time of the review's initiation, and is used to compare predictions of the effects of the proposed action or a reasonable range of alternatives.

Biologically significant unit – A geographical/spatial area within greater sage-grouse habitat that contains relevant and important habitats that is used as the basis for comparative calculations to support evaluation of changes to habitat. A biologically significant unit or subset of the unit is used in the calculation of the anthropogenic disturbance threshold and in the adaptive management habitat trigger. Specifically, in Nevada a biologically significant unit is determined to be where GRSG interactions have been documented between two or more population management units (Areas

delineated based on aggregations of GRSG lek locations, where the potential for short-term genetic interchange among populations is high.), which represent local GRSG population habitats and seasonal use areas in the sub-region.

Causal factor – A resource use or activity (e.g., livestock grazing or oil and gas development) or other factor (e.g., wildfire or drought) contributing to the decline of GRSG habitat and/or populations as identified under the Adaptive Management (Appendix C)**,** resulting in a soft or hard trigger being tripped. A causal factor can occur singly or in combination with one another.

Co-location – Installation of new linear improvements (i.e., communication towers, electrical lines, other rights-of-way, or designated corridors) in, or on, or adjacent to existing linear improvements.

Communication tower site – Sites that include broadcast types of uses (e.g., television, AM/FM radio, cable television, broadcast translator) and non-broadcast uses (e.g., commercial or private mobile radio service, cellular telephone, microwave, local exchange network, passive reflector).

Compensatory mitigation – Compensating for the residual impact of a certain action or parts of an action by replacing or providing substitute resources or environments.

Compensatory mitigation projects – The restoration, creation, enhancement, and/or preservation of impacted resources, such as on-the-ground actions to improve and/or protect habitats (e.g. chemical vegetation treatments, land acquisitions, conservation easements).

Controlled surface use – A category of moderate constraint stipulations that allows some use and occupancy of public land while protecting identified resources or values and is applicable to fluid mineral leasing and all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads).

Corridor – A tract of land varying in width forming passageway through which various commodities such as oil, gas, and electricity are transported.

Disruptive activities – Land resource uses/activities that are likely to alter the behavior, displace, or cause excessive stress to greater sage-grouse populations occurring at a specific location and/or time. Actions that alter behavior or cause the displacement of individuals such that reproductive success is negatively affected, or an individual's physiological ability to cope with environmental stress is compromised.

Distribution line – An electrical utility line with a capacity of less than 100kV or a natural gas, hydrogen, or water pipeline less than 24" in diameter.

Diversity (biological) – The number and distribution of plant and animal species within a specified geographic area. For purpose of the National Forest Management Act, the geographic area is a national forest or grassland unit.

Durable (protective and ecological) – The administrative, legal, and financial assurances that secure and protect the conservation status of a compensatory mitigation site, and the ecological benefits of a compensatory mitigation project, for at least as long as the associated impacts persist.

Enhance – The improvement of habitat by increasing missing or modifying unsatisfactory components and/or attributes of the plant community to meet greater sage-grouse objectives.

Exception – A case-by-case exemption from a lease stipulation. The stipulation continues to apply to all other sites within the leasehold to which the restrictive criteria apply. The authorized officer (any employee of the Forest Service to whom has been delegated the authority to perform the duties described in the applicable Forest Service manual or handbook) may grant an exception if an environmental record of review determines that the action, as proposed or conditioned, would not impair the function or utility of the site for the current or subsequent seasonal habitat, life-history, or behavioral needs of greater sage-grouse.

Feasible – see technically/economically feasible.

Fluid minerals – Oil, gas, coal bed natural gas, and geothermal resources.

Forage reserve – Designation for allotments on which there is no current term permit obligation for some or all of the estimated livestock grazing capacity and where there has been a determination made to use the available forage on the allotment to enhance management flexibility for authorized livestock use (FSH id_2209.13-2007-1)

Forest transportation system – Roads, trails, and areas designated for motor vehicle use that provide access to National Forest System lands for both motorized and non-motorized uses in a manner that is socially, environmentally, and economically sustainable over the long term, enhances public enjoyment of National Forest System roads, and maintains other important values and uses.

General habitat management areas – NFS lands that are occupied seasonally or year-round habitat outside of PHMA where some special management would apply to sustain GRSG populations. The boundaries and management strategies for GHMAs are derived from and generally follow the Preliminary General Habitat boundaries.

Habitat – An environment that meets a specific set of physical, biological, temporal, or spatial characteristics that satisfy the requirements of a plant or animal species or group of species for part or all of their life cycle.

Hard triggers –Thresholds indicating that immediate action is necessary to stop a severe deviation from sage grouse conservation objectives set forth in the land and resources management plan.

High-voltage transmission line – An electrical power line that is 100 kilovolts or larger.

Holder – An individual or entity that holds a valid special use authorization.

Impact – The effect, influence, alteration, or imprint caused by an action.

Indicators – Factors that describe resource condition and change and can help the BLM and the Forest Service determine trends over time.

Isolated parcel – An individual parcel of land that may share a corner, but does not have a common border with another parcel.

Invasive species (invasives plant species, invasives) – An alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. The species must cause, or be likely to cause, harm, and be exotic to the ecosystem it has infested before considered invasive.

Landownership adjustment – Land adjustments to National Forest System lands by purchase, exchange, interchange, or conveyance under authority delegated by law to the Secretary of Agriculture.

Landscape – A distinct association of land types that exhibit a unique combination of local climate, landform, topography, geomorphic process, surficial geology, soil, biota, and human influences. Landscapes are generally of a size that the eye can comprehend in a single view.

Lease – A contract granting use or occupation of property during a specified period in exchange for a specified rent or other form of payment; a type of special use authorization (usually granted for uses other than linear rights-of-way) that is used when substantial capital investment is required and when conveyance of a conditional and transferable interest in National Forest System lands is necessary or desirable to serve or facilitate authorized long-term uses, and that may be revocable and compensable according to its terms.

Leasable minerals – Those minerals or materials designated as leasable under the Mineral Leasing Act of 1920, as amended, and the Mineral Leasing Act for Acquired Lands of 1947. These include energy-related mineral resources such as oil, natural gas, coal, and geothermal, and some non-energy minerals, such as phosphate, sodium, potassium, and sulfur. Geothermal resources are also leasable under the Geothermal Steam Act of 1970.

Lek – A courtship display area attended by male greater sage-grouse in or adjacent to sagebrush dominated habitat. For management purposes, leks with less than five males observed strutting should be confirmed active for 2 years to meet the definition of a lek (Connelly et al 2000, Connelly et al. 2003, 2004).

Lessee – A person or entity holding record title in a lease issued by the United States; a person or entity authorized to use and occupy National Forest System land under a specific instrument identified as a lease.

Livestock conversion – To change the kind of livestock authorized to graze on National Forest System lands (e.g., a change from sheep to cows).

Locatable minerals – Mineral disposable under the General Mining Act of 1872, as amended, that was not excepted in later legislation. They include hardrock, placer, industrial minerals, and uncommon varieties of rock found on public domain lands.

Major pipeline – A pipeline that is 24 inches or more in outside-pipe diameter (Mineral Leasing Act of 1920, as amended, 30 U.S.C. § 181; 36 CFR 251.54(f)(1)).

Mineral – Any naturally formed inorganic material, solid or fluid inorganic substance that can be extracted from the earth, any of various naturally occurring homogeneous substances (as stone, coal, salt, sulfur, sand, petroleum, water, or natural gas) obtained usually from the ground. Under

Federal laws, considered as locatable (subject to the general mining laws), leasable (subject to the Mineral Leasing Act of 1920, as amended), and salable (subject to the Materials Act of 1947).

Mineral materials –Common varieties of mineral materials such as soil, sand and gravel, stone, pumice, pumicite, and clay that are not obtainable under the mining or leasing laws but that can be acquired under the Materials Act of 1947, as amended.

Minimization mitigation – Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

Mitigation – Specific means, measures, or practices that could reduce, avoid, or eliminate adverse impacts. Mitigation can include avoiding the impact altogether by not taking a certain action or parts of an action, minimizing the impact by limiting the degree of magnitude of the action and its implementation, rectifying the impact by repairing, rehabilitation, or restoring the affected environment, reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action, and compensating for the impact by replacing or providing substitute resources or environments.

Modification (oil and gas) – A fundamental change to the provisions of a lease stipulation, either temporarily or for the term of the lease. A modification may include an exemption from or alteration to a stipulated requirement. Depending on the specific modification, the stipulation may or may not apply to all other sites within the leasehold to which the restrictive criteria applied.

Native plant species – A plant species which occurs naturally in a particular region, state, ecosystem and habitat without direct or indirect human actions.

Net conservation gain – The actual benefit or gain above baseline conditions. Actions which result in habitat loss and degradation include those identified as threats which contribute to GRSG disturbance as identified by the USFWS in its 2010 listing decision (75 *Federal Register* 13910) and shown in Table 2 in the Greater Sage-Grouse Monitoring Framework (Appendix A).

No surface occupancy (NSO) – A major constraint where use or occupancy of the land surface for fluid mineral exploration or development and all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads) are prohibited to protect identified resource values. Areas identified as NSO are open to fluid mineral leasing, but surface occupancy or surface-disturbing activities associated with fluid mineral leasing cannot be conducted on the surface of the land. Access to fluid mineral deposits would require horizontal drilling from outside the boundaries of the NSO area.

Occupied lek – A lek that has been active during at least one strutting season within the prior 10 years.

Permit – A special use authorization that provides permission, without conveying an interest in land, to occupy and use National Forest System land or facilities for specified purposes, and which is both revocable and terminable.

Permit cancellation – Action taken to permanently invalidate a term grazing permit in whole or part.

Persistent woodlands – Long-lived pinyon-juniper woodlands that typically have sparse understories and occur on poor substrates in the assessment area.

Plan of Operation – A Plan of Operation is required for all mining activity conducted under the General Mining Act of 1872, as amended, if the proposed operations will likely cause significant disturbance of surface resources. The Plan of Operation describes the type of operations proposed and how they would be conducted, the type and standard of existing and proposed roads or access routes, the means of transportation to be used, the period during which the proposed activity will take place, and measures to be taken to meet the requirements for environmental protection (36 CR 228.4).

Prescribed fire – Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist and NEPA requirements, where applicable, must be met before ignition.

Priority habitat management areas – NFS lands identified as having highest habitat value for maintaining sustainable GRSG populations. The boundaries and management strategies for PHMAs are derived from and generally follow the Preliminary Priority Habitat boundaries. Areas of PHMAs largely coincide with areas identified as Priority Areas for Conservation (PACs) in the COT report.

Reclamation plans – Plans that guide the suite of actions taken within an area affected by human disturbance, the outcome of which is intended to change the condition of the disturbed area to meet pre-determined objectives and/or make it acceptable for certain defined resources (e.g., wildlife habitat, grazing, ecosystem function, etc.).

Residual impacts – Impacts from an implementation-level decision that remain after applying avoidance and minimization mitigation; also referred to as unavoidable impacts.

Restoration – Implementation of a set of actions that promotes plant community diversity and structure that allows plant communities to be more resilient to disturbance and invasive species over the long term. The long-term goal is to create functional, high quality habitat that is occupied by greater sage-grouse. Short-term goal may be to restore the landform, soils and hydrology and increase the percentage of preferred vegetation, seeding of desired species, or treatment of undesired species.

Restriction/restrict – A limitation or constraint, not a prohibition, on public land uses and operations. Restrictions can be of any kind, but most commonly apply to certain types of vehicle use, temporal and/or spatial constraints, or certain authorizations.

Right-of-way – Land authorized to be used or occupied for the construction, operation, maintenance, and termination of a project or facility passing over, upon, under or through such land.

Road or trail – A road or trail wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources.

Sagebrush focal areas – Areas identified by the U.S. Fish and Wildlife Service that represent recognized "strongholds" for greater sage-grouse that have been noted and referenced as having the highest densities of greater sage-grouse and other criteria important for the persistence of the species.

Soft triggers – An intermediate threshold indicating that management changes are needed at the implementation level to address habitat or population losses.

Special use authorization – A written permit, term permit, lease, or easement that authorizes use or occupancy of National Forest System lands and specifies the terms and conditions under which the use or occupancy may occur.

Stipulation (general) – A term or condition in an agreement, contract, or written authorization.

Stipulation (oil and gas) – A provision that modifies standard lease rights and is attached to and made a part of the lease. Lease stipulations include No Surface Occupancy, Timing Limitations, and Controlled Surface Use.

Surface disturbing activities – Actions that alter the vegetation, surface/near surface soil resources, and/or surface geologic features, beyond natural site conditions and on a scale that affects other public land values. Examples of surface disturbing activities may include operation of heavy equipment to construct well pads, roads, pits and reservoirs; installation of pipelines and power lines; maintenance activities, and several types of vegetation treatments (e.g., prescribed fire, etc.). Surface disturbing activities may be either restricted, not allowed, or not authorized.

Surface occupancy – Placement or construction on the land surface of semi-permanent or permanent facilities requiring continual service or maintenance. Casual use is not included.

Surface uses – Activities that may be present on the surface or near-surface (e.g., pipelines) of public lands. When administered as a use restriction (e.g., no surface occupancy), this phrase prohibits all but specified resource uses and activities in a certain area to protect particular sensitive resource values and property. This designation typically applies to small acreage sensitive resource sites (e.g., plant community study exclosure, etc.), and/or administrative sites (e.g., government ware-yard, etc.) where only authorized, agency personnel are admitted.

Tall structures – A wide array of infrastructure (e.g., poles that support lights, telephone and electrical distribution, communication towers, meteorological towers, high-tension transmission towers, and wind turbines) that have the potential to disrupt lekking or nesting birds by creating new perching/nesting opportunities and/or decreasing the use of an area. A determination as to whether something is considered a tall structure would be based on local conditions such as vegetation or topography.

Technically/economically feasible – Actions that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of

the applicant. It is the Forest Service's responsibility to determine what actions are technically and economically feasible based on a review of the applicant's rational and the available best science. The Forest Service will consider whether implementation of the proposed action is likely given past and current practice and technology; this consideration does not necessarily require a cost-benefit analysis or speculation about an applicant's costs and profit.

Temporary special use permit – A type of permit that terminates within 1 year or less after the approval date. All other provisions applicable to permits apply fully to temporary permits. Temporary special use permits are issued for seasonal or short-duration uses involving minimal improvement and investment.

Term permit – An authorization to occupy and use National Forest System land, other than rights-of-way for a specified period that is both revocable and compensable according to its terms.

Timely – The conservation benefits from compensatory mitigation accruing as early as possible or before impacts have begun.

Timing limitation (TL) – A moderate constraint, applicable to fluid mineral leasing, on all activities associated with fluid mineral leasing (e.g., truck-mounted drilling and geophysical exploration equipment off designated routes, construction of wells and/or pads), and other surface disturbing activities (i.e., those not related to fluid mineral leasing). Areas identified for TL are closed to fluid mineral exploration and development, surface-disturbing activities, and intensive human activity during identified time frames. This stipulation does not apply to operation and basic maintenance activities, including associated vehicle travel, unless otherwise specified. Construction, drilling, completions, and other operations considered to be intensive in nature are not allowed. Intensive maintenance, such as workovers on wells, is not permitted. TLs can overlap spatially with NSO and CSU, as well as with areas that have no other restrictions.

Transmission line – An electrical utility line with a capacity greater than or equal to 100kV or a natural gas, hydrogen, or water pipeline greater than or equal to 24" in diameter.

Utility-scale and/or commercial energy development – A project that is capable of producing 20 or more megawatts of electricity for distribution to customers through the electricity-transmission-grid system.

Valid existing rights – Documented legal rights or interests in the land that allow a person or entity to use said land for a specific purpose and that are still in effect. Such rights include but are not limited to fee title ownership, mineral rights, and easements. Such rights may have been reserved, acquired, granted, permitted, or otherwise authorized under various statutes of law over time.

Vegetation treatment – Management practices that are designed to maintain current vegetation structure or change the vegetation structure to a different stage of development. Vegetation treatment methods may include managed fire, prescribed fire, chemical, mechanical, and seeding.

Waiver (oil and gas) – Permanent exemption from a lease stipulation. The stipulation no longer applies anywhere within the leasehold.

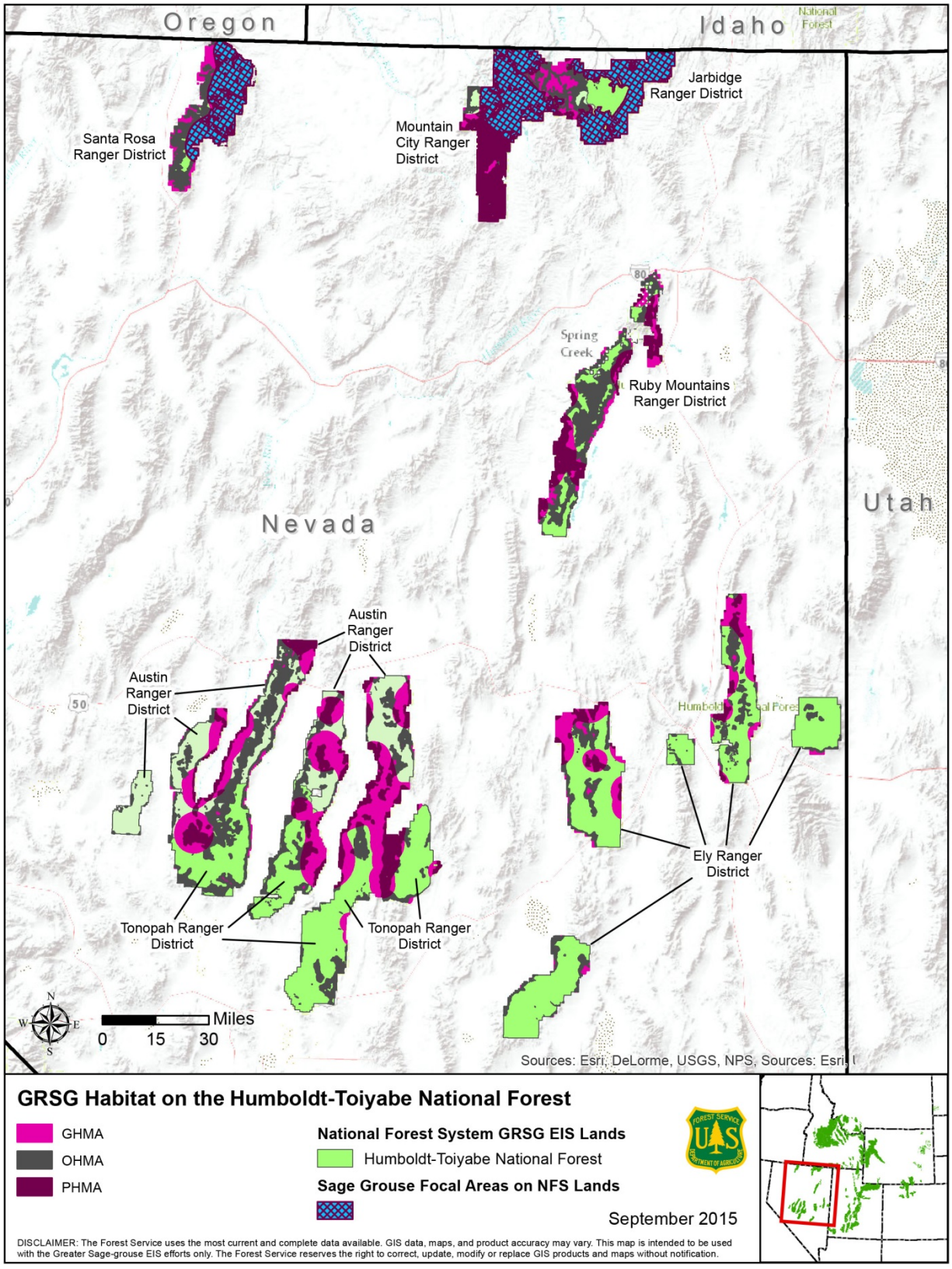
Waived without preference – A permittee waives a term grazing permit to the United States without identifying a preferred applicant (i.e., a third party that has purchased either permitted livestock, base property, or both).

