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Ladies and Gentlemen:


The sage-grouse is an imperiled icon of the Sagebrush Sea. Federal departments and agencies manage more than 70 percent of remaining sagebrush steppe. Although cooperation among many federal and state agencies and private land owners will be necessary to conserve sage-grouse and sagebrush habitat, the federal government and federal public land are key to achieving these goals. The BLM and Forest Service have an important opportunity to address decades of mismanagement and habitat loss and set a new course to protect and restore sagebrush steppe for sage-grouse and hundreds of other species. We look forward to participating in the planning process ahead.

Thank you for this opportunity to submit comments.

Sincerely,

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The Sage-grouse Recovery Alternative

This document offers general comments and presents the Sage-Grouse Recovery Alternative for inclusion as a complete alternative in Bureau of Land Management environmental impact statements and resource management plans to conserve and recover Greater Sage-grouse (Centrocercus urophasianus) (see 76 Fed. Reg. 77008; 77 Fed. Reg. 7178). The comments and alternative are also applicable to U.S. Forest Service land and resource use plans that will be amended as part of the announced planning process. We recommend that the Bureau and Land Management and Forest Service incorporate the planning issues, planning criteria, recommended land designations, and management stipulations described in this document in all environmental impact statements and land use plans that affect sage-grouse.

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I. INTRODUCTION

Despite its size, sagebrush steppe is among the most imperiled landscapes in North America (Wisdom et al. 2005c; Noss et al. 1995). Millions of acres have been lost to crop agriculture, urban development, and other land uses (Connelly et al. 2011b), while remaining sagebrush habitat is degraded and fragmented by gas and oil drilling, livestock grazing and associated infrastructure, unnatural fire, invasive species, roads, fences, utility corridors and related effects (Wisdom et al. 2005c; see Map 3). Habitat loss and degradation continue (Connelly et al. 2011b) and efforts to protect and restore sagebrush steppe are inadequate, ineffective and hampered by myriad factors (Wisdom et al. 2005c; Connelly et al. 2011b).

The Greater Sage-grouse (*Centrocercus urophasianus*) is a sagebrush obligate species whose range has been significantly reduced with the loss of sagebrush steppe (see Map 1). Greater Sage-grouse distribution has decreased by 44 percent (Schroeder et al. 2004) and populations have experienced long-term declines (Connelly and Braun 1997; Connelly et al. 2004; Anonymous 2008). The U.S. Fish and Wildlife Service (FWS) determined that Greater Sage-grouse warrant listing under the Endangered Species Act (ESA) in March 2010 (although listing was precluded by other, higher priorities) (75 Fed. Reg. 13910). FWS will finally propose sage-grouse for listing under the ESA or determine the species is “not warranted” for protection in fiscal year 2015 in accordance with legally binding settlement agreements with conservation organizations.

Sage-grouse are a landscape species that use a variety of sagebrush habitats throughout the year (Connelly et al. 2004; Connelly et al. 2011a). Large, interconnected areas of sagebrush steppe must be conserved if sage-grouse are to persist (Connelly et al. 2011b). Most remaining sage-grouse habitat is publicly owned, most of it managed by the federal government (Knick 2011). Historic patterns of land use, conflicting management policies and demand for resources on these lands have left little sagebrush steppe protected. Less than 1 percent of sage-grouse current range is within wilderness or other protected areas (Knick 2011; see also Map 4).

Federal departments and agencies manage more than 70 percent of remaining sagebrush steppe (Appendix 1). Although cooperation among many federal and state agencies and private land owners will be necessary to conserve sage-grouse and sagebrush habitat (Stiver et al. 2006), the federal government and federal public land are key to achieving these goals. Federal agencies must prioritize sagebrush conservation if sage-grouse are to persist (Connelly et al. 2011a). Sage-grouse would benefit from landscape-level planning and conservation (see Braun 2005).

Developing and implementing conservation strategies at regional or landscape scales will have the greatest benefit for sage-grouse and sagebrush steppe (Holloran 2005). Protecting large expanses of sagebrush steppe and current populations of Greater Sage-grouse are the highest priority (Connelly et al. 2011a; Wisdom et al. 2005c). Establishing a system of habitat reserves in sagebrush steppe will help conserve habitat components and ecological processes important to species conservation.
Sage-grouse are a useful, if imperfect, umbrella species \(^1\) for sagebrush steppe. A suite of sagebrush birds are declining and would benefit from increased protection of sagebrush steppe (Knick et al. 2003). Rich et al. (2005: 602) contended that “conservation of Greater and Gunnison Sage-grouse populations in reasonable numbers well distributed across their historical ranges also will provide for the conservation of many, or even most, other bird species that co-occur with these grouse.” Rowland et al. (2006) also found that conserving Greater Sage-grouse may benefit other species, particularly sagebrush obligate wildlife.

Given the importance of public lands to sage-grouse conservation; the sensitivity of these lands to disturbance, longer recovery periods and variable response to restoration; and their susceptibility to invasion by exotic plants (Knick 2011), land uses that negatively affect these lands should be restricted or eliminated in key habitat areas to conserve sage-grouse habitat.

* * *

We respectfully submit the following comments in response to the “Notice of Intent To Prepare Environmental Impact Statements and Supplemental Environmental Impact Statements To Incorporate Greater Sage-grouse Conservation Measures Into Land Use Plans and Land Management Plans” (76 Fed. Reg. 77008) and “Notice of Correction to Notice of Intent To Prepare Environmental Impact Statements and Supplemental Environmental Impact Statements To Incorporate Greater Sage-grouse Conservation Measures Into Land Use Plans and Land Management Plans” (77 Fed. Reg. 7178) (planning notices). These planning notices announce a new planning process by the Bureau of Land Management (BLM) and the U.S. Forest Service (USFS) to amend certain land use plans to improve management and conservation of Greater Sage-grouse throughout most of its range. The planning process will produce multiple environmental impact statements (EISs) that will analyze a range of alternatives, select preferred alternatives, and then amend tiered BLM resource management plans (RMPs) and USFS land and resource management plans (LMRPs) accordingly (76 Fed. Reg. 77008-77011).

Our comments include an alternative for agency planners to analyze and consider in the planning process. As noted in BLM Instruction Memorandum 2012-044, the BLM must consider a reasonable range of alternatives in the sage-grouse planning process in accordance with the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321 et seq). The Council on Environmental Quality has also promulgated regulations stating that alternatives are the “heart” of NEPA planning and that federal agencies must “rigorously explore and objectively evaluate all reasonable alternatives” (40 CFR § 1502.14). The Forest Service Handbook states that the purpose and intent of alternatives are to “ensure that the range of alternatives does not foreclose prematurely any option that might protect, restore and enhance the environment” (FSH ch. 20 § 23.2). Even an alternative that prescribes measures that are outside the legal jurisdiction of the lead agency must still be analyzed in an EIS if it is reasonable (46 Fed. Reg. 18026, 18027).

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\(^1\) An “umbrella species” is defined as one “whose conservation confers a protective umbrella to numerous co-occurring species” (Fleishman et al. 2001: 1489). Functionally, an umbrella species should having the following characteristics: “they represent other species, their biology is well known, they are easily observed or sampled, they have large home ranges, are migratory, and are persistent” (Rich and Altman 2001: 10).
Our alternative, the “Sage-Grouse Recovery Alternative” (recovery alternative), is reasonable and scientifically sound. It seeks to maintain and increase current sage-grouse abundance and distribution by conserving, enhancing and restoring sagebrush steppe. It is an evidence-based alternative that takes a precautionary approach to resource management. It will likely differ from other alternatives developed in the planning process in at least two key ways:

1. **The Sage-Grouse Recovery Alternative prescribes additional, and more restrictive, conservation measures than the Report on National Greater Sage-grouse Conservation Measures.** The BLM convened a Sage-Grouse National Technical Team (NTT) in 2011 to review information on sage-grouse and sagebrush steppe and produce “A Report on National Greater Sage-grouse Conservation Measures” (SGNTT 2011). The BLM will primarily consider management recommendations in that report in the planning process (BLM Memo 2012-044). However, the NTT’s assessment and recommendations for some planning issues, such as livestock grazing and associated infrastructure, vegetation management, invasive plants, fire management, and wind energy development, are insufficient to robustly conserve sage-grouse across its range. The Sage-Grouse Recovery Alternative incorporates information from other agency and peer-reviewed references to make additional and stronger management prescriptions for these land uses and related effects.

2. **The Sage-Grouse Recovery Alternative recommends that the BLM designate a system of Areas of Critical Environmental Concern (ACECs) to conserve sage-grouse and other sagebrush-dependent species.** The planning notices invite the public to propose ACECs in scoping comments (76 Fed. Reg. 77011). The Sage-Grouse Recovery Alternative recommends criteria for identifying a system of ACECs (BLM) and Sagebrush Conservation Areas (USFS) rangewide to serve as refugia for sage-grouse and other species.

These differences are significant and warrant separate and complete analysis and consideration in the planning process. As the Sage-grouse Recovery Alternative will be different from other alternatives and presents a reasonable program for conserving sage-grouse and their habitat, we intend for it to be published and analyzed as a stand-alone alternative in planning documents.

**II. GENERAL COMMENTS**

1. The planning notices identify 68 BLM planning areas and 20 USFS land management plans that may be affected by the announced planning process (76 Fed. Reg. 77009-77010; 77 Fed. Reg. 7178) (the BLM National Greater Sage-grouse Planning Strategy states that the planning effort will affect 73 BLM planning units (BLM 2011b: 1); we generated Table 1 from multiple BLM sources, listing 80 BLM planning units that may be affected by the planning process). As conservation organizations have previously advised, all federal departments and agencies that manage sage-grouse habitat should be involved in the planning process, including the BLM, USFS (National Forest System, see below), FWS (National Wildlife Refuge System), National Park Service, the Bureau of Reclamation, and the Departments of Energy and Defense. All federal lands with Greater Sage-grouse habitat should be included in the planning process—currently millions of acres of federally managed...
habitat would not be covered in the process (see Appendix 1). Failure to conserve sage-grouse on these lands could require listing the species under the Endangered Species Act.

2. The planning process should also include all federal agencies that fund, permit, or monitor activities or resources on public or private land that affect sage-grouse, including the Federal Energy Regulatory Commission, Environmental Protection Agency, Natural Resources Conservation Service, Farm Services Agency, and the Army Corps of Engineers. The U.S. Geological Survey possesses much important information and expertise on sage-grouse and sagebrush steppe and should also be involved.

3. No current BLM plans have considered or incorporated the NTT report recommendations (or the recovery alternative), and so every BLM planning unit with sage-grouse habitat must be amended by the planning process, regardless of whether they are currently under revision or the status of their revision. Table 1 lists BLM planning units that may be affected by the planning process.

4. The announced planning process would affect 20 USFS land use plans (76 Fed. Reg. 77010; 77 Fed. Reg. 7178). The planning process should include all USFS units that contain sage-grouse habitat (see Appendix 3). Failure to include all affected USFS units in the planning process and to amend those land use plans with sage-grouse conservation measures could hinder conservation and recovery of the species, particularly at the periphery of its range.

5. Wyoming BLM initiated a planning process in 2010 to address sage-grouse conservation in six RMPs (75 Fed. Reg. 30054) (the Wyoming sage-grouse RMP amendments might also include the Thunder Basin National Grasslands (C. Otto, Wyoming BLM, pers. comm. with M. Salvo (Jan. 12, 2011))). Some individual RMPs in Wyoming are also currently under revision and will consider new conservation measures for sage-grouse (C. Otto, Wyoming BLM, pers. comm. with M. Salvo (Jan. 12, 2011)). The initial rangewide planning notice states that the Wyoming sage-grouse RMP amendments and individual RMP revisions will proceed as intended (76 Fed. Reg. 77009). Although the RMP amendments and revisions may analyze and consider the conservation measures in the NTT report, they are expected to adopt some version of Wyoming’s sage-grouse strategy as their preferred alternative for managing the species. That strategy, developed by the state and generally adopted by Wyoming BLM in statewide sage-grouse management guidance, may be inadequate to fully recover sage-grouse for the long-term. There are significant differences between the Wyoming strategy and recommendations in the NTT report (see Appendix 5). The Wyoming sage-grouse amendments and individual RMP revisions must not adopt weaker management prescriptions for sage-grouse than land use plans in other states and regions are expected to use.

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22 The new Forest Service planning rule was finalized on March 23, 2012. It may be advisable for the agency to plan for sage-grouse conservation in accordance with the new rule.

3 See BLM (2012: 54), “The BLM is currently amending six RMPs across the state. Within the High Plains DO, the Casper and Newcastle RMPs are currently being amended. These RMP amendments will provide for public input including scoping and comments. The goal of the RMP amendments is to implement a species conservation strategy consistent with the Wyoming Governor’s Executive Order 2011-5 and BLM policy under the ESA” (emphasis added).
6. BLM Instruction Memorandum 2012-043 states that the Columbia Basin and Bi-State Distinct Population Segments of sage-grouse will not be included in the planning process. The planning process should include all populations and Distinct Population Segments of Greater Sage-grouse rangewide.

7. The BLM and USFS specifically identified a reference to inform the planning process (in addition to the NTT report): the Western Association of Fish and Wildlife Agencies (WAFWA) Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats (Connelly et al. 2004) (76 Fed. Reg. 77010). Planners should also consult Greater Sage-grouse: Ecology and Conservation of a Landscape Species and Its Habitat (Knick and Connelly 2011),\(^4\) a seminal reference that updates and expands on the WAFWA publication, as well as other peer-reviewed scientific information (e.g., references cited in 75 Fed. Reg. 13910).

8. While the BLM planning directive requires planners to analyze and consider the same conservation measures in EISs (i.e., the measures in the NTT report), it “expects” that measures may be variously and varyingly applied at regional and sub-regional levels (BLM Memo 2012-044). While some variation is reasonable to address local ecological conditions, federal agencies must avoid developing and applying significantly different management prescriptions across sage-grouse range. A series of local plans that, for example, deviate from rangewide prescriptions to accommodate local economic interests and land uses could result in the same deficient, patchwork management that FWS previously determined to be inadequate to conserve sage-grouse in its “warranted, but precluded” listing determination (75 Fed. Reg. 13910).

9. In addition to prescribing the same or very similar conservation measures for sage-grouse rangewide, the multiple EISs must require that each covered RMP and LMRP adopt those measures. Conservation measures cannot be optional or left to interpretation, or some BLM field offices and national forests and grasslands may choose not to implement them, or implement them differently than planners intended, resulting once again in varying and patchwork management schemes for sage-grouse.

10. The initial planning notice invited commenters to recommend areas on BLM lands for designation as ACECs (76 Fed. Reg. 77011) and, while the recovery alternative recommends designating a system of ACECs on BLM land to conserve sage-grouse and other sagebrush-dependent species, we request the BLM extend the comment deadline for the public to nominate ACECs as part of the planning process. ACECs should be central to the BLM’s sage-grouse conservation strategy. The public should have additional time to identify and nominate ACECs, particularly since key information, such as maps of priority and general sage-grouse habitat, are not yet publicly available, like in Utah (see BLM Memo 2012-144).

11. The BLM and USFS should support the National Science Foundation (NSF) to establish Long-Term Ecological Research (LTER) sites in sagebrush-steppe. None of the existing 26

\(^4\) See also Braun (2011) for a review of Greater Sage-grouse: Ecology and Conservation of a Landscape Species and Its Habitat.
LTERs in the United States are in sagebrush habitat.\(^5\) Sagebrush steppe is among the largest landscapes in the United States; supports hundreds of species; and will experience significant change under current and future management, climate change (Neilson et al. 2005), and other factors. The NSF should establish LTERs in each of the seven sage-grouse management zones identified by Stiver et al. (2006).\(^6\)

12. While FWS may engage in the proposed planning process as a regulator responsible for implementing the ESA, the agency should also participate as a land manager responsible for administrating key sage-grouse habitat. FWS currently manages 21 refuge units, totaling more than two million acres, within the historic range of Greater Sage-grouse (see Appendix 4) (some refuges have more sagebrush habitat than others). Presently, many of these refuges are in the process of completing their comprehensive conservation plans (CCPs) or reviewing existing plans for updates.

The value of these lands to sage-grouse recovery should not be overlooked, especially if refuge CCPs are appropriately amended, including to potentially expand existing refuge boundaries to protect additional sagebrush steppe. The National Wildlife Refuge System Administration Act (16 U.S.C. §§ 668dd-668ee, as amended) directs the Secretary of Interior to “plan and direct the continued growth of the System in a manner that is best designed to accomplish the mission of the System, to contribute to the conservation of the ecosystems of the United States, to complement efforts of States and other Federal agencies to conserve fish and wildlife and their habitats, and to increase support for the System and participation from conservation partners and the public” (16 U.S.C. §§ 668dd(a)(4)(C)). To support growth of the refuge system, the statute also provides the Secretary the authority to “[a]ccept donations of funds and to use such funds to acquire or manage lands or interests therein” and “[a]cquire lands or interests therein by exchange for acquired lands or public lands, or for interests in acquired or public lands, under his jurisdiction which he finds to be suitable for disposition” (16 U.S.C. §§ 668dd(b)(2), (3)).

The Secretary could also designate new refuge units in the form of Legacy Conservation Areas like that established in the Flint Hills in Kansas (USFWS 2010). While not entirely regulatory in nature, establishing such areas could contribute to sage-grouse conservation by uniting public lands management goals with complimentary, federally funded initiatives on private land to conserve sage-grouse on mixed land ownerships (see e.g., NRCS 2011; NRCS 2009\(^7\)).


\(^6\) At least two non-NSF facilities currently support research on sagebrush steppe: the Idaho National Laboratory in southern Idaho and the Pacific Northwest National Laboratory in Washington, both managed by Battelle for the Department of Energy.
\(^7\) Reference to these federally funded initiatives on private land is not necessarily an endorsement of them. Some of these initiatives are more beneficial to sage-grouse than others.
\(^8\) Excluding fish and some other taxa.
Segments of vertebrate species that use sagebrush and/or other habitat types in sagebrush steppe that are designated as “endangered,” “threatened” or candidate species under the ESA (see Appendix 2). Although sage-grouse are a useful umbrella species for the landscape, the planning process should account for specific habitat needs of other declining sagebrush-dependent species, such as Brewer’s sparrow, pygmy rabbit, Wyoming pocket gopher, and myriad fishes, amphibians, plants and mollusks. Wisdom et al. (2005b) categorized habitat types within sagebrush steppe in the Great Basin and identified groups of vertebrate species that primarily use those habitats. They recommend managing sub-habitats using these species as focal species (Wisdom et al. 2006b). Others propose using a suite of bird species that represent the full spectrum of nesting guilds (ground nesting, in shrub canopies, woodland canopies, and in cavities) and use a variety of habitat types as focal species for conservation planning in sagebrush steppe (CalPIF 2005). Planning for a suite of sagebrush species now could avoid land use conflicts with conservation in the future. Planners should consult a newly published reference, Sagebrush Ecosystem Conservation and Management: Ecoregional Assessment Tools and Models for the Wyoming Basins (Hanser et al. 2011), to plan for multiple species in the Wyoming Basin ecoregion.

14. The BLM and USFS must not delay implementing improved conservation measures for Greater Sage-grouse. Unfortunately, BLM interim planning guidance prescribes less restrictive conservation measures than are even included in the NTT report (BLM Memo 2012-043). The BLM and USFS should issue new interim guidance based on conservation measures in the NTT report.

15. The federal government must consult with western states about their desired hunting seasons for sage-grouse. Recovering sage-grouse must include increasing populations to support sustainable harvest goals. The BLM and USFS should ensure that federal conservation planning supports western states annual harvest goals.

III. SAGE-GROUSE CONSERVATION PLANNING

A. PLANNING PROCESS AND COMPONENTS

The BLM is the lead agency for the current planning effort. The BLM must follow certain steps in preparing an EIS and analysis and address certain elements in management planning (see BLM Handbook 1610-1). These comments and recovery alternative address a number of elements in the planning process, including planning criteria, planning issues, management stipulations and ACEC recommendations. Public participation should continue throughout the planning process. Agencies within the Department of Interior agencies are encouraged to coordinate, cooperate, consult and collaborate with interested publics in development and analysis of alternatives (see DOI 1980).

B. PLANNING CRITERIA

BLM planning guidance requires that the agency address planning issues and follow planning criteria when developing and revising land use plans (BLM Handbook 1610-1). Planning criteria guide the development of a plan by defining the planning space involved. The planning space is bounded by legal obligations and by existing policies and decisions relevant to the issues being
addressed. The criteria are then used to select the preferred alternative. Described another way, the preferred alternative must meet the planning criteria. The planning criteria and issues associated with the recovery alternative draw on objectives and guidelines for sage-grouse conservation in the NTT report and other sources:

- Designate priority sage-grouse habitat in each WAFWA management zone (Stiver et al. 2006) across the current geographic range of sage-grouse that are large enough to stabilize populations in the short-term and enhance populations over the long-term.
- Maintain or increase current sage-grouse populations, and manage or restore priority habitat so that at least 70 percent of the land cover provides adequate sagebrush habitat to meet sage-grouse needs.
- Protect priority habitat from large-scale anthropogenic disturbances that will adversely affect sage-grouse distribution and abundance at any level. Disturbances include but are not limited to highways, roads, transmission lines, substations, wind turbines, oil and gas wells, heavily grazed areas, range developments, severely burned areas, pipelines, landfills, mines, and vegetation treatments that reduce sagebrush cover.
- If priority habitat cannot be protected from disturbance (e.g., due to valid existing rights), minimize impacts by limiting permitted disturbance to one instance per section of sage-grouse habitat regardless of ownership, with no more than three percent surface disturbance (or, where stipulated, implement the disturbance cap prescribed in the applicable state conservation plan, whichever is more protective).
- Ensure that unavoidable small scale disturbances do not cumulatively disturb more than three percent of each priority area.
- Increase the amount of protected priority habitat by aggressively using available tools to resolve land use conflicts, including fluid mineral lease retirement, voluntary grazing permit retirement, mineral withdrawal, coal unsuitability findings, and mineral claim buyout.
- Reduce road density in priority habitat, and establish exclusion areas for new right-of-way permits.
- Ensure that disturbance or land uses permitted outside priority habitat do not negatively impact sage-grouse populations in priority habitat.
- Manage range resources to meet sage-grouse habitat objectives.
- Only implement vegetation treatments that are demonstrated to benefit sage-grouse and retain sagebrush height and cover consistent with sage-grouse habitat objectives.
- Design and implement fuels treatments to protect existing sagebrush ecosystems and support sage-grouse habitat objectives.
- Require adequate protections for sage-grouse general habitat to maintain habitat connectivity, and support sage-grouse persistence and management goals in priority habitat.
- Identify sage-grouse restoration habitat; use primarily passive restoration to restore these areas to support sage-grouse objectives.
- Designate sagebrush reserves (ACECs, SCAs) and develop management stipulations to achieve sage-grouse conservation goals.
- Ensure that plan implementation includes both agency and independent verification through collaborative monitoring (BLM Handbooks H4180-1, H16109).
- Evaluate actions using independent peer review standards (OMB 2004).
• Provide a linked sequence of measurable objectives for goals, needed land use prescriptions, actions taken to resolve identified issues, and verifiable monitoring.
• The preferred alternative should be achievable under current and foreseeable agency resources.