West Nile virus – A virus that is found in temperate and tropical regions of the world and most commonly transmitted by mosquitoes. West Nile virus can cause flu-like symptoms in humans and can be lethal to birds, including greater sage-grouse.

Wildfire suppression – An appropriate management response to wildfire, escaped wildland fire use or prescribed fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire.

Withdrawal (land) – Withholding an area of Federal land from settlement, sale, location, or entry, under some or all of the general land laws, including the mining and mineral leasing laws, for the purpose of limiting activities under those laws to maintain other public values in the area, or for reserving the area for a particular public purpose or program.

Map 1. *GRSG Habitat on the Humboldt-Toiyabe National Forest.*



APPENDIX A – GREATER SAGE-GROUSE MONITORING FRAMEWORK

Developed by the Interagency
Greater Sage-Grouse
Disturbance and Monitoring Subteam

BUREAU OF LAND MANAGEMENT
U.S. FOREST SERVICE

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INTRODUCTION

The purpose of this BLM and Forest Service Greater Sage-Grouse Monitoring Framework (hereafter, monitoring framework) is to describe the methods to monitor habitats and evaluate the implementation and effectiveness of the BLM's national planning strategy (attachment to BLM Instruction Memorandum 2012-044), the BLM RMPs and the Forest Service's LMPs to conserve the species and its habitat. The regulations for the BLM (43 CFR 1610.4-9) and the Forest Service (36 CFR part 209, published July 1, 2010) require that land use plans establish intervals and standards, as appropriate, for monitoring and evaluations based on the sensitivity of the resource to the decisions involved. Therefore, the BLM and the Forest Service will use the methods described herein to collect monitoring data and to evaluate implementation and effectiveness of the Greater Sage-Grouse (GRSG) (hereafter, sage-grouse) planning strategy and the conservation measures contained in their respective land use plans (LUPs). A monitoring plan specific to the EIS, land use plan, or field office will be developed after the ROD is signed. For a summary of the frequency of reporting, see Attachment A, An Overview of Monitoring Commitments. Adaptive management will be informed by data collected at any and all scales.

To ensure that the BLM and the Forest Service are able to make consistent assessments about sage-grouse habitats across the range of the species, this framework lays out the methodology—at multiple scales—for monitoring of implementation and disturbance and for evaluating the effectiveness of BLM and Forest Service actions to conserve the species and its habitat. Monitoring efforts will include data for measurable quantitative indicators of sagebrush availability, anthropogenic disturbance levels, and sagebrush conditions. Implementation monitoring results will allow the BLM and the Forest Service to evaluate the extent that decisions from their LUPs to conserve sage-grouse and their habitat have been implemented. State fish and wildlife agencies will collect population monitoring information, which will be incorporated into effectiveness monitoring as it is made available.

This multiscale monitoring approach is necessary, as sage-grouse are a landscape species and conservation is scale-dependent to the extent that conservation actions are implemented within seasonal habitats to benefit populations. The four orders of habitat selection (Johnson 1980) used in this monitoring framework are described by Connelly et al. (2003) and were applied specifically to the scales of sage-grouse habitat selection by Stiver et al. (in press) as first order (broad scale), second order (mid scale), third order (fine scale), and fourth order (site scale).

Habitat selection and habitat use by sage-grouse occur at multiple scales and are driven by multiple environmental and behavioral factors. Managing and monitoring sage-grouse habitats are complicated by the differences in habitat selection across the range and habitat use by individual birds within a given season. Therefore, the tendency to look at a single indicator of habitat suitability or only one scale limits managers' ability to identify the threats to sage-grouse and to respond at the appropriate scale. For descriptions of these habitat suitability indicators for each scale, see "Sage-Grouse Habitat Assessment Framework: Multiscale Habitat Assessment Tool" (HAF; Stiver et al. in press).

Monitoring methods and indicators in this monitoring framework are derived from the current peer-reviewed science. Rangewide, best available datasets for broad- and mid-scale monitoring will

be acquired. If these existing datasets are not readily available or are inadequate, but they are necessary to inform the indicators of sagebrush availability, anthropogenic disturbance levels, and sagebrush conditions, the BLM and the Forest Service will strive to develop datasets or obtain information to fill these data gaps. Datasets that are not readily available to inform the fine- and site-scale indicators will be developed. These data will be used to generate monitoring reports at the appropriate and applicable geographic scales, boundaries, and analysis units: across the range of sage-grouse as defined by Schroeder et al. (2004), and clipped by Western Association of Fish and Wildlife Agencies (WAFWA) Management Zone (MZ) (Stiver et al. 2006) boundaries and other areas as appropriate for size (e.g., populations based on Connelly et al. 2004). (See Figure 1, Map of Greater Sage-Grouse range, populations, subpopulations, and Priority Areas for Conservation as of 2013.) This broad- and mid-scale monitoring data and analysis will provide context for RMP/LMP areas; states; GRSG Priority Habitat, General Habitat, and other sage- grouse designated management areas; and Priority Areas for Conservation (PACs), as defined in "Greater Sage-grouse (Centrocercus urophasianus) Conservation Objectives: Final Report" (Conservation Objectives Team [COT] 2013). Hereafter, all of these areas will be referred to as "sage-grouse areas."

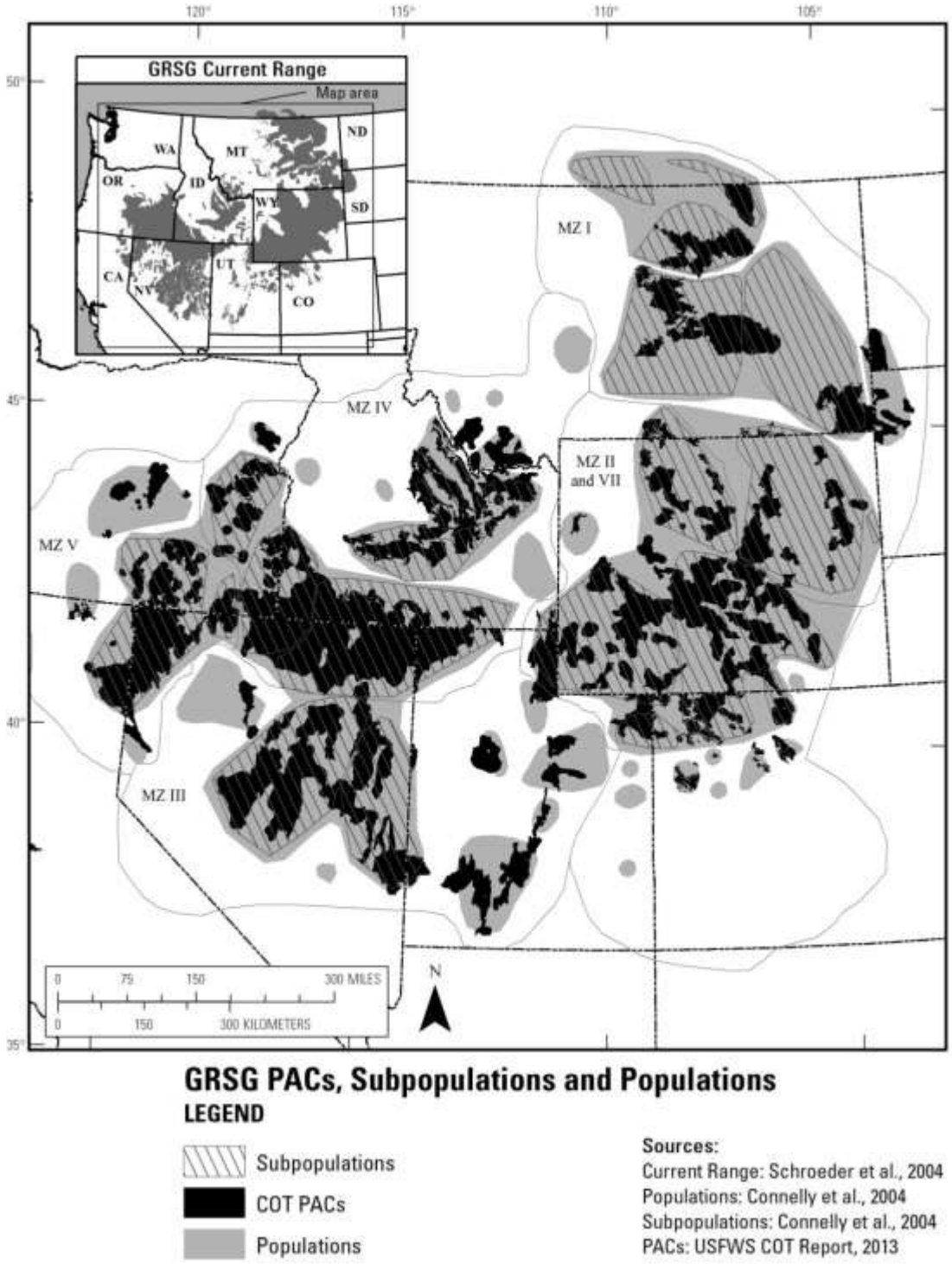

Figure 1. *Map of Greater Sage-Grouse range, populations, subpopulations, and Priority Areas for Conservation as of 2013.*

This monitoring framework is divided into two sections. The broad- and mid-scale methods , described in Section I, provide a consistent approach across the range of the species to monitor implementation decisions and actions, mid-scale habitat attributes (e.g., sagebrush availability and habitat degradation), and population changes to determine the effectiveness of the planning strategy and management decisions. (See Table 1, Indicators for monitoring implementation of the national planning strategy, RMP/LMP decisions, sage-grouse habitat, and sage-grouse populations at the broad and mid scales.) For sage-grouse habitat at the fine and site scales, described in Section II, this monitoring framework describes a consistent approach (e.g., indicators and methods) for monitoring sage-grouse seasonal habitats. Funding, support, and dedicated personnel for broad- and mid-scale monitoring will be renewed annually through the normal budget process. For an overview of BLM and Forest Service multiscale monitoring commitments, see Attachment A.

Table 1. *Indicators for monitoring implementation of the national planning strategy, RMP/LMP decisions, sage-grouse habitat, and sage-grouse populations at the broad and mid scales.*

Implementation		Habitat		Population (State Wildlife Agencies)
Geographic Scales		Availability	Degradation	Demographics
Broad Scale: From the range of sage-grouse to WAFWA Management Zones	BLM/Forest Service National planning strategy goal and objectives	Distribution and amount of sagebrush within the range	Distribution and amount of energy, mining, and infrastructure facilities	WAFWA Management Zone population trend
Mid Scale: From WAFWA Management Zone to populations ; PACs	RMP/LMP decisions	Mid-scale habitat indicators (HAF; Table 2 herein, e.g., percent of sagebrush per unit area)	Distribution and amount of energy, mining, and infrastructure facilities (Table 2 herein)	Individual population trend

I. BROAD AND MID SCALES

First-order habitat selection, the broad scale, describes the physical or geographical range of a species. The first-order habitat of the sage-grouse is defined by populations of sage-grouse associated with sagebrush landscapes, based on Schroeder et al. 2004, and Connelly et al. 2004, and on population or habitat surveys since 2004. An intermediate scale between the broad and mid scales was delineated by WAFWA from floristic provinces within which similar environmental factors influence vegetation communities. This scale is referred to as the WAFWA Sage-Grouse Management Zones (MZs). Although no indicators are specific to this scale, these MZs are biologically meaningful as reporting units.

Second-order habitat selection, the mid-scale, includes sage-grouse populations and PACs. The second order includes at least 40 discrete populations and subpopulations (Connelly et al. 2004). Populations range in area from 150 to 60,000 mi2 and are nested within MZs. PACs range from 20 to 20,400 mi2 and are nested within population areas.

Other mid-scale landscape indicators, such as patch size and number, patch connectivity, linkage areas, and landscape matrix and edge effects (Stiver et al. in press) will also be assessed. The methods used to calculate these metrics will be derived from existing literature (Knick et al. 2011, Leu and Hanser 2011, Knick and Hanser 2011).

A. Implementation (Decision) Monitoring

Implementation monitoring is the process of tracking and documenting the implementation (or the progress toward implementation) of RMP/LMP decisions. The BLM and the Forest Service will monitor implementation of project-level and/or site-specific actions and authorizations, with their associated conditions of approval/stipulations for sage-grouse, spatially (as appropriate) within Priority Habitat, General Habitat, and other sage-grouse designated management areas, at a minimum, for the planning area. These actions and authorizations, as well as progress toward completing and implementing activity-level plans, will be monitored consistently across all planning units and will be reported to BLM and Forest Service headquarters annually, with a summary report every 5 years, for the planning area. A national-level GRSG Land Use Plan Decision Monitoring and Reporting Tool is being developed to describe how the BLM and the Forest Service will consistently and systematically monitor and report implementation-level activity plans and implementation actions for all plans within the range of sage-grouse. A description of this tool for collection and reporting of tabular and spatially explicit data will be included in the ROD or approved plan. The BLM and the Forest Service will provide data that can be integrated with other conservation efforts conducted by state and federal partners.

B. Habitat Monitoring

The USFWS in its 2010 listing decision for the sage-grouse, identified 18 threats contributing to the destruction, modification, or curtailment of sage-grouse habitat or range (75 FR 13910 2010). The BLM and the Forest Service will, therefore, monitor the relative extent of these threats that remove sagebrush, both spatially and temporally, on all lands within an analysis area, and will report on amount, pattern, and condition at the appropriate and applicable geographic scales and boundaries. These 18 threats have been aggregated into three broad- and mid-scale measures to account for whether the threat predominantly removes sagebrush or degrades habitat. (See Table 2, Relationship between the 18 threats and the three habitat disturbance measures for monitoring.) The three measures are:

Measure 1: Sagebrush Availability (percent of sagebrush per unit area)

Measure 2: Habitat Degradation (percent of human activity per unit area)

Measure 3: Energy and Mining Density (facilities and locations per unit area)

These three habitat disturbance measures will evaluate disturbance on all lands, regardless of land ownership. The direct area of influence will be assessed with the goal of accounting for actual removal of sagebrush on which sage-grouse depend (Connelly et al. 2000) and for habitat degradation as a surrogate for human activity. Measure 1 (sagebrush availability) examines where disturbances have removed plant communities that support sagebrush (or have broadly removed sagebrush from the landscape). Measure 1, therefore, monitors the change in sagebrush availability—or, specifically, where and how much of the sagebrush community is available within the range of sage-grouse. The sagebrush community is defined as the ecological systems that have the capability of supporting sagebrush vegetation and seasonal sage-grouse habitats within the range of sage-grouse (see Section I.B.1., Sagebrush Availability). Measure 2 (see Section I.B.2., Habitat Degradation Monitoring) and Measure 3 (see Section I.B.3., Energy and Mining Density) focus on where habitat degradation is occurring by using the footprint/area of direct disturbance and the number of facilities at the mid scale to identify the relative amount of degradation per geographic area of interest and in areas that have the capability of supporting sagebrush and seasonal sage-grouse use. Measure 2 (habitat degradation) not only quantifies footprint/area of direct disturbance but also establishes a surrogate for those threats most likely to have ongoing activity. Because energy development and mining activities are typically the most intensive activities in sagebrush habitat, Measure 3 (the density of active energy development, production, and mining sites) will help identify areas of particular concern for such factors as noise, dust, traffic, etc. that degrade sage-grouse habitat.

Table 2. *Relationship between the 18 threats and the three habitat disturbance measures for monitoring.*

Note: Data availability may preclude specific analysis of individual layers. See the detailed methodology for more information.

USFWS Listing Decision Threat	Sagebrush Availability	Habitat Degradation	Energy and Mining Density
Agriculture	X		
Urbanization	X		
Wildfire	X		
Conifer encroachment	X		
Treatments	X		
Invasive Species	X		
Energy (oil and gas wells and development facilities)		X	X
Energy (coal mines)		X	X
Energy (wind towers)		X	X
Energy (solar fields)		X	X
Energy (geothermal)		X	X
Mining (active locatable, leasable, and saleable developments)		X	X
Infrastructure (roads)		X	
Infrastructure (railroads)		X	
Infrastructure (power lines)		X	
Infrastructure (communication towers)		X	
Infrastructure (other vertical structures)		X	
Other developed rights-of-way		X	

The methods to monitor disturbance found herein differ slightly from methods used in Manier et al. 2013, which provided a baseline environmental report (BER) of datasets of disturbance across jurisdictions. One difference is that, for some threats, the BER data were for federal lands only. In addition, threats were assessed individually, using different assumptions from those in this monitoring framework about how to quantify the location and magnitude of threats. The methodology herein builds on the BER methodology and identifies datasets and procedures to use the best available data across the range of the sage-grouse and to formulate a consistent approach to quantify impact of the threats through time. This methodology also describes an approach to combine the threats and calculate each of the three habitat disturbance measures.