C. PLANNING ISSUES

Issues are problems or concerns that a land use plan needs to resolve. The issues relevant to this scoping process are listed below and described in more detail in subsequent sections.

1. Habitat loss and mismanagement.

   Issue: Sagebrush steppe is among the most imperiled landscapes in North America; millions of acres have been lost to crop agriculture, urban development, and other land uses, while remaining sagebrush habitat is degraded and fragmented by gas and oil drilling, livestock grazing, unnatural fire, invasive species, roads, fences, utility corridors and related effects. Habitat loss and degradation continues and efforts to protect and restore sagebrush steppe are inadequate, ineffective and hampered by myriad factors.

2. Vegetation management.

   Issue: Past and current vegetation management has affected vegetation composition, height and cover to the detriment of sage-grouse.

   Issue: Past monitoring methods failed to establish baseline data for ecological site potential or habitat characteristics needed for sage-grouse.

   Issue: Current upland rangeland health assessment methods fail to include indicators required for sage-grouse habitat.

   Issue: Reference areas for upland ecological sites are too few or too small and as a result, dependent habitat assessments lack objectivity and verification.

3. Riparian management.

   Issue: Many riparian areas fail to meet habitat conditions that sage-grouse require.

   Issue: There is a lack of appropriate standards and guidelines to restore habitat to reference conditions.

   Issue: Existing methods used to assess riparian areas (lentic and lotic) fail to include habitat requirements for sage-grouse.

   Issue: Reference riparian areas required in most agency assessments are too few and often too small in size to provide a basis for comparison.
4. Livestock grazing management.

*Issue:* Livestock grazing is the most pervasive land use in sagebrush steppe and has led to significant loss of grass and forb cover in sage-grouse habitat. Most sage-grouse habitat fails to meet sage-grouse habitat objectives.

*Issue:* Livestock grazing contributes to the spread of invasive species, conifer encroachment and unnatural fire in sagebrush steppe.

*Issue:* Livestock management as normally practiced by federal agencies leads to significant degradation of riparian areas.

*Issue:* Range facilities such as water developments, fences, and nutrient supplements generally negatively affect sage-grouse.

5. Mineral development.

*Issue:* Mineral extraction and associated infrastructure, including gas, oil, and coal, eliminate, fragment and degrade habitat and have significant negative effects on sage-grouse.

6. West Nile virus.

*Issue:* West Nile virus, a disease that is usually fatal to sage-grouse, is spread by the *Culex* mosquito that will use anthropogenic water sources as habitat.

7. Roads and off-highway vehicles.

*Issue:* Roads fragment sage-grouse habitat, and vehicle use on and off-road disturbs sage-grouse and can contribute to sage-grouse population declines.

8. Right-of-ways.

*Issue:* Utility corridors, including powerlines, pipelines and associated infrastructure, fragment habitat and affect sage-grouse populations. Potential geothermal and solar energy development on federal lands may also impact sage-grouse.


*Issue:* Unnatural fire has damaged large areas of sage-grouse habitat in recent years. Prescribed fire and post-fire restoration fail to support sage-grouse conservation.

10. Invasive plants.

*Issue:* Invasion by exotic plants, particularly annual grasses, may permanently alter vegetative composition and fire ecology in sagebrush steppe to the detriment of sage-grouse.
11. Conifer encroachment and recovery.

*Issue:* Some native conifer species are encroaching on sagebrush steppe; other native conifers are reoccupying historic range. Both phenomena affect sage-grouse, although management must address encroachment and recovery differently.

12. Wind energy development.

*Issue:* Wind turbines and associated infrastructure can negatively affect sage-grouse.

13. Climate change.

*Issue:* Degraded habitat has less resilience and this loss of resilience amplifies the negative impacts of climate change on sage-grouse and sagebrush steppe.

1. **Habitat Designations**

The BLM recognized the need to designate “priority” habitat to conserve Greater Sage-grouse (BLM Memo MT-2010-017, “protection priority areas”; BLM Memo WY-2010-012, “key habitat areas”; BLM Memo 2010-071, “priority habitat”; BLM Memo 2012-044, “preliminary priority habitat”). Priority habitat is generally defined as “having the highest conservation value to maintaining sustainable Greater Sage-grouse populations,” including “breeding, late brood-rearing, and winter conservation areas” (BLM Memo 2010-071). “Priority habitat will be areas of high quality habitat supporting important sage-grouse populations, including those populations that are vulnerable to localized extirpation but necessary to maintain range-wide connectivity and genetic diversity” (BLM 2010-071). BLM interim guidance and the announced planning process both depend on designation of priority habitat and other “general” habitat (BLM Memo 2012-043; BLM Memo 2012-043). Sage-grouse “core areas” in Wyoming should be considered priority habitat, with some modifications (see Map 13).

The NTT report organizes conservation measures based on habitat designation: “priority” and “general.” The technical team stated the overall objective for managing priority habitat must be to avoid “anthropogenic disturbances that will reduce distribution or abundance of sage-grouse” (SGNTT 2011: 7). It identified the following sub-objectives for priority habitat:

- Designate priority sage-grouse habitat in each of the seven management zones (Stiver et al. 2006) across the current range of sage-grouse that are large enough to stabilize populations in the short-term and enhance populations over the long-term.
- Manage or restore priority areas so that least 70 percent of the land cover provides adequate sage-grouse habitat to meet the species’ needs.
- Develop quantifiable habitat and population objectives.
- Develop a monitoring and adaptive management strategy to track whether these objectives are being met, and allow for revisions to management approaches if they are not.
• Manage priority sage-grouse habitats so that discrete anthropogenic disturbances cover less than three percent of total sage-grouse habitat regardless of ownership.  

• Prohibit further anthropogenic disturbances where the three percent threshold has been exceeded from any source until enough habitat has been restored to maintain the area under the threshold.


The NTT report defines “discrete” disturbances to include roads, transmission lines, oil and gas wells, wind turbines and similar, definite development (SGNTT 2011: 8). The three percent disturbance threshold does not include “diffuse” disturbances; the NTT report identifies livestock grazing and fire (depending on the scale and effects) as diffuse disturbance (SGNTT 2011: 8). We are concerned that the NTT report defines the pervasive, tangible, cumulative effects of livestock grazing as “diffuse.” The NTT report notes that “diffuse disturbance over broad spatial and temporal scales can have similar, but less visible effects” (SGNTT 2011: 8). The BLM and USFS should consider heavily grazed areas and range developments as discrete disturbance in sagebrush steppe. The agencies should also include extensive, severely burned areas and rangeland seedings with nonnative plants among discrete disturbances.

The NTT report identifies remaining areas outside priority sage-grouse habitat as “general habitat” (SGNTT 2011: 9). The NTT report lists sub-objectives for general habitat that include quantifying and delineating general habitat to buffer and connect priority areas; serve as potential replacement priority habitat; and serve as potential restoration sites (SGNTT 2011: 9-10).

The recovery alternative, which is structured like the NTT report, also stipulates conservation measures based on habitat designation. In addition to “priority” and “general” habitat, the recovery alternative would designate two additional habitat types: ACECs and “restoration” habitat. Although the BLM has invited commenters to nominate individual ACECs in the planning process, the recovery alternative is more ambitious. It recommends BLM designate a system of ACECs across sage-grouse range and prescribes even more restrictive measures for these designations than for priority habitat.

Montana BLM previously identified the need for restoration areas where the “goal is to achieve a balance between ongoing and future resource use so that enough quality habitat is maintained to allow some residual populations in impacted areas to persist” (BLM Memo MT-2010-017). The NTT report promotes restoration of sagebrush habitats (SGNTT 2011: 28), and recommends prioritizing restoration projects where environmental variables improve chances for success (citing Meinke et al. 2009), but is silent on mapping restoration priority areas. FWS recognizes that “[m]eaningful restoration for greater sage-grouse requires landscape, watershed, or ecoregional scale context rather than individual, unconnected efforts” (75 Fed. Reg. 13917). Consequently, the recovery alternative recommends that federal agencies identify restoration habitat in management planning based on their importance to sage-grouse and the likelihood of successfully restoring sagebrush communities (Meinke et al. 2009; Wisdom et al. 2005c; see Maps 7 and 8).

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9 The NTT report describes two spatial extents to measure discrete disturbance in sage-grouse habitat (SGNTT 2011: 8-9).
2. Threats

The BLM identified the following preliminary issues to analyze in the planning process:

- Greater Sage-grouse habitat management
- Fluid minerals
- Coal mining
- Hard rock mining
- Mineral materials
- Rights-of-way
- Renewable energy development
- Fire
- Invasive species
- Grazing
- Off-highway vehicle management and recreation


The BLM’s list of issues is incomplete. Connelly et al. (2011: 555-556, Tables 24.1, 24.2) reviewed literature and listed additional threats to sage-grouse that likely exist on federal land, including conifer encroachment, West Nile virus, seeded grassland, fences, power lines, vegetation treatments, roads, and reservoirs. It is unclear if BLM and USFS will address conifer encroachment/expansion, West Nile virus, seeded grassland and vegetation treatments as part of “Greater Sage-grouse habitat management.” The NTT report also listed a few additional threats that degrade or fragment habitat or affect sage-grouse, including geothermal energy development, landfills, and residential development (SGNTT 2011: 8). The agencies should address all of these factors in the planning process.

The BLM and USFS should also analyze the effects of climate change on sagebrush steppe, a recognized threat to sage-grouse (Connelly et al. 2011: 556, Table 24.2) that is predicted to have deleterious impacts on sagebrush steppe (Neilson et al. 2005; see Map 6). Climate change effects should be assessed individually and cumulatively with other land uses, such as livestock grazing. For example, Catlin et al. (2011) evaluated BLM grazing management in sagebrush steppe, illustrating the importance of achieving ecosystem potential to buffer against the effects of climate change and documenting problems with BLM monitoring and management that prevent improvement in conditions. The Secretary of Interior has directed each bureau and office to “consider and analyze potential climate change impacts when undertaking long-range planning exercises…[and] developing multi-year management plans, and making major decisions regarding the potential use of resources under the Department’s purview” (Secretary of the Interior Order no. 3289, Amendment no. 1). The proposed comprehensive, multi-year planning effort for sage-grouse should analyze potential climate change impacts in accordance with the Secretary’s order.

Some threats to sage-grouse are more important than others. An expert panel convened by the U.S. Fish and Wildlife Service ranked threats to the species. They are, in order: invasive species,
infrastructure related to energy (natural gas and oil) development and urbanization, wildfire, agriculture, grazing, energy development, urbanization, strip/coal mining, weather, and pinyon-juniper encroachment (70 Fed. Reg. 2267). The panel noted that energy development (70 Fed. Reg. 2264) and infrastructure related to energy development (70 Fed. Reg. 2258) are of greater concern in the eastern part of sage-grouse range, and wildfire (in part fueled by invasive plants) (70 Fed. Reg. 2265) is more important in the western portion of the range. Disease, predation, hard-rock mining, hunting and environmental contaminants were considered to be of lesser importance to sage-grouse (70 Fed. Reg. 2267).

The individual synergistic and cumulative effects of land uses and related effects continue to fragment, degrade and eliminate sage-grouse habitat across its range (Connelly et al. 2011). Federal planners must fully analyze these threats, develop conservation and mitigation measures and apply them rangewide to conserve and recover sage-grouse. Some of the most pervasive threats to sage-grouse are briefly reviewed below.

a. Vegetation Management

Federal agencies have historically treated sagebrush steppe to increase forage for livestock, which included seeding extensive areas with nonnative plants to support livestock production. More recently, land managers have employed various sagebrush treatment methods (e.g., prescribed fire, mechanical means such as Dixie Harrow, chemical applications, and all accompanied with seeding efforts) to attempt to create or enhance sage-grouse habitat, such as brood rearing habitat. Unfortunately, there is a dearth of long-term, well-designed\(^{10}\) scientific studies that document whether these sagebrush treatments benefit nest success or fecundity. Vegetation management in sagebrush steppe is an area that requires additional, carefully planned research.

Of the existing research, there are many cases where sagebrush treatments specifically done for sage-grouse have not produced intended results. For example, two and three years after sagebrush was mechanically treated and seeded to improve sage-grouse nesting and brood-rearing habitat near Alton, Utah, the percentage of forbs/grass cover in the treatment areas were less than half of the percentage of cover in breeding habitat reference areas, and less than half of the percentage of shrub cover in reference areas (Frey 2010, presentation). In addition, the average forb/grass height was also twice as high in breeding reference areas than in the treated areas (Frey 2010, presentation). Also during this period (2005-2007) sage grouse monitoring found that sage-grouse preferred the intact sagebrush stands to the treated areas (Frey and Heaton 2009, unpublished paper).

BLM interim direction for sage-grouse management and planning (BLM Memo 2012-043) cites Western Association of Fish and Wildlife Agencies (2009) as guidance for designing vegetation treatments in sagebrush steppe. WAFWA (2009: 1) states that “[i]n spite of considerable loss of functional sagebrush habitats from wildfire and other factors (e.g., energy development, agricultural conversion, and urban expansion), some natural resource professionals promote using different types of treatments to reduce sagebrush cover on remaining intact sagebrush

\(^{10}\) E.g., involving replication, comparison to non-treated controls, and controlling for confounding variables, most notably, post-treatment livestock grazing.
habitats (Bunting et al. 1987, Wyoming Interagency Vegetation Committee 2002, Davies et al. 2008, McAdoo et al. unpublished report). These treatments include prescribed fire, mechanical alterations, herbicide applications and intensive, short-duration livestock grazing. Justification for these treatments have included the need to increase resiliency of sagebrush-grassland habitats to wildfire, improve forage for livestock grazing, diversify age-structure of sagebrush, reduce ‘decadent’ stands of big sagebrush, and enhance sage-grouse habitat (Wyoming Interagency Vegetation Committee 2002). We question the biological and ecological value of treatments that remove sagebrush in xeric sagebrush communities and are concerned about long-term negative impacts to sage-grouse.”

b. Livestock Grazing

Livestock grazing is considered the single most important influence on sagebrush habitats and fire regimes throughout the Intermountain West in the past 140 years (Knick et al. 2005: 68). Grazing is the most widespread use of sagebrush steppe and almost all sagebrush habitat is managed for grazing (Connelly et al. 2004; Knick et al. 2003; Knick et al. 2011). Livestock grazing disturbs the soil, removes native vegetation, and spreads invasive species in sagebrush steppe (Knick et al. 2005). Cattle or sheep grazing in sage-grouse nesting and brood-rearing habitat can negatively affect habitat quality; nutrition for gravid hens; clutch size; nesting success; and/or chick survival (Connelly and Braun 1997; Beck and Mitchell 2000; Barnett and Crawford 1994; Coggins 1998; Aldridge and Brigham 2003). Livestock may directly compete with sage-grouse for grasses, forbs and shrub species; trample vegetation and sage-grouse nests; disturb individual birds and cause nest abandonment (Valentine 1990; Pederson et al. 2003; Call and Maser 1985; Holloran and Anderson 2003; Coates 2007). The potential conflict between livestock grazing and sage-grouse intensifies near riparian and mesic habitats due to the importance of these areas to sage-grouse, particularly during brood-rearing and in summer. Heavy cattle grazing near springs, seeps, and riparian areas can remove grasses used for cover by grouse (Klebenow 1982). According to Call and Maser (1985:17), “rapid removal of forbs by livestock on spring or summer ranges may have a substantial adverse impact on young grouse, especially where forbs are already scarce.”

Grazing infrastructure, such as water developments and fences, also fragment and degrade sage-grouse habitat (Connelly et al. 2004; Braun 1998; Call and Maser 1985; Knick et al. 2003). Fatal collisions with fences were “relatively common and widespread” in sage-grouse breeding habitat in southern Idaho (Stevens 2011), corroborating other evidence that fences may pose a significant risk to low flying sage-grouse (e.g., Danvir 2002, unpublished report). Fences (like other high structures) may serve as perches for raptors and other avian predators of sage-grouse nests, chicks and adults (Connelly et al. 2011b). Fence densities exceed 2 km/km² in many areas occupied by sage grous (Knick et al. 2011).

Native vegetation communities in sagebrush steppe did not evolve with significant grazing pressure by large ungulates (Mack and Thompson 1982). Excessive livestock grazing by domestic livestock during the late 1800s and early 1900s had significant impacts on sagebrush steppe and those effects persist today (Knick et al. 2003). Grazing (in addition to other factors) is

11 One expert contended that the “livestock industry has had [a] more negative impact on sage-grouse than any other single factor” and “[i]t’s rare to find any place that hasn’t been grazed” Hudak (2007: 28-29).
implicated in the encroachment of conifers in sagebrush steppe, including western juniper (Juniperus occidentalis) (Knick et al. 2011, citing Miller and Rose 1999; Kerr and Salvo 2007, unpublished report). Decades of livestock grazing have altered plant communities and soil and reduced productivity in sagebrush steppe (Knick et al 2003). Cattle grazed at “conservative” levels in sagebrush steppe in the northern Great Basin initially selected bunchgrasses in interspaces between sagebrush plants (France et al. 2008). The removal of native species from interspaces by cattle, in conjunction with other factors, appears to facilitate invasion by cheatgrass (Bromus tectorum) into these areas (Reisner 2010). The spread of cheatgrass and other invasive plants into degraded rangelands has accelerated the natural fire cycle and threatens to convert enormous areas of sagebrush habitat into annual grasslands (Wisdom et al. 2005c; Miller et al. 2011). Ecological modeling indicates that sheep grazing in sagebrush steppe may cause declines in sage-grouse populations (particularly where large, frequent fires also occur in the same area) (Pederson et al. 2003).

Rich et al. (2005: 592) suggested that “livestock grazing across the public lands of western landscapes has impacted and will continue to impact the quality of those habitats and their ability to support source populations of sagebrush bird species.” The authors contended that, contrary to prevailing sentiment, the number of animal unit months (AUMs) provided on federal public lands in Oregon, Idaho and Washington, has varied little over the period from 1949 and 2000 and that there were more AUMs on public lands in these states in 2000 than 1949 (when recordkeeping began) (Rich et al. 2005). Further, “livestock have been selected so that the mean mass of individuals has increased over time” and, consequently, “the total grazing impact on the vegetation and other resources is substantially greater than it was historically” (Rich et al. 2005: 599 and figures).

Beck and Mitchell (2000) reviewed literature for positive and negative direct and indirect effects of livestock grazing on sage grouse. Their review found more negative than positive impacts from grazing. (Beck and Mitchell 2000: 994, Table 1). However, of greater importance is the scope of the reported positive and negative impacts on sage-grouse and sagebrush habitats. While positive impacts are generally limited to specific areas and circumstances (e.g., light grazing regenerates upland meadow), negative impacts often affect much larger areas, rendering them unusable for sage-grouse.

Impacts should be considered in the context of their scale. For example, a sage grouse population in southeastern Idaho may have benefited indirectly from presence of livestock when they established strutting grounds on sheep salting areas [very small areas relative to overall habitat], whereas weed infestations induced by livestock grazing in the Great Basin may reduce quality of habitat for sage grouse populations across this vast region. (Beck and Mitchell 2000: 997, citations omitted).

Connelly et al. (2007), citing Coggins (1998) and Beck and Mitchell (2000), stated that “[t]he large number of documented negative impacts of livestock grazing in sagebrush shrub steppe appears to neutralize or outweigh any positive effects.” Jones (2000) found that 11 of 16 analyses of the effects of livestock grazing in arid ecosystems revealed significant negative effects on a range of ecological components from livestock grazing, including reduced grass and shrub cover, and reduced total vegetation biomass.
Beck and Mitchell (2000) concluded that livestock grazing appears to most affect productivity of sage grouse populations. Moynahan et al. (2007) also noted that condition of greater sage-grouse nesting habitat, an important factor in sage-grouse productivity, is likely affected by livestock grazing, among other influences. Holloran et al. (2005: 648) documented the importance of herbaceous cover, including residual grass, to sage-grouse nesting success and concluded that “annual grazing in nesting habitat, regardless of the timing, could negatively impact the following year’s nesting success [by reducing residual vegetation].” Aldridge and Boyce (2007: 522), citing Manier and Hobbs (2006), suggested that removing cattle or reducing livestock intensity may result in increased shrub cover and/or plant diversity in shrubsteppe. They also suggested that eliminating water impoundments (such as earthen livestock watering holes) may allow water to recharge former mesic sites in sagebrush steppe, which would benefit sage-grouse (Aldridge and Boyce 2007: 523).

Grazing management was identified as a threat to sage-grouse by three expert panels and in recent reviews (Connelly et al. 2011: 555-556, Tables 24.1, 24.2). Federal government scientists have suggested that “livestock grazing across the public lands of western landscapes has impacted and will continue to impact the quality of those habitats and their ability to support source populations of sagebrush bird species” (Rich et al. 2005: 592). In their study on sage-grouse in eastern Oregon, Call and Maser (1985: 3) made the following basic assumption: “[w]here there are conflicts between sage grouse and livestock on public lands, it may be essential to give priority to sage-grouse if they are to continue to exist on these areas.”

Contributions of Livestock Grazing to Cheatgrass Incursion

Livestock grazing appears to spread cheatgrass through multiple effects (Chambers 2008b) and grazing is probably not effective to control cheatgrass in preparation for restoring sagebrush steppe (Hempy-Mayer and Pyke 2008). Other information suggests that there are simply not enough livestock available to graze at the preferred locations, at the preferred intensity, at the preferred times during the year, to control cheatgrass at a landscape-level (McAdoo et al., undated, factsheet). The number of livestock and grazing intensity required to control cheatgrass would also probably have additional negative effects on native vegetation, soil, and other resources in sagebrush steppe that could outweigh any benefits from cheatgrass control. The removal of herbaceous perennials by grazing may increase water and nitrate availability to cheatgrass, and less perennial herbaceous cover may increase cheatgrass invasion (Chambers et al. 2007). The removal of cheatgrass by grazing may also increase cheatgrass seed production the following year (Chambers et al. 2007). Cheatgrass invasibility is lowest on sites with relatively high cover of perennial herbaceous species (Chambers et al. 2007).

Cheatgrass incursion in sagebrush steppe began in the 1850s with the introduction of domestic livestock, which trampled the biological soil crust that occupied the interspaces between native vegetation (Mack 1981) and facilitated the species’ spread. Intact, lichen-dominated biological soil crusts can significantly inhibit germination and root penetration of cheatgrass (Deines et al. 2007), while the presence of cheatgrass can negatively affect biological soil crust richness and cover (Ponzetti et al. 2007). Moss-dominated biological soil crusts may also effect germination of annual grasses, including cheatgrass (Serpe et al. 2006). The diversity, cover and resiliency of
biological crusts are positively correlated to low abundance of cheatgrass, low level of soil disturbance and high moss cover (Ponzetti et al. 2007). Shinneman et al. (2008) discovered that herbaceous and biological soil crust cover and species richness and diversity were generally greater on ungrazed than grazed areas in semi-arid shrubsteppe in western Colorado.

The recent proclamation by Davies et al. (2011: 3) that “livestock grazing per se is not a stressor threatening the sustainability of the [sagebrush] ecosystem”—that did not account for the direct and indirect contributions of grazing to the spread of cheatgrass—is without merit. The authors failed to consider the role of livestock grazing in altering the outcome of competitive interactions between bunchgrasses and cheatgrass, or the role of disturbance in succession and community assembly in sagebrush steppe (see Reisner 2010). Similarly, even if sagebrush steppe in the Wyoming Basin evolved with moderate herbivory (Mack and Thompson 1982), grazing prescriptions in sage-grouse habitat in Wyoming (e.g., Cagney et al. 2010) that fail to recognize the increasing presence of cheatgrass in the state (Smith and Enloe 2006, factsheet) may inadvertently contribute to its spread.

Livestock Grazing Management.

Developing and implementing grazing systems that are positive or neutral for sage-grouse is complex (Vavra 2005) (and may be impossible). Kuipers (2004) found (weak evidence) that nesting habitat selected by sage-grouse hens, nest success and brood-rearing habitat were associated with greater canopy cover, residual grass, and forb availability, respectively, on sites that were not grazed, or only lightly grazed in spring in Wyoming. Woodward (2006) (c.f. Adams et al. 2004) confirmed some of these findings and noted that reduced grazing/light grazing and/or deferred grazing in sage-grouse nesting habitat in spring lessened impacts on shrubsteppe vegetation and reduced conflicts with sage-grouse. Aldridge et al. (2008) recommended altering grazing practices in sagebrush steppe during times of drought to conserve herbaceous vegetation for sage-grouse.

Some references recommend implementing high intensity, short-duration (rotation) grazing systems to conserve prairie grouse (e.g., Lupis et al. 2006). Notwithstanding the fact that large areas of sagebrush-steppe did not evolve with large, hoofed herbivores (Mack and Thompson 1982), Holechek et al. (1999) reviewed the literature and found that forage production generally did not differ between rotation grazing systems and continuous or season-long grazing. Further, Wolfe et al. (2007) noted that high intensity, short-duration livestock grazing recommended to conserve prairie grouse frequently requires more fencing, which can be negative for sage-grouse.

Decades of research by range professionals provide direction to recover depleted bunchgrass communities, restore production and provide cover for sage-grouse and other wildlife species in upland (nesting) and riparian (brood-rearing) areas. Galt et al. (2000) and Holecheck et al. (2010) recommend 25 percent utilization to improve productivity and land health compared to higher utilization levels. To maintain adequate cover in riparian areas, USFS researchers determined that 24-30 percent utilization across the riparian zone will maintain 6” residual height (Clary and Webster 1989). These authors also indicated that, for riparian areas in degraded condition, as much as 15 years rest may be needed for recovery (Clary and Webster 1989).
Native bunchgrasses in sagebrush steppe, such as bluebunch wheatgrass and Idaho fescue, also require rest after being grazed during the growing season. Hormay and Talbot (1961) designed rest-rotation grazing to allow recovery after each grazing session, allowing sensitive native bunchgrasses to recover their vigor. Other BLM and USFS researchers have provided guidance for recovery of native bunchgrasses that may require multiple years of rest to restore vigor (Anderson 1991; Mueggler 1975). Anderson and Inouye (2001) working in sagebrush steppe in southern Idaho determined that native perennial grasses were recovering after 45 years of livestock exclusion and the increasing trend of these native grasses was inversely correlated to non-native invasive species such as cheatgrass.

Range scientists have determined that stocking rate rather than grazing system is the primary factor affecting rangeland production (Briske et al. 2008; Holechek et al. 1998; Van Poollen and Lacey 1979), yet agencies continue to place emphasis on water developments and increased fencing rather than addressing current forage capacity and landscape constraints. For example, cattle heavily graze riparian areas before moving on to adjacent uplands to seek forage (Pinchak et al. 1991). Deferred rotation grazing resulted in higher use of meadows and there was no correlation of upland presence of cattle with upland water developments (Gillen et al. 1984).

Galt et al. (2000) and Holechek et al. (2010) provided recommendations for establishing stocking rates in arid rangelands that recognize the constraints of topography, water availability and forage production on livestock stocking rates. Table 3 presents factors that are applied to align stocking rates with capacity and reduce the risk of excessive grazing. These are then combined with current forage availability available and the consumption rates of livestock to determine the stocking rate.

Discrete Disturbance from Livestock Grazing.

The NTT report considers livestock grazing a “diffuse” disturbance in sage-grouse habitat, which disregards the pronounced effects of grazing around water developments, salting and supplemental feeding areas, and fences. It is important to recognize that livestock infrastructure such as water developments and salt placement are attractants to livestock, resulting in concentrations at these locations that can have similar impacts on sagebrush steppe as other “discrete” disturbances (e.g., oil and gas wells). Fencelines also become travelways for trailing livestock and can have noticeable effects on sagebrush habitat.

The concentrated effects of livestock use near water sources is an example of how diffuse grazing can cause discrete disturbance on the landscape. Holechek et al. (2001) stated that, depending on topography, areas of severe degradation, or “sacrifice areas” around water sources, including water developments, can extend from one to several miles from water sources. Holechek et al. (2004), citing others, described the effects of water developments on forage production and native bunchgrasses in Idaho, Montana and New Mexico, noting that nearly all forage is used around water developments, decreasing with increasing distance from water. They reported that, under moderate grazing intensities, forage production was most severely reduced in the zone 0.5 miles from water. The authors noted that “perhaps the greatest problem with additional water developments is degradation of rangeland in high ecological condition” (Holechek et al. 2004: 321). They lamented that “[r]egrettably we have observed the degradation
of many publicly owned, high condition rangelands when permanent water developments were installed” (Holechek et al. 2004: 321).

Rinehart and Zimmerman (2001) studied the effects of livestock water developments on plant communities in the Little Missouri National Grassland, measuring total species, native bunchgrasses, other perennials, native species, decreasers, vegetation structure, and grass production. Each of these parameters was lowest in the areas near water developments and gradually increased out to one mile, the furthest point measured. Green needlegrass and needle and thread, both bunchgrasses valuable for their height, cover and production, were considered decreasers, while blue grama, a short grass, was an increaser that replaced the taller bunchgrasses in areas closer to water. The effect of this disturbance on factors relevant to sage grouse habitat are tabulated in Table 4.

Based on these sources, livestock grazing around water developments may adversely affect an area up to one-mile radius from the development. There is little information on disturbance from grazing and trampling around salt blocks, supplemental feeding areas and fences. It is incumbent on federal agencies to define an area of impact around water developments and other infrastructure in sage-grouse habitat in order to account for these disturbances in the maximum allowable disturbance on the landscape.

c. Mineral Development

Fluid Mineral Development. The NTT report and Knick and Connelly (2011a) thoroughly review the effects of fluid mineral development on sage-grouse. In addition, there is some new information for federal planners to consider in sage-grouse conservation plans.

A new study commissioned by the Bureau of Land Management has exposed major difficulties with the agency's current approach to sage-grouse conservation in the Powder River Basin, a region that is heavily developed for gas and oil. The study indicates that an increasing density of coalbed methane wells and conventional oil and gas wells coupled with an outbreak of West Nile virus could cause "functional extinction" of sage-grouse in the Powder River Basin. Under such a scenario, modeling predicts that 370 active leks known today in the Basin would be reduced to only six (Taylor et al. 2012). The authors estimate that 27 percent of the pre-development sage-grouse population has already been lost as a result of heavy coalbed methane and conventional drilling in the Powder River Basin, and predicts that only 39 percent of the original population will remain when coalbed methane is fully developed (with up to eight wells per section) in the Basin, even in the absence of a West Nile virus outbreak (Taylor et al. 2012). The study also found that sage-grouse censused at large leks would be expected to decline by 70 percent from pre-development numbers as well spacing reaches 4 wells per square mile. Finally, effects of drilling on sage-grouse were noticeable out to 12.4 miles from leks, indicating that current core areas may not be large enough to conserve and recover the species (Taylor et al. 2012).

Coal Mining. Coal mining and related infrastructure destroys and fragments sage-grouse habitat. FWS recognized the deleterious impacts of surface coal mining on sage-grouse—particularly in potential priority habitat—in recent comments Alton Coal Tract Lease by Application Draft Environmental Impact Statement. The Bureau of Land Management has proposed to extend
surface coal mining from a private land tract onto thousands of acres of critical sage grouse breeding, nesting and brood-rearing habitat on public land outside the town of Alton, Utah (BLM 2011a). FWS recommended that BLM reject the lease application and withdraw the tract for sale, stating “[w]e believe that mining activity under any of the action alternatives will result in the extirpation of the Alton-Sink Valley greater sage-grouse lek and the Alton greater sage-grouse population” (USFWS 2012: 1).

d. West Nile Virus

West Nile virus (WNv) is an exotic disease that was discovered in Greater Sage-grouse in 2003 (Naugle et al. 2004). Sage-grouse are highly susceptible to WNv infection (Walker et al. 2007). WNv is usually fatal to sage-grouse, resulting in death within six days of infection (Dierauf/USGS bulletin 2006). WNv has had a significant negative impact on local populations of sage-grouse (Walker et al. 2004; Naugle et al. 2004). The species’ resistance to the disease is expected to increase slowly over time (Walker and Naugle 2011).

WNv-related sage-grouse mortality rates vary widely and occur in areas with and without coal-bed methane (CBM) development (Naugle et al. 2004). However, ponds created from CBM development were deemed responsible for a 75 percent increase in mosquito breeding habitat in the Powder River Basin and appear to facilitate the spread of WNv into otherwise semi-arid sage-grouse habitat (Zou et al. 2006). CBM wastewater reservoirs were found to “significantly increase the overall population of [WNv] vector mosquitoes in the [Powder River Basin]” and “[coalbed natural gas] ponds and associated habitats enhance mosquito abundance and may serve to increase pathogen transmission in an otherwise arid ecosystem” (Doherty 2007: ix).

WNv has been discovered in all 11 states and two Canadian provinces where sage-grouse still occur (Kilpatrick et al. 2007), and sage-grouse mortalities from the disease have been documented in 10 states and one province (Walker and Naugle 2011). Naugle et al. (2004: 711) stated that the “emergence of WNv further complicates the difficult task of conserving sage-grouse in western North America.” Sage-grouse populations are becoming increasingly fragmented and the threat of WNv to small, isolated populations of sage-grouse is cause for concern (Naugle et al. 2004). Warming temperatures that result from climate change are expected to facilitate the spread of the Culex mosquito that carry WNv (Gould and Higgs 2009). Scientists recommend reducing the spread of WNv by avoiding development new anthropogenic water sources, and eliminating current sources, that support vector mosquitoes (Naugle et al. 2004; Walker et al. 2007; Walker and Naugle 2011).

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12 The CBM extraction process requires removal of large quantities of groundwater from coal seams in order to extract the methane trapped below. Methane extraction produces approximately 15,000 gallons of wastewater per day, per well, and significantly impacts underground aquifers. ENS. “Wyoming coalbed methane leases ruled illegal. Environment News Service (Apr. 30, 2002). Because the pumped water is usually loaded with dissolved solids and sodium (and numerous other pollutants), it is often stored in surface holding ponds for indefinite periods, rather than re-injected in aquifers or flushed down local streams. These holding ponds (and other naturally occurring and human-made surface waters, such as agricultural irrigation and livestock waters) serve as breeding habitat for insect vectors that transmit WNV. See Doherty, M. K. 2007; see also G. Johnson. Oral report on mosquito surveillance in the Powder River Basin, Sheridan, WY. (Oct. 24, 2003) (abstract). Document obtained via FOIA request to Wyoming BLM; received by Biodiversity Conservation Alliance, Laramie, WY, July 21, 2004.
e. Roads and Off-highway Vehicles

Less than 5 percent of sage-grouse current range is >2.5 km (>1.55 mi) from a mapped road (Knick et al. 2011). Roads have multiple impacts on sage-grouse (SGNTT 2011: 11, citing others; Braun 1998). Sage-grouse are killed in collisions with vehicles and may be affected by roads up to 6.9 km (4.2 miles) away (Connelly et al. 2004: 13-21, Table 13.1). Off-highway vehicles can disturb sage-grouse, fragment habitat, and spread nonnative plants in sagebrush steppe (Knick et al. 2011). The BLM has affirmative duties to evaluate existing authorizations and uses (including travel management) and take steps to protect natural resources, including sage-grouse (BLM Memo IM 2012-043).

f. Utility Corridors

Utility poles and wires have been known to pose a threat to sage-grouse since at least 1938, when evidence of grouse striking telephone wires was reported (Borell 1939). Utility corridors also fragment habitat and contribute to increased predation of sage-grouse locally by subsidizing raptors and corvids. The Oregon Department of Fish and Wildlife recently reviewed literature on the contributions of utility corridors to sage-grouse predation in the Sage-Grouse Conservation Assessment and Strategy for Oregon (Hagen 2011: 47-48, internal citations omitted).

Perching on power poles and transmission structures increases a raptor or corvid’s range of vision, allowing for greater speed and effectiveness in searching for and acquiring prey. Increased abundance of raptors and corvids within occupied sage-grouse habitats may result in predation rates outside the range of natural variation. Population level impacts to sage-grouse populations have been mixed. Transmission structures may also provide nesting sites for corvids and raptors in habitats with low vegetation and relatively flat terrain. Thus, these birds may preferentially seek out transmission structures in areas where natural perches and nesting sites are limited.

Case Studies

• Within one year of construction of a 372.5 mi transmission line in southern Idaho and Oregon, raptors and common ravens (Corvus corax) began nesting on the support structures, and within 10 years of construction 133 pairs of raptors and ravens were nesting on the transmission structures.
• Raptor observations have remained stable over a 5 year period after construction of a power line in Nevada, but common ravens have increased >200%.
• Golden eagle (Aquila chrysaetos) predation of sage-grouse increased from 26% to 73% (of the total predation) after a transmission line was constructed within 220 yd of an occupied lek in northeastern Utah. The lek was extirpated, and the presence of the transmission line resulted in changes in sage-grouse dispersal patterns and fragmentation of the habitat.
• In Washington, 95% (19 of 20) of leks ≤4.7 miles from 500 kV transmission lines are now unoccupied, while the unoccupied rate for leks >4.7 miles is 59% (22 of 37 leks).
• Leks within 0.25 miles of new power lines constructed for coalbed methane development in the Powder River Basin of Wyoming had significantly slower growth
rates compared to leks further from these lines, which was presumed to be the result of increased raptor predation.

- The presence of a power line may fragment sage-grouse habitats even if raptors are not present. Use of otherwise suitable habitat by sage-grouse near power lines increased as distance from the power line increased for up to 660 yards. The presence of power lines may limit sage-grouse use within 0.6 miles in otherwise suitable habitat.

As the United States transitions from fossil fuels to renewable energy sources, there will likely be a need for additional long-distance transmission lines. For example, the President’s Council on Environmental Quality Interagency Rapid Response Transmission Team (RRTT), formed in 2011, has identified five priority transmission lines in the West, and two in the East. These lines are planned to promote the development of remotely constrained renewable resources, mostly wind development. Of the five projects included in the West—SunZia, Cascade Crossing, Boardman to Hemingway, Gateway West, and TransWest Express—four cross sagebrush habitat identified by Doherty et al. (2010b) as having the highest densities of breeding sage-grouse. Early consideration of routes for these transmission lines and plans for expansion of remote, renewable resources can aid in reducing conflicts between transmission infrastructure and sage-grouse. The sage-grouse planning process should provide key information and prescribe conservation measures for current and future transmission planning in sage-grouse habitat.

Iterative transmission planning efforts are underway at the state and regional level. The primary clearing house for transmission expansion planning across areas identified as sage-grouse habitat is the Western Electricity Coordinating Council (WECC). WECC included environmental data in its Transmission Expansion Planning process, and WECC’s Scenario Planning Working Group Environmental Data Task Force (EDTF) was tasked with building a decision support tool to allow for a comparison of future transmission alternatives through the lens of environmental and cultural data sets. These data sets provide transmission planners with a method by which to show the relative ‘risk’ to a project developer of trying to develop a particular route. Lands were screened and classified under four tiers of suitability resulting in risk determinations dependent upon resources, such as lands with dense sage-grouse populations.

The EDTF will continue to conduct regular outreach to stakeholders across the West to update, collect and integrate additional environmental and cultural data into this decision support tool for use by regional transmission planners. Within this framework, information regarding Greater Sage-grouse habitat protection can and should flow two ways. BLM and USFS sage-grouse conservation planning efforts provide an opportunity to incorporate planning for renewable energy generation and transmission expansion based on long-term and west-wide modeling of existing and future renewable energy goals and reliability constraints. Conversely, the agencies should ensure that transmission planning efforts underway at WECC have incorporated new sage-grouse conservation efforts into future scenario planning through EDTF tools.

**g. Fire**

Natural fire intervals in sagebrush steppe range from 35-450 years (Baker 2006), depending on sagebrush type, elevation, aspect, etc., although fire may return more frequently to a given
watershed during productive periods (Miller and Tausch 2001). However, a combination of fire suppression and the spread of highly flammable nonnative plants has drastically altered the natural fire regime throughout much of the sagebrush steppe (Baker 2011). Wildfires now burn larger, hotter, and more frequently in lower elevation basin and Wyoming big sagebrush habitats. Little remains in the wake of these fires, and burned areas are often vulnerable to reinvasion by cheatgrass, which can completely occupy a burned site (Chambers et al. 2007; Brooks et al. 2004). Paradoxically, the removal of fine fuels (e.g., by livestock) in higher elevation mountain sagebrush habitats may deprive those sites of natural fire for many years, permitting conifer encroachment in some cases (Miller and Rose 1999).

The fire regime in sagebrush steppe has been altered by cheatgrass incursion and harmful land uses, and habitat loss and fragmentation from fire is likely to accelerate (Wisdom et al. 2005c). More than 12 million acres of sagebrush steppe burned in sage-grouse historic range between 1996-2010 (WildEarth Guardians data). Fires, prescribed and natural, have long-term effects (>10 yr) and sage-grouse may continue to avoid burned areas even after sagebrush has recovered (Nelle et al. 2000). Sagebrush may return to preburn occurrence within 15 to 20 years after fire if conditions are favorable (e.g., proximate seed sources, quick seedling establishment, conducive weather, etc.). If not, various sagebrush varieties may require between 30 to 50 years to re-occupy a burned site (Baker 2006; Knick et al. 2005).

Wildfire was identified as a threat to sage-grouse by two expert panels and three recent reviews (Connelly et al. 2011: 555-556, Tables 24.1, 24.2). Prescribed fire was also identified as a threat to sage-grouse (Connelly et al. 2011: 556, Table 24.2). Fire within 54 km of sage-grouse leks was associated with lek abandonment—in fact, the probability of abandonment increased 800 percent for each unit increase in fire within 54 km of a lek (Knick and Hanser 2011). While small, infrequent fires can maintain a mosaic of successional habitats that benefit sage-grouse, ecological modeling indicates that frequent, large fires in sagebrush steppe may lead to extirpation of the species (Aldridge et al. 2008). Prescribed fire was not shown to improve habitat characteristics for sage-grouse in Wyoming big sagebrush steppe that was already comprised of shrubs, native grasses and forbs (Rhodes et al. 2010).

h. Invasive Plants

Biological invasions, especially invasion by exotic annual grasses, is consistently cited as among the most important challenges to maintenance of healthy sagebrush communities (Miller et al. 2011; Wisdom et al. 2005c; Suring et al. 2005). At least 46 exotic plants occur in sagebrush steppe (Pyke 2000). Estimates of the rapid spread of weeds in the West include 2,300 acres per day on BLM lands and 4,600 acres per day on all western public lands (65 Fed. Reg. 54544).