1. Sagebrush Availability (Measure 1)

Sage-grouse populations have been found to be more resilient where a percentage of the landscape is maintained in sagebrush (Knick and Connelly 2011), which will be determined by sagebrush availability. Measure 1 has been divided into two submeasures to describe sagebrush availability on the landscape:

Measure 1a: the current amount of sagebrush on the geographic area of interest, and

Measure 1b: the amount of sagebrush on the geographic area of interest compared with the amount of sagebrush the landscape of interest could ecologically support.

Measure 1a (the current amount of sagebrush on the landscape) will be calculated using this formula: [the existing updated sagebrush layer] divided by [the geographic area of interest]. The appropriate geographic areas of interest for sagebrush availability include the species' range, WAFWA MZs, populations, and PACs. In some cases these sage-grouse areas will need to be aggregated to provide an estimate of sagebrush availability with an acceptable level of accuracy.

Measure 1b (the amount of sagebrush for context within the geographic area of interest) will be calculated using this formula: [existing sagebrush divided by [pre-EuroAmerican settlement geographic extent of lands that could have supported sagebrush]. This measure will provide information to set the context for a given geographic area of interest during evaluations of monitoring data. The information could also be used to inform management options for restoration or mitigation and to inform effectiveness monitoring.

The sagebrush base layer for Measure 1 will be based on geospatial vegetation data adjusted for the threats listed in Table 2. The following subsections of this monitoring framework describe the methodology for determining both the current availability of sagebrush on the landscape and the context of the amount of sagebrush on the landscape at the broad and mid scales.

a. Establishing the Sagebrush Base Layer

The current geographic extent of sagebrush vegetation within the rangewide distribution of sage- grouse populations will be ascertained using the most recent version of the Existing Vegetation Type (EVT) layer in LANDFIRE (2013). LANDFIRE EVT was selected to serve as the sagebrush base layer for five reasons: 1) it is the only nationally consistent vegetation layer that has been updated multiple times since 2001; 2) the ecological systems classification within

LANDFIRE EVT includes multiple sagebrush type classes that, when aggregated, provide a more accurate (compared with individual classes) and seamless sagebrush base layer across jurisdictional boundaries; 3) LANDFIRE performed a rigorous accuracy assessment from which to derive the rangewide uncertainty of the sagebrush base layer; 4) LANDFIRE is consistently used in several recent analyses of sagebrush habitats (Knick et al. 2011, Leu and Hanser 2011, Knick and Hanser 2011); and 5) LANDFIRE EVT can be compared against the geographic extent of lands that are believed to have had the capability of supporting sagebrush vegetation pre-EuroAmerican settlement [LANDFIRE Biophysical Setting (BpS)]. This fifth reason provides a reference point for understanding how much sagebrush currently remains in a defined geographic area of interest compared with how much sagebrush existed historically (Measure 1b). Therefore, the BLM and the Forest Service have determined that LANDFIRE provides the best available data at broad and mid scales to serve as a sagebrush base layer for monitoring changes in the geographic extent of sagebrush. The BLM and the Forest Service, in addition to aggregating the sagebrush types into the sagebrush base layer, will aggregate the accuracy assessment reports from LANDFIRE to document the cumulative accuracy for the sagebrush base layer. The BLM—through its Assessment, Inventory, and Monitoring (AIM) program and, specifically, the BLM's landscape monitoring framework (Taylor et al. 2014)—will provide field data to the LANDFIRE program to support continuous quality improvements of the LANDFIRE EVT layer. The sagebrush layer based on LANDFIRE EVT will allow for the mid-scale estimation of the existing percent of sagebrush across a variety of reporting units. This sagebrush base layer will be adjusted by changes in land cover and successful restoration for future calculations of sagebrush availability (Measures 1a and 1b).

This layer will also be used to determine the trend in other landscape indicators, such as patch size and number, patch connectivity, linkage areas, and landscape matrix and edge effects (Stiver et al. *in press*). In the future, changes in sagebrush availability, generated annually, will be included in the sagebrush base layer. The landscape metrics will be recalculated to examine changes in pattern and abundance of sagebrush at the various geographic boundaries. This information will be included in effectiveness monitoring (See Section I.D., Effectiveness Monitoring).

Within the Forest Service and the BLM, forest-wide and field office–wide existing vegetation classification mapping and inventories are available that provide a much finer level of data than what is provided through LANDFIRE. Where available, these finer-scale products will be useful for additional and complementary mid-scale indicators and local-scale analyses (see Section II Fine and Site Scales). The fact that these products are not available everywhere limits their utility for monitoring at the broad and mid scale, where consistency of data products is necessary across broader geographies.

i. Data Sources for Establishing and Monitoring Sagebrush Availability

There were three criteria for selecting the datasets for establishing and monitoring the change in sagebrush availability (Measure 1):

- Nationally consistent dataset available across the range
- Known level of confidence or accuracy in the dataset

- Continual maintenance of dataset and known update interval

Datasets meeting these criteria are listed in Table 3, Datasets for establishing and monitoring changes in sagebrush availability.

ii. LANDFIRE Existing Vegetation Type (EVT) Version 1.2

LANDFIRE EVT represents existing vegetation types on the landscape derived from remote sensing data. Initial mapping was conducted using imagery collected in approximately 2001. Since the initial mapping there have been two update efforts: version 1.1 represents changes before 2008, and version 1.2 reflects changes on the landscape before 2010. Version 1.2 will be used as the starting point to develop the sagebrush base layer.

Sage-grouse subject matter experts determined which of the ecological systems from the LANDFIRE EVT to use in the sagebrush base layer by identifying the ecological systems that have the capability of supporting sagebrush vegetation and that could provide suitable seasonal habitat for the sage-grouse. (See Table 4, Ecological systems in BpS and EVT capable of supporting sagebrush vegetation and capable of providing suitable seasonal habitat for Greater Sage-Grouse.) Two additional vegetation types that are not ecological systems were added to the EVT: *Artemisia tridentata* ssp. *vaseyana* Shrubland Alliance and *Quercus gambelii* Shrubland Alliance. These alliances have species composition directly related to the Rocky Mountain Lower Montane-Foothill Shrubland ecological system and the Rocky Mountain Gambel Oak- Mixed Montane Shrubland ecological system, both of which are ecological systems in LANDFIRE BpS. In LANDFIRE EVT, however, in some map zones, the Rocky Mountain Lower Montane-Foothill Shrubland ecological system and the Rocky Mountain Gambel Oak- Mixed Montane Shrubland ecological system were named *Artemisia tridentata* ssp. *vaseyana* Shrubland Alliance and *Quercus gambelii* Shrubland Alliance, respectively

Table 3. *Datasets for establishing and monitoring changes in sagebrush availability.*

Dataset	Source	Update Interval	Most Recent Version Year	Use
BioPhysical Setting v1.1	LANDFIRE	Static	2008	Denominator for sagebrush availability
Existing Vegetation Type	LANDFIRE	Static	2010	Numerator for sagebrush availability
Cropland Data Layer	National Agricultural Statistics Service	Annual	2012	Agricultural updates; removes existing sagebrush from numerator of sagebrush availability
National Land Cover Dataset Percent Imperviousness	Multi-Resolution Land Characteristics Consortium (MRLC)	5-Year	2011 (next available in 2016)	Urban area updates; removes existing sagebrush from numerator of sagebrush availability
Fire Perimeters	GeoMac	Annual	2013	< 1,000-acre fire updates; removes existing sagebrush from numerator of sagebrush availability
Burn Severity	Monitoring Trends in Burn Severity	Annual	2012 (2-year delay in data availability)	> 1,000-acre fire updates; removes existing sagebrush from numerator of sagebrush availability except for unburned sagebrush islands

Table 4. *Ecological systems in BpS and EVT capable of supporting sagebrush vegetation and capable of providing suitable seasonal habitat for Greater Sage-Grouse.*

Ecological System	Sagebrush Vegetation that the Ecological System has the Capability of Producing
Colorado Plateau Mixed Low Sagebrush Shrubland	*Artemisia arbuscula ssp. Longiloba* *Artemisia bigelovii* *Artemisia nova* *Artemisia frigida* *Artemisia tridentata ssp. wyomingensis*
Columbia Plateau Low Sagebrush Steppe	*Artemisia arbuscula* *Artemisia arbuscula ssp. Longiloba* *Artemisia nova*
Columbia Plateau Scabland Shrubland	*Artemisia rigida*
Columbia Plateau Steppe and Grassland	*Artemisia spp.*
Great Basin Xeric Mixed Sagebrush Shrubland	*Artemisia arbuscula ssp. Longicaulis* *Artemisia arbuscula ssp. longiloba* *Artemisia nova* *Artemisia tridentata ssp. wyomingensis*
Inter-Mountain Basins Big Sagebrush Shrubland	*Artemisia tridentata ssp. tridentata* *Artemisia tridentata ssp. Xericensis* *Artemisia tridentata ssp. Vaseyana* *Artemisia tridentata ssp. wyomingensis*
Inter-Mountain Basins Big Sagebrush Steppe	*Artemisia cana ssp. cana* *Artemisia tridentata ssp. tridentata* *Artemisia tridentata ssp. xericensis* *Artemisia tridentata ssp. wyomingensis* *Artemisia tripartita ssp. Tripartite* *Artemisia frigida*
Inter-Mountain Basins Curl-Leaf Mountain Mahogany Woodland and Shrubland	*Artemisia tridentata ssp. vaseyana* *Artemisia arbuscula* *Artemisia tridentata*
Inter-Mountain Basins Mixed Salt Desert Scrub	*Artemisia tridentata ssp. wyomingensis* *Artemisia spinescens*
Inter-Mountain Basins Montane Sagebrush Steppe	*Artemisia tridentata ssp. vaseyana* *Artemisia tridentata ssp. wyomingensis* *Artemisia nova* *Artemisia arbuscula* *Artemisia tridentata ssp. spiciformis*

Ecological System	Sagebrush Vegetation that the Ecological System has the Capability of Producing
Inter-Mountain Basins Semi-Desert Shrub- Steppe	*Artemisia tridentata* *Artemisia bigelovii* *Artemisia tridentata ssp. wyomingensis*
Northwestern Great Plains Mixed Grass Prairie	*Artemisia cana ssp. cana* *Artemisia tridentata ssp. vaseyana* *Artemisia frigida*
Northwestern Great Plains Shrubland	*Artemisia cana ssp. cana* *Artemisia tridentata ssp. tridentata* *Artemisia tridentata ssp. wyomingensis*
Rocky Mountain Gambel Oak-Mixed Montane Shrubland	*Artemisia tridentata*
Rocky Mountain Lower Montane-Foothill Shrubland	*Artemisia nova Artemisia tridentata* *Artemisia frigida*
Western Great Plains Floodplain Systems	*Artemisia cana ssp. cana*
Western Great Plains Sand Prairie	*Artemisia cana ssp. cana*
Wyoming Basins Dwarf Sagebrush Shrubland and Steppe	*Artemisia arbuscula ssp. longiloba* *Artemisia nova* *Artemisia tridentata ssp. wyomingensis* *Artemisia tripartita ssp. rupicola*
Artemisia tridentata ssp. vaseyana Shrubland Alliance (EVT only)	*Artemisia tridentata ssp. vaseyana*
Quercus gambelii Shrubland Alliance (EVT only)	*Artemisia tridentata*

iii. Accuracy and Appropriate Use of LANDFIRE Datasets

Because of concerns over the thematic accuracy of individual classes mapped by LANDFIRE, all ecological systems listed in Table 4 will be merged into one value that represents the sagebrush base layer. With all ecological systems aggregated, the combined accuracy of the sagebrush base layer (EVT) will be much greater than if all categories were treated separately.

LANDFIRE performed the original accuracy assessment of its EVT product on a map zone basis. There are 20 LANDFIRE map zones that cover the historical range of sage-grouse as defined by Schroeder (2004). (See Attachment B, User and Producer Accuracies for Aggregated Ecological Systems within LANDFIRE Map Zones.) The aggregated sagebrush base layer for monitoring had user accuracies ranging from 57.1% to 85.7% and producer accuracies ranging from 56.7% to 100%.

LANDFIRE EVT data are not designed to be used at a local level. In reports of the percent sagebrush statistic for the various reporting units (Measure 1a), the uncertainty of the percent sagebrush will increase as the size of the reporting unit gets smaller. LANDFIRE data should never be used at the 30m pixel level ($900m^2$ resolution of raster data) for any reporting. The smallest geographic extent for using the data to determine percent sagebrush is at the PAC level;

for the smallest PACs, the initial percent sagebrush estimate will have greater uncertainties compared with the much larger PACs.

iv. Agricultural Adjustments for the Sagebrush Base Layer

The dataset for the geographic extent of agricultural lands will come from the National Agricultural Statistics Service (NASS) Cropland Data Layer (CDL) (http://www.nass.usda.gov/research/Cropland/Release/index.htm). CDL data are generated annually, with estimated producer accuracies for "large area row crops ranging from the mid 80% to mid-90%," depending on the state (http://www.nass.usda.gov/research/Cropland/sarsfaqs2.htm#Section3_18.0). Specific information on accuracy may be found on the NASS metadata website (http://www.nass.usda.gov/research/Cropland/metadata/meta.htm). CDL provided the only dataset that matches the three criteria (nationally consistent, known level of accuracy, and periodically updated) for use in this monitoring framework and represents the best available agricultural lands mapping product.

The CDL data contain both agricultural classes and nonagricultural classes. For this effort, and in the baseline environmental report (Manier et al. 2013), nonagricultural classes were removed from the original dataset. The excluded classes are:

> Barren (65 & 131), Deciduous Forest (141), Developed/High Intensity (124), Developed/Low Intensity (122), Developed/Med Intensity (123), Developed/Open Space (121), Evergreen Forest (142), Grassland Herbaceous (171), Herbaceous Wetlands (195), Mixed Forest (143), OpenWater (83 & 111), Other Hay/Non Alfalfa

(37), Pasture/Hay (181), Pasture/Grass (62), Perennial Ice/Snow (112), Shrubland (64 & 152), Woody Wetlands (190).

The rule set for adjusting the sagebrush base layer for agricultural lands (and for updating the base layer for agricultural lands in the future) is that once an area is classified as agriculture in any year of the CDL, those pixels will remain out of the sagebrush base layer even if a new version of the CDL classifies that pixel as one of the nonagricultural classes listed above. The assumption is that even though individual pixels may be classified as a nonagricultural class in any given year, the pixel has not necessarily been restored to a natural sagebrush community that would be included in Table 4. A further assumption is that once an area has moved into agricultural use, it is unlikely that the area would be restored to sagebrush. Should that occur, however, the method and criteria for adding pixels back into the sagebrush base layer would follow those found in the sagebrush restoration monitoring section of this monitoring framework (see Section I.B.1.b., Monitoring Sagebrush Availability).

v. Urban Adjustments for the Sagebrush Base Layer

The National Land Cover Database (NLCD) (Fry et al. 2011) includes a percent imperviousness dataset that was selected as the best available dataset to be used for urban adjustments and monitoring. These data are generated on a 5-year cycle and are specifically designed to support monitoring efforts. Other datasets were evaluated and lacked the spatial specificity that was captured in the NLCD product. Any new impervious pixel in NLCD will be removed from the sagebrush base layer through the monitoring process. Although the impervious surface layer includes a number of impervious pixels outside of urban areas, this is acceptable for the adjustment and monitoring for two reasons. First, an evaluation of national urban area datasets did not reveal a layer that could be confidently used in conjunction with the NLCD product to screen impervious pixels outside of urban zones. This is because unincorporated urban areas were not being included, thus leaving large chunks of urban pixels unaccounted for in this rule set. Second, experimentation with setting a threshold on the percent imperviousness layer that would isolate rural features proved to be unsuccessful. No combination of values could be identified that would result in the consistent ability to limit impervious pixels outside urban areas. Therefore, to ensure consistency in the monitoring estimates, all impervious pixels will be used.

vi. Fire Adjustments for the Sagebrush Base Layer

Two datasets were selected for performing fire adjustments and updates: GeoMac fire perimeters and Monitoring Trends in Burn Severity (MTBS). An existing data standard in the BLM requires that all fires of more than 10 acres are to be reported to GeoMac; therefore, there will be many small fires of less than 10 acres that will not be accounted for in the adjustment and monitoring attributable to fire. Using fire perimeters from GeoMac, all sagebrush pixels falling within the perimeter of fires less than 1,000 acres will be used to adjust and monitor the sagebrush base layer.

For fires greater than 1,000 acres, MTBS was selected as a means to account for unburned sagebrush islands during the update process of the sagebrush base layer. The MTBS

program (http://www.mtbs.gov) is an ongoing, multiyear project to map fire severity and fire perimeters consistently across the United States. One of the burn severity classes within MTBS is an unburned to low-severity class. This burn severity class will be used to represent unburned islands of sagebrush within the fire perimeter for the sagebrush base layer. Areas within the other severity classes within the fire perimeter will be removed from the base sagebrush layer during the update process. Not all wildfires, however, have the same impacts on the recovery of sagebrush habitat, depending largely on soil moisture and temperature regimes. For example, cooler, moister sagebrush habitat has a higher potential for recovery or, if needed, restoration than does the warmer, dryer sagebrush habitat. These cooler, moister areas will likely be detected as sagebrush in future updates to LANDFIRE.

vii. Conifer Encroachment Adjustment for the Sagebrush Base Layer

Conifer encroachment into sagebrush vegetation reduces the spatial extent of sage-grouse habitat (Davies et al. 2011, Baruch-Mordo et al. 2013). Conifer species that show propensity for encroaching into sagebrush vegetation resulting in sage-grouse habitat loss include various juniper species, such as Utah juniper *(Juniperus osteosperma),* western juniper *(Juniperus occidentalis),* Rocky Mountain juniper *(Juniperus scopulorum),* pinyon species, including singleleaf pinyon *(Pinus monophylla)* and pinyon pine *(Pinus edulis),* ponderosa pine *(Pinus ponderosa),* lodgepole pine *(Pinus contorta),* and Douglas fir *(Pseudotsuga menziesii)* (Gruell et al. 1986, Grove et al. 2005, Davies et al. 2011).