Cheatgrass, an invasive annual grass, is now the dominant species on 100 million acres (158,000 square miles) in the Intermountain West (Rosentreter 1994: 170, citing Mack 1981). It was estimated in 1999 that 25 percent of the original sagebrush ecosystem has been converted to cheatgrass/medusa-head rye (Taeniatherum caput-medusae) annual grassland, and an additional 25 percent of sagebrush steppe has only cheatgrass as understory vegetation (West 2000). Cheatgrass is estimated to spread at a rate of 14 percent annually in the United States (Duncan et al. 2004: 1412, Table 1). The conversion of sagebrush steppe to exotic annual grassland has been
described as “massive” (Allen 2003) and is expected to continue (Miller et al. 2011; Hemstrom et al. 2002).

Cheatgrass thrives in disturbed, and especially burned, areas. It can increase fire frequency, favoring itself and potentially inhibiting perennial seedling establishment (Miller et al. 2011). Cheatgrass incursion into sagebrush habitat can lead to an eventual conversion of sagebrush/grass (perennial) community to sagebrush/grass (annual) or annual grass rangeland. In some cases, cheatgrass invasion facilitates establishment of other exotic species such as medusa-head rye, knapweed and thistle. It was observed in 1979 that annual-dominated communities in sagebrush steppe appeared to have crossed a threshold and created a new equilibrium (Hanley 1979) from which restoration to functional sagebrush steppe would be very costly and difficult (if not impossible) to achieve (Billings 1990).

Invasive species was identified as a threat to sage-grouse by three expert panels and in recent reviews (Connelly et al. 2011b (Table 1)). One panel listed cheatgrass as the most important threat to sage-grouse in the western portion of its range (70 Fed. Reg. 2267), where it has invaded much of the lower elevation, xeric sagebrush habitat (Miller et al. 2011). Land uses such as livestock grazing (Reisner 2010), off-road vehicle use, and coalbed methane development (Bergquist et al. 2007), can facilitate cheatgrass incursion in sagebrush steppe.

### i. Conifer Encroachment and Recovery

**Conifer Encroachment.**

Some juniper (*Juniperus* spp.) and piñon (*Pinus* spp.) species have increased in abundance and/or expanded into sagebrush steppe, primarily at higher elevations (Miller et al. 2011). Since 1870, concurrent with the introduction of domestic livestock and the resultant exclusion of periodic fire, the occurrence of western juniper (*Juniperus occidentalis occidentalis*) in the sagebrush steppe has increased approximately ten-fold in Oregon, northeastern California, northwestern Nevada, Idaho and Washington (Miller et al. 2005). Approximately 12 percent of the current distribution of sagebrush steppe is expected to be replaced, primarily by expansion of woody vegetation, with each 1°C increase in temperature (Miller et al. 2011). Sage-grouse habitat will be reduced as cheatgrass spreads at lower elevations and woody species eliminate sage-grouse habitat at higher elevations in sagebrush steppe (Miller et al. 2011).

Natural Resources Conservation Service has recognized conifer encroachment as a threat to sage-grouse (*e.g.*, NRCS 2009). The NTT report makes no specific prescriptions for addressing conifer encroachment.

**Conifer Recovery**

Some juniper and piñon species are not encroaching on sagebrush steppe, but reoccupying areas from which they were removed by miners and settlers. Piñon-juniper were a source of fuel and fiber for communities, ranching and mining in some parts of the West in the Nineteenth Century.

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(Lanner 1981). With the end of widespread logging of these species, these piñon and juniper are returning to much of their historic distribution (Lanner 1981, Catlin et al. 2011, unpublished research).

j. Wind Energy Development

Significant areas of sage-grouse habitat have high potential for wind energy development, and wind energy development is increasing in sage-grouse range. FWS recognizes the potential negative effects of wind energy development on sage-grouse (75 Fed. Reg. 13949-13952) and has indicated that lek buffer recommendations for other types of development may be appropriate for wind energy projects (USFWS, undated (a)). Buffer recommendations generally range from “3-5 miles and beyond” (USFWS, undated (b); Manville 2004; USFWS 2003). The NTT report identified “wind turbines” as a discreet disturbance in sage-grouse habitat, but did not make specific recommendations for wind energy development (SGNTT 2011). FWS has stated that wind energy development should be prohibited sage-grouse core areas designated in Wyoming unless and until it can shown to have no impact on the species (Kelly 2009, letter). This suggests that wind energy development should be prohibited in priority habitat in other states.

We support wind development in suitable areas and in accordance with the prescriptions in the recovery alternative, but it should not proceed in the absence of proper planning to protect sage-grouse and other resources. Landscape-level planning that designates zones for wind energy development would save the agency from committing time and resources to analyze inappropriate wind energy projects. The proposed China Mountain Wind Energy Project, now delayed,14 is an example of a project proposed in important sage-grouse habitat that would clearly have unacceptable impacts on sage-grouse, and yet required many years of analysis by BLM before it was suspended to account for the sage-grouse planning process.

The BLM has data on the quality of wind resources (compiled during the preparation of the Wind PEIS), potential conflicts from wind energy development with other resources and values, and the availability of transmission (in addition to current transmission-specific planning efforts), which the agency can use to designate wind energy zones for leasing. Further, the BLM’s 2012 budget justification proposed:

… a $3,000,000 increase for the Renewable Energy Management program to conduct studies and prepare regional planning studies and environmental reviews of potential wind energy zones in Nevada and Oregon. These studies will be completed in addition to those being supported with base funds in New Mexico, California, and Wyoming.15

The BLM’s budget proposal iterates the agency’s intent to plan for wind energy development zones and to update the Wind Programmatic EIS completed in 2005, while also taking into account planned transmission. The agency should use the sage-grouse planning process to inform

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14 “BLM Defers Final Decision on China Mountain Wind Project” (news release) (March 8, 2012),
planning for renewable energy development in sagebrush steppe. Similarly, the Forest Service should use this opportunity to identify areas most appropriate for wind energy development and/or develop guidelines for doing so.

k. Climate Change

Up to 80 percent of remaining sagebrush steppe could be lost to the direct or indirect effects of global warming (Wisdom et al. 2005c: 206, citing Neilson et al. 2005). Average temperature has already increased 0.6 - 1.1° F in the last 100 years in the Great Basin (Chambers 2008a). Raupach et al. (2007) discovered that the growth rate in anthropogenic CO$_2$ emissions increased more rapidly between 2000 and 2004 than even predicted by the highest growth rate (i.e., “worst case”) scenario developed by a leading intergovernmental organization in the late 1990s. Drought may also contribute to increased atmospheric CO$_2$ by reducing the amount of CO$_2$ that is annually taken up by terrestrial vegetation (Peters et al. 2007). Increased CO$_2$ may, in turn, favor invasive, annual grasses, including cheatgrass (Smith et al. 2000).

Climate change could be a significant threat to Greater Sage-grouse (van Kooten et al. 2007). Moynahan et al. (2007) reported that drought effects sage-grouse nesting probability. Holloran et al. (2005) noticed that annual sage-grouse nest success rates were positively correlated with the precipitation in the previous year. Increased temperatures are expected to dry out sagebrush steppe and may intensify the effects of other threats to sage-grouse, such as livestock grazing, invasive species and fire frequency (Alridge et al. 2008). Increased temperature may extend the fire season in the western United States and increase total area burned in some regions (McKenzie et al. 2003; Baker 2011).

The World Wildlife Fund modeled predicted effects of climate change on Wyoming big sagebrush and silver sagebrush in Wyoming, Montana, North Dakota, and South Dakota (Schrag and Forrest 2008, unpublished data). Results suggested a decrease in distribution of Wyoming big sagebrush by approximately 76-81 percent and a decrease in silver sagebrush of 71-80 percent by 2030 (Schrag and Forrest 2008, unpublished data). The authors contended that increased temperatures will also lead to the increased spread of WNv and these factors, combined with habitat loss and degradation from continued land uses, may threaten sage-grouse with extinction (Schrag and Forrest 2008, unpublished data).

3. Sagebrush Reserves, Designations for Sage-Grouse Conservation

The sage-grouse planning process should identify and designate a system of sagebrush reserves to conserve sage-grouse and other sagebrush-dependent species. In the planning process, these reserves take the form of special land use designations. Some (perhaps most) priority habitat on public land should be designated as sagebrush reserves. These areas should receive even greater protection than priority habitat. The reserve system would be the basis for sage-grouse recovery and long-term persistence in the face of climate change and continuing land uses on remaining sage-grouse priority and general habitat. Reserves on BLM land should be designated as areas of critical environmental concern. Similarly, the USFS should administratively designate sagebrush conservation areas to protect sage-grouse and other sagebrush-dependent species (36 CFR § 219.27). Both agencies should also establish additional RNAs as appropriate in sagebrush steppe.
a. Areas of Critical Environmental Concern (BLM)

The Federal Land Policy Management Act (FLPMA) (43 U.S.C. §§ 1701 et seq.) declared that the United States will develop regulations and plans for the protection of public land “areas of critical environmental concern” (43 U.S.C. § 1701(11)). FLPMA directs the Secretary of the Interior to “prepare and maintain on a continuing basis an inventory of all public lands [managed by BLM] and their resource and other values…giving priority to areas of critical environmental concern” (43 U.S.C. § 1711(a)). The Secretary is instructed to “give priority to the designation and protection of areas of critical environmental concern” on public lands administered by BLM when developing and revising land use plans (43 U.S.C. § 1712(c)(3)).

FLPMA defines areas of critical environmental concern (ACEC) as areas of public land “where special management attention is required…to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes…” (43 U.S.C. § 1702(a); 43 CFR § 1601.0-5(a)). A potential ACEC may only be designated if it meets both “relevance” and “importance’ criteria outlined in BLM regulations (43 CFR § 1601.0-5(a)(1)-(2)). A BLM Manual defines these criteria:

1. Relevance

An area meets the relevance criteria if it contains one or more of the following:

   a. A significant historic, cultural, or scenic value (including but not limited to rare or sensitive archeological resources and religious or cultural resources important to native Americans).

   b. A fish and wildlife resource (including but not limited to habitat for endangered, sensitive, or threatened species, or habitat essential for maintaining species diversity).

   c. A natural process or system (including but not limited to endangered, sensitive, or threatened plant species; rare, endemic, or relic plants or plant communities which are terrestrial, aquatic, or riparian; or rare geological features).

   d. Natural hazards (including but not limited to areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs).

   e. A hazard caused by human action may meet the relevance criteria if it is determined through the RMP process that it has become part of a natural process.

2. Importance

The value, resource, system, process, or hazard described in the relevance section must have substantial significance and values to meet the importance criteria. This generally means that the value, resource, system, process, or hazard is characterized by one or more of the following:

   a. Has more than locally significant qualities which give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.
b. Has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.

c. Has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of FLPMA.

d. Has qualities that warrant highlighting in order to satisfy public or management concerns about safety and public welfare.

e. Poses a significant threat to human life and safety or to property.

BLM Man. 1613.1.

ACECs are typically identified, evaluated, and designated through BLM resource management planning or amendment process (BLM Man. 1613.06). However, BLM managers must consider proposed ACECs, even if a planning effort is not underway or imminent (BLM Man. 1613.21.E). If, upon preliminary evaluation, the proposed area meets relevance and importance criteria, the agency must initiate a plan amendment to further evaluate the potential ACEC or provide temporary management until an evaluation is completed through resource management planning (BLM Man. 1613.21.E).

To be designated as an ACEC, an area must require “special management attention” to protect the relevant and important values (BLM Man. 1613.12). At least one additional management prescription must be developed for each ACEC (BLM Man. 1613.22) (that distinguishes management of the area from other, surrounding public land). Management prescriptions for ACECs are developed during the resource management planning or amendment process (BLM Man. 1613.12). The BLM identifies a number of factors that may influence management prescriptions, including conditions or trends of the potential ACEC; relationship to other resources and activities; opportunities for protection and/or restoration of potential ACEC values; the wisdom of highlighting the resource with an ACEC designation; the proposed boundaries of the potential ACEC; relationship of the potential ACEC to non-BLM designations; opportunities for management by another agency; and relationship to existing rights (BLM Man. 1613.22.A.1-8).

b. Sagebrush Conservation Areas (USFS)

The USFS may “adopt special designations through plan amendment or revision” to conserve natural resources (36 CFR § 219.27). The USFWS should administratively designate sagebrush conservation areas (SCAs) in the current planning process with similar purpose and management as BLM ACECs to conserve sage-grouse and other sagebrush dependent species on National Forest System lands.

c. Research Natural Areas (BLM & USFS)

The BLM and USFS should each designate Research Natural Areas (RNAs) in sagebrush steppe (43 CFR § 8223.0-1 - 8223.1; 36 CFR § 251.23, respectively). Both agencies have promulgated regulations to administratively establish RNAs to permanently protect species, ecosystems and natural conditions on public land for the purposes of conserving biological diversity, conducting non-manipulative research and monitoring, and fostering education. RNAs are commonly designated to preserve high quality examples of widespread ecosystems; unique ecosystems or
ecological features; and rare or sensitive species of plants and animals and their habitat. RNAs can help protect biological diversity at the genetic, species, ecosystem and landscape scales. These areas are managed to maintain the natural features and processes for which they were established, and so detrimental land uses are typically prohibited.

The Forest Service Chief is specifically directed to “establish a series of research natural areas sufficient in number and size to illustrate adequately or typify for research or education purposes, the important forest and ranges in each forest region, as well as other plant communities that have special or unique characteristics of scientific interest and importance” (36 CFR § 251.23). USFS has already designated numerous RNAs in sagebrush steppe, although relatively few in Nevada, and none in Wyoming (see Appendix 6), where the agency manages significant sage-grouse habitat. The agency should designate additional RNAs in sagebrush steppe as part of the proposed planning process in accordance with applicable law.

d. Guidelines for Designating Sagebrush Reserves

1. Protect Large Expanses of Sagebrush Steppe

Greater Sage-grouse are a landscape species (Connelly et al. 2011a). Migratory populations have large annual ranges that can encompass >2,700 km² (1,042 mi²/667,184 ac) (Knick and Connelly 2011b, citing Dalke et al. 1963; Schroeder et al. 1999; Leonard et al. 2000) (the species may use up to 2,500 mi² per population (Rich and Altman 2001)). Large-bodied birds are generally more strongly affected by habitat loss and fragmentation (Winter et al. 2006). Although conclusive data on minimum patch size is unavailable (Connelly et al. 2011a), conserving large expanses of sagebrush steppe is the highest priority to conserve sage-grouse (Aldridge et al. 2008; Connelly et al. 2011b). Knick and Hanser (2011) identified ten lek complexes that were >5,000 km² (1,930 mi²/1,235,526 ac) (range 5,395–100,288 km²) and 8 of them contained >100 leks (range 143–1,139) (see Map 9). Some sagebrush-dependent species use different habitat composition, structure or succession than sage-grouse prefer. Protecting large blocks of habitat will also help preserve a mosaic of different habitats of varying successional stages used by sage-grouse and other sagebrush-dependent species.

2. Protect Small Areas and Connectivity in Sagebrush Steppe

Protecting small habitat patches can help connect larger areas. Conservation strategies for sage-grouse should preserve networks of populations and/or habitat patches, including connecting smaller lek complexes within 18 km that could serve as intermediary islands of habitat for dispersing sage-grouse (Knick and Hanser 2011). Protecting small habitat patches is also important to conserve smaller birds and maintain avifaunal diversity (Winter et al. 2006).

Sage-grouse may move long distances between seasonal habitats (Connelly et al. 1988). Annual movements of 40-160 km (24.8-99.4 mi) by sage-grouse along established routes have been reported (Dalke et al. 1963; Connelly 1982; Leonard et al. 2000). Although much is still unknown about the distribution, configuration, and characteristics of sage-grouse migration corridors (Connelly et al. 2011a), Beck et al. (2006) recommended conserving habitat corridors to facilitate easier movement for migratory sage-grouse.
3. Protect Sage-Grouse Leks, and Nesting and Brood-rearing Habitats

The loss and degradation of nesting and brood-rearing habitats, which leads to reduced nesting success and increased chick mortality, appears to be a primary cause of declining Greater Sage-grouse populations rangewide (Aldridge and Boyce 2007; Holloran et al. 2005). Most sage-grouse nesting and brood-rearing habitat is found near sage-grouse leks. Sage-grouse conservation strategies should focus on protecting leks and associated habitat.

- Conservation of sagebrush within 5 km (3.1 miles) of sage-grouse leks was recommended to maintain most nesting and early brood-rearing habitat used by nonmigratory populations, whereas 18-km radii (11.2 miles) have been recommended for migratory populations (Wakkinen et al. 1992; Connelly et al. 2000; Holloran and Anderson 2005).
- Braun (2006, unpublished report) recommended restricting surface occupancy and construction of new roads within 5.5 km (3.4 mi) of active sage-grouse leks.
- A 4-mile (6.4 km) lek buffer encompassed 74-80 percent of sage-grouse nests in Montana and Wyoming (Moynahan 2004; Holloran and Anderson 2005).
- Doherty et al. (2010b), in mapping breeding densities of Greater Sage-grouse rangewide, buffered leks by 8.5 km (5.3 mi), identified by Holloran and Anderson (2005: 746) as an area of interest (see Map 10).
- A majority (~90%) of nesting and brood-rearing habitat was within 10 km (6.2 miles) of active leks in Alberta (Aldridge and Boyce 2007); 97 percent of nests were found within 6.2 miles of leks where females were marked in the Powder River Basin in Montana and Wyoming (Doherty et al. 2010a).
- Sage-grouse nesting habitat was accurately predicted up to 20 km (12.4 mi) from leks in the Powder River Basin in Montana and Wyoming (Doherty et al. 2010a).
- Effects of gas and oil drilling on sage-grouse were noticeable out to 12.4 miles from leks (Taylor et al. 2012).
- Movements from lek sites to nesting locations can exceed 25 km (15.5 mi) (Holloran and Anderson 2005).
- Characteristics of sagebrush steppe within 54 km (33.6 miles) of sage-grouse leks might influence seasonal movements and also incorporate habitats used outside the breeding season (Swenson et al. 1987; Leonard et al. 2000).

GIS modeling can identify sage-grouse habitat, but only at a larger scales (Doherty et al. 2010a). Within areas identified by GIS modeling as nesting habitat, there is some local variability in which sites are actually suitable for nesting (Doherty et al. 2010a). For example, sage-grouse nests may be clumped in one area, but not other areas the same distance from a lek.

4. Protect Other Seasonal Habitats

Conservation strategies focused on conserving sage-grouse nesting and brood-rearing habitats that fail to address other important seasonal habitats may not yield intended benefits for sage-grouse (Connelly et al. 2000; Doherty et al. 2008). For example, sage-grouse consume forbs in summer found at mesic sites (e.g., wet meadows, riparian areas) and/or at higher elevations (Connelly et al. 2011a, citing others). A lack of mesic sites (for example, during dry years) can
be limiting on sage-grouse due to lack of summer food sources (Aldridge 2000). Conservation strategies should seek to protect and restore mesic sites in sage-grouse habitat.

The availability of winter habitat is also important to sage-grouse persistence. The quality of winter habitat appears to influence the abundance and condition of female sage-grouse and their nesting effort and clutch sizes in spring (Moynahan et al. 2007). The species depends almost exclusively on sagebrush exposed above the snow for food and shelter (Connelly et al. 2011a, citing others). Suitable winter habitat is often on wind swept ridges, south-facing slopes or in protected draws (Braun et al. 2005) (although research in Canada also identified winter habitat is less rugged areas and away from energy development and two-tracked roads (Carpenter et al. 2010)). These landscape features may be limited in some areas (e.g., Beck 1977). Winter habitat should be locally identified and conserved (Braun et al. 2005, citing Connelly et al. 2000 and others; Moynahan et al. 2007).

5. Protect a System of Reserves

A system of reserves must conserve a large proportion of habitat to sustain biological processes and conserve species. The commonly cited goal of conserving 10 percent of a given landscape lacks basis in science (Soulé and Sanjayan 1998; Svancara et al. 2005). Much larger areas, perhaps 50 percent of rangewide distribution, may be necessary to conserve biodiversity and ecosystem integrity (Soulé and Sanjayan 1998). Conservation sites identified by experts to protect diverse habitats and species (including sage-grouse) in the Great Basin covered 40 percent of the region (Nachlinger et al. 2001, unpublished report). A system of reserves must be large enough to achieve the goals of biological representation, and ecological redundancy and resiliency within an ecosystem (Svancara et al. 2005). The percentage area needed to conserve biodiversity and ecosystem processes should emerge from the biological requirements of species. Braun (2006, unpublished report) recommended conserving large blocks of sagebrush steppe (in excess of 20 mi²), one per Township (36 mi²), in fragmented habitat to conserve sage-grouse.

A system of reserves should protect centers of species abundance on the landscape. Doherty et al. (2010b) found that, while sage-grouse occupy large areas, their breeding distribution is aggregated in relatively small areas. Areas representing 25 percent of the known sage-grouse population were 3.9 percent of the species range, and 75 percent of sage-grouse were within 27 percent of the species range (Doherty et al. 2010b) (see Map 10).

A system of reserves should protect peripheral and/or genetically distinct populations of species. Peripheral populations are often located at the ecological limits of a species range, where species are exposed to environmental circumstances that may later become prevalent in central populations, such as effects from climate change. Such testing of the periphery can act to stabilize the entire species in the face of environmental change (Lesica and Allendorf 1995). Genetically distinct populations increase genetic diversity in a species and expand the genetic background against which natural selection occurs (Lesica and Allendorf 1995). Reserves should be designated to protect the Columbia Basin and Bi-State distinct population segments of Greater Sage-grouse in Washington (Wisdom et al. 2005c) and eastern California/southwestern Nevada, respectively.
A system of reserves should prioritize preservation of areas have moderate or high potential to be maintained or restored in the face of climate change, cheatgrass incursion, unnatural fire and effects from historic and current land uses (see Wisdom et al. 2005c). In general, most areas with high potential to maintain or restore sagebrush communities are concentrated in Wyoming, eastern Idaho and northern Nevada. Areas with very low, low, or moderate potential to maintain or restore sagebrush are concentrated in Washington, Oregon, western Idaho and much of Nevada (Wisdom et al. 2005c).

The recovery alternative includes criteria for designating ACECs (and SCAs) based on these guidelines and applies them to Utah and Wyoming to demonstrate how BLM should designate ACECs rangewide (see Maps 12 and 14).

IV. SAGE-GROUSE RECOVERY ALTERNATIVE

The Sage-Grouse Recovery Alternative is submitted as a complete alternative to be analyzed and considered for the sage-grouse planning process in accordance with NEPA. The recovery alternative incorporates the planning criteria and issues described above. The management prescriptions are based on the conservation measures in the NTT report (SGNTT 2011: 11-28), although they also differ from the NTT recommendations in key areas. The alternative includes some prescriptions additional to those in the NTT report, and rejects some NTT recommendations. These differences are identified in the recovery alternative in Appendix 7.

The recovery alternative is comprehensive, reasonable and feasible to implement, and we expect it will be published as a stand-alone alternative. We encourage the BLM and USFS to consult with us about any elements that may appear unclear or could be more appropriately described. We also request planners to communicate with us about any needed modifications in format for ease of comparison with other alternatives.

* * *

A. GOAL AND OBJECTIVES

Goal: Maintain and increase current sage-grouse abundance and distribution by conserving, enhancing and restoring the sagebrush ecosystem.

Objectives:

1. Increase sage-grouse populations to a level where they are viable and secure from local extirpation events, and eventually to a level that allows for an annual harvestable surplus.
2. Restore and maintain sagebrush steppe to its ecological potential in priority, general and restoration sage-grouse habitat.
3. Establish a system of sagebrush reserves to anchor recovery efforts by protecting the highest quality habitats.
**Priority, General and Restoration Sage-Grouse Habitat**

Designate and manage **priority sage-grouse habitat** to conserve large expanses of sagebrush steppe and all active sage-grouse leks, and brood-rearing, transitional and winter habitats. While designating priority habitat, seek to preserve peripheral populations and connectivity in sagebrush habitat. For states that have failed to protect these values in their core areas or similar designations, include the excluded lands in federal priority sage-grouse habitat. Consider using Doherty et al. (2010b) (100 percent of active leks) as a basis for designating priority sage-grouse habitat, including brood-rearing, transitional and winter habitats.

Limit discrete surface disturbance in priority sage-grouse habitat to one instance per section of sage-grouse habitat regardless of ownership, with no more than three percent surface disturbance (or, where stipulated, implement the disturbance cap prescribed in the applicable state conservation plan, whichever is more protective). The three percent cap includes existing and all new initial disturbance to the landscape, interim mitigation and restoration efforts notwithstanding. Discrete disturbances include but are not limited to highways, roads, transmission lines, substations, wind turbines, oil and gas wells, heavily grazed areas, range developments, severely burned areas, pipelines, landfills, mines, and vegetation treatment and rangeland seedings that reduce sagebrush cover. As additional research on the three percent cap becomes available, revise this prescription, as necessary, to conserve sage-grouse.

**General sage-grouse habitat** is occupied (seasonal or year-round) habitat outside of priority habitat designated by western state fish and wildlife agencies in coordination with the appropriate federal agency(s). General sage-grouse habitat shall be managed for no net loss of sage-grouse.

**Restoration sage-grouse habitat** is degraded or fragmented habitat that is currently unoccupied by sage-grouse, but might be useful to the species if restored to its potential natural community. Restoration habitat shall be identified in management planning based on its importance to sage-grouse and the likelihood of successfully restoring sagebrush communities (Meinke et al. 2009; Wisdom et al. 2005c). Passive restoration is preferred for restoring these areas over active restoration methods.

**B. MANAGEMENT PRESCRIPTIONS**

**Travel and Transportation**

- Motorized travel will be restricted to designated roads and routes in priority and general sage-grouse habitat.

- Prohibit new road construction within 4 miles of active sage-grouse leks, and avoid new road construction in priority sage-grouse habitat.

- Implement permanent seasonal road or area closures to protect breeding, nesting and brood-rearing sage-grouse.
Complete activity level plans (BLM) or forest plan revisions within five years of the record of decision. During activity level planning, where appropriate, designate routes with current administrative/agency purpose or need for administrative access only.

Limit route construction to realignments of existing designated routes if that realignment has a minimal impact on sage-grouse habitat, eliminates the need to construct a new road, or is necessary for motorist safety. Mitigate any impacts with methods that have been demonstrated to be effective to offset the loss of sage-grouse habitat.

Use existing roads, or realignments as described above to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then, following the 4-mile prohibition from leks, build any new road constructed to the absolute minimum standard necessary (jeep trails should be the primary form of access road in priority areas), and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3% for that area, then make additional mitigation that has been demonstrated to be effective to offset the resulting loss of sage-grouse habitat.

Allow no upgrading of existing routes that would change route category (road, primitive road, or trail) or capacity unless it is necessary for motorist safety, or eliminates the need to construct a new road. Any impacts shall be mitigated with methods that have been demonstrated to be effective to offset the loss of sage-grouse habitat.

Close and restore to natural habitat all primitive roads and trails not designated in travel management plans. This includes primitive routes/roads that were not designated in Wilderness Study Areas and within lands with wilderness characteristics that have been selected for protection.

For sage-grouse habitat areas that do not have a travel management plan, the amended Resource Management Plan shall include an interim transportation plan that assesses road densities and closes and restores routes for sage-grouse conservation.

A new definition of “spot maintenance” shall be adopted for primitive roads or ways within all sage-grouse habitat that does not allow for continuous maintenance (e.g., blading), but is limited to spots of minimal maintenance necessary to maintain the passage of high clearance vehicles. This maintenance shall preserve the primitive characteristics of the route and cannot cause an upgrade in route consideration or road maintenance level in future wilderness or route inventories or transportation decisions, thereby preventing the further fragmentation of sagebrush habitat.

Consider closing designated routes in sage-grouse priority habitat.

When reseeding closed roads, primitive roads and trails, use appropriate native seed mixes and require the use of transplanted sagebrush.
Recreation

- Seasonally prohibit camping and other non-motorized recreation within 4 miles of active sage-grouse leks.
- Prohibit off-road vehicle use in priority sage-grouse habitat.
- Only allow special recreation permits that have demonstrated neutral or beneficial affects to priority habitat areas.

Lands/Realty

1. Rights of Way

Priority sage-grouse habitat areas

- Priority sage-grouse habitat areas shall be exclusion areas for new ROWs permits. Consider the following exceptions:
  - Within designated ROW corridors encumbered by existing ROW authorizations: new ROWs may be co-located only if the entire footprint of the proposed project (including construction and staging), can be completed within the existing disturbance associated with the authorized ROWs.
  - Subject to valid, existing rights: where new ROWs associated with valid existing rights are required, co-locate new ROWs within existing ROWs or where it best minimizes sage-grouse impacts. Use existing roads, or realignments as described above, to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3% for that area, then make additional mitigation that has been demonstrated to be effective to offset the resulting loss of sage-grouse habitat.

- Evaluate and take advantage of opportunities to remove, bury, or modify existing power lines within priority sage-grouse habitat areas. Sage-grouse may avoid powerlines because of increased predation risk (Steenhof et al. 1993; Lammers and Collopy 2007). Powerlines effectively influence (direct physical area plus estimated area of effect due to predator movements) at least 39% of the sage-grouse range (Knick et al. 2011). Deaths resulting from collisions with powerlines were an important source of mortality for sage-grouse in southeastern Idaho (Beck et al. 2006; 75 FR 13910).

- Where existing leases or ROWs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat.

Planning Direction Note: While engaged in this sage-grouse EIS planning process, relocate existing designated ROW corridors crossing priority sage-grouse habitat void of
any authorized ROWs, outside of the priority habitat area. If relocation is not possible, undesignate that entire corridor during the planning process.

General sage-grouse habitat areas

- Make general sage-grouse habitat areas “avoidance areas” for new ROWs.
- Where new ROWs are necessary, co-locate new ROWs within existing ROWs where possible.

2. Land Tenure Adjustment

Priority sage-grouse habitat areas

- Retain public ownership of priority sage-grouse habitat. Consider exceptions where:
  
  o There is mixed ownership, and land exchanges would allow for additional or more contiguous federal ownership patterns within the priority sage-grouse habitat area.
  o In priority sage-grouse habitat areas with minority federal ownership, include an additional, effective mitigation agreement for any disposal of federal land. As a final preservation measure consideration should be given to pursuing a permanent conservation easement.

- Where suitable conservation actions cannot be achieved, seek to acquire state and private lands with intact subsurface mineral estate by donation, purchase or exchange in order to best conserve, enhance or restore sage-grouse habitat.

3. Proposed Land Withdrawals

Priority sage-grouse habitat areas

- Propose lands within priority sage-grouse habitat areas for mineral withdrawal.
- Do not approve withdrawal proposals not associated with mineral activity unless the land management is consistent with sage-grouse conservation measures. (For example, in a proposed withdrawal for a military training range buffer area, manage the buffer area with sage-grouse conservation measures that have been demonstrated to be effective.)

Range Management

- For range management and free-roaming horse and burro management, sage-grouse habitat objectives are based on, in priority order, potential natural community within the applicable Ecological Site Description, Connelly et al. (2000: 977, Table 3),\(^{16}\) or other objectives that have been demonstrated to be associated with increasing sage-grouse populations.

\(^{16}\) See Table 2 in this document.
All prescriptions for range management apply to priority sage-grouse habitat, general sage-grouse habitat, and restoration habitat, unless otherwise stated.

1. Planning and Health Assessments

- Within sage-grouse habitat, incorporate measurable sage-grouse habitat objectives and triggers for changed management into all BLM and Forest Service grazing allotments through amendments to RMPs or LMRPs, applicable to all AMPs or permit renewals.

- Work cooperatively on integrated ranch planning within sage-grouse habitat so operations with deeded/BLM and/or Forest Service allotments can be planned as single units.

- Prioritize completion of land health assessments and processing grazing permits within priority sage-grouse habitat areas. Focus this process on allotments that have the best opportunities for conserving, enhancing or restoring habitat for sage-grouse. Utilize sage-grouse habitat objectives to conduct land health assessments to determine if standards of rangeland health are being met.

- Conduct land health assessments that include (at a minimum) indicators and measurements of structure/condition/composition of vegetation specific to achieving sage-grouse habitat objectives. Failure to meet sage-grouse habitat objectives is a failure to meet rangeland health standards.

- Establish and maintain sufficiently large areas free of livestock as reference areas to aid in describing ecological site potential and as a measure of the comparative effects of livestock grazing—and relief from livestock grazing—on sage-grouse populations.

2. Implementing Management Actions after Land Health and Habitat Evaluations

- Within one year of adopting the planning amendment, develop specific objectives to conserve, enhance or restore sage-grouse habitat based on sage-grouse habitat objectives (including within wetlands and riparian areas).

- Manage for vegetation composition and structure consistent with achieving sage-grouse habitat objectives.

- Implement management actions (RMPs, LMRPs, grazing decisions, AMP/Conservation Plan development, establishment of ungrazed reference areas, or other plans or agreements) to modify grazing management to meet seasonal sage-grouse habitat requirements (Connelly et al. 2011c). Consider singly, or in combination, changes in:
  
  1. Season, timing, and/or frequency of livestock use;
  2. Numbers/AUMs of livestock (includes temporary non-use or livestock removal);
  3. Distribution of livestock use;
4. Intensity of livestock use; and
5. Type of livestock (e.g., cattle, sheep, horses, llamas, alpacas and goats) (Briske et al. 2011).

- To achieve sage-grouse habitat objectives, utilization levels should not exceed 25 percent annually on uplands, meadows, flood plains and riparian habitat (Holecheck et al. 2010; BLM & USFS 1994).¹⁷

- Rest at least 25 percent of each sage-grouse planning area from livestock grazing annually.

- Reduce grazing in advance of predicted drought so that, to the degree possible, sagebrush habitat continues to meet sage-grouse habitat objectives. During drought periods, prioritize evaluating effects of drought in sage-grouse habitat areas relative to their biological needs, as well as drought effects on ungrazed reference areas. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999; Cagney et al. 2010), ensure that post-drought management allows for vegetation recovery that meets sage-grouse needs in sage-grouse habitat areas based on sage-grouse habitat objectives.

### 3. Riparian Areas and Wet Meadows

- Manage riparian and wetland areas to meet proper functioning condition which is indicated by adequate moisture from surface water and vegetation for dependent wildlife needs and vegetation adequate to protect steam banks and dissipate stream flow energy from high stream flow events, that reflects the desired plant community or the potential natural community, contains a diverse age structure and composition, shows high vigor, and provides food, cover and other habitat needs for dependent animal species (BLM 1997).

- Within sage-grouse habitats, manage wet meadows to maintain a component of perennial forbs with diverse species richness and productivity relative to site potential (e.g., reference state) to facilitate brood-rearing. Also conserve or enhance these wet meadow complexes to maintain or increase the amount of edge and cover within that edge to minimize elevated mortality during the late brood-rearing period (Hagen et al. 2007; Kolada et al. 2009; Atamian et al. 2010).

- Where riparian areas and wet meadows meet proper functioning condition, strive to attain potential natural community relative to the ecological site description.

- Authorize no new water developments for diversion from spring or seep sources within sage-grouse habitat.

- Analyze springs, seeps and associated water developments to determine if modifications are necessary to maintain the continuity of the predevelopment riparian area within sage-grouse habitats. Make modifications where necessary, including dismantling water developments.

¹⁷ “A community is considered to be at its natural potential when the existing vegetation is between 75-100 percent of the site’s potential natural plant community.” BLM & USFS 2004: 3-26.
4. **Structural Range Improvements and Livestock Management Tools**

- Avoid all new structural range developments and location of supplements (salt or protein blocks) in priority sage-grouse habitat unless independent peer-reviewed studies show that the range improvement structure or nutrient supplement placement benefits sage-grouse. Structural range developments, in this context, include but are not limited to cattleguards, fences, exclosures, corrals or other livestock handling structures; pipelines, troughs, storage tanks (including moveable tanks used in livestock water hauling), windmills, ponds/reservoirs, solar panels and spring developments. Potential for invasive species establishment or increase following construction must be considered in the project planning process and monitored and treated post-construction. Consider the comparative cost of changing grazing management instead of constructing additional range developments.

- When developing or modifying water developments, use best management practices (BMPs, see Appendix C)\(^\text{18}\) to mitigate potential impacts from West Nile virus (Clark et al. 2006; Doherty 2007; Walker et al. 2007; Walker and Naugle 2011).

- Evaluate existing structural range developments and location of supplements (salt or protein blocks) to document that they conserve, enhance or restore sage-grouse habitat.
  - Remove, modify or mark fences in areas of moderate or high risk of sage-grouse strikes within sage-grouse habitat based on proximity to lek, lek size, and topography (Christiansen 2009; Stevens 2011).
  - Monitor for, and treat invasive species associated with existing range developments (Gelbard and Belnap 2003; Bergquist et al. 2007).

5. **Retirement of Grazing Privileges**

- In each planning process, identify grazing allotments where permanent retirement of grazing privileges would be potentially beneficial to sage-grouse.

- Maintain retirement of grazing privileges as an option in sage-grouse habitat areas when base property is transferred or the current permittee is willing to retire grazing on all or part of an allotment.

- Encourage partners to monitor effects of retiring grazing permits in sage-grouse habitat.

**Free-Roaming Horse and Burro Management**

1. **Ongoing Authorizations/Activities**

- Manage free-roaming horse and burro populations at levels demonstrated to achieve and maintain sage-grouse habitat objectives.

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\(^{18}\) Listed appendices are original to the corresponding prescriptions in the NTT report.
• Prioritize gathers in priority sage-grouse habitat, unless removals are necessary in other areas to prevent catastrophic environmental issues, including herd health impacts.

2. Proposed Authorization/Activities

• Within sage-grouse habitat, develop or amend herd management area and herd area plans to incorporate sage-grouse habitat objectives for managing all BLM herd management areas (HMAs) and USFS herd areas (HAs).

• Coordinate with other resources (Range, Wildlife, and Riparian) to conduct land health assessments to determine existing structure/condition/composition of vegetation within all BLM HMAs and USFS HAs.

• When conducting NEPA analysis for free-roaming horse and burro management activities, water developments or other range developments for free-roaming horses in sage-grouse habitat, address the direct and indirect effects to sage-grouse populations and habitat. Implement any water developments or range developments using the criteria identified for domestic livestock. Consider the comparative cost of changing grazing management instead of constructing additional range developments.

Minerals

1. Fluid Minerals

   a. Unleased Federal Fluid Mineral Estate

• Close priority sage-grouse habitat areas to fluid mineral leasing, and within 4 miles of active sage-grouse leks. Consider an exception:

   When there is an opportunity for the BLM to influence conservation measures where surface and/or mineral ownership is not entirely federally owned (i.e., checkerboard ownership). In this case, a plan amendment may be developed that opens the priority area for new leasing. The plan must demonstrate long-term population increases in the priority area through mitigation (prior to issuing the lease) including lease stipulations and off-site mitigation, and avoid short-term losses that put the sage-grouse population at risk from stochastic events leading to extirpation.

• Upon expiration or termination of existing leases, do not accept nominations/expressions of interest for parcels within priority areas.

• Allow geophysical exploration within priority sage-grouse habitat areas to obtain exploratory information for areas outside of and adjacent to priority sage-grouse habitat areas. Only allow geophysical operations by helicopter-portable drilling methods and in accordance with seasonal timing restrictions and/or other restrictions that may apply. Geophysical exploration shall be subject to seasonal restrictions that preclude activities in breeding, nesting, brood-rearing and winter habitats during their season of use by sage-grouse.
b. Leased Federal Fluid Mineral Estate

Priority sage-grouse habitat areas

Apply the following conservation measures as Conditions of Approval at the project and well permitting stages, and through RMP implementation decisions and upon completion of the environmental record of review (43 CFR § 3162.5), including appropriate documentation of compliance with NEPA. In this process evaluate, among other things:

A. Whether the conservation measure is “reasonable” (43 CFR § 3101.1-2) with the valid existing rights; and

B. Whether the action is in conformance with the approved RMP.

- Do not allow new surface occupancy on federal leases within priority habitats, this includes winter concentration areas (Doherty et al. 2008, Carpenter et al. 2010) during any time of the year. Consider an exception:
  - If the lease is entirely within priority habitats, apply a 4-mile NSO around the lek, and limit permitted disturbances to 1 per section with no more than 3% surface disturbance in that section.
  - If the entire lease is within the 4-mile lek perimeter, limit permitted disturbances to 1 per section with no more than 3% surface disturbance in that section. Require any development to be placed at the most distal part of the lease from the lek, or, depending on topography and other habitat aspects, in an area that is less demonstrably harmful to sage-grouse.

- Apply a seasonal restriction on exploratory drilling that prohibits surface-disturbing activities during the nesting and brood-rearing season in all priority sage-grouse habitat during this period. This seasonal restriction shall also apply to related activities that are disruptive to sage-grouse, including vehicle traffic and other human presence.

- Do not use Categorical Exclusions (CXs) including under the Energy Policy Act of 2005, Section 390 in priority sage-grouse habitats due to resource conflicts.

- Complete Master Development Plans in lieu of Application for Permit to Drill (APD)-by-APD processing for all but wildcat wells.

- When permitting APDs on existing leases that are not yet developed, the proposed surface disturbance cannot exceed 3% per section for that area.

- Require unitization with no surface occupancy stipulations for sensitive habitats when deemed necessary for proper development and operation of an area (with strong oversight
and monitoring) to minimize adverse impacts to sage-grouse according to the Federal Lease Form, 3100-11, Sections 4 and 6.

- Prohibit the surface disposal of coalbed methane wastewater, as well as the construction of evaporation or infiltration reservoirs to hold wastewater. Inject coalbed methane wastewater underground into a formation of equal or lower water quality.

- Identify areas where acquisitions (including subsurface mineral rights) or conservation easements, would benefit sage-grouse habitat.

- Require a full reclamation bond specific to the site. Insure bonds are sufficient for costs relative to reclamation (Connelly et al. 2000; Hagen et al. 2007) that would result in full restoration. Base the reclamation costs on the assumption that contractors for the BLM will perform the work.

- Make applicable Best Management Practices (BMPs, see Appendix D) mandatory as Conditions of Approval within priority sage-grouse habitat.

2. Solid Minerals

   a. Coal

   Priority sage-grouse habitat areas

   - Surface mines: Find unsuitable all surface mining of coal under the criteria set forth in 43 CFR § 3461.5.

   - Sub-surface mines: Grant no new mining leases unless all surface disturbances (appurtenant facilities) are placed outside of the priority sage-grouse habitat area.

   - For coal mining operations on existing leases:

     o Sub-surface mining: in priority sage-grouse habitat areas, place any new appurtenant facilities outside of priority areas. Where new appurtenant facilities associated with the existing lease cannot be located outside the priority sage-grouse habitat area, co-locate new facilities within existing disturbed areas. If this is not possible, then build any new appurtenant facilities to the absolute minimum standard necessary. Abate wastewater associated with coal mining to mitigate potential impacts from West Nile virus.

   General sage-grouse habitat

   - Apply minimization of surface-disturbing or disrupting activities (including operations and maintenance) where needed to reduce the impacts of human activities on important seasonal sage-grouse habitats. Apply these measures during activity level planning.
• Use additional, effective mitigation to offset impacts as appropriate (determined by local options/needs).

• Abate wastewater associated with coal mining to mitigate potential impacts from West Nile virus.

**b. Locatable Minerals**

Priority sage-grouse habitat areas

• Withdraw priority habitat from mineral entry (43 U.S.C. § 1714).

• Subject all existing claims within the withdrawal area subject to validity patent exams or buyout. Include claims that have been subsequently determined to be null and void in the proposed withdrawal. In plans of operations required prior to any proposed surface disturbing activities, include the following:
  
  o Additional, effective mitigation in perpetuity for conservation (In accordance with existing policy, WO IM 2008-204). Example: purchase private land and mineral rights or severed subsurface mineral rights within the priority area and deed to US Government).

  o Consider seasonal restrictions if deemed effective.

  o Make applicable Best Management Practices (see Appendix E) mandatory as Conditions of Approval within priority sage-grouse habitat.