A rule set for conifer encroachment was developed to adjust the sagebrush base layer. To capture the geographic extent of sagebrush that is likely to experience conifer encroachment, ecological systems within LANDFIRE EVT version 1.2 (NatureServe 2011) were identified if they had the capability of supporting both the conifer species (listed above) and sagebrush vegetation. Those ecological systems were deemed to be the plant communities with conifers most likely to encroach into sagebrush vegetation. (See Table 5, Ecological systems with conifers most likely to encroach into sagebrush vegetation.) Sagebrush vegetation was defined as including sagebrush species or subspecies that provide habitat for the Greater Sage-Grouse and that are included in the HAF. (See Attachment C, Sagebrush Species and Subspecies Included in the Selection Criteria for Building the EVT and BpS Layers.) An adjacency analysis was conducted to identify all sagebrush pixels that were directly adjacent to these conifer ecological systems, and these pixels were removed from the sagebrush base layer.

Table 5. *Ecological systems with conifers most likely to encroach into sagebrush vegetation.*

EVT Ecological Systems	**Coniferous Species and Sagebrush Vegetation that the Ecological System has the Capability of Producing**
Colorado Plateau Pinyon-Juniper Woodland	*Pinus edulis* *Juniperus osteosperma* *Artemisia tridentata* *Artemisia arbuscula* *Artemisia nova* *Artemisia tridentata ssp. tridentata* *Artemisia tridentata ssp. wyomingensis* *Artemisia tridentata ssp. vaseyana* *Artemisia bigelovii* *Artemisia pygmaea*
Columbia Plateau Western Juniper Woodland and Savanna	*Juniperus occidentalis Pinus ponderosa* *Artemisia tridentata* *Artemisia arbuscula* *Artemisia rigida* *Artemisia tridentata ssp. vaseyana*
East Cascades Oak-Ponderosa Pine Forest and Woodland	*Pinus ponderosa* *Pseudotsuga menziesii* *Artemisia tridentata* *Artemisia nova*
Great Basin Pinyon-Juniper Woodland	*Pinus monophylla* *Juniperus osteosperma* *Artemisia arbuscula* *Artemisia nova* *Artemisia tridentata* *Artemisia tridentata ssp. vaseyana*
Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	*Pinus ponderosa* *Artemisia tridentata* *Artemisia arbuscula* *Artemisia tridentata ssp. vaseyana*
Rocky Mountain Foothill Limber Pine-Juniper Woodland	*Juniperus osteosperma* *Juniperus scopulorum* *Artemisia nova* *Artemisia tridentata*

EVT Ecological Systems	Coniferous Species and Sagebrush Vegetation that the Ecological System has the Capability of Producing
Rocky Mountain Poor-Site Lodgepole Pine Forest	*Pinus contorta* *Pseudotsuga menziesii* *Pinus ponderosa* *Artemisia tridentata*
Southern Rocky Mountain Pinyon-Juniper Woodland	*Pinus edulis* *Juniperus monosperma* *Artemisia bigelovii* *Artemisia tridentata* *Artemisia tridentata ssp. wyomingensis* *Artemisia tridentata ssp. vaseyana*
Southern Rocky Mountain Ponderosa Pine Woodland	*Pinus ponderosa* *Pseudotsuga menziesii* *Pinus edulis Pinus contorta Juniperus spp.* *Artemisia nova* *Artemisia tridentata* *Artemisia arbuscula* *Artemisia tridentata ssp. vaseyana*

viii. Invasive Annual Grasses Adjustments for the Sagebrush Base Layer

There are no invasive species datasets from 2010 to the present (beyond the LANDFIRE data) that meet the three criteria (nationally consistent, known level of accuracy, and periodically updated) for use in the determination of the sagebrush base layer. For a description of how invasive species land cover will be incorporated in the sagebrush base layer in the future, see Section I.B.1.b., Monitoring Sagebrush Availability.

ix. Sagebrush Restoration Adjustments for the Sagebrush Base Layer

There are no datasets from 2010 to the present that could provide additions to the sagebrush base layer from restoration treatments that meet the three criteria (nationally consistent, known level of accuracy, and periodically updated); therefore, no adjustments were made to the sagebrush base layer calculated from the LANDFIRE EVT (version 1.2) attributable to restoration activities since 2010. Successful restoration treatments before 2010 are assumed to have been captured in the LANDFIRE refresh.

b. Monitoring Sagebrush Availability

i. Monitoring Sagebrush Availability

Sagebrush availability will be updated annually by incorporating changes to the sagebrush base layer attributable to agriculture, urbanization, and wildfire. The monitoring schedule for the existing sagebrush base layer updates is as follows:

2010 Existing Sagebrush Base Layer = [Sagebrush EVT] minus [2006 Imperviousness Layer] minus [2009 and 2010 CDL] minus [2009/10 GeoMac Fires that are less than 1,000 acres] minus [2009/10 MTBS Fires that are greater than 1,000 acres, excluding unburned sagebrush islands within the perimeter] minus [Conifer Encroachment Layer]

2012 Existing Sagebrush Update = [2010 Existing Sagebrush Base Layer] minus [2011 Imperviousness Layer] minus [2011 and 2012 CDL] minus [2011/12 GeoMac Fires < 1,000 acres] minus [2011/12 MTBS Fires that are greater than 1,000 acres, excluding unburned sagebrush islands within the perimeter]

Monitoring Existing Sagebrush post 2012 = [Previous Existing Sagebrush Update Layer] minus [Imperviousness Layer (if new data are available)] minus [Next 2 years of CDL] minus [Next 2 years of GeoMac Fires < 1,000 acres] minus [Next 2 years of MTBS Fires that are greater than 1,000 acres, excluding unburned sagebrush islands within the perimeter] plus [restoration/monitoring data provided by the field]

ii. Monitoring Sagebrush Restoration

Restoration after fire, after agricultural conversion, after seedings of introduced grasses, or after treatments of pinyon pine and/or juniper are examples of updates to the sagebrush base layer that can add sagebrush vegetation back into sagebrush availability in the landscape. When restoration has been determined to be successful through rangewide, consistent, interagency fine- and site- scale monitoring, the polygonal data will be used to add sagebrush pixels back into the broad- and mid-scale sagebrush base layer.

iii. Measure 1b: Context for Monitoring the Amount of Sagebrush in a Geographic Area of Interest

Measure 1b describes the amount of sagebrush on the landscape of interest compared with the amount of sagebrush the landscape of interest could ecologically support. Areas with the potential to support sagebrush were derived from the BpS data layer that describes sagebrush pre-EuroAmerican settlement (v1.2 of LANDFIRE).

The identification and spatial locations of natural plant communities (vegetation) that are believed to have existed on the landscape (BpS) were constructed based on an approximation of the historical (pre-EuroAmerican settlement) disturbance regime and how the historical disturbance regime operated on the current biophysical environment. BpS is composed of map units that are based on NatureServe (2011) terrestrial ecological systems classification.

The ecological systems within BpS used for this monitoring framework are those ecological systems that are capable of supporting sagebrush vegetation and of providing seasonal habitat for sage-grouse (Table 4). Ecological systems selected included sagebrush species or subspecies that are included in the HAF and listed in Attachment C.

The BpS layer does not have an associated accuracy assessment, given the lack of any reference data. Visual inspection of the BpS data, however, reveals inconsistencies in the labeling of pixels among LANDFIRE map zones. The reason for these inconsistencies is that the rule sets used to map a given ecological system will vary among map zones based on different physical, biological, disturbance, and atmospheric regimes of the region. These variances can result in artificial edges in the map. Metrics will be calculated, however, at broad spatial scales using BpS potential vegetation type, not small groupings or individual pixels. Therefore, the magnitude of these observable errors in the BpS layer will be minor compared with the size of the reporting units. Since BpS will be used to identify broad landscape patterns of dominant vegetation, these inconsistencies will have only a minor impact on the percent sagebrush availability calculation. *As with the LANDFIRE EVT, LANDFIRE BpS data are not designed to be used at a local level*. LANDFIRE data should never be used at the 30m pixel level for reporting.

In conclusion, sagebrush availability data will be used to inform effectiveness monitoring and initiate adaptive management actions as necessary. The 2010 estimate of sagebrush availability will serve as the base year, and an updated estimate for 2012 will be reported in 2014 after all datasets become available. The 2012 estimate will capture changes attributable to wildfire, agriculture, and urban development. Subsequent updates will always include new fire and agricultural data and new urban data when available. Restoration data that meet the criteria for adding sagebrush areas back into the sagebrush base layer will be factored in as data allow.

Given data availability, there will be a 2-year lag (approximately) between when the estimate is generated and when the data used for the estimate become available (e.g., the 2014 sagebrush availability will be included in the 2016 estimate).

iv. Future Plans

Geospatial data used to generate the sagebrush base layer will be available through the BLM's EGIS web portal and geospatial gateway or through the authoritative data source. Legacy datasets will be preserved so that trends may be calculated. Additionally, accuracy assessment data for all source datasets will be provided on the portal either spatially, where applicable, or through the metadata. Accuracy assessment information was deemed vital to help users understand the limitation of the sagebrush estimates; it will be summarized spatially by map zone and will be included in the portal.

LANDFIRE plans to begin a remapping effort in 2015. This remapping has the potential to improve the overall quality of data products greatly, primarily through the use of higher-quality remote sensing datasets. Additionally, the BLM and the Multi-Resolution Land Characteristics Consortium (MRLC) are working to improve the accuracy of vegetation map products for broad- and mid-scale analyses through the Grass/Shrub mapping effort. The

Grass/Shrub mapping effort applies the Wyoming multiscale sagebrush habitat methodology (Homer et al. 2009) to depict spatially the fractional percent cover estimates for five components rangewide and West-wide.

These five components are percent cover of sagebrush vegetation, percent bare ground, percent herbaceous vegetation (grass and forbs combined), annual vegetation, and percent shrubs. A benefit of the design of these fractional cover maps is that they facilitate monitoring "within" class variation (e.g., examination of declining trend in sagebrush cover for individual pixels). This "within" class variation can serve as one indicator of sagebrush quality that cannot be derived from LANDFIRE's EVT information. The Grass/Shrub mapping effort is not a substitute for fine-scale monitoring but will leverage fine-scale data to support the validation of the mapping products. An evaluation will be conducted to determine if either dataset is of great enough quality to warrant replacing the existing sagebrush layers. At the earliest, this evaluation will occur in 2018 or 2019, depending on data availability.

2. Habitat Degradation Monitoring (Measure 2)

The measure of habitat degradation will be calculated by combining the footprints of threats identified in Table 2. The footprint is defined as the direct area of influence of "active" energy and infrastructure; it is used as a surrogate for human activity. Although these analyses will try to summarize results at the aforementioned meaningful geographic areas of interest, some may be too small to report the metrics appropriately and may be combined (smaller populations, PACs within a population, etc.). Data sources for each threat are found in Table 6, Geospatial data sources for habitat degradation. Specific assumptions (inclusion criteria for data, width/area assumptions for point and line features, etc.) and methodology for each threat, and the combined measure, are detailed below. All datasets will be updated annually to monitor broad- and mid- scale year-to-year changes and to calculate trends in habitat degradation to inform adaptive management. A 5-year summary report will be provided to the USFWS.

a. Habitat Degradation Datasets and Assumptions

i. Energy (oil and gas wells and development facilities)

This dataset will compile information from three oil and gas databases: the proprietary IHS Enerdeq database, the BLM Automated Fluid Minerals Support System (AFMSS) database, and the proprietary Platts (a McGraw-Hill Financial Company) GIS Custom Data (hereafter, Platts) database of power plants. Point data from wells active within the last 10 years from IHS and producing wells from AFMSS will be considered as a 5-acre (2.0ha) direct area of influence centered on the well point, as recommended by the BLM WO-300 (Minerals and Realty Management). Plugged and abandoned wells will be removed if the date of well abandonment was before the first day of the reporting year (i.e., for the 2015 reporting year, a well must have been plugged and abandoned by 12/31/2014 to be removed). Platts oil and gas power plants data (subset to operational power plants) will also be included as a 5-acre (2.0ha) direct area of influence.

Additional Measure: Reclaimed Energy-related Degradation. This dataset will include those wells that have been plugged and abandoned. This measure thereby attempts to measure energy-related degradation that has been reclaimed but not necessarily fully restored to sage-grouse habitat. This measure will establish a baseline by using wells that have been plugged and abandoned within the last 10 years from the IHS and AFMSS datasets. Time lags for lek attendance in response to infrastructure have been documented to be delayed 2–10 years from energy development activities (Harju et al. 2010).

Reclamation actions may require 2 or more years from the Final Abandonment Notice. Sagebrush seedling establishment may take 6 or more years from the point of seeding, depending on such variables as annual precipitation, annual temperature, and soil type and depth (Pyke 2011). This 10-year period is conservative and assumes some level of habitat improvement 10 years after plugging. Research by Hemstrom et al. (2002), however, proposes an even longer period—more than 100 years—for recovery of sagebrush habitats, even with active restoration approaches. Direct area of influence will be considered 3 acres (1.2ha) (J. Perry, personal communication, February 12, 2014). This additional layer/measure could be used at the broad and mid scale to identify areas where sagebrush habitat and/or potential sagebrush habitat is likely still degraded. This layer/measure could also be used where further investigation at the fine or site scale would be warranted to: 1) quantify the level of reclamation already conducted, and 2) evaluate the amount of restoration still required for sagebrush habitat recovery. At a particular level (e.g., population, PACs), these areas and the reclamation efforts/success could be used to inform reclamation standards associated with future developments. Once these areas have transitioned from reclamation standards to meeting restoration standards, they can be added back into the sagebrush availability layer using the same methodology as described for adding restoration treatment areas lost to wildfire and agriculture conversion (see Monitoring Sagebrush Restoration in Section I.B.1.b., Monitoring Sagebrush Availability). This dataset will be updated annually from the IHS dataset.

ii. Energy (coal mines)

Currently, there is no comprehensive dataset available that identifies the footprint of active coal mining across all jurisdictions. Therefore, point and polygon datasets will be used each year to identify coal mining locations. Data sources will be identified and evaluated annually and will include at a minimum: BLM coal lease polygons, U.S. Energy Information Administration mine occurrence points, U.S. Office of Surface Mining Reclamation and Enforcement coal mining permit polygons (as available), and U.S. Geological Survey (USGS) Mineral Resources Data System mine occurrence points. These data will inform where active coal mining may be occurring. Additionally, coal power plant data from Platts power plants database (subset to operational power plants) will be included. Aerial imagery will then be used to digitize manually the active coal mining and coal power plants surface disturbance in or near these known occurrence areas. While the date of aerial imagery varies by scale, the most current data available from Esri and/or Google will be used to locate (generally at 1:50,000 and below) and digitize (generally at 1:10,000 and below) active coal mine and power plant direct area of influence. Coal mine location data source and imagery date will be documented for each digitized coal polygon at the time of creation.

Subsurface facility locations (polygon or point location as available) will also be collected if available, included in density calculations, and added to the active surface activity layer as appropriate (if an actual direct area of influence can be located).

iii. Energy (wind energy facilities)
This dataset will be a subset of the Federal Aviation Administration (FAA) Digital Obstacles point file. Points where "Type_" = "WINDMILL" will be included. Direct area of influence of these point features will be measured by converting to a polygon dataset as a direct area of influence of 3 acres (1.2ha) centered on each tower point. See the BLM's "Wind Energy Development Programmatic Environmental Impact Statement" (BLM 2005). Additionally, Platts power plants database will be used for transformer stations associated with wind energy sites (subset to operational power plants), also with a 3-acre (1.2ha) direct area of influence.

iv. Energy (solar energy facilities)
This dataset will include solar plants as compiled with the Platts power plants database (subset to operational power plants). This database includes an attribute that indicates the operational capacity of each solar power plant. Total capacity at the power plant was based on ratings of the in-service unit(s), in megawatts. Direct area of influence polygons will be centered over each point feature representing 7.3ac (3.0ha) per megawatt of the stated operational capacity, per the report of the National Renewable Energy Laboratory (NREL), "Land-Use Requirements for Solar Power Plants in the United States" (Ong et al. 2013).

v. Energy (geothermal energy facilities)
This dataset will include geothermal wells in existence or under construction as compiled with the IHS wells database and power plants as compiled with the Platts database (subset to operational power plants). Direct area of influence of these point features will be measured by converting to a polygon dataset of 3 acres (1.2ha) centered on each well or power plant point.

vi. Mining (active developments; locatable, leasable, saleable)
This dataset will include active locatable mining locations as compiled with the proprietary InfoMine database. Aerial imagery will then be used to digitize manually the active mining surface disturbance in or near these known occurrence areas. While the date of aerial imagery varies by scale, the most current data available from Esri and/or Google will be used to locate (generally at 1:50,000 and below) and digitize (generally at 1:10,000 and below) active mine direct area of influence. Mine location data source and imagery date will be documented for each digitized polygon at the time of creation. Currently, there are no known compressive databases available for leasable or saleable mining sites beyond coal mines. Other data sources will be evaluated and used as they are identified or as they become available. Point data may be converted to polygons to represent direct area of influence unless actual surface disturbance is available.

vii. Infrastructure (roads)
This dataset will be compiled from the proprietary Esri Street Map Premium for ArcGIS. Dataset features that will be used are: Interstate Highways, Major Roads, and Surface

Streets to capture most paved and "crowned and ditched" roads while not including "two-track" and 4-wheel-drive routes. These minor roads, while not included in the broad- and mid-scale monitoring, may support a volume of traffic that can have deleterious effects on sage-grouse leks. It may be appropriate to consider the frequency and type of use of roads in a NEPA analysis for a proposed project. This fine- and site-scale analysis will require more site-specific data than is identified in this monitoring framework. The direct area of influence for roads will be represented by 240.2ft, 84.0ft, and 40.7ft (73.2m, 25.6m, and 12.4m) total widths centered on the line feature for Interstate Highways, Major Roads, and Surface Streets, respectively (Knick et al. 2011). The most current dataset will be used for each monitoring update. Note: This is a related but different dataset than what was used in BER (Manier et al. 2013). *Individual BLM/Forest Service planning units may use different road layers for fine- and site-scale monitoring.*

viii. Infrastructure (railroads)

This dataset will be a compilation from the Federal Railroad Administration Rail Lines of the USA dataset. Non-abandoned rail lines will be used; abandoned rail lines will not be used. The direct are of influence for railroads will be represented by a 30.8ft (9.4m) total width (Knick et al. 2011) centered on the non-abandoned railroad line feature.

ix. Infrastructure (power lines)

This line dataset will be derived from the proprietary Platts transmission lines database. Linear features in the dataset attributed as "buried" will be removed from the disturbance calculation. Only "In Service" lines will be used; "Proposed" lines will not be used. Direct area of influence will be determined by the kV designation: 1–199 kV (100ft/30.5m), 200–399 kV (150ft/45.7m), 400–699 kV (200ft/61.0m), and 700-or greater kV (250ft/76.2m) based on average right-of-way and structure widths, according to BLM WO-300 (Minerals and Realty Management).

x. Infrastructure (communication towers)

This point dataset will be compiled from the Federal Communications Commission (FCC) communication towers point file; all duplicate points will be removed. It will be converted to a polygon dataset by using a direct area of influence of 2.5 acres (1.0ha) centered on each communication tower point (Knick et al. 2011).

xi. Infrastructure (other vertical structures)

This point dataset will be compiled from the FAA's Digital Obstacles point file. Points where "Type_" = "WINDMILL" will be removed. Duplicate points from the FCC communication towers point file will be removed. Remaining features will be converted to a polygon dataset using a direct area of influence of 2.5 acres (1.0ha) centered on each vertical structure point (Knick et al. 2011).

xii. Other Developed Rights-of-Way

Currently, no additional data sources for other rights-of-way have been identified; roads, power lines, railroads, pipelines, and other known linear features are represented in the categories described above. The newly purchased IHS data do contain pipeline information; however, this database does not currently distinguish between above-ground and

underground pipelines. If additional features representing human activities are identified, they will be added to monitoring reports using similar assumptions to those used with the threats described above.

b. Habitat Degradation Threat Combination and Calculation

The threats targeted for measuring human activity (Table 2) will be converted to direct area of influence polygons as described for each threat above. These threat polygon layers will be combined and features dissolved to create one overall polygon layer representing footprints of active human activity in the range of sage-grouse. Individual datasets, however, will be preserved to indicate which types of threats may be contributing to overall habitat degradation.