**c. Non-energy Leasable Minerals (i.e. sodium, potash)**

Priority sage-grouse habitat areas

• Close priority habitat to non-energy leasable mineral leasing. This includes not permitting any new leases to expand an existing mine.

• For existing non-energy leasable mineral leases, in addition to the solid minerals BMPs (Appendix E), follow the same BMPs applied to Fluid Minerals (Appendix D), when wells are used for solution mining.

**d. Saleable Mineral Materials**

Priority sage-grouse habitat areas

• Close priority habitat to mineral material sales.
• Restore saleable mineral pits no longer in use to meet sage-grouse habitat conservation objectives.

3. Mineral Split Estate

Priority sage-grouse habitat areas

• Where the federal government owns the mineral estate, and the surface is in non-federal ownership, apply the conservation measures applied on public lands.

• Where the federal government owns the surface, and the mineral estate is in non-federal ownership, apply appropriate Fluid Mineral BMPs (see Appendix D) to surface development.

Wind Energy Development

• Do not site wind energy development in priority sage-grouse habitat (Jones 2012).

• Site wind energy development at least five miles from active sage-grouse leks (Manville 2004; Jones 2012).

• Site wind energy development at least four miles from the perimeter of sage-grouse winter habitat.

Vegetation Management

• For vegetation treatments, fuels management and habitat restoration, sage-grouse habitat objectives are based on, in priority order, potential natural community within the applicable Ecological Site Description, Connelly et al. (2000: 977, Table 3), or other objectives that have been demonstrated to be associated with increasing sage-grouse populations.

1. Vegetation Treatments

• Ensure that vegetation treatments create landscape patterns which most benefit sage-grouse. Only allow treatments that are demonstrated to benefit sage-grouse and retain sagebrush height and cover consistent with sage-grouse habitat objectives (this includes treatments that benefit livestock as part of an AMP/Conservation Plan to improve sage-grouse habitat).

• Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses in and adjacent to sage-grouse habitat to determine if they should be restored to sagebrush or habitat of higher quality for sage-grouse. If these seedings provide value in conserving or enhancing sage-grouse habitat, then no restoration would be necessary. Assess the compatibility of these seedings for sage-grouse habitat during the land health assessments.

• Any vegetation treatment plan must include pretreatment data on wildlife and habitat condition, establish non-grazing exclosures, and include long-term monitoring where treated
areas are monitored for at least three years before grazing returns. Continue monitoring for five years after livestock are returned to the area, and compare to treated, ungrazed exclosures, as well as untreated areas.

- The BLM interim guidance on sage-grouse management and planning states that the agency must “meet vegetation management objectives that have been set for seeding projects prior to returning the area to authorized uses, specifically livestock grazing” (BLM Memo IM 2012-043). This means that grazing cannot resume until a treated site meets sage-grouse habitat objectives. This may be many years as research indicates long-term rest may be required to restore native vegetation (Anderson 1991; Anderson and Inouye 2001; Hormay and Talbot 1961; Mueggler 1975).

2. **Fuels Management**

- Design and implement fuels treatments with an emphasis on protecting existing sagebrush ecosystems.
  - Closely evaluate the benefits of the fuel break against the additional loss of sagebrush cover in the EA process.
  - Allow no fuels treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around or in the winter range and will maintain winter range habitat quality.
  - Design fuels management projects in priority sage-grouse habitat to strategically and effectively reduce wildfire threats in the greatest area. This may require fuels treatments implemented in a more linear versus block design (Launchbaugh et al. 2007).

- Apply appropriate seasonal restrictions for implementing fuels management treatments according to the type of seasonal habitats present.

- Retain sagebrush canopy cover at or above what is expected for that ecological site, consistent with sage-grouse habitat objectives unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of priority sage-grouse habitat and conserve habitat quality for the species.

- Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species; Connelly et al. 2000; Hagen et al. 2007; Beck et al. 2009). However, if as a last resort and after all other treatment opportunities have been explored and site specific variables allow, the use of prescribed fire for fuel breaks that would disrupt the fuel continuity across the landscape could be considered, in stands where cheatgrass is a very minor component in the understory (Brown 1982).

- Design post fuels management projects to ensure long term persistence of seeded or pretreatment native plants, including sagebrush. This may require temporary or long-term changes in livestock grazing management, free-roaming horse and burro management, travel management, or other activities to achieve and maintain the desired condition of the fuels.

3. **Fire operations**

- In priority sage-grouse habitat areas, prioritize suppression, immediately after life and property, to conserve the habitat.

- In general sage-grouse habitat, prioritize suppression where wildfires threaten priority sage-grouse habitat.

- Follow Best Management Practices (WO IM 2011-138, see Appendix E.)

4. **Emergency Stabilization and Rehabilitation (ES&R)**

- Establish and strengthen networks and financial arrangements with seed growers to assure availability of native seed for ES&R projects.

- Prioritize native seed allocation for use in sage-grouse habitat in years when preferred native seed is in short supply. This may require reallocation of native seed from ES&R projects outside of priority sage-grouse habitat to those inside it. Require use of native plant seeds for ES&R seedings based on availability, adaptation (ecological site potential), and probability of success (Richards et al. 1998). Where probability of success or native seed availability is low (beyond the ability of the federal government to increase and insure native seed availability), non-native seeds may be used as long as they meet sage-grouse habitat conservation objectives (Pyke 2011). Reestablishment of appropriate sagebrush species/subspecies and important native understory plants, relative to site potential, shall be the highest priority for rehabilitation efforts.

- Design post ES&R management to ensure long term persistence of seeded or pre-burn native plants. This may require temporary or long-term changes in livestock grazing, free-roaming horse and burro, and travel management, etc., to achieve and maintain the desired condition of ES&R projects to benefit sage-grouse (Eiswerth and Shonkwiler 2006).

- Consider potential changes in climate (Miller at al. 2011) when proposing post-fire seedings using native plants. Consider seed collections from the warmer component within a species’ current range for selection of native seed (Kramer and Havens 2009).

- Post fire recovery must include establishing adequately sized exclosures (free of livestock grazing) that can be used to assess recovery.

- Livestock grazing should be excluded from burned areas until woody and herbaceous plants achieve sage-grouse habitat objectives.
• Where burned sage-grouse habitat cannot be fenced from other unburned habitat, the entire area (e.g., allotment/pasture) should be closed to grazing until recovered.

5. Habitat Restoration

• Identify sage-grouse restoration habitat and prioritize areas for restoration projects based on environmental variables that improve chances for project success (Meinke et al. 2009; Pellant et al. 2005).
  o Prioritize restoration in seasonal habitats that are thought to be limiting sage-grouse distribution and/or abundance and where factors causing degradation have already been addressed (e.g., changes in livestock management).
  o Design post restoration management to ensure long term persistence. This could include changes in livestock grazing management, free-roaming horse and burro management and travel management, etc., to achieve and maintain the desired condition of the restoration effort that benefits sage-grouse (Eiswerth and Shonkwiler 2006).
  o In fire prone areas where sagebrush seed is required for sage-grouse habitat restoration, consider establishing seed harvest areas that are managed for seed production (Armstrong 2007) and are a priority for protection from outside disturbances.

• Include sage-grouse habitat objectives in habitat restoration projects. Make meeting these objectives within priority sage-grouse habitat areas the highest restoration priority.

• Require use of native seeds for restoration based on availability, adaptation (ecological site potential), and probability of success (Richards et al. 1998). Where probability of success or adapted seed availability is low (beyond the ability of the federal government to increase and insure native seed availability), non-native seeds may be used as long as they support sage-grouse habitat objectives (Pyke 2011). Consider potential changes in climate (Miller et al. 2011) when proposing restoration seedings when using native plants. Consider collection from the warmer component of the species current range when selecting native species (Kramer and Havens 2009).

6. Invasive Plants

• Monitor and control invasive vegetation in treated, burned or restored sagebrush steppe. Rapidly restore burned or disturbed sagebrush steppe to prevent incursion of invasive plants.

• Restrict activities in sage-grouse habitat that facilitate the spread of invasive plants.

• In sage-grouse habitat, ensure that soil cover and native herbaceous plants are at their ecological potential to help protect against invasive plants. Most sagebrush communities important to sage-grouse are expected to have a significant percentage of ground cover in biological crusts at most successional stages (Belnap et al. 2001). Perennial grasses and forb germination is aided by the presence of biological crusts (Belnap and Eldredge 2001).

• Develop and implement methods for prioritizing and restoring sagebrush steppe invaded by nonnative plants.
C. SAGEBRUSH RESERVES

Designate Areas of Critical Environmental Concern (ACECs) (BLM) and Sagebrush Conservation Areas (SCAs) (USFS), respectively, as sagebrush reserves to conserve sage-grouse and other sagebrush-dependent species. A large subset of sage-grouse priority habitat areas should be designated as reserves. Sagebrush reserves would be the basis for enhancing sage-grouse populations and supporting long-term persistence in the face of climate change and continuing land uses on remaining sage-grouse priority and general habitat. These purposes satisfy the relevance and importance criteria for BLM ACECs. The BLM and Forest Service should also support the establishment of Long-Term Ecological Research sites in sagebrush steppe.

1. Criteria for Designating ACECs and SCAs

- Prioritize areas of high biological value to sage-grouse and other sagebrush-dependent species for designation as ACECs and SCAs, especially areas that are currently undeveloped for oil and gas or other uses. These special management areas should be a subset of priority habitat, which includes all active sage-grouse leks (Doherty et al. 2009).
- Designate large sagebrush reserves that encompass centers of sage-grouse abundance on the landscape. Protect a sufficiently large proportion of habitat in each planning area to sustain biological processes, recover species and buffer against the systematic effects of climate change and land uses and related effects, including invasion by nonnative plants and unnatural fire. Undeveloped areas with high biological value should be immediately considered for ACEC and SCA designation.
- Consider prioritizing ACECs and SCAs in areas that meet the previous criteria, and are near high biological value areas that are likely to be developed, in order to support resilience of areas disturbed by development.
- Designate ACECs and SCAs to protect peripheral and/or genetically distinct populations of sage-grouse and preserve or restore habitat connectivity.
- Designate a system of reserves that is large enough to achieve the goals of biological representation, and ecological redundancy and resiliency within an ecosystem.
- Prioritize areas that have moderate or high potential to be maintained or restored.
- ACECs and SCAs can be designated to conserve biological resources, but also to preserve historic, cultural and scenic values. Consider identifying areas for ACEC designation that would include both priority sage-grouse habitat and other vulnerable resources, such as wilderness characteristics, other endangered species, or cultural resources. By taking this approach, BLM and USFS can assure that designation and management of ACECs and SCAs will maximize protection of multiple resources that the agency is obligated to manage.

2. Special Management Prescriptions for ACECs and SCAs

- New ACECs and SCAs will be managed the same as sage-grouse priority habitat, except for the following:

---

19 One potential location for a Long-Term Ecological Research site is sage-grouse core area habitat in the Great Divide Basin south of Green Mountain in Wyoming.
- ACECs and SCAs shall be withdrawn from locatable and leasable mineral development (43 U.S.C. § 1714).
- Sagebrush reserves shall be closed to new fluid mineral development.
- No new surface disturbance shall be allowed in ACECs and SCAs.
- New rights-of-ways will be restricted in ACECs and SCAs.
- The removal of infrastructure (including unneeded oil and gas development equipment, roads, range developments and fencing) will be prioritized in ACECs and SCAs.

• Existing ACECs in sage-grouse habitat should be managed under these same prescriptions wherever possible.
V. MAPS AND TABLES

Map 1

Greater sage-grouse historic range closely conformed to the occurrence of sagebrush (*Artemisia* spp.) in what became thirteen western states and three Canadian provinces (Schroeder et al. 2004). The species was extirpated from Nebraska, Arizona and British Columbia (Schroeder et al. 2004), and may be extirpated soon from Alberta (Brooymans, *Edmonton J.* 11-09-2010).
The sagebrush density map depicts the percent area in sagebrush habitat within a 5-kilometer radius of each 0.5 km grid cell. The layer is clipped to greater sage-grouse historic range. The darker shades represent greater percent of sagebrush on the landscape. The data is based on Comer et al. (2002); versions of this map were published in Connelly et al. (2004) and other references.
Sagebrush habitats are potentially threatened by 26 anthropogenic factors and related effects,\textsuperscript{1} including gas and oil drilling, livestock grazing, agricultural conversion, roads, fences, powerlines and pipelines, off-road vehicle use, urban development, mining, unnatural fire, and invasive species (Wisdom et al. 2005a: 30-33, table 1.5). Just three of these threats—gas and oil drilling, livestock grazing, and probable occurrence of cheatgrass (*Bromus tectorum*)—affect more than 81 percent of sage-grouse current range (Salvo 2008, unpublished report). Sagebrush steppe has become one of the most endangered landscapes in North America (Wisdom et al. 2005b; Noss et al. 1995).

\textsuperscript{1} Connelly et al. 2011b reported 15 “major threats” to sage-grouse as identified by others.
Less than 5 percent of sage-grouse historic range—and only 2.92 percent of sage-grouse current range—is on specially designated federal land (Salvo 2008, unpublished report).²

Specially designated areas include national parks, national wildlife refuges, national conservation areas, a cooperative management and protection area, national monuments, national recreation areas, a national reserve, and a Department of Energy facility. Some specially designated lands contain more sagebrush habitat than others. Some offer more protection than others. Bureau of Land Management wilderness study areas are not included because their long-term protection is uncertain. Military reservations are also not included as any conservation benefits derived from military lands are considered incidental to their purpose and management.
Bureau of Land Management (BLM) wilderness study areas, if designated as wilderness by Congress, and BLM areas of critical environmental concern, if managed for conservation, could provide additional protection for sage-grouse and other species.
Neilson et al. (2005) simulated the effects of the current climate and seven future climate change scenarios on sagebrush persistence. Most climate change simulations predict sagebrush steppe will contract as mean temperatures increase and the frost line shifts northward. In the worst case scenario, sagebrush species are simulated to contract under the current and all seven climate change models to just 20 percent of current distribution. The largest remaining areas will be in southern Wyoming and in the gap between the northern and central Rocky Mountains, followed by areas along the northern edge of the Snake River Plateau and small patches in Washington, Oregon and Nevada.
Wisdom et al. (2005c) analyzed the potential to maintain sagebrush steppe based on elevation and precipitation (current distribution of sagebrush steppe based on Comer et al. 2002). Although conserving sagebrush steppe can be complex—Wisdom et al. (2005) identified 26 threats to sagebrush habitat—it may be less difficult to maintain sagebrush habitat at higher elevations that receive greater precipitation, than at lower, drier sites. In general, areas with high potential to maintain sagebrush are characterized by mountain big sagebrush communities and low sagebrush varieties. Areas at lower elevations with less potential to maintain habitat are mostly Wyoming big sagebrush. These dry sites are more vulnerable to cheatgrass (<i>Bromus tectorum</i>) incursion and unnatural fire.
Wisdom et al. (2005c) also analyzed the potential to restore former sagebrush steppe based on elevation and precipitation (using Küchler (1970) to identify historic or potential sagebrush steppe). Areas converted to crop agriculture, urban development, etc. have low potential for restoration. Areas at low elevation that receive less precipitation also have low potential for restoration due to their vulnerability to cheatgrass incursion and unnatural fire.
Knick and Hanser (2011) used connectivity analysis to identify areas within current sage-grouse range important for conservation and to estimate the distance thresholds that potentially isolate sage-grouse populations. They used Landfire (2006) data to plot sagebrush habitat and censuses for 5,232 active leks as foci for connectivity analysis. Their study assumed that sage-grouse disperse up to 18 km from leks with sufficient frequency to serve as a viable measure of connectivity. Leks were clustered into complexes where neighboring leks were connected by dispersal distances < 18 km. (Complexes containing fewer than 5 leks are not depicted on this map.) Complexes with the highest relative importance for maintaining connectivity, as characterized by higher censuses of sage-grouse and connectivity to other leks, are depicted in darker shades.
Doherty et al. (2010), using maximum count data from 4,885 active leks, mapped greater sage-grouse breeding abundance rangewide. They buffered leks by 8.5 km (5.3 mi), identified by Holloran and Anderson (2005: 746) as an area of interest. They found that sage-grouse breeding abundance is highly clumped at rangewide scales. Breeding density areas used by 25 percent of the known sage-grouse population comprise only 3.9 percent (2.92 million ha/7.22 million ac) of the species current range; 50 percent of sage-grouse use leks within 10 percent (7.58 million ha/18.73 million ac) of their range; and 75 percent of sage-grouse use leks within 27 percent (20.36 million ha/50.31 million ac) of their range.
BLM lands are key to conserving and recovering sage-grouse populations. More than half of sage-grouse breeding habitat identified by Doherty et al. (2010) are on BLM land, covering 46,914,377 acres.
Map 12. Proposed ACECs for Utah.

The Sage-Grouse Recovery Alternative calls for designating a system of sagebrush reserves on public land managed by BLM and USFS to conserve sage-grouse and other sagebrush-dependent species, and includes criteria for identifying these special designations. We applied these criteria on BLM land in Map 12 to show proposed ACECs in Utah.

This case example depicts areas on BLM land needed “to conserve and restore the greater sage-grouse and its habitat on BLM-administered lands on a range-wide basis over the long-term” (BLM 2011b: 1). The areas identified are a subset of sage-grouse priority habitat and represent core areas that support sage-grouse persistence and can serve as refugia for grouse recovery. They contain breeding, brooding, winter, and other critical occupied sage-grouse habitat—relevant and important values that meet criteria for designating ACECs (43 CFR § 1601.0-5(a)(1)-(2)). These values are not adequately protected under current BLM management. Designating these areas as ACECs will support improved management for sage-grouse and other resources.

The boundaries of the proposed ACECs were developed as follows:

1. The sage-grouse priority habitat is based on the definition of priority habitat in the recovery alternative, and was created by merging all active leks, buffered by 8.5 km (Doherty et al. 2010b), with sage-grouse brooding, transitional and winter habitat (UDWR).

2. Significantly impacted lands near active oil and gas wells were removed from the proposal by subtracting an area of 1 mile radius around oil and gas wells from the sage-grouse priority habitat

3. All remaining BLM lands were then selected for ACECs.

We propose designating an extensive system of ACECs in recognition of the importance of public lands to conserve sage-grouse, the species’ relatively sparse distribution in Utah, and the precarious future facing sage-grouse in the state (Aldridge et al. 2008).
Map 14

Greater Sage-Grouse Range-Wide Breeding Density Thresholds

Legend:
- 25% Breeding Densities
- 50% Breeding Densities
- 75% Breeding Densities
- 100% Breeding Densities

No current BLM plans include the NTT report recommendations, and so every BLM planning unit with sage-grouse habitat must be amended by the planning process, regardless of whether they are currently under revision or the status of their revision. Table 1, generated from multiple BLM sources, lists BLM planning units that may be affected by the planning process. Six Wyoming BLM plans will be amended by the Wyoming Sage-Grouse RMP Amendments (highlighted in pink).

<table>
<thead>
<tr>
<th>No.</th>
<th>BLM Plan</th>
<th>Status of Plan Revision</th>
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<td>12</td>
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<td>South Dakota RMP (1986)</td>
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<td>Randolph MFP (1980)</td>
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<td>18</td>
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<td>36 Cascade RMP (1988) (Four Rivers RMP revision)</td>
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<tr>
<td>37 Kuna RMP (1983) (Four Rivers RMP revision)</td>
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<td>38 Jarbidge RMP (2013)</td>
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<td>39 Lemhi RMP (1987)</td>
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<td>45 Monument RMP (1985) (Shoshone-Burley RMP revision)</td>
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<td>47 Twin Falls RMP (1982) (Shoshone-Burley RMP revision)</td>
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<td>53 Dillon RMP (2006)</td>
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<td>61 Winnemucca RMP (2012)</td>
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<td><strong>Oregon</strong></td>
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<td>64 Brothers-Lapine RMP (1989)</td>
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<td>65 John Day RMP (2012)</td>
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<td>66 Lakeview RMP (2003)</td>
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<td>69 Three Rivers RMP (1992)</td>
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<td></td>
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<td>70 Two Rivers RMP (1989)</td>
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<td>71 Upper Deschutes RMP (2005)</td>
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<td>79</td>
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</tr>
<tr>
<td>80</td>
<td>Warm Springs RMP (1986)</td>
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</table>

* Western Watersheds Project is litigating RMP(s) administered by the BLM Burley Field Office.
♦ Western Watersheds Project is litigating RMP(s) administered by the BLM Battle Mountain District.
Western Watersheds Project is also litigating RMPs administered by the Moab and Monticello field offices.
Table 2. Characteristics of Sagebrush Steppe Needed for Productive Sage-Grouse Habitat.

Connelly et al. (2000: 977, Table 3) listed characteristics of productive, seasonal sage-grouse habitats.

<table>
<thead>
<tr>
<th></th>
<th>Breeding</th>
<th>Brood rearing</th>
<th>Winter&lt;sup&gt;e&lt;/sup&gt;</th>
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<tr>
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<td>Height (cm)</td>
<td>Canopy (%)</td>
<td>Height (cm)</td>
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<td></td>
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<tr>
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<td>&gt;18&lt;sup&gt;c&lt;/sup&gt;</td>
<td>≥25&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Variable</td>
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<tr>
<td>Grass/forb</td>
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<td>≥15</td>
<td>Variable</td>
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<tr>
<td>Area&lt;sup&gt;b&lt;/sup&gt;</td>
<td>&gt;80</td>
<td>&gt;40</td>
<td>&gt;80</td>
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</tbody>
</table>

<sup>a</sup> Mesic and arid sites should be defined on a local basis; annual precipitation, herbaceous understory, and soils should be considered (Tisdale and Hironaka 1981; Hironaka et al. 1983).

<sup>b</sup> Percentage of seasonal habitat needed with indicated conditions.

<sup>c</sup> Measured as “droop height”; the highest naturally growing portion of the plant.

<sup>d</sup> Coverage should exceed 15% for perennial grasses and 10% for forbs; values should be substantially greater if most sagebrush has a growth form that provides little lateral cover (Schroeder 1995).