This measure has been divided into three submeasures to describe habitat degradation on the landscape. Percentages will be calculated as follows:

Measure 2a. Footprint by geographic area of interest: Divide area of the active/direct footprint by the total area of the geographic area of interest (% disturbance in geographic area of interest).

Measure 2b. Active/direct footprint by historical sagebrush potential: Divide area of the active footprint that coincides with areas with historical sagebrush potential (BpS calculation from habitat availability) within a given geographic area of interest by the total area with sagebrush potential within the geographic area of interest (% disturbance on potential historical sagebrush in geographic area of interest).

Measure 2c. Active/direct footprint by current sagebrush: Divide area of the active footprint that coincides with areas of existing sagebrush (EVT calculation from habitat availability) within a given geographic area of interest by the total area that is current sagebrush within the geographic area of interest (% disturbance on current sagebrush in geographic area of interest).

3. Energy and Mining Density (Measure 3)

The measure of density of energy and mining will be calculated by combining the locations of energy and mining threats identified in Table 2. This measure will provide an estimate of the intensity of human activity or the intensity of habitat degradation. The number of energy facilities and mining locations will be summed and divided by the area of meaningful geographic areas of interest to calculate density of these activities. Data sources for each threat are found in Table 6. Specific assumptions (inclusion criteria for data, width/area assumptions for point and line features, etc.) and methodology for each threat, and the combined measure, are detailed below. All datasets will be updated annually to monitor broad- and mid-scale year-to-year changes and 5-year (or longer) trends in habitat degradation.

Table 6. *Geospatial data sources for habitat degradation (Measure 2).*

Degradation Type	Subcategory	Data Source	Direct Area of Influence	Area Source
Energy (oil & gas)	Wells	IHS; BLM (AFMSS)	5.0ac (2.0ha)	BLM WO-
	Power Plants	Platts (power plants)	5.0ac (2.0ha)	BLM WO-300
Energy (coal)	Mines	BLM; Forest Service; Office of Surface Mining Reclamation and Enforcement; USGS Mineral Resources Data System	Polygon area (digitized)	Esri/Google Imagery
	Power Plants	Platts (power plants)	Polygon area (digitized)	Esri Imagery
Energy (wind)	Wind Turbines	Federal Aviation Administration	3.0ac (1.2ha)	BLM WO-300
	Power Plants	Platts (power plants)	3.0ac (1.2ha)	BLM WO-300
Energy (solar)	Fields/Power Plants	Platts (power plants)	7.3ac (3.0ha)/MW	NREL
Energy (geothermal)	Wells	IHS	3.0ac (1.2ha)	BLM WO-300
	Power Plants	Platts (power plants)	Polygon area (digitized)	Esri Imagery
Mining	Locatable Developments	InfoMine	Polygon area (digitized)	Esri Imagery
Infrastructure (roads)	Surface Streets (Minor Roads)	Esri StreetMap Premium	40.7ft (12.4m)	USGS
	Major Roads	Esri StreetMap Premium	84.0ft (25.6m)	USGS
	Interstate Highways	Esri StreetMap Premium	240.2ft (73.2m)	USGS
Infrastructure (railroads)	Active Lines	Federal Railroad Administration	30.8ft (9.4m)	USGS
Infrastructure (power lines)	1-199kV Lines	Platts (transmission lines)	100ft (30.5m)	BLM WO-300
	200-399 kV Lines	Platts (transmission lines)	150ft (45.7m)	BLM WO-300
	400-699kV Lines	Platts (transmission lines)	200ft (61.0m)	BLM WO-300
	700+kV Lines	Platts (transmission lines)	250ft (76.2m)	BLM WO-300
Infrastructure (communication)	Towers	Federal Communications Commission	2.5ac (1.0ha)	BLM WO-300

a. Energy and Mining Density Datasets and Assumptions

i. Energy (oil and gas wells and development facilities)
(See Section I.B.2., Habitat Degradation Monitoring.)

ii. Energy (coal mines)
(See Section I.B.2., Habitat Degradation Monitoring.)

iii. Energy (wind energy facilities)
(See Section I.B.2., Habitat Degradation Monitoring.)

iv. Energy (solar energy facilities)
(See Section I.B.2., Habitat Degradation Monitoring.)

v. Energy (geothermal energy facilities)
(See Section I.B.2., Habitat Degradation Monitoring.)

vi. Mining (active developments; locatable, leasable, saleable)
(See Section I.B.2., Habitat Degradation Monitoring.)

b. Energy and Mining Density Threat Combination and Calculation

Datasets for energy and mining will be collected in two primary forms: point locations (e.g., wells) and polygon areas (e.g., surface coal mining). The following rule set will be used to calculate density for meaningful geographic areas of interest including standard grids and per polygon:

1. Point locations will be preserved; no additional points will be removed beyond the methodology described above. Energy facilities in close proximity (an oil well close to a wind tower) will be retained.

2. Polygons will not be merged, or features further dissolved. Thus, overlapping facilities will be retained, such that each individual threat will be a separate polygon data input for the density calculation.

3. The analysis unit (polygon or 640-acre section in a grid) will be the basis for counting the number of mining or energy facilities per unit area. Within the analysis unit, all point features will be summed, and any individual polygons will be counted as one (e.g., a coal mine will be counted as one facility within population). Where polygon features overlap multiple units (polygons or pixels), the facility will be counted as one in each unit where the polygon occurs (e.g., a polygon crossing multiple 640-acre sections would be counted as one in each 640-acre section for a density per 640-acre- section calculation).

4. In methodologies with different-sized units (e.g., MZs, populations, etc.) raw facility counts will be converted to densities by dividing the raw facility counts by the total area of the unit. Typically this will be measured as facilities per 640 acres.

5. For uniform grids, raw facility counts will be reported. Typically this number will also be converted to facilities per 640 acres.

6. Reporting may include summaries beyond the simple ones above. Zonal statistics may be used to smooth smaller grids to help display and convey information about areas within meaningful geographic areas of interest that have high levels of energy and/or mining activity.

7. Additional statistics for each defined unit may also include adjusting the area to include only the area with the historical potential for sagebrush (BpS) or areas currently sagebrush (EVT).

Individual datasets and threat combination datasets for habitat degradation will be available through the BLM's EGIS web portal and geospatial gateway. Legacy datasets will be preserved so that trends may be calculated.

C. Population (Demographics) Monitoring

State wildlife management agencies are responsible for monitoring sage-grouse populations within their respective states. WAFWA will coordinate this collection of annual population data by state agencies. These data will be made available to the BLM according to the terms of the forthcoming Greater Sage-Grouse Population Monitoring Memorandum of Understanding (MOU) (2014) between WAFWA and the BLM. The MOU outlines a process, timeline, and responsibilities for regular data sharing of sage-grouse population and/or habitat information for the purposes of implementing sage-grouse LUPs/amendments and subsequent effectiveness monitoring. Population areas were refined from the "Greater Sage-grouse *(Centrocercus urophasianus)* Conservation Objectives: Final Report" (COT 2013) by individual state wildlife agencies to create a consistent naming nomenclature for future data analyses. These population data will be used for analysis at the applicable scale to supplement habitat effectiveness monitoring of management actions and to inform the adaptive management responses.

D. Effectiveness Monitoring

Effectiveness monitoring will provide the data needed to evaluate BLM and Forest Service actions toward reaching the objective of the national planning strategy (BLM IM 2012-044)—to conserve sage-grouse populations and their habitat—and the objectives for the land use planning area. Effectiveness monitoring methods described here will encompass multiple larger scales, from areas as large as the WAFWA MZ to the scale of this LUP. Effectiveness data used for these larger-scale evaluations will include all lands in the area of interest, regardless of surface ownership/management, and will help inform where finer-scale evaluations are needed, such as population areas smaller than an LUP or PACs within an LUP (described in Section II, Fine and Site Scales). Data will also include the trend of disturbance within these areas of interest to inform the need to initiate adaptive management responses as described in the land use plan.

Effectiveness monitoring reported for these larger areas provides the context to conduct effectiveness monitoring at finer scales. This approach also helps focus scarce resources to areas experiencing habitat loss, degradation, or population declines, without excluding the possibility of concurrent, finer-scale evaluations as needed where habitat or population anomalies have been identified through some other means.

To determine the effectiveness of the sage-grouse national planning strategy, the BLM and the Forest Service will evaluate the answers to the following questions and prepare a broad- and mid-scale effectiveness report:

1. Sagebrush Availability and Condition:

    a. What is the amount of sagebrush availability and the change in the amount and condition of sagebrush?

    b. What is the existing amount of sagebrush on the landscape and the change in the amount relative to the pre-EuroAmerican historical distribution of sagebrush (BpS)?

c. What is the trend and condition of the indicators describing sagebrush characteristics important to sage-grouse?

2. Habitat Degradation and Intensity of Activities:

    a. What is the amount of habitat degradation and the change in that amount?

    b. What is the intensity of activities and the change in the intensity?

    c. What is the amount of reclaimed energy-related degradation and the change in the amount?

3. What is the population estimation of sage-grouse and the change in the population estimation?

4. How are the BLM and the Forest Service contributing to changes in the amount of sagebrush?

5. How are the BLM and the Forest Service contributing to disturbance?

The compilation of broad- and mid-scale data (and population trends as available) into an effectiveness monitoring report will occur on a 5-year reporting schedule (see Attachment A), which may be accelerated to respond to critical emerging issues (in consultation with the USFWS and state wildlife agencies). In addition, effectiveness monitoring results will be used to identify emerging issues and research needs and inform the BLM and the Forest Service adaptive management strategy (see the adaptive management section of this EIS).

To determine the effectiveness of the sage-grouse objectives of the land use plan, the BLM and the Forest Service will evaluate the answers to the following questions and prepare a plan effectiveness report:

1. Is this plan meeting the sage-grouse habitat objectives?

2. Are sage-grouse areas within the LUP meeting, or making progress toward meeting, land health standards, including the Special Status Species/wildlife habitat standard?

3. Is the plan meeting the disturbance objective(s) within sage-grouse areas?

4. Are the sage-grouse populations within this plan boundary and within the sage-grouse areas increasing, stable, or declining?

The effectiveness monitoring report for this LUP will occur on a 5-year reporting schedule (see Attachment A) or more often if habitat or population anomalies indicate the need for an evaluation to facilitate adaptive management or respond to critical emerging issues. Data will be made available through the BLM's EGIS web portal and the geospatial gateway.

1. Methods

At the broad and mid scales (PACs and above) the BLM and the Forest Service will summarize the vegetation, disturbance, and (when available) population data. Although the analysis will try to summarize results for PACs within each sage-grouse population, some populations may be too small to report the metrics appropriately and may need to be combined to provide an estimate with an acceptable level of accuracy. Otherwise, they will be flagged for more intensive monitoring by the appropriate landowner or agency. The BLM and the Forest Service will then analyze monitoring data to detect the trend in the amount of sagebrush; the condition of the vegetation in the sage-grouse areas (MacKinnon et al. 2011); the trend in the amount of disturbance; the change in disturbed areas owing to successful restoration; and the amount of new disturbance the BLM and/or the Forest Service has permitted. These data could be supplemented with population data (when available) to inform an understanding of the correlation between habitat and PACs within a population. This overall effectiveness evaluation must consider the lag effect response of populations to habitat changes (Garton et al. 2011).

Calculating Question 1, National Planning Strategy Effectiveness: The amount of sagebrush available in the large area of interest will use the information from Measure 1a (I.B.1., Sagebrush Availability) and calculate the change from the 2012 baseline to the end date of the reporting period. To calculate the change in the amount of sagebrush on the landscape to compare with the historical areas with potential to support sagebrush, the information from Measure 1b (I.B.1., Sagebrush Availability) will be used. To calculate the trend in the condition of sagebrush at the mid scale, three sources of data will be used: the BLM's Grass/Shrub mapping effort (Future Plans in Section I.B.1., Sagebrush Availability); the results from the calculation of the landscape indicators, such as patch size (described below); and the BLM's Landscape Monitoring Framework (LMF) and sage-grouse intensification effort (also described below). The LMF and sage-grouse intensification effort data are collected in a statistical sampling framework that allows calculation of indicator values at multiple scales.

Beyond the importance of sagebrush availability to sage-grouse, the mix of sagebrush patches on the landscape at the broad and mid scale provides the life requisite of space for sage-grouse dispersal needs (see the HAF). The configuration of sagebrush habitat patches and the land cover or land use between the habitat patches at the broad and mid scales also defines suitability. There are three significant habitat indicators that influence habitat use, dispersal, and movement across populations: the size and number of habitat patches, the connectivity of habitat patches (linkage areas), and habitat fragmentation (scope of unsuitable and non-habitats between habitat patches). The most appropriate commercial software to measure patch dynamics, connectivity, and fragmentation at the broad and mid scales will be used, along with the same data layers derived for sagebrush availability.

The BLM initiated the LMF in 2011 in cooperation with the Natural Resources Conservation Service (NRCS). The objective of the LMF effort is to provide unbiased estimates of vegetation and soil condition and trend using a statistically balanced sample design across BLM lands.

Recognizing that sage-grouse populations are more resilient where the sagebrush plant community has certain characteristics unique to a particular life stage of sage-grouse (Knick and Connelly 2011, Stiver et al. in press), a group of sage-grouse habitat and sagebrush plant

community subject matter experts identified those vegetation indicators collected at LMF sampling points that inform sage-grouse habitat needs. The experts represented the Agricultural Research Service, BLM, NRCS, USFWS, WAFWA, state wildlife agencies, and academia. The common indicators identified include: species composition, foliar cover, height of the tallest sagebrush and herbaceous plant, intercanopy gap, percent of invasive species, sagebrush shape, and bare ground. To increase the precision of estimates of sagebrush conditions within the range of sage-grouse, additional plot locations in occupied sage-grouse habitat (Sage-Grouse Intensification) were added in 2013. The common indicators are also collected on sampling locations in the NRCS National Resources Inventory Rangeland Resource Assessment (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/nri/?&cid=stelprdb10416 20).

The sage-grouse intensification baseline data will be collected over a 5-year period, and an annual sage-grouse intensification report will be prepared describing the status of the indicators. Beginning in year 6, the annual status report will be accompanied with a trend report, which will be available on an annual basis thereafter, contingent on continuation of the current monitoring budget. This information, in combination with the Grass/Shrub mapping information, the mid- scale habitat suitability indicator measures, and the sagebrush availability information will be used to answer Question 1 of the National Planning Strategy Effectiveness Report.

Calculating Question 2, National Planning Strategy Effectiveness: Evaluations of the amount of habitat degradation and the intensity of the activities in the area of interest will use the information from Measure 2 (Section I.B.2., Habitat Degradation Monitoring) and Measure 3 (Section I.B.3., Energy and Mining Density). The field office will collect data on the amount of reclaimed energy-related degradation on plugged and abandoned and oil/gas well sites. The data are expected to demonstrate that the reclaimed sites have yet to meet the habitat restoration objectives for sage-grouse habitat. This information, in combination with the amount of habitat degradation, will be used to answer Question 2 of the National Planning Strategy Effectiveness Report.

Calculating Question 3, National Planning Strategy Effectiveness: The change in sage-grouse estimated populations will be calculated from data provided by the state wildlife agencies, when available. This population data (Section I.C., Population [Demographics] Monitoring) will be used to answer Question 3 of the National Planning Strategy Effectiveness Report.

Calculating Question 4, National Planning Strategy Effectiveness: The estimated contribution by the BLM or the Forest Service to the change in the amount of sagebrush in the area of interest will use the information from Measure 1a (Section I.B.1., Sagebrush Availability). This measure is derived from the national datasets that remove sagebrush (Table 3). To determine the relative contribution of BLM and Forest Service management, the current Surface Management Agency geospatial data layer will be used to differentiate the amount of change for each management agency for this measure in the geographic areas of interest. This information will be used to answer Question 4 of the National Planning Strategy Effectiveness Report.

Calculating Question 5, National Planning Strategy Effectiveness: The estimated contribution by the BLM or the Forest Service to the change in the amount of disturbance in the area of interest will use the information from Measure 2a (Section I.B.2., Monitoring Habitat Degradation) and Measure 3 (Section I.B.3., Energy and Mining Density). These measures are all derived from the national disturbance datasets that degrade habitat (Table 6). To determine the relative contribution of BLM and Forest Service management, the current Surface Management Agency geospatial data layer will be used to differentiate the amount of change for each management agency for these two measures in the geographic areas of interest. This information will be used to answer Question 5 of the National Planning Strategy Effectiveness Report.

Answers to the five questions for determining the effectiveness of the national planning strategy will identify areas that appear to be meeting the objectives of the strategy and will facilitate identification of population areas for more detailed analysis. Conceptually, if the broad-scale monitoring identifies increasing sagebrush availability and improving vegetation conditions, decreasing disturbance, and a stable or increasing population for the area of interest, there is evidence that the objectives of the national planning strategy to maintain populations and their habitats have been met. Conversely, where information indicates that sagebrush is decreasing and vegetation conditions are degrading, disturbance in sage-grouse areas is increasing, and/or populations are declining relative to the baseline, there is evidence that the objectives of the national planning strategy are not being achieved. Such a determination would likely result in a more detailed analysis and could be the basis for implementing more restrictive adaptive management measures.

With respect to the land use plan area, the BLM and the Forest Service will summarize the vegetation, disturbance, and population data to determine if the LUP is meeting the plan objectives.

Effectiveness information used for these evaluations includes BLM/Forest Service surface management areas and will help inform where finer-scale evaluations are needed, such as seasonal habitats, corridors, or linkage areas. Data will also include the trend of disturbance within the sage-grouse areas, which will inform the need to initiate adaptive management responses as described in the land use plan.

Calculating Question 1, Land Use Plan Effectiveness: The condition of vegetation and the allotments meeting land health standards (as articulated in "BLM Handbook 4180-1, Rangeland Health Standards") in sage-grouse areas will be used to determine the LUP's effectiveness in meeting the vegetation objectives for sage-grouse habitat set forth in the plan. The field office/ranger district will be responsible for collecting this data. In order for this data to be consistent and comparable, common indicators, consistent methods, and an unbiased sampling framework will be implemented following the principles in the BLM's AIM strategy (Taylor et al. 2014; Toevs et al. 2011; MacKinnon et al. 2011), in the BLM's Technical Reference "Interpreting Indicators of Rangeland Health" (Pellant et al. 2005), and in the HAF (Stiver et al. in press) or other approved WAFWA MZ–consistent guidance to measure and monitor sage- grouse habitats. This information will be used to answer Question 1 of the Land Use Plan Effectiveness Report.

Calculating Question 2, Land Use Plan Effectiveness: Sage-grouse areas within the LUP that are achieving land health stands (or, if trend data are available, that are making progress toward achieving them)—particularly the Special Status Species/wildlife habitat land health standard—will be used to determine the LUP's effectiveness in achieving the habitat objectives set forth in the plan. Field offices will follow directions in "BLM Handbook 4180-1, Rangeland Health Standards," to ascertain if sage-grouse areas are achieving or making progress toward achieving land health standards. One of the recommended criteria for evaluating this land health standard is the HAF indicators.

Calculating Question 3, Land Use Plan Effectiveness: The amount of habitat disturbance in sage- grouse areas identified in this LUP will be used to determine the LUP's effectiveness in meeting the plan's disturbance objectives. National datasets can be used to calculate the amount of disturbance, but field office data will likely increase the accuracy of this estimate. This information will be used to answer Question 3 of the Land Use Plan Effectiveness Report.

Calculating Question 4, Land Use Plan Effectiveness: The change in estimated sage-grouse populations will be calculated from data provided by the state wildlife agencies, when available, and will be used to determine LUP effectiveness. This population data (Section I.C., Population [Demographics] Monitoring) will be used to answer Question 4 of the Land Use Plan Effectiveness Report.

Results of the effectiveness monitoring process for the LUP will be used to inform the need for finer-scale investigations, initiate adaptive management actions as described in the land use plan, initiate causation determination, and/or determine if changes to management decisions are warranted. The measures used at the broad and mid scales will provide a suite of characteristics for evaluating the effectiveness of the adaptive management strategy.

II. FINE AND SITE SCALES

Fine-scale (third-order) habitat selected by sage-grouse is described as the physical and geographic area within home ranges during breeding, summer, and winter periods. At this level, habitat suitability monitoring should address factors that affect sage-grouse use of, and movements between, seasonal use areas. The habitat monitoring at the fine and site scale (fourth order) should focus on indicators to describe seasonal home ranges for sage-grouse associated with a lek or lek group within a population or subpopulation area. Fine- and site-scale monitoring will inform LUP effectiveness monitoring (see Section I.D., Effectiveness Monitoring) and the hard and soft triggers identified in the LUP's adaptive management section.

Site-scale habitat selected by sage-grouse is described as the more detailed vegetation characteristics of seasonal habitats. Habitat suitability characteristics include canopy cover and height of sagebrush and the associated understory vegetation. They also include vegetation associated with riparian areas, wet meadows, and other mesic habitats adjacent to sagebrush that may support sage-grouse habitat needs during different stages in their annual cycle.

As described in the Conclusion (Section III), details and application of monitoring at the fine and site scales will be described in the implementation-level monitoring plan for the land use plan.

The need for fine- and site-scale-specific habitat monitoring will vary by area, depending on proposed projects, existing conditions, habitat variability, threats, and land health. Examples of fine- and site-scale monitoring include: habitat vegetation monitoring to assess current habitat conditions; monitoring and evaluation of the success of projects targeting sage-grouse habitat enhancement and/or restoration; and habitat disturbance monitoring to provide localized disturbance measures to inform proposed project review and potential mitigation for project impacts. Monitoring plans should incorporate the principles outlined in the BLM's AIM strategy (Toevs et al. 2011) and in "AIM-Monitoring: A Component of the Assessment, Inventory, and Monitoring Strategy" (Taylor et al. 2014). Approved monitoring methods are:

- "BLM Core Terrestrial Indicators and Methods" (MacKinnon et al. 2011);
- The BLM's Technical Reference "Interpreting Indicators of Rangeland Health" (Pellant et al. 2005); and,
- "Sage-Grouse Habitat Assessment Framework: Multiscale Assessment Tool" (Stiver et al. *in press*).

Other state-specific disturbance tracking models include: the BLM's Wyoming Density and Disturbance Calculation Tool (http://ddct.wygisc.org/) and the BLM's White River Data Management System in development with the USGS. Population monitoring data (in cooperation with state wildlife agencies) should be included during evaluation of the effectiveness of actions taken at the fine and site scales.

Fine- and site-scale sage-grouse habitat suitability indicators for seasonal habitats are identified in the HAF. The HAF has incorporated the Connelly et al. (2000) sage-grouse guidelines as well as many of the core indicators in the AIM strategy (Toevs et al. 2011). There may be a need to develop

adjustments to height and cover or other site suitability values described in the HAF; any such adjustments should be ecologically defensible. To foster consistency, however, adjustments to site suitability values at the local scale should be avoided unless there is strong, scientific justification for making those adjustments. That justification should be provided.

WAFWA MZ adjustments must be supported by regional plant productivity and habitat data for the floristic province. If adjustments are made to the site-scale indicators, they must be made using data from the appropriate seasonal habitat designation (breeding/nesting, brood-rearing, winter) collected from sage-grouse studies found in the relevant area and peer-reviewed by the appropriate wildlife management agency(ies) and researchers.

When conducting land heath assessments, the BLM should follow, at a minimum, "Interpreting Indicators of Rangeland Health" (Pellant et. al. 2005) and the "BLM Core Terrestrial Indicators and Methods" (MacKinnon et al. 2011). For assessments being conducted in sage-grouse designated management areas, the BLM should collect additional data to inform the HAF indicators that have not been collected using the above methods. Implementation of the principles outlined in the AIM strategy will allow the data to be used to generate unbiased estimates of condition across the area of interest; facilitate consistent data collection and rollup analysis among management units; help provide consistent data to inform the classification and interpretation of imagery; and provide condition and trend of the indicators describing sagebrush characteristics important to sage-grouse habitat (see Section I.D., Effectiveness Monitoring).

III. CONCLUSION

This Greater Sage-Grouse Monitoring Framework was developed for all of the FEISs involved in the sage-grouse planning effort. As such, it describes the monitoring activities at the broad and mid scales and provides a guide for the BLM and the Forest Service to collaborate with partners/other agencies to develop the land use plan- specific monitoring plan.

IV. THE GREATER SAGE-GROUSE DISTURBANCE AND MONITORING SUBTEAM MEMBERSHIP

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Appendix A – Attachment A. *An Overview of Monitoring Commitments.*

	Broad and Mid Scales					
	Implementation	Sagebrush Availability	Habitat Degradation	Population	Effectiveness	Fine and Site Scales
How will the data be used?	Track and document implementation of land use plan decisions and inform adaptive management	Track changes in land cover (sagebrush) and inform adaptive management	Track changes in disturbance (threats) to sage-grouse habitat and inform adaptive management	Track trends in sage-grouse populations (and/or leks; as determined by state wildlife agencies) and inform adaptive management	Characterize the relationship among disturbance, implementation actions, and sagebrush metrics and inform adaptive management	Measure seasonal habitat, connectivity at the fine scale, and habitat conditions at the site scale, calculate disturbance, and inform adaptive management
Who is collecting the data?	BLM FO and Forest Service Forest	NOC and NIFC	National datasets (NOC), BLM FOs, and Forest Service Forests as applicable	State wildlife agencies through WAFWA	Comes from other broad- and mid-scale monitoring types, analyzed by the NOC	BLM FO and SO, Forest Service Forests and RO (with partners)
How often are the data collected, reported, and made available to USFWS?	Collected and reported annually; summary report every 5 years	Updated and changes reported annually; summary report every 5 years	Collected and changes reported annually; summary report every 5 years	State data reported annually per WAFWA MOU; summary report every 5 years	Collected and reported every 5 years (coincident with LUP evaluation)	Collection and trend analysis ongoing, reported every 5 years or as needed to inform adaptive management
What is the spatial scale?	Summarized by LUP with flexibility for reporting by other units	Summarized by PACs (size dependent) with flexibility for reporting by other units	Summarized by PACs (size dependent) with flexibility for reporting by other units	Summarized by PACs (size dependent) with flexibility for reporting by other units	Summarized by MZ and LUP with flexibility for reporting by other units (e.g., PAC)	Variable (e.g., projects and seasonal habitats)
What are the potential personnel and budget impacts?	Additional capacity or reprioritization of ongoing monitoring work and budget realignment	At a minimum, current skills and capacity must be maintained; data management costs TBD	At a minimum, current skills and capacity must be maintained; data management and data layer	No additional personnel or budget impacts for the BLM or the Forest Service	Additional capacity or reprioritization of ongoing monitoring work and budget realignment	Additional capacity or reprioritization of ongoing monitoring work and budget realignment

Who has primary and secondary responsibilities for reporting?	1) BLM FO & SO; Forest Service Forest & RO 2) BLM & Forest Service Planning	1) NOC 2) WO	1) NOC 2) BLM SO, Forest Service RO & appropriate programs	1) WAFWA & state wildlife agencies 2) BLM SO, Forest Service RO, NOC	1) Broad and mid scale at the NOC, LUP at BLM SO, Forest Service RO	1) BLM FO & Forest Service Forests 2) BLM SO & Forest Service RO
What new processes/tools are needed	National implementation datasets and analysis tools	Updates to national land cover data	Data standards and rollup methods for these data	Standards in population monitoring (WAFWA)	Reporting methodologies	Data standards data storage; and reporting

FO (field office); NIFC (National Interagency Fire Center); NOC (National Operations Center); RO (regional office); SO (state office); TBD (to be determined) ; WO (Washington Office)

Appendix A – Attachment B. *User and Producer Accuracies for Aggregated Ecological Systems within LANDFIRE Map Zones.*

LANDFIRE Map Zone Name	User Accuracy	Producer Accuracy	% of Map Zone within Historical Schroeder
Wyoming Basin	76.9%	90.9%	98.5%
Snake River Plain	68.8%	85.2%	98.4%
Missouri River Plateau	57.7%	100.0%	91.3%
Grand Coulee Basin of the Columbia Plateau	80.0%	80.0%	89.3%
Wyoming Highlands	75.3%	85.9%	88.1%
Western Great Basin	69.3%	75.4%	72.9%
Blue Mountain Region of the Columbia Plateau	85.7%	88.7%	72.7%
Eastern Great Basin	62.7%	80.0%	62.8%
Northwestern Great Plains	76.5%	92.9%	46.3%
Northern Rocky Mountains	72.5%	89.2%	42.5%
Utah High Plateaus	81.8%	78.3%	41.5%
Colorado Plateau	65.3%	76.2%	28.8%
Middle Rocky Mountains	78.6%	73.3%	26.4%
Cascade Mountain Range	57.1%	88.9%	17.3%
Sierra Nevada Mountain Range	0.0%	0.0%	12.3%
Northwestern Rocky Mountains	66.7%	60.0%	7.3%
Southern Rocky Mountains	58.6%	56.7%	7.0%
Northern Cascades	75.0%	75.0%	2.6%
Mogollon Rim	66.7%	100.0%	1.7%
Death Valley Basin	0.0%	0.0%	1.2%

There are two anomalous map zones with 0% user and producer accuracies, attributable to no available reference data for the ecological systems of interest.

User accuracy is a map-based accuracy that is computed by looking at the reference data for a class and determining the percentage of correct predictions for these samples. For example, if I select any sagebrush pixel on the classified map, what is the probability that I'll be standing in a sagebrush stand when I visit that pixel location in the field? Commission Error equates to including a pixel in a class when it should have been excluded (i.e., commission error = 1 – user's accuracy).

Producer accuracy is a reference-based accuracy that is computed by looking at the predictions produced for a class and determining the percentage of correct predictions. In other words, if I know that a particular area is sagebrush (I've been out on the ground to check), what is the probability that the digital map will correctly identify that pixel as sagebrush? Omission Error equates to excluding a pixel that should have been included in the class (i.e., omission error = 1 – producer's accuracy).

Appendix A – Attachment C. *Sagebrush Species and Subspecies Included in the Selection Criteria for Building the EVT and BpS Layers.*

- *Artemisia arbuscula subspecies longicaulis*
- *Artemisia arbuscula subspecies longiloba*
- *Artemisia bigelovii*
- *Artemisia nova*
- *Artemisia papposa*
- *Artemisia pygmaea*
- *Artemisia rigida*
- *Artemisia spinescens*
- *Artemisia tripartita subspecies rupicola*
- *Artemisia tripartita subspecies tripartita*
- *Tanacetum nuttallii*
- *Artemisia cana subspecies bolanderi*
- *Artemisia cana subspecies cana*
- *Artemisia cana subspecies viscidula*
- *Artemisia tridentata subspecies wyomingensis*
- *Artemisia tridentata subspecies tridentata*
- *Artemisia tridentata subspecies vaseyana*
- *Artemisia tridentata subspecies spiciformis*
- *Artemisia tridentata subspecies xericensis*
- *Artemisia tridentata variety pauciflora*
- *Artemisia frigida*
- *Artemisia pedatifida*

APPENDIX B – MITIGATION STRATEGY

General

The Forest Service will require mitigation that provides a net conservation gain to the greater sage-grouse (GRSG) when undertaking Forest Service management actions, and consistent with valid existing rights and applicable law, in authorizing third party actions that result in GRSG habitat loss and degradation. This will be achieved by avoiding, minimizing, and compensating for impacts by applying beneficial mitigation actions. Mitigation will follow the regulations from the White House Council on Environmental Quality (CEQ) (40 CFR 1508.20) and the steps of avoid, minimize, and compensate, hereafter referred to as the mitigation hierarchy. If impacts from Forest Service management actions and authorized third party actions, which result in habitat loss and degradation, remain after applying avoidance and minimization measures (i.e., residual impacts), then compensatory mitigation will be used to provide a net conservation gain to the GRSG. Mitigation should account for any uncertainty associated with the effectiveness of such mitigation. Any compensatory mitigation will be durable, timely, and in addition to that which would have resulted without the compensatory mitigation

The Forest Service will participate with the BLM to establish a Western Association of Fish and Wildlife Agencies (WAFWA) Management Zone Greater Sage-Grouse Conservation Team (Team) to develop a WAFWA Management Zone Regional Mitigation Strategy (Strategy). The Strategy will inform the National Environmental Policy Act (NEPA) decision making process, including application of the mitigation hierarchy for Forest Service management actions and third party actions that result in habitat loss and degradation. The application of a robust and transparent Strategy will contribute to GRSG habitat conservation by reducing, eliminating, or minimizing threats and compensating for residual impacts to the GRSG and its habitat.

The BLM Regional Mitigation Manual MS-1794 as well as the Forest Service mitigation policy and CEQ regulations will serve as a framework for developing and implementing the Strategy. In developing the Strategy, the Team should consider any state-level GRSG mitigation guidance that is consistent with the following framework. The Strategy should be developed in a transparent manner and must be based on the best science available and standardized metrics. The Strategy should be developed within 1 year of the issuance of the ROD.

Developing a WAFWA Management Zone Regional Mitigation Strategy

The following sections provide additional guidance specific to the development and implementation of the Strategy.

- **Avoidance includes the following:**
    - Avoidance areas (e.g., no surface occupancy areas) already included in right-of-way avoidance/exclusion areas, laws, regulations, policies, and/or land use plans (e.g., LMPs, state plans).
    - Any potential additional avoidance actions (e.g., additional avoidance best management practices) related to GRSG conservation.
- **Minimization includes the following:**
    - Minimization actions (e.g., required design features, best management practices) already included in laws, regulations, policies, LMPs, and special use authorizations.
    - Any potential additional minimization actions (e.g., additional minimization best management practices) related to GRSG conservation.
- **Compensation includes the following:**
    - Discussion of impact/project valuation, compensatory mitigation options, siting, compensatory project types and costs, monitoring, reporting, and administration. Each of these topics is discussed in detail below.