<sup>e</sup> Values for height and canopy coverage are for shrubs exposed above snow.
Table 3. Factors that Affect Cattle Stocking Rates.

This table lists the effects of two factors, distance from water and percent slope, on grazing capacity, which should be reflected in stocking rates. These data were taken from Galt et al. (2000) and Holechek et al. (2010).

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<th>Distance from Water (miles)</th>
<th>Percent Reduction in Grazing Capacity</th>
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<tr>
<td>0 - 1</td>
<td>0</td>
</tr>
<tr>
<td>1 - 2</td>
<td>50</td>
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<tr>
<td>&gt; 2</td>
<td>100</td>
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<table>
<thead>
<tr>
<th>Slope (percent)</th>
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<td>11 - 30</td>
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<td>&gt; 60</td>
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Table 4. Vegetation Community Characteristics Observed as a Function of Distance from Water on the Little Missouri National Grassland (Rinehart and Zimmerman 2001).

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<th>Distance from water, miles</th>
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<tr>
<td>Total species (number)</td>
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<tr>
<td>Green needlegrass (canopy %)</td>
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<tr>
<td>Needle and thread (canopy %)</td>
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<tr>
<td>Blue grama (canopy %)</td>
<td>15</td>
</tr>
<tr>
<td>Decreasers (frequency)</td>
<td>4</td>
</tr>
<tr>
<td>Perennials (frequency)</td>
<td>21</td>
</tr>
<tr>
<td>Natives (frequency)</td>
<td>23</td>
</tr>
<tr>
<td>Vegetation structure (Robel Pole visual obstruction reading)</td>
<td>2</td>
</tr>
<tr>
<td>Grass production (lb/acre air dry wt.)</td>
<td>732</td>
</tr>
</tbody>
</table>
VI. REFERENCES


SAGEBRUSH ECOSYSTEM: METHODS OF REGIONAL ASSESSMENT AND APPLICATIONS IN THE GREAT BASIN. Alliance Communications Group. Lawrence, KS.


Western Association of Fish and Wildlife Agencies, Sage and Columbian Sharp-tailed Grouse Technical Committee. 2009. Prescribed fire as a management tool in xeric sagebrush systems: it is worth the risk to sage grouse? (June 2009).


Appendix 1. Ownership of Sagebrush Steppe.

State, provincial, and national ownership of sagebrush steppe (km², acres, % of sagebrush area) by management authority. Specific federal agencies for which data are presented include the Bureau of Land Management (BLM), U.S. Forest Service (USFS), Bureau of Indian Affairs (BIA), U.S. Fish and Wildlife Service (FWS), and U.S. National Park Service (NPS).

<table>
<thead>
<tr>
<th>State/Province</th>
<th>Private</th>
<th>BLM</th>
<th>USDA FS</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>km²</td>
<td>acres</td>
<td>%</td>
<td>km²</td>
</tr>
<tr>
<td>Arizona</td>
<td>2,812</td>
<td>694,564</td>
<td>19</td>
<td>3,323</td>
</tr>
<tr>
<td>California</td>
<td>2,405</td>
<td>594,035</td>
<td>19</td>
<td>55,768</td>
</tr>
<tr>
<td>Colorado</td>
<td>9,126</td>
<td>2,254,122</td>
<td>48</td>
<td>6,809</td>
</tr>
<tr>
<td>Idaho</td>
<td>9,852</td>
<td>2,433,444</td>
<td>17</td>
<td>30,065</td>
</tr>
<tr>
<td>Montana</td>
<td>13,642</td>
<td>3,369,574</td>
<td>13</td>
<td>5,574</td>
</tr>
<tr>
<td>Nevada</td>
<td>13,800</td>
<td>3,408,600</td>
<td>13</td>
<td>77,654</td>
</tr>
<tr>
<td>New Mexico</td>
<td>2,087</td>
<td>515,489</td>
<td>20</td>
<td>1,956</td>
</tr>
<tr>
<td>North Dakota †</td>
<td>2</td>
<td>494</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Oregon</td>
<td>15,363</td>
<td>3,794,661</td>
<td>27</td>
<td>37,138</td>
</tr>
<tr>
<td>South Dakota †</td>
<td>222</td>
<td>54,834</td>
<td>46</td>
<td>12</td>
</tr>
<tr>
<td>Utah</td>
<td>10,825</td>
<td>2,673,775</td>
<td>29</td>
<td>16,721</td>
</tr>
<tr>
<td>Washington</td>
<td>10,590</td>
<td>2,615,730</td>
<td>53</td>
<td>1,011</td>
</tr>
<tr>
<td>Wyoming</td>
<td>36,004</td>
<td>8,892,988</td>
<td>38</td>
<td>44,952</td>
</tr>
</tbody>
</table>

United States  126,730  31,023,310 | 27  | 230,807  57,009,329 | 50  | 38,297   9,459,359 | 8   | 22,918   5,660,746 | 5   |

<table>
<thead>
<tr>
<th>State/Province</th>
<th>FWS</th>
<th>NPS</th>
<th>BIA</th>
<th>BoRec/DoE/DoD 21</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>km²</td>
<td>acres</td>
<td>%</td>
<td>km²</td>
</tr>
<tr>
<td>Arizona</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1,652</td>
</tr>
<tr>
<td>California</td>
<td>70</td>
<td>17,290</td>
<td>1</td>
<td>252</td>
</tr>
<tr>
<td>Colorado</td>
<td>62</td>
<td>15,314</td>
<td>0</td>
<td>116</td>
</tr>
<tr>
<td>Idaho</td>
<td>63</td>
<td>15,561</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Montana †</td>
<td>480</td>
<td>118,560</td>
<td>2</td>
<td>79</td>
</tr>
<tr>
<td>Nevada</td>
<td>2,384</td>
<td>588,848</td>
<td>2</td>
<td>135</td>
</tr>
<tr>
<td>New Mexico</td>
<td>41</td>
<td>10,127</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>North Dakota †</td>
<td>14</td>
<td>3,458</td>
<td>0</td>
<td>61</td>
</tr>
<tr>
<td>Oregon</td>
<td>999</td>
<td>246,753</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>South Dakota †</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Utah</td>
<td>770</td>
<td>190,190</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Wyoming</td>
<td>127</td>
<td>31,369</td>
<td>0</td>
<td>658</td>
</tr>
</tbody>
</table>

United States  5,010  1,237,470 | 1  | 3,566  865,982 | 0  | 21,610  5,337,670 | 5  | 9,814   2,424,058 | 2  |

<table>
<thead>
<tr>
<th>State/Province</th>
<th>Private</th>
<th>Federal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>km²</td>
<td>acres</td>
</tr>
<tr>
<td>Alberta</td>
<td>2,927</td>
<td>722,969</td>
</tr>
<tr>
<td>British Columbia</td>
<td>5</td>
<td>1,235</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>6,272</td>
<td>1,549,184</td>
</tr>
<tr>
<td>Canada</td>
<td>9,204</td>
<td>2,273,388</td>
</tr>
</tbody>
</table>

20 Total area of sagebrush habitat in the eastern portion of the sagebrush biome was likely underestimated because current maps of equivalent spatial and thematic resolutions were not available when these data were assembled.

This table lists 60 species, subspecies and Distinct Population Segments that use sagebrush and/or other habitat types in sagebrush steppe that are designated as “endangered,” “threatened” or candidate species under the Endangered Species Act. Listed species, subspecies and Distinct Population Segments are identified in literature as dependent on sagebrush and/or other habitat types within the sagebrush steppe. This list does not include dozens of species, subspecies or distinct population segments that were petitioned for listing, but are still awaiting a listing determination from the Fish and Wildlife Service. The list also does not include petitioned flora and fauna whose status is uncertain pending litigation (i.e., the agency was sued for issuing a negative petition finding or listing decision).

<table>
<thead>
<tr>
<th>No.</th>
<th>Species</th>
<th>Species Type</th>
<th>ESA Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ash Meadows speckled dace (<em>Rhinichthys osculus nevadensis</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>2.</td>
<td>Bonytail chub (<em>Gila elegans</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>3.</td>
<td>Borax Lake chub (<em>Gila boraxobius</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>4.</td>
<td>Clover Valley speckled dace (<em>Rhinichthys osculus oligoporus</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>5.</td>
<td>Cui-ui (<em>Chasmistes cujus</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>6.</td>
<td>Hiko White River springfish (<em>Crenichthys baileyi grandis</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>7.</td>
<td>Independence Valley [speckled] dace (<em>Rhinichthys osculus lethoporus</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>8.</td>
<td>Lost River sucker (<em>Deltistes luxatus</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>9.</td>
<td>Moapa dace (<em>Moapa coriacea</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>10.</td>
<td>Pahranagat roundtail chub (<em>Gila robusta jordani</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>11.</td>
<td>Razorback sucker (<em>Xyrauchen texanus</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>12.</td>
<td>Shortnose sucker (<em>Chasmistes brevirostris</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>13.</td>
<td>Virgin River chub (<em>Gila seminuda</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>14.</td>
<td>White River spinedace (<em>Lepidomeda albivalis</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>15.</td>
<td>White River springfish (<em>Crenichthys baileyi baileyi</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>16.</td>
<td>White sturgeon (<em>Acipenser transmontanus</em>)</td>
<td>Fish</td>
<td>Endangered</td>
</tr>
<tr>
<td>17.</td>
<td>Banbury Springs limpet (<em>Lanx sp. 1</em>)</td>
<td>Invertebrate</td>
<td>Endangered</td>
</tr>
<tr>
<td>18.</td>
<td>Bruneau hot springsnail (<em>Pyrgulopsis bruneaensis</em>)</td>
<td>Invertebrate</td>
<td>Endangered</td>
</tr>
<tr>
<td>19.</td>
<td>White River physa (snail) (<em>Physa natricina</em>)</td>
<td>Invertebrate</td>
<td>Endangered</td>
</tr>
<tr>
<td>20.</td>
<td>Pygmy rabbit (Columbia Basin DPS) (<em>Brachylagus idahoensis</em> (pop. 2))</td>
<td>Mammal</td>
<td>Endangered</td>
</tr>
<tr>
<td>21.</td>
<td>Amargosa niterwort (<em>Nitrophila mohavensis</em>)</td>
<td>Plant</td>
<td>Endangered</td>
</tr>
<tr>
<td>22.</td>
<td>Malheur wire lettuce (<em>Stephanomeria malheurensis</em>)</td>
<td>Plant</td>
<td>Endangered</td>
</tr>
<tr>
<td>24.</td>
<td>Steamboat [Williams'] buckwheat (<em>Eriogonum ovalifolium williamsiae</em>)</td>
<td>Plant</td>
<td>Endangered</td>
</tr>
<tr>
<td>25.</td>
<td>Big Spring spinedace (<em>Lepidomeda mollispinis pratensis</em>)</td>
<td>Fish</td>
<td>Threatened</td>
</tr>
<tr>
<td>26.</td>
<td>Bull trout (<em>Salvelinus confluentus</em>)</td>
<td>Fish</td>
<td>Threatened</td>
</tr>
<tr>
<td>27.</td>
<td>Desert dace (<em>Eremichthys acros</em>)</td>
<td>Fish</td>
<td>Threatened</td>
</tr>
<tr>
<td>28.</td>
<td>Foskett Spring speckled dace (<em>Rhinichthys osculus ssp. 3</em>)</td>
<td>Fish</td>
<td>Threatened</td>
</tr>
<tr>
<td>29.</td>
<td>Hutton Springs tui chub (<em>Gila bicolor ssp. 1</em>)</td>
<td>Fish</td>
<td>Threatened</td>
</tr>
<tr>
<td>30.</td>
<td>Lahontan cutthroat trout (<em>Oncorhynchus clarki henshawi</em>)</td>
<td>Fish</td>
<td>Threatened</td>
</tr>
<tr>
<td>31.</td>
<td>Railroad Valley springfish (<em>Crenichthys nevadae</em>)</td>
<td>Fish</td>
<td>Threatened</td>
</tr>
<tr>
<td>32.</td>
<td>Warner sucker (<em>Catostomus warnerensis</em>)</td>
<td>Fish</td>
<td>Threatened</td>
</tr>
<tr>
<td>33.</td>
<td>Bliss Rapids snail (<em>Taylorconcha serpenticola</em>)</td>
<td>Invertebrate</td>
<td>Threatened</td>
</tr>
<tr>
<td>34.</td>
<td>Ash Meadows blazingstar (<em>Mentzelia leucophylla</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>35.</td>
<td>Ash Meadows gumweed [gumplant] (<em>Grindelia fraxinopratensis</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>No.</td>
<td>Species</td>
<td>Species Type</td>
<td>ESA Status</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>--------------</td>
<td>----------------</td>
</tr>
<tr>
<td>36.</td>
<td>Ash Meadows ivesia (<em>Ivesia kingii eremica</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>37.</td>
<td>Ash Meadows milkvetch (<em>Astragalus phoenix</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>38.</td>
<td>Ash Meadows sunray (<em>Enceliopsis nudicaulis corrugata</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>39.</td>
<td>Colorado butterfly plant (<em>Gaura neomexicana coloradensis</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>40.</td>
<td>Desert yellowhead (<em>Yermo xanthocephalus</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>41.</td>
<td>Howell's spectacular thelypody (<em>Thelypodium howellii spectabilisis</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>42.</td>
<td>Macfarlane's four o'clock (<em>Mirabilis macfarlanei</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>43.</td>
<td>Mesa Verde cactus (<em>Sclerocactus mesae-verdae</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>44.</td>
<td>Slickspot peppergrass (<em>Lepidium papilliferum</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>45.</td>
<td>Spalding’s silene [campion] [catchfly] (<em>Silene spaldingii</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>46.</td>
<td>Spring-loving centaury (<em>Centaurium namophilum</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>47.</td>
<td>Ute ladies'-tresses (<em>Spiranthes diluvialis</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>48.</td>
<td>Water howellia (<em>Howellia aquatilis</em>)</td>
<td>Plant</td>
<td>Threatened</td>
</tr>
<tr>
<td>49.</td>
<td>Greater sage-grouse (Bi-State DPS) (<em>Centrocercus urophasianus</em>)</td>
<td>Bird</td>
<td>Candidate</td>
</tr>
<tr>
<td>50.</td>
<td>Greater sage-grouse (Columbia Basin DPS) (<em>Centrocercus urophasianus</em>)</td>
<td>Bird</td>
<td>Candidate</td>
</tr>
<tr>
<td>51.</td>
<td>Greater sage-grouse (Columbia Basin DPS) (<em>Centrocercus urophasianus</em>)</td>
<td>Bird</td>
<td>Candidate</td>
</tr>
<tr>
<td>52.</td>
<td>Gunnison sage-grouse (<em>Centrocercus minimus</em>)</td>
<td>Bird</td>
<td>Candidate</td>
</tr>
<tr>
<td>53.</td>
<td>Roundtail chub (<em>Gila robusta</em>)</td>
<td>Fish</td>
<td>Candidate</td>
</tr>
<tr>
<td>54.</td>
<td>Elongate Mud Meadows springsnail (<em>Pyrgulopsis notidicola</em>)</td>
<td>Invertebrate</td>
<td>Candidate</td>
</tr>
<tr>
<td>55.</td>
<td>Southern Idaho ground squirrel (<em>Spermophilus brunneus endemicus</em>)</td>
<td>Mammal</td>
<td>Candidate</td>
</tr>
<tr>
<td>56.</td>
<td>Washington ground squirrel (<em>Spermophilus washingtoni</em>)</td>
<td>Mammal</td>
<td>Candidate</td>
</tr>
<tr>
<td>57.</td>
<td>Goose Creek milkvetch (<em>Astragalus anserinus</em>)</td>
<td>Plant</td>
<td>Candidate</td>
</tr>
<tr>
<td>58.</td>
<td>Soldier Meadow cinquefoil (<em>Potentilla basaltica</em>)</td>
<td>Plant</td>
<td>Candidate</td>
</tr>
<tr>
<td>59.</td>
<td>Umtanum [Basalt desert] wild buckwheat (<em>Eriogonum codium</em>)</td>
<td>Plant</td>
<td>Candidate</td>
</tr>
<tr>
<td>60.</td>
<td>Webber’s ivesia [Wire mouse tail] (<em>Ivesia webberi</em>)</td>
<td>Plant</td>
<td>Candidate</td>
</tr>
</tbody>
</table>

The Forest Service has an important role in sage-grouse conservation and recovery. The agency manages 8 percent of current sage-grouse habitat, or 12.8 million acres (75 Fed. Reg. 13979). There are 32 national forests and grasslands across the range of sage-grouse, and twenty-six of them contain moderately to highly important seasonal habitat for the species (USFS 2008, Appendix 2, Table 2; 75 Fed. Reg. 13979).22 The current planning process would affect 20 USFS land use plans:

4. Ashley National Forest Plan (1986) (Utah)
16. Thunder Basin National Grassland LMRP (no date) (Wyoming)


The planning process should include all USFS units with sage-grouse habitat. As the FWS noted in its “warranted, but precluded” determination, although the sage-grouse is designated a Forest Service “sensitive species” across its range, that status is conferred various levels of protection depending on the forest plan and/or project plan and other local factors. Fourteen national forests identify sage-grouse as a "management indicator species," but 16 of the 32 forests and grasslands with sage-grouse habitat have not developed any specific conservation measures for sage-grouse (75 Fed. Reg. 13979). Failure to include all relevant USFS units in the planning process could hinder conservation and recovery of the species, particularly at the periphery of its range.

---

22 FWS, citing a USFS reference, stated that there are 33 USFS units with sage-grouse habitat (75 Fed. Reg. 13979), but the USFS reference lists a total of 32 forests and grasslands (see Table 5). If there is a discrepancy, it appears to be either the absence of the Buffalo Gap National Grassland from some parts of the reference, the combination of Routt National Forest (Colorado) and the Medicine Bow National Forest (Wyoming) in the USFS table, or the combination of the Challis and Salmon national forests (Idaho) in the USFS table.
The USFS identified 32 national forests and grasslands that have sage-grouse habitat (Table 5).

**Table 5. Occupied Greater Sage-grouse Habitat and Sagebrush on National Forests and Grasslands.**

<table>
<thead>
<tr>
<th>National Forest/Grassland</th>
<th>State</th>
<th>Total Acres</th>
<th>Acres of Occupied Sage-Grouse Habitat</th>
<th>Acres of Sagebrush Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Arapaho/Roosevelt</td>
<td>Colorado</td>
<td>2,476,800</td>
<td>0</td>
<td>2000</td>
</tr>
<tr>
<td>2. Ashley</td>
<td>Utah</td>
<td>1,401,100</td>
<td>273,600</td>
<td>283,700</td>
</tr>
<tr>
<td>3. Beaverhead/Deerlodge</td>
<td>Montana</td>
<td>3,600,100</td>
<td>335,750</td>
<td>227,700</td>
</tr>
<tr>
<td>4. Bighorn</td>
<td>Wyoming</td>
<td>1,112,300</td>
<td>42,700</td>
<td>22,200</td>
</tr>
<tr>
<td>5. Boise</td>
<td>Idaho</td>
<td>2,594,100</td>
<td>37,800</td>
<td>232,000</td>
</tr>
<tr>
<td>6. Bridger-Teton</td>
<td>Wyoming</td>
<td>3,464,700</td>
<td>277,100</td>
<td>549,300</td>
</tr>
<tr>
<td>7. Caribou</td>
<td>Idaho</td>
<td>1,133,900</td>
<td>87,000</td>
<td>355,100</td>
</tr>
<tr>
<td>8. Crooked River NG</td>
<td>Oregon</td>
<td>173,700</td>
<td>0</td>
<td>45,400</td>
</tr>
<tr>
<td>9. Culew</td>
<td>Idaho</td>
<td>74,900</td>
<td>74,900</td>
<td>32,300</td>
</tr>
<tr>
<td>10. Custer</td>
<td>Montana/South Dakota</td>
<td>1,231,477</td>
<td>322,100</td>
<td>42,600</td>
</tr>
<tr>
<td>11. Deschutes</td>
<td>Oregon</td>
<td>1,872,900</td>
<td>2,100</td>
<td>10,100</td>
</tr>
<tr>
<td>12. Dixie</td>
<td>Utah</td>
<td>1,964,800</td>
<td>290,200</td>
<td>338,700</td>
</tr>
<tr>
<td>13. Fishlake</td>
<td>Utah</td>
<td>1,519,200</td>
<td>133,900</td>
<td>206,800</td>
</tr>
<tr>
<td>14. Fremont</td>
<td>Oregon</td>
<td>1,709,200</td>
<td>209,500</td>
<td>29,800</td>
</tr>
<tr>
<td>15. Humboldt-Toiyabe</td>
<td>Nevada</td>
<td>6,794,500</td>
<td>4,731,100</td>
<td>2,795,100</td>
</tr>
<tr>
<td>16. Inyo</td>
<td>California</td>
<td>2,098,800</td>
<td>444,300</td>
<td>355,900</td>
</tr>
<tr>
<td>17. Lewis and Clark</td>
<td>Montana</td>
<td>2,001,200</td>
<td>2,900</td>
<td>39,900</td>
</tr>
<tr>
<td>18. Little Missouri NG</td>
<td>North Dakota</td>
<td>2,123,300</td>
<td>319,900</td>
<td>2,300</td>
</tr>
<tr>
<td>19. Malheur</td>
<td>Oregon</td>
<td>1,466,300</td>
<td>183,500</td>
<td>13,000</td>
</tr>
<tr>
<td>20. Manti-Lasal</td>
<td>Utah</td>
<td>1,413,700</td>
<td>122,500</td>
<td>140,700</td>
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<tr>
<td>22. Modoc</td>
<td>California</td>
<td>2,022,200</td>
<td>497,400</td>
<td>511,600</td>
</tr>
<tr>
<td>23. Nebraska</td>
<td>South Dakota</td>
<td>2,073,400</td>
<td>22,300</td>
<td>8,100</td>
</tr>
<tr>
<td>24. Ochoco</td>
<td>Oregon</td>
<td>961,200</td>
<td>219,800</td>
<td>833,500</td>
</tr>
<tr>
<td>25. Salmon-Challis</td>
<td>Idaho</td>
<td>4,339,300</td>
<td>1,406,6,9</td>
<td>833,500</td>
</tr>
<tr>
<td>26. Sawtooth</td>
<td>Idaho</td>
<td>2,186,300</td>
<td>256,100</td>
<td>778,100</td>
</tr>
<tr>
<td>27. Targhee</td>
<td>Idaho</td>
<td>1,861,600</td>
<td>125,600</td>
<td>300,300</td>
</tr>
<tr>
<td>28. Thunder Basin NG</td>
<td>Wyoming</td>
<td>1,818,900</td>
<td>1,818,900</td>
<td>344,400</td>
</tr>
<tr>
<td>29. Uinta</td>
<td>Utah</td>
<td>982,900</td>
<td>133,100</td>
<td>128,300</td>
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<tr>
<td>30. Wallowa-Whitman</td>
<td>Oregon</td>
<td>2,402,100</td>
<td>3,700</td>
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<tr>
<td>31. Wasatch-Cache</td>
<td>Utah</td>
<td>1,926,100</td>
<td>241,500</td>
<td>255,700</td>
</tr>
<tr>
<td>32. White River</td>
<td>Colorado</td>
<td>2,432,000</td>
<td>16,000</td>
<td>157,100</td>
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</table>