    - Residual Impact and Compensatory Mitigation Project Valuation Guidance
        - A common standardized method should be identified for estimating the value of the residual impacts and value of the compensatory mitigation projects, including accounting for any uncertainty associated with the effectiveness of the projects.
        - This method should consider the quality of habitat, scarcity of the habitat, and the size of the impact/project.
        - For compensatory mitigation projects, consideration of durability, timeliness, and the potential for failure (e.g., uncertainty associated with effectiveness) may require an upward adjustment of the valuation.
        - The resultant compensatory mitigation project will, after application of the above guidance, result in proactive conservation measures for GRSG
    - ***Compensatory Mitigation Options***
        - Options for implementing compensatory mitigation should be identified, such as:
            - Utilizing certified mitigation/conservation bank or credit exchanges.
            - Contributing to an existing mitigation/conservation fund.
            - Authorized-user conducted mitigation projects.

- For any compensatory mitigation project, the investment must be additional (i.e.

- ***Compensatory Mitigation Siting***
  - Sites should be in areas that have the potential to yield a net conservation gain to the GRSG, regardless of land ownership.
  - Sites should be durable.
  - Sites identified by existing plans and strategies (e.g., fire restoration plans, invasive species strategies, healthy land focal areas) should be considered if those sites have the potential to yield a net conservation gain to GRSG and are durable.
- ***Compensatory Mitigation Project Types and Costs***
  - Project types should be identified that help reduce threats to GRSG (e.g., protection, conservation, and restoration projects).
  - Each project type should have a goal and measurable objectives.
  - Each project type should have associated monitoring and maintenance requirements for the duration of the impact.
  - To inform contributions to a mitigation/conservation fund, expected costs for these project types (and their monitoring and maintenance), within the WAFWA Management Zone, should be identified.
- ***Compensatory Mitigation Compliance and Monitoring***
  - Mitigation projects should be inspected to ensure that they are implemented as designed and if not, there should be methods to enforce compliance.
  - Mitigation projects should be monitored to ensure that the goals and objectives are met and that the benefits are effective for the duration of the impact.
- ***Compensatory Mitigation Reporting***
  - Standardized, transparent, scalable, and scientifically-defensible reporting requirements should be identified for mitigation projects.
  - Reports should be compiled, summarized, and reviewed in the WAFWA Management Zone to determine if GRSG conservation has been achieved and/or to support adaptive management recommendations.
- ***Compensatory Mitigation Program Implementation Guidelines***
  - Guidelines for implementing a state-level compensatory mitigation program should include holding and applying compensatory mitigation funds, operating a transparent and credible accounting system, certifying mitigation credits, and managing reporting requirements.

Incorporating the Regional Mitigation Strategy into NEPA Analyses

The Forest Service will include the avoidance, minimization, and compensatory recommendations from the Strategy in one or more of the NEPA analysis' alternatives for Forest Service and BLM proposed management actions and third party actions that result in habitat loss and degradation, and the appropriate mitigation actions will be carried forward into the decision.

Implementing a Compensatory Mitigation Program

The Forest Service must ensure that compensatory mitigation is strategically implemented to provide a net conservation gain to the GRSG, as identified in the Strategy. To align with any existing compensatory mitigation efforts, compensatory mitigation will be managed at a state-level (as opposed to a WAFWA Management Zone, a field office, or a forest), in collaboration with Forest Service partners (e.g., federal, Tribal, and state agencies).

To ensure transparent and effective management of the compensatory mitigation funds, the Forest Service will work with the BLM to determine the best process (e.g., enter into a contract or agreement with a third-party) to help manage the state-level compensatory mitigation funds within 1 year of the issuance of the ROD. The Forest Service will be responsible for making decisions that affect National Forest System lands.

Glossary Terms

Additionality - The conservation benefits of compensatory mitigation are demonstrably new and would not have resulted without the compensatory mitigation project.

Avoidance mitigation - Avoiding the impact altogether by not taking a certain action or parts of an action. (40 CFR 1508.20(a)) (e.g., may also include avoiding the impact by moving the proposed action to a different time or location.)

Compensatory mitigation - Compensating for residual impact by replacing or providing substitute resources or environments. (40 CFR 1508.20)

Compensatory mitigation projects -The restoration, creation, enhancement, and/or preservation of impacted resources (adopted and modified from 33 CFR 332), such as on-the-ground actions to improve and/or protect habitats (e.g., chemical vegetation treatments, land acquisitions, and conservation easements).

Compensatory mitigation sites - The durable areas where compensatory mitigation projects will occur. Durability (protective and ecological): the maintenance of the effectiveness of a mitigation site and project for the duration of the associated impacts, which include resource, administrative/legal, and financial considerations.

Durable (protective and ecological) - The administrative, legal, and financial assurances that secure and protect the conservation status of a compensatory mitigation site and the ecological benefits of a compensatory mitigation project for at least as long as the associated impacts persist.

Minimization mitigation - Minimizing impacts by limiting the degree or magnitude of the action and its implementation. (40 CFR 1508.20 (b))

Net conservation gain - The actual benefit or gain above baseline conditions.

Residual impacts - Impacts that remain after applying avoidance and minimization mitigation; also referred to as unavoidable adverse impacts.

Timeliness - The lack of a time lag between impacts and the achievement of compensatory mitigation goals and objectives.

APPENDIX C – ADAPTIVE MANAGEMENT

Introduction

Adaptive management is a decision process that promotes flexible resource-management decision-making that can be adjusted as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust resource management directions as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a "trial and error" process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits.

The Forest Service will adjust management actions through an adaptive management process defined in Forest Plan standards identified in the Idaho and Southwest Montana, Nevada, and Utah LMP amendments. This appendix describes the management approach to implement these standards. The adaptive management strategy described in this appendix consists of the following elements: 1. Scale at which the Forest Service will monitor and apply adaptive management triggers in Idaho and Southwest Montana, Nevada, and Utah; 2. Soft and hard triggers for habitat and population thresholds; and 3. Responses or actions to be taken if a trigger is met.

Adaptive management provides an additional framework for assessing the effectiveness of conservation measures implemented in the ROD. The conservation measures, along with adaptive management, are incorporated in the LMP amendment to ameliorate threats to GRSG, thereby increasing the likelihood that the conservation measures are effective in reducing threats to GRSG and its habitat.

The adaptive management strategy includes soft and hard triggers and responses. The triggers are not specific to any particular project, but identify habitat and population thresholds outside of natural fluctuations or variations. Triggers are based on the two key metrics that are being monitored; habitat loss and/or population declines. Adaptive management, with specific triggers, provide additional certainty that the regulatory mechanisms included in the LMP amendments are robust and able to respond to a variety of conditions and circumstances quickly and effectively to conserve GRSG habitat. Tripping a soft or hard trigger will initiate a state-federal inter-agency dialogue to evaluate causal factors and recommend adjustments in management activities or additional potential implementation-level activities to reverse the trend. Any adjustment to management activities or new management activities proposed as a result of tripping a soft or hard trigger will be developed with the participation of agency leadership and science experts.

Scale of Application and Monitoring

Idaho and Southwest Montana

A biologically significant unit (BSU) defines the geographic extent and scale in Idaho and Southwest Montana that will be considered when evaluating anthropogenic disturbance and the adaptive management habitat triggers. Disturbance and habitat triggers are calculated differently since anthropogenic disturbance and habitat loss affect GRSG differently. In Idaho and Southwest Montana, the BSU is the spatial extent of breeding and wintering habitat within priority habitat management areas (PHMA) and important habitat management areas (IHMA) within a Conservation Area in Idaho and PHMA in Montana.

Nevada

The scale used to monitor the adaptive management triggers is the BSU developed in collaboration with the Nevada Sagebrush Ecosystem Technical Team, the Nevada Department of Wildlife, California Department of Fish and Wildlife, and US Geological Survey. In Nevada, BSUs represent local GRSG population-use areas in the Nevada and Northeastern California. Once a soft or hard trigger is met, adaptive management responses will be applied at the BSU or a finer scale, as detailed below.

Utah

The overarching adaptive management includes identification of a two-tiered system of triggers (soft and hard) for both BSUs and their associated habitats. The BSU is a geographically/spatial area that contains the relevant habitats which are used by GRSG. In Utah, the BLM and FS have defined BSUs as the total PHMA area associated with a GRSG population area. These triggers are not specific to particular project areas, but rather to identified BSUs in the state. Triggers are based on the two key metrics that are typically monitored; population declines and habitat loss.

Triggers

Soft triggers are an intermediate threshold indicating that management changes are needed at the project/implementation level to address GRSG habitat and population losses. If a soft trigger is met, the Forest Service would apply additional mitigation measures to alleviate the known or probable causes in the decline of GRSG populations or its habitats with consideration of local knowledge and conditions. Soft triggers and responses, if the triggers are met, are described below.

Hard triggers are a threshold indicating that immediate action is necessary to stop a severe deviation from GRSG conservation goals and objectives, as set forth in the Forest Service plans. Hard triggers and responses, if the triggers are met, are described below.

Idaho and Southwest Montana

Population Triggers

Soft Population Triggers
Adaptive Regulatory Criteria for Population Soft Triggers are defined as:

- A 10% decline in the current 3-year average of total maximum number of males counted compared to the 2011 maximum male baseline and a finite rate of change (λ) below 1.0 within PHMA within a Conservation Area over the same 3-year period; or
- A 10% decline in the current 3-year average of total maximum number of males counted compared to the 2011 maximum male baseline and a finite rate of change (λ) below 1.0 within IHMA within a Conservation Area over the same 3-year period.

Hard Population Triggers
Adaptive Regulatory Criteria for Population Hard Triggers are defined as:

- A 20% decline in the current 3-year average of total maximum number of males counted compared to the 2011 maximum male baseline and a finite rate of change (λ) significantly below 1.0 within PHMA within a Conservation Area over the same 3-year period; or
- A 20% decline in the current 3-year average of total maximum number of males counted compared to the 2011 maximum male baseline and a finite rate of change (λ) significantly below 1.0 within IHMA within a Conservation Area over the same 3-year period.
- Significance is defined by the 90% confidence interval around the current 3-year finite rate of change. If the 90% confidence interval is less than, and does not include 1.0, then the finite rate of change is considered significant. The finite rate of change and variance will be calculated following Garton et al. (2011).

Habitat Triggers

For purposes of evaluating the adaptive management triggers, effective habitat in Idaho is tracked using the Key Habitat Map, which is updated annually by BLM in coordination with Idaho Department of Fish and Game, the Forest Service, the USFWS, and local working groups, tracks the areas of generally intact sagebrush providing GRSG habitat during some portion of the year. Effective habitat equates to areas described as Key Habitat on the Key Habitat Map.

Soft Habitat Triggers

Adaptive Regulatory Criteria for Habitat Soft Triggers are defined as:

- A 10% loss of Key Habitat within the BSU of the PHMA of a Conservation Area when compared to the 2011 baseline; or
- A 10% loss of Key Habitat within the BSU of the IHMA of a Conservation Area when compared to the 2011 baseline.

Hard Habitat Triggers

Adaptive Regulatory Criteria for Habitat Hard Triggers are defined as:

- A 20% loss of Key Habitat within the BSU of the PHMA of a Conservation Area when compared to the 2011 baseline, inclusive of all land ownerships or
- A 20% loss of Key Habitat within the BSU of the IHMA of a Conservation Area when compared to the 2011 baseline.

Nevada

Population Triggers

Soft Population Triggers

Soft population triggers at each GRSG population scale (Coates et al. in prep) are as follows:

1. Individual lek (Individual breeding display sites where male and female GRSGs congregate, with males performing courtship displays to gain mating opportunities with females.)
    a. A soft trigger is met when the population rate of change of a lek:
        i. Is less than 0.85 - 0.95 for 2 consecutive years and
        ii. In relation to the lek cluster (A group of leks in the same vicinity, between which GRSG may interchange over time and representing a group of closely related individuals. Agencies may revise the lek clusters listed above, based on new data.), is less than 0.85 - 0.95 for the 2 consecutive years.
    b. Three consecutive soft triggers will result in a hard trigger response.
    c. The causal factor(s) evaluation area(s) is the GRSG seasonal habitats and use areas associated with the lek (for example, the Space Use Index, Coates 2014).

    d. The trigger response area is the GRSG seasonal habitats and use areas associated with the lek that are specifically affected by the causal factor(s).
2. Lek cluster (project level)
    a. A soft trigger is met when the population rate of change of a lek cluster:
        i. Is less than 0.90 for two consecutive years and
        ii. In relation to the BSU, is less than 0.90 for both of the 2 years.
    b. Three consecutive soft triggers will result in a hard trigger response.
3. BSU (sub-regional scale)
    a. A soft trigger is met when the population rate of change within the BSU:
        i. Is less than 0.90 for 2 consecutive years and
        ii. In relation to the management zone, is less than 0.90 for both of the 2 years.
    b. Three consecutive soft triggers will result in a hard trigger response.

Hard Population Triggers

Hard population triggers at each GRSG population scale (Coates et al. in prep) are as follows:

1. Individual lek;
    a. A hard trigger is met when the population rate of change of a lek:
        i. Is less than 0.01 - 0.15 for 1 year and
        ii. In relation to the lek cluster, is less than 0.01 - 0.15 for 1 year.
    b. The causal factor(s) evaluation area(s) is the GRSG seasonal habitats and use areas associated with the lek (for example, the Space Use Index, Coates 2014).
    c. The trigger response area is the GRSG seasonal habitats and use areas associated with the lek that are specifically affected by the causal factor(s).
2. Lek cluster (project level)
    a. A hard trigger is met when the population rate of change of the lek cluster:
        i. Is less than 0.10 for 1 year and
        ii. In relation to the BSU, is less than 0.10 for 1 year.
    b. Three consecutive soft triggers would result in a hard trigger response.
3. BSU (sub-regional scale)
    a. A hard trigger is met when the population rate of change within the BSU:
        i. Is less than 0.10 for one year and
        ii. In relation to the management zone, is less than 0.10 for 1 year.
    b. Three consecutive soft triggers would result in a hard trigger response.
    c. A hard trigger response for the BSU will result if soft triggers are hit for both GRSG populations and its habitat.

Monitor and adjust the rate of GRSG population decline and the time frame over which populations are evaluated as understanding of GRSG population thresholds emerge. The Forest Service, BLM, Nevada Department of Wildlife, US Geological Survey, and California Department of Fish and Wildlife will pursue a program to collect and incorporate additional demographic data into the GRSG space-use model (Space Use Index, Coates 2014). As the models are updated, soft and hard population triggers may be adjusted to conform to the current understanding of population ranges.

Habitat Triggers

Soft and Hard Habitat Triggers

Soft and hard habitat triggers are as follows:

1. At the lek or lek cluster scale:
   a. A soft trigger would be met if the habitat disturbance exceeded 5% of any individual GRSG seasonal habitat component used by the local population.
   b. A hard trigger would be met if the disturbance exceeds 10%.
2. At the BSU scale:
   a. In areas with 25 to 65% sagebrush cover:
      i. A soft trigger would be met if there were a decline in sagebrush cover of 2%.
      ii. A hard trigger would be met if there were a decline of 5% or greater of sagebrush cover or if the disturbance were to reduce the landscape sagebrush cover below 30%.
   b. In areas with greater than 65% landscape sagebrush cover:
      i. A soft trigger would be met if there were a decline of 5% in landscape sagebrush cover.
      ii. A hard trigger would be met if there were a decline of 10% or greater in landscape sagebrush cover or if the disturbance were to reduce the landscape sagebrush cover below 70%.
   c. In a BSU, a hard trigger response would result if soft triggers are hit for both GRSG populations and its habitat.

Utah

The Utah GRSG adaptive management strategy includes the identification of soft and hard triggers and a management approach for responding to those triggers. GRSG populations across the species' range may fluctuate cyclically. In Utah, the cycle appears to follow a 10-year pattern. The exact reasons for the cycle are not currently known. However, various aspects (i.e., vital rates) of the GRSGs life cycle have been linked by past research to changes in the environment, including habitat.

Population Triggers

Soft Population Triggers

A population soft trigger would be met in PHMA if any one of 1a, 1b, 1c, or 1d are met, AND number 2 is also met:

1a. 4 consecutive years of 10% or greater annual decline in average males per lek in each year, based on trend leks; OR

1b. 6 consecutive years of declining average males per lek in each year, based on trend leks; OR

1c. 40% or greater decline in average males per lek in any single year, based on trend leks; OR

1d. 50% or greater decline in average males per lek in a 4 consecutive years, based on trend leks; AND

2. Lambda of less than 1 in 4 consecutive years, based on all leks in the PHMA. Using criteria 1c, the 40% decline in a single year may occur at any point of the 4-year lambda monitoring window (year one, two, three, or four).

For PHMA in the Ibapah and Hamlin Valley population areas, if a GRSG population adaptive management trigger (hard or soft) from the Nevada LMP amendment is met on GRSG habitat in Nevada that is adjacent to the Ibapah or Hamlin Valley PHMA, a soft trigger would be met for the Utah areas, regardless of whether the above criteria have been met.

The management to be applied if the soft trigger criteria are met is identified below under the Management Response section. The intent of the population soft trigger is to identify changes to population trends and adjust management before a hard trigger is met.

Hard Population Triggers
A population hard trigger would be met in PHMA if any one of the following criteria (a-d) is identified through monitoring:

Short-term Decline

a. Four consecutive years of 20% or greater annual decline in average males per lek in each year, based on trend leks; OR

b. Average males per lek based on trend leks drops 75% below the 10-year rolling average males per lek in any single year (i.e., a decline under 75% of the 10-year rolling average); OR

Long-term Decline

a. Lambda of less than 1 in 6 consecutive years, based on all leks within the PHMA; OR

b. Lambda of less than 1 in 8 years of a 10-year window, based on all leks within the PHMA.

The management to be applied if the hard trigger criteria are met is identified below under the Management Response section. Any change in management would only apply to the PHMA where the trigger is met.

Habitat Triggers

Soft Habitat Triggers
A habitat soft trigger would be met in PHMA if one of the following criteria is identified through monitoring:

a. 10% loss of total GRSG habitat in PHMA; OR

b. 10% loss of habitat within nesting areas in PHMA; OR

c. 5% loss of habitat within Utah Division of Wildlife Resources mapped wintering areas in PHMA; OR

d. Any one fire burns 5% of total GRSG habitat in PHMA.

Hard Habitat Triggers

a. 20% loss of total GRSG habitat in PHMA; OR

b. 20% loss of habitat within nesting areas in PHMA; OR

c. 20% loss of habitat within Utah Division of Wildlife Resources mapped wintering areas in PHMA.