**Totals**

<table>
<thead>
<tr>
<th>National Forest/Grassland</th>
<th>State</th>
<th>Total Acres</th>
<th>Acres of Occupied Sage-Grouse Habitat</th>
<th>Acres of Sagebrush Habitat</th>
</tr>
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<tbody>
<tr>
<td>Totals</td>
<td></td>
<td>66,024,377</td>
<td>12,779,100</td>
<td>9,184,900</td>
</tr>
</tbody>
</table>

Source: USFS 2008, Appendix 1, Table 1.
Appendix 4. Specially Designated Federal Land in Greater Sage-Grouse Historic Range
(December 22, 2010)

California
National Wildlife Refuges
- Clear Lake National Wildlife Refuge
- Modoc National Wildlife Refuge Wilderness
- Granite Mountain Wilderness (BLM)
- Piper Mountain Wilderness (BLM)
- Sylvania Mountains Wilderness (BLM)
- White Mountains Wilderness (BLM, Forest Service)

Wilderness
- Granite Mountain Wilderness (BLM)
- Piper Mountain Wilderness (BLM)
- Sylvania Mountains Wilderness (BLM)
- White Mountains Wilderness (BLM, Forest Service)

National Monuments
- Dinosaur National Monument (partial)

Montana
National Wildlife Refuges
- Bowdoin National Wildlife Refuge
- Charles M. Russell National Wildlife Refuge, UL Bend National Wildlife Refuge, UL Bend Wilderness [FWS]
- Hewitt Lake National Wildlife Refuge
- Red Rock Lakes National Wildlife Refuge, Red Rock Lakes Wilderness [FWS]

Wilderness
- Alta Toquima Wilderness (Forest Service) (partial)
- Arc Dome Wilderness (Forest Service) (partial)
- Bald Mountain Wilderness (Forest Service) (partial)
- Becky Peak Wilderness (BLM) (partial)
- Bristlecone Wilderness (BLM) (partial)
- Currant Mountain Wilderness (Forest Service) (partial)
- East Humboldts Wilderness (Forest Service) (partial)
- Far South Egans Wilderness (BLM) (partial)
- Fortification Range Wilderness (BLM)
- Goshute Canyon Wilderness (BLM) (partial)
- Grant Range Wilderness (Forest Service) (partial)
- Highland Ridge Wilderness (BLM) (partial)
- Jarbidge Wilderness (Forest Service)
- Mount Grafton Wilderness (BLM) (partial)
- Parsnip Peak Wilderness (BLM)
- Quinn Canyon Wilderness (Forest Service)
- Santa Rosa-Paradise Peak Wilderness (Forest Service)

National Monuments
- Upper Missouri River Breaks National Monument

Idaho
National Wildlife Refuges
- Arapaho National Wildlife Refuge
- Craters of the Moon National Monument (Craters of the Moon Wilderness [NPS])
- Dinosaur National Monument (partial)

Wilderness
- Big Jacks Creek Wilderness (BLM)
- Bruneau-Jarbidge Rivers Wilderness (BLM)
- Little Jacks Creek Wilderness (BLM)
- North Fork Owyhee Wilderness (BLM)
- Owyhee River Wilderness (BLM)
- Pole Creek Wilderness (BLM)

National Monuments
- Craters of the Moon National Monument (Craters of the Moon Wilderness [NPS])
- Dinosaur National Monument (partial)

National Conservation/Recreation Areas
- Snake River Birds of Prey National Conservation Area
- Other
- City of Rocks National Reserve
- Idaho National Laboratory

Nevada
National Parks
- Great Basin National Park (partial)

National Wildlife Refuges
- Ruby Lake National Wildlife Refuge

Wilderness
- Alta Toquima Wilderness (Forest Service) (partial)
- Arc Dome Wilderness (Forest Service) (partial)
- Bald Mountain Wilderness (Forest Service) (partial)
- Becky Peak Wilderness (BLM) (partial)
- Bristlecone Wilderness (BLM) (partial)
- Currant Mountain Wilderness (Forest Service) (partial)
- East Humboldts Wilderness (Forest Service) (partial)
- Far South Egans Wilderness (BLM) (partial)
- Fortification Range Wilderness (BLM)
- Goshute Canyon Wilderness (BLM) (partial)
- Grant Range Wilderness (Forest Service) (partial)
- Highland Ridge Wilderness (BLM) (partial)
- Jarbidge Wilderness (Forest Service)
- Mount Grafton Wilderness (BLM) (partial)
- Parsnip Peak Wilderness (BLM)
- Quinn Canyon Wilderness (Forest Service)
- Santa Rosa-Paradise Peak Wilderness (Forest Service)

Other
- City of Rocks National Reserve
- Idaho National Laboratory
Nevada, cont’d

Wilderness, cont’d
- Shellback Wilderness (Forest Service) (partial)
- South Egan Range Wilderness (BLM) (partial)
- Table Mountain Wilderness (Forest Service)
- Tunnel Spring Wilderness (BLM) (partial)
- Weepah Spring Wilderness (BLM)
- White Pine Range Wilderness (Forest Service) (partial)
- White Rock Range Wilderness (BLM)

National Conservation/Recreation Areas

North Dakota

National Parks
- Theodore Roosevelt National Park (Theodore Roosevelt Wilderness [NPS]) (partial)

Oregon

Wilderness
- Oregon Badlands Wilderness (BLM)
- Spring Basin Wilderness (BLM)

National Wildlife Refuges
- Hart Mountain National Antelope Refuge
- Malheur National Wildlife Refuge

Other
- Steens Mountain Cooperative Management and Protection Area (Steens Mountain Wilderness [BLM])

Utah

National Wildlife Refuges
- Bear River Migratory Bird Refuge (partial)
- Fish Springs National Wildlife Refuge (partial)
- Ouray National Wildlife Refuge (partial)

Wilderness
- Cedar Mountain Wilderness (BLM) (partial)

National Monuments
- Dinosaur National Monument (partial)

Washington

National Wildlife Refuges
- Columbia National Wildlife Refuge

Wilderness
- Juniper Dunes Wilderness (BLM)

National Monuments
- Hanford Reach National Monument

Wyoming

National Parks
- Grand Teton National Park (partial)

National Wildlife Refuges
- Cokeville Meadows National Wildlife Refuge
- Seedskadee National Wildlife Refuge

National Monuments
- Fossil Butte National Monument

The state of Wyoming developed a Greater Sage-grouse conservation strategy in response to increasing concern for the species in 2008. The strategy was developed by a group of diverse stakeholders at the request of Governor Freudenthal, who endorsed it by Executive Order in August 2008 (WY EO 2008-2). Governor Freudenthal approved a revised strategy in 2010 (WY EO 2010-4), and his predecessor, Governor Mead, further revised the strategy in 2011 (WY EO 2011-4). In 2010, Wyoming BLM issued its own sage-grouse management guidance based on the state’s sage-grouse strategy (BLM Memo WY-2010-012).

Similar to the NTT report, which recommends implementing special conservation measures in sage-grouse priority habitat, the success of the Wyoming state and BLM strategies depends on protecting sage-grouse in comparably defined core habitat (“core areas”). However, the documents differ significantly in their management prescriptions for sage-grouse. The NTT report, based on the most recent information, recommends greater restrictions on land uses in priority habitat than either the state strategy or Wyoming BLM require in core areas. There is concern that prescriptions in the state/BLM strategies, some of which lack scientific basis, may be inadequate to fully recover sage-grouse in Wyoming.

In 2010, Wyoming BLM initiated its own planning process to address sage-grouse conservation in six RMPs (75 Fed. Reg. 30054) (the Wyoming sage-grouse RMP amendments might also include the Thunder Basin National Grasslands (C. Otto, Wyoming BLM, pers. comm. with M. Salvo (Jan. 12, 2011)). Some individual RMPs in Wyoming are also currently under revision and will consider new conservation measures for sage-grouse (C. Otto, Wyoming BLM, pers. comm. with M. Salvo (Jan. 12, 2011)) (see Table 6). The initial notice of the current rangewide planning process states that the Wyoming sage-grouse RMP amendments and individual RMP revisions will proceed as intended (76 Fed. Reg. 77009). Although the RMP amendments and revisions may analyze and consider the conservation measures in the NTT report, they are expected to adopt some version of Wyoming’s sage-grouse strategy as their preferred alternative for managing the species (BLM 2012: 54).

The following table presents the important differences in management prescriptions between the Wyoming state strategy and Wyoming BLM sage-grouse guidance, and the NTT report.
### Table 6.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oil and Gas Development</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No surface occupancy within 0.6 miles of occupied sage-grouse leks, and “no more than” 0.25 miles from occupied leks outside core areas.</td>
<td>Surface occupancy is “prohibited or restricted” within 0.6 miles of occupied or undetermined sage-grouse leks in core areas, and 0.25 miles from leks outside core areas.</td>
<td>Development negatively affects sage-grouse 1.9 miles from occupied leks (Holloran 2005). Most sage-grouse hens nest within 4 miles of leks (Moynahan 2004; Holloran and Anderson 2005). Effects of drilling on sage-grouse were noticeable out to 12.4 miles from leks (Taylor et al. 2012).</td>
<td>No surface occupancy throughout priority habitat; exceptions may be considered if a 4-mile no surface occupancy buffer is applied, and if an entire lease is within priority habitat, then a limitation of one well-pad per section might be applied.</td>
</tr>
<tr>
<td>Maximum development density of 1 well per an average of 640 acres.</td>
<td>Maximum development density of 1 well per 640 acres (with some exceptions).</td>
<td>Maximum development density of 1 well per 640 acres to 1 well per 699 acres (Holloran 2005; Doherty 2008).</td>
<td>Limited disturbance to 1 well per 640 acres.</td>
</tr>
<tr>
<td>In core areas, surface disturbance limited to 5 percent of “suitable sage-grouse habitat” per an average of 640 acres.</td>
<td>Cumulative existing surface disturbance may not exceed 5 percent per 640 acres.</td>
<td>No specific research, but sage-grouse are known to respond negatively to surface disturbance.</td>
<td>Surface disturbance may not exceed 3 percent per 640 acres (exceptions may be considered in limited circumstances).</td>
</tr>
<tr>
<td>Activities permitted up to 0.6 miles from leks in core areas from July 1-March 15, and may be approved year-round in unsuitable habitat in core areas.</td>
<td>No surface disturbing or disruptive activities in sage-grouse nesting or brooding habitat in core areas, or within 2 miles of occupied or undetermined leks outside core areas, from March 15-June 30.</td>
<td>No surface disturbing or disruptive activities from March to July within 3.1 miles of a sage-grouse leks (Holloran 2005).</td>
<td>Apply seasonal restrictions on surface disturbing activities in priority habitat.</td>
</tr>
<tr>
<td>Activities restricted in sage-grouse winter habitat in core areas from December 2-March 13; “seasonal restrictions should also be considered” in winter habitat outside core areas.</td>
<td>No surface disturbing or disruptive activities in sage-grouse winter habitat from November 30-March 14.</td>
<td>No surface disturbance in or adjacent to winter habitat any time of year (Walker 2008).</td>
<td>No surface occupancy in winter habitat during any time of the year; exceptions may be considered if a 4-mile no surface occupancy buffer is applied, and if an entire lease is within priority habitat, then a limitation of one well-pad per section might be applied.</td>
</tr>
<tr>
<td><strong>Mining</strong></td>
<td>Not considered.</td>
<td>Coal mining can have deleterious effects on sage-grouse, depending on location (USFWS 2012).</td>
<td>Find unsuitable all surface mining of coal in priority habitat.</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Livestock Grazing</strong></td>
<td>Not considered.</td>
<td>Livestock grazing can have myriad negative effects on sage-grouse and sagebrush steppe (Bohne et al. 2007; Knick et al. 2005; Vallentine 1990; Pederson et al. 2003; Call and Maser 1985; Holloran and Anderson 2003; Coates 2007).</td>
<td>Assess range health and current livestock use; implement grazing systems to support sage-grouse conservation; manage upland and riparian habitats to achieve desired condition; maintain voluntary grazing permit retirement as a management option.</td>
</tr>
</tbody>
</table>

CALIFORNIA
Blacks Mountain

COLORADO
Hell Canyon
North St. Vrain

IDAHO
Bannock Creek
Basin Gulch
Bear Creek
Bear Valley Creek
Burns Canyon
Burton Canyon
Cattle Gulch
Cliff Lake
Colson Creek
Cottonwood Creek
Council Mountain
Cuddy Mountain
Dry Gulch-Forge Creek
Elk Creek Exclosure
Emery Creek
Gibson Jack Creek
Horse Prairie
Mahogany Creek
Meade Peak
Pole Canyon
Pole Creek Exclosure
Pony Creek
Raspberry Bulch
Roaring River
Rocky Comfort Flat
Smiley Mountain
St. Charles Creek
Thurman Creek
Trapper Creek
Trinity Mountain
West Fork Mink Creek
Willow Creek

NEVADA
Bald Mountain Wash
Carpenter Canyon
Fall Creek
Hole-In-The Mountain
Jacks Spring Pinyon
Pearl Peak
Troy Peak

OREGON
Augur Creek
Dry Mountain
Goodlow Mountain
Silver Lake Exclosure
Vee Pasture

UTAH
Afton Front
Cliff Dwellers Pasture
Desert Range
Gunsight Peak
Hideout Mesa
Jumpoff
Lance Canyon
Mollens Hollow
Morris Creek
Nelson Mountain
Red Butte Canyon

WASHINGTON
Meeks Table
Monte Cristo

The Sage-Grouse Recovery Alternative is based on the conservation measures in the NTT report (SGNTT 2011: 11C28), although they also differ from the NTT recommendations in key areas. The alternative includes some prescriptions additional to those in the NTT report, and rejects some NTT recommendations. These differences are marked in the recovery alternative: additional text is underlined, while text removed by the recovery alternative from the NTT report recommendations is struck out.

* * *

A. GOAL AND OBJECTIVES

Goal: Maintain and/or increase current sage-grouse abundance and distribution by conserving, enhancing and restoring the sagebrush ecosystem upon which populations depend in cooperation with other conservation partners.

Objectives:

1. Increase sage-grouse populations to a level where they are viable and secure from local extirpation events, and eventually to a level that allows for an annual harvestable surplus.
2. Restore and maintain sagebrush steppe to its ecological potential in priority, general and restoration sage-grouse habitat.
3. Establish a system of sagebrush reserves to anchor recovery efforts by protecting the highest quality habitats.

Priority, General and Restoration Sage-Grouse Habitat

Designate and manage priority sage-grouse habitat to conserve large expanses of sagebrush steppe and all active sage-grouse leks, and brood-rearing, transitional and winter habitats. While designating priority habitat, seek to preserve peripheral populations and connectivity in sagebrush habitat. For states that have failed to protect these values in their core areas or similar designations, include the excluded lands in federal priority sage-grouse habitat. Consider using Doherty et al. (2010b) (100 percent of active leks) as a basis for designating priority sage-grouse habitat, including brood-rearing, transitional and winter habitats.

Limit discrete surface disturbance in priority sage-grouse habitat to one instance per section of sage-grouse habitat regardless of ownership, with no more than three percent surface disturbance (or, where stipulated, implement the disturbance cap prescribed in the applicable state conservation plan, whichever is more protective). The three percent cap includes existing and all new initial disturbance to the landscape, interim mitigation and restoration efforts notwithstanding. Discrete disturbances include but are not limited to highways, roads, transmission lines, substations, wind turbines, oil and gas wells, heavily grazed areas, range developments, severely burned areas, pipelines, landfills, mines, and vegetation treatment that reduces sagebrush cover. As additional research on the three percent cap becomes available, revise this prescription, as necessary, to conserve sage-grouse.
**General sage-grouse habitat** is occupied (seasonal or year-round) habitat outside of priority habitat designated by western state fish and wildlife agencies in coordination with the appropriate federal agency(s). General sage-grouse habitat shall be managed for no net loss of sage-grouse.

**Restoration sage-grouse habitat** is degraded or fragmented habitat that is currently unoccupied by sage-grouse, but might be useful to the species if restored to its potential natural community. Restoration habitat shall be identified in management planning based on its importance to sage-grouse and the likelihood of successfully restoring sagebrush communities (Meinke et al. 2009; Wisdom et al. 2005c). Passive restoration is preferred for restoring these areas over active restoration methods.

### B. MANAGEMENT PRESCRIPTIONS

**Travel and Transportation**

- Motorized travel will be restricted to designated roads and routes, primitive roads and trails in priority and general sage-grouse habitat at a minimum.

- Prohibit new road construction within 4 miles of active sage-grouse leks, and avoid new road construction in priority sage-grouse habitat.

- Implement permanent seasonal road or area closures to protect breeding, nesting and brood-rearing sage-grouse.

- Complete activity level plans (BLM) or forest plan revisions within five years of the record of decision. During activity level planning, where appropriate, designate routes with current administrative/agency purpose or need for administrative access only.

- Limit route construction to realignments of existing designated routes if that realignment has a minimal impact on sage-grouse habitat, eliminates the need to construct a new road, or is necessary for motorist safety. Mitigate any impacts with methods that have been demonstrated to be effective to offset the loss of sage-grouse habitat.

- Use existing roads, or realignments as described above to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then follow the 4-mile prohibition from leks, build any new road constructed to the absolute minimum standard necessary (jeep trails should be the primary form of access road in priority areas), and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3% for that area, then make additional, effective mitigation that has been demonstrated to be effective necessary to offset the resulting loss of sage-grouse habitat.

- Allow no upgrading of existing routes that would change route category (road, primitive road, or trail) or capacity unless the upgrading would have minimal impact on sage-grouse.
habitat, it is necessary for motorist safety, or eliminates the need to construct a new road. Any impacts shall be mitigated with methods that have been demonstrated to be effective to offset the loss of sage-grouse habitat.

- **Conduct restoration of roads**: Close and restore to natural habitat all primitive roads and trails not designated in travel management plans. This also includes primitive routes/roads that were not designated in Wilderness Study Areas and within lands with wilderness characteristics that have been selected for protection.

- **For sage-grouse habitat areas that do not have a travel management plan**, the amended Resource Management Plan shall include an interim transportation plan that assesses road densities and closes and restores routes for sage-grouse conservation.

- **A new definition of “spot maintenance”** shall be adopted for primitive roads or ways within all sage-grouse habitat that does not allow for continuous maintenance (e.g., blading), but is limited to spots of minimal maintenance necessary to maintain the passage of high clearance vehicles. This maintenance shall preserve the primitive characteristics of the route and cannot cause an upgrade in route consideration or road maintenance level in future wilderness or route inventories or transportation decisions, thereby preventing the further fragmentation of sagebrush habitat.

- **Consider closing designated routes in sage-grouse priority habitat.**

- **When reseeding closed roads, primitive roads and trails**, use appropriate native seed mixes and **require consideration** of the use of transplanted sagebrush.

**Recreation**

- **Seasonally prohibit camping and other non-motorized recreation** within 4 miles of active sage-grouse leks.

- **Prohibit off-road vehicle use** in priority sage-grouse habitat.

- **Only allow special recreation permits** that have demonstrated neutral or beneficial affects to priority habitat areas.

**Lands/Realty**

1. **Rights of Way**

Priority sage-grouse habitat areas

- **Priority sage-grouse habitat areas shall be exclusion areas for new ROWs permits.** Consider the following exceptions:
Within designated ROW corridors encumbered by existing ROW authorizations: new ROWs may be co-located only if the entire footprint of the proposed project (including construction and staging), can be completed within the existing disturbance associated with the authorized ROWs.

Subject to valid, existing rights: where new ROWs associated with valid existing rights are required, co-locate new ROWs within existing ROWs or where it best minimizes sage-grouse impacts. Use existing roads, or realignments as described above, to access valid existing rights that are not yet developed. If valid existing rights cannot be accessed via existing roads, then build any new road constructed to the absolute minimum standard necessary, and add the surface disturbance to the total disturbance in the priority area. If that disturbance exceeds 3% for that area, then make additional effective mitigation necessary that has been demonstrated to be effective to offset the resulting loss of sage-grouse habitat.

- Evaluate and take advantage of opportunities to remove, bury, or modify existing power lines within priority sage-grouse habitat areas. Sage-grouse may avoid powerlines because of increased predation risk (Steenhof et al. 1993; Lammers and Collopy 2007). Powerlines effectively influence (direct physical area plus estimated area of effect due to predator movements) at least 39% of the sage-grouse range (Knick et al. 2011). Deaths resulting from collisions with powerlines were an important source of mortality for sage-grouse in southeastern Idaho (Beck et al. 2006; 75 FR 13910).

- Where existing leases or ROWs have had some level of development (road, fence, well, etc.) and are no longer in use, reclaim the site by removing these features and restoring the habitat.

Planning Direction Note: While engaged in this sage-grouse EIS planning process, relocate existing designated ROW corridors crossing priority sage-grouse habitat void of any authorized ROWs, outside of the priority habitat