Responses to Triggers

Idaho and Southwest Montana

Soft Trigger Responses

The Sage-Grouse Implementation Task Force, in coordination with BLM and Forest Service, would use monitoring information to assess when triggers have been met. When information indicates that the soft habitat or population trigger may have been met, the Sage-Grouse Implementation Task Force, in coordination with the BLM and the Forest Service would assess the factor(s) leading to the decline and identify potential management actions. The Sage-Grouse Implementation Task Force may consider and recommend to the Forest Service and the BLM possible changes in management in the PHMA. In IHMA, the Sage-Grouse Implementation Task Force may review the causes for decline and identify potential management changes only to the extent those factors significantly impair the State's ability to meet the overall management objective. It is anticipated that Idaho Department of Fish and Game will collect data annually and will make recommendations to the Implementation Team by August 31st for population triggers and January 15th for habitat triggers.

Only where monitoring information indicates that the cause(s) of the decline is not a primary threat would the Sage-Grouse Implementation Task Force analyze the secondary threats to the species and determine whether further management actions are needed.

When any of the adaptive regulatory criteria for soft triggers have been met would the Sage-grouse Implementation Task Force evaluate causal factors and recommend potential implementation-level activities to the appropriate agency line officer.

Hard Trigger Responses

When any of the adaptive regulatory criteria for hard triggers have been met, all PHMA management direction would be applied to IHMA within that Conservation Area and the Sage-grouse Implementation Task Force would evaluate causal factors and recommend additional potential implementation-level activities to the appropriate agency line officer.

Nevada

Soft Trigger Responses

When a soft trigger is met, the Forest Service will:

1. Identify the causal factor.
2. Adjust management actions to lessen the cause by applying project-level adaptive management contained in the authorization.
    a. The adjustment in management would be based on the causal factor and would affect only the area being impacted in the lek cluster or appropriate scale.
    b. The adjustment in management would be applied to future similar authorizations.
3. If the causal factor were not readily discernable, then an interdisciplinary team, including the Forest Service, the BLM, and a State wildlife agency representative, would identify and recommend to the Forest Service line officer the appropriate mitigation or adjusted management actions, in a timely manner.

Hard Trigger Responses

Specific hard trigger responses due to anthropogenic disturbances are identified in tables 1 and 2.

Table 1. *Hard Trigger Responses in PHMAs under the Final Plan.*

Program	Plan Direction	Adaptive Management Response
Land use authorizations—existing corridors	Open	Manage as a ROW avoidance area.
Land use authorizations—major ROWs	Restrict issuance of new lands special use authorizations for all major ROWs	Management of the affected BSU would change to exclude high voltage transmission lines (≥100 kV) and major pipelines (≥24 inches).
Land use authorizations—minor ROWs	Restrict issuance of new lands special use authorizations for all minor ROWs	Limit ROW authorizations, leases, and permits to those needed for public safety and valid existing rights.
Wind energy development	Do not authorize new utility-scale commercial wind energy facilities.	No change
Industrial solar	Do not authorize new utility-scale solar energy facilities.	No change

Program	Plan Direction	Adaptive Management Response
Fluid minerals	In SFAs, manage as NSO with no waiver, exception, or modification. Manage as NSO with no waivers or exceptions. Three specific limited exceptions could be granted.	No change Manage as NSO with no waivers, exceptions, or modifications.
Locatable minerals	Manage locatable mineral development to minimize effects on GRSG habitat. A phased development approach should be applied to operations.	No change
Mineral materials	Closed to new mineral disposal.	No change
Non-energy leasable minerals	Provide recommendations to the BLM for the protection of greater sage-grouse and their habitats.	No change
Vegetation management	Identify and prioritize landscape-scale enhancement, restoration, fuels reduction, and mitigation projects based on ecological site potential, state and transition models, and other data that would contribute to decision-making informed by science to increase rangeland resilience before and following wildfire.	BSUs where a hard trigger has been met would be the first priority for regional mitigation habitat restoration and fuels reduction treatments.

Table 2. *Hard Trigger Responses in General Habitat Management Areas under the Proposed Plan.*

Program	Plan Direction	Adaptive Management Response
Land use authorizations—existing corridors	Open to new uses.	Manage as ROW avoidance area.
Land use authorizations—major ROWs outside corridors	Authorizations may be issued if located within existing designated corridors or rights-of-way and the authorization includes stipulations to protect greater sage-grouse and their habitats.	Manage affected BSU as exclusion for high-voltage transmission lines (≥100 KV), major pipelines (>24 inches), and wind energy.

Program	Plan Direction	Adaptive Management Response
Land use authorizations—minor ROWs outside corridors	Authorization may be issued if located within existing designated corridors or rights-of-way and the authorization includes stipulations to protect greater sage-grouse and their habitats.	Manage as avoidance area for ROWs leases and permits.
Wind energy development (UT and NV only)	Do not authorize new utility-scale commercial wind energy facilities.	Manage as exclusion for utility-scale commercial wind energy facilities.
Industrial solar (UT and NV only)	Do not authorize new utility-scale solar energy facilities.	No change
Fluid minerals	Apply moderate stipulations (CSU and TL).	Apply an NSO stipulation, with limited exceptions.
Locatable minerals	Manage locatable mineral development to minimize effects on GRSG habitat. A phased development approach should be applied to operations.	No change
Mineral materials	Open to new mineral disposal.	Manage as closed to new mineral disposal.
Non-energy leasable minerals	Provide recommendations to the BLM for the protection of greater sage-grouse and their habitats.	Manage as closed to new non-energy leasable mineral leasing.
Vegetation management	Identify and prioritize landscape-scale enhancement, restoration, fuels reduction, and mitigation projects, based on ecological site potential, state and transition models, and other data that would contribute to decision-making informed by science to increase rangeland resilience before and following wildfire.	BSUs where a hard trigger has been met would be the first priority for regional mitigation habitat restoration and fuels reduction treatments.

Utah

Soft Trigger Responses

Upon an annual review of monitoring data, if it is apparent that soft trigger criteria have been met for an area (see Spatial Scale discussion below) the Forest Service and the BLM will determine if there is a specific cause or causes that are contributing to the decline. In completing this evaluation, the Forest Service and the BLM will coordinate with GRSG biologists from multiple agencies including the USFWS, Natural Resources Conservation Service, and Utah Division of Wildlife Resources. Through this coordination, the BLM and the Forest Service will review available national, state-wide, and local data to determine if there is additional information that could identify the cause(s) of the declines. The Forest Service and the BLM will also coordinate with field office/district and state agency specialists and local GRSG working groups to identify additional information that could assist in identifying the cause/causes.

If it is determined that the decline is related to a natural population variation, no specific management actions would be required. However, if Forest Service and BLM management actions are determined to cause or contribute to the decline, the Forest Service and the BLM designated official would apply measures within their implementation-level discretion to mitigate the decline of populations and/or habitats to the area where the trigger has been met. These measures would apply more conservative or restrictive implementation conservation conditions, terms, or decisions within the agencies' discretion to mitigate the decline of populations and/or habitats. If identified, the management measures should address the specific causal factor(s) that resulted in the decline, with consideration of local knowledge and conditions.

Responses to soft triggers may require the adjustment of future project level/plan implementation activities in the short- or long-term, as consistent with the individual site-specific NEPA analyses. Soft trigger responses be terms, conditions, design features, BMPs, or site specific mitigation measures.

Hard Trigger Responses

Hard triggers represent a threshold indicating that immediate action is necessary to stop a severe deviation from GRSG conservation objectives as set forth in the Forest Service plans. As such, the Proposed LUPA/FEIS includes a hard-wired plan-level response; that is, it provides that, upon meeting a hard trigger, a more restrictive alternative or an appropriate component of a more restrictive alternative analyzed in the EIS will be implemented without further action by the Forest Service in the area where the trigger has been met. Specific hard-wired changes in management are identified in table 3, Specific Management Responses. This table also identifies the decision from the Forest Service Proposed Plan that would be changed.

In addition to the specific changes identified in table 3, the Forest Service will review available and pertinent data, in coordination with GRSG biologists from multiple agencies including UDWR, USFWS, and NRCS, to determine the causal factor(s) and implement a corrective strategy in the area where the trigger has been met. The corrective strategy would include the changes

identified in table 3 and could also include the need to amend or revise the LMP to address the situation and modify management accordingly.

For BSUs that are directly connected to BSUs in adjacent states (i.e., Box Elder, Hamlin Valley, Uintah, and Rich), if a hard trigger is met on one of the connected BSUs outside the Utah sub-region, the applicable WAFWA Management Zone Greater Sage-Grouse Conservation Team will convene to determine the causal factor and propose project-level responses, as appropriate, and discuss further appropriate actions that could be applied. The team will also investigate the status of the hard triggers in other BSUs within the priority areas for conservation (i.e., key habitats identified by state sage-grouse conservation plans or through other sage-grouse conservation efforts) and will recommend the appropriate plan response. Adoption of any further actions at the plan level may require initiating a plan amendment process.

Table 3 *Specific Management Responses.*

Program	Adaptive Management Response[1]	Affected Decision Number		Where considered in the Draft LUPA/EIS
		BLM	Forest Service	
Sage-Grouse Management	If a hard-trigger is met in the Sheeprocks Population Area, adopt the PHMA boundary from Alternative B and apply management as described in the Proposed Plan, except as modified below.	Modify MA-GRSG-1 specific to Sheeprocks	Not applicable	The Alternative B PHMA boundary was analyzed in the DEIS (463,100 acres). There are no National Forest System lands within the Sheeprocks Population Area, therefore the Forest Service does not have a proposed management action for this area.
	PHMA within a BSU where a soft trigger has been met would be the top priority for habitat improvement and restoration projects and for fuels reduction treatments. Areas within and adjacent to PHMA within a BSU where a hard trigger has been met would be the top priority for regional mitigation habitat restoration and fuels reduction treatments.	Adjust: MA-VEG-1 MA-FIRE-1 MA-GRSG-3A to address specific area	GRSG-GRSGH-ST-001 GRSG-FM-GL-003 GRSG-GEN-ST-002	Prioritizing fuels reduction treatments was a component of MA-FIRE-1 under Alternative D in the DEIS. Prioritizing restoration based on environmental variables and in seasonal habitats that are thought to be limiting to GRSG distribution and/or abundance was a component of MA-VEG-1 under

Table 3 *Specific Management Responses.*

Program	Adaptive Management Response[1]	Affected Decision Number		Where considered in the Draft LUPA/EIS
		BLM	Forest Service	
				Alternatives B, C, and D in the DEIS. Prioritizing mitigation sites, projects, and measures was a component of the Regional Mitigation Strategy in the DEIS (Appendix F, Page F-2, Item 5).
	Collaborate with applicable government entities to implement intensive programs to reduce populations of GRSG predators (e.g., ravens, red fox, badgers, raccoons, skunks, raptors), focusing on area-specific predators to provide GRSG populations the best opportunity to recover while improving habitat conditions.	Adjust MA-GRSG-3D to focus on area-specific predators	Not applicable	Applying activities and practices to reduce opportunities for and decrease the effectiveness of GRSG predators was a component of MA-GRSG-6 under Alternatives D and E in the DEIS. The Forest Service Wyoming proposed plan includes a similar management action.
Vegetation Management	PHMA, within a BSU, would be the top priority for regional mitigation, habitat restoration and fuels reduction treatments.	Adjust: MA-GRSG-3A MA-VEG-1 MA-FIRE-1 to address specific area	GRSG-GRSGH-ST-001 GRSG-FM-GL-003 GRSG-GEN-ST-002	Prioritizing mitigation sites, projects, and measures was a component of the Regional Mitigation Strategy in the DEIS (Appendix F, Page F-2, Item 5). Prioritizing fuels reduction treatments was a component of MA-FIRE-1 under Alternative D in the DEIS. Prioritizing restoration based on environmental variables and in seasonal habitats

Table 3 *Specific Management Responses.*

Program	Adaptive Management Response[1]	Affected Decision Number		Where considered in the Draft LUPA/EIS
		BLM	Forest Service	
				that are thought to be limiting to GRSG distribution and/or abundance was a component of MA-VEG-1 under Alternatives B, C, and D in the DEIS.
Wild Horse and Burro Management	Initiate emergency gathers to reduce wild horse and burro populations within affected area to low end of AML, subject to funding and holding space availability. If the population is within AML and the area does not meet GRSG habitat objectives, reduce AML for the HMA within the affected area up to 25% to facilitate meeting habitat objectives.	Adjust: MA-WHB-7 MA-WHB-3 MA-WHB-4 to address specific area	Not applicable	Prioritizing gathers in PHMA to prevent catastrophic environmental issues was a component of MA-WHB-1 under Alternatives B, C, and D in the DEIS. Reducing AML by 25% in GRSG occupied habitat to reduce grazing pressure on vegetation was analyzed under Alternative C1 (MA-WHB-1) in the DEIS. The Forest Service does not manage any WHB populations.
Wildland Fire Management	Reassess GRSG habitat needs to determine if priorities for at risk habitats, fuels management areas, preparedness, suppression and restoration have changed.	Adjust MA-FIRE-1to address specific area	GRSG-GRSGH-ST-001	Assessments to prioritize at risk habitats and identify fuels management, preparedness, suppression and restoration priorities was analyzed as a component of MA-FIRE-1 under Alternative D in the DEIS.

Table 3 *Specific Management Responses.*

Program	Adaptive Management Response[1]	Affected Decision Number		Where considered in the Draft LUPA/EIS
		BLM	Forest Service	
Livestock Grazing	In areas where a soft trigger was met, prioritize the completion of rangeland health assessments to determine if the area is meeting Utah's Rangeland Health Standards and is achieving the GRSG habitat objectives (Objective GRSG-2). Focus monitoring and management activities on allotments found not to be achieving Utah's Rangeland Health Standards and that have the best opportunities for conserving, enhancing or restoring habitat for GRSG. For areas not achieving the GRSG habitat objectives (Objective GRSG-2), apply one or more of the adjustments to livestock grazing from MA-GRA-6.	Adjust: MA-GRA-4 MA-GRA-5 to address specific area	GRSG-LG-GL-001 GRSG-LG-GL-002	Prioritizing completion of land health assessments was analyzed as a component of MA-GRA-4 under Alternatives B and C2. Focusing management activities on allotments found not to be achieving Utah's Rangeland Health Standards and that have the best opportunity for conserving, enhancing or restoring habitat for GRSG was a component of MA-GRA-4 under Alternative D. Applying adjustments or otherwise modifying to grazing management to help meet GRSG seasonal habitat objectives was a component of MA-GRA-8 under Alternatives B, C2, and D.
Rights of Way – Existing Corridors	Retain the corridors as mapped, but limit the size of new lines within the corridors to same as existing structures, or not larger than 138kV.	Augment MA-LAR-2 MA-LAR-4 MA-LAR-8 with additional criteria	GRSG-LR-SUA-ST-007	Collocating new ROW/SUAs within existing corridors (as long as entire footprint of the proposed project can be completed within the existing disturbance) was a component of MA-LAR-3 analyzed under Alternative B in the DEIS.

Table 3 *Specific Management Responses.*

Program	Adaptive Management Response[1]	Affected Decision Number		Where considered in the Draft LUPA/EIS
		BLM	Forest Service	
Rights of Way – Outside of Corridors	Management of the affected BSU would change to exclude high voltage transmission lines (greater than or equal to 100kv) and major pipelines (greater than or equal to 24 inch). No change in management would be made to transmission lines under 100kv or pipelines less than 24 inches.	Augment MA-LAR-2 with additional criteria	GRSG-LR-SUA-GL-001	Designating PHMA (within 4 mi. of occupied lek) as exclusion for new above ground linear transmission lines and avoidance for new permanent underground/on-ground lines was a component of MA-LAR-2 analyzed under Alternative D in the DEIS.
Wind Energy Development	No change from Proposed Plan.	Not applicable	Not applicable	PHMA is already excluded from wind development therefore no additional restrictive response is available.
Industrial Solar	No change from Proposed Plan.	Not applicable	Not applicable	During development of the DEIS it was determined no existing or proposed solar development poses a threat to GRSG in the planning area.

Table 3 *Specific Management Responses.*

Program	Adaptive Management Response[1]	Affected Decision Number		Where considered in the Draft LUPA/EIS
		BLM	Forest Service	
Comprehensive Travel and Transportation Management	If travel management planning has not been completed within GRSG habitat, PHMA areas where the hard trigger was met would be the highest priority for future travel management planning efforts. If travel management has been completed within GRSG habitat in the PHMA where the hard trigger was met, re-evaluate designated routes to determine their effects on GRSG. If routes are found to be causing population-level impacts, revise their designation status to reduce the effect.	Adjust: MA-TTM-4 MA-TTM-2 MA-TTM-5 MA-TTM-3 to address specific area	Not applicable	Completing travel management planning in Utah's top priority areas, minimizing impacts to have a neutral or positive effect on GRSG habitat, and adjusting route designations to avoid impacts to GRSG were similar conceptual components of MA-TTM-2, 3, 4, and 5 analyzed under Alternative D in the DEIS.

Table 3 *Specific Management Responses.*

Program	Adaptive Management Response[1]	Affected Decision Number		Where considered in the Draft LUPA/EIS
		BLM	Forest Service	
Fluid Minerals	No change from Proposed Plan.	Not applicable	Not applicable	In coordination with USFWS, it was determined that additional restrictions beyond existing plan level conservation measures (e.g., stipulations, 3% disturbance cap, RDFs, 1/640 acre density, lek buffers, noise, and seasonal restrictions) would be unlikely to elicit improvement.
Locatable Minerals	No change from Proposed Plan.	Not applicable	Not applicable	In coordination with USFWS, it was determined that additional restrictions would be unlikely to elicit improvement.
Salable Minerals	No change from Proposed Plan.	Not applicable	Not applicable	In coordination with USFWS, it was determined that additional restrictions would be unlikely to elicit improvement.
Nonenergy Leasable Minerals	No change from Proposed Plan.	Not applicable	Not applicable	In coordination with USFWS, it was determined that additional restrictions would be unlikely to elicit improvement.

[1]Any change in management would only apply to the PHMA where the trigger is met.
Unless otherwise noted as a soft trigger response, all Adaptive Management Responses would be implemented where a hard trigger is met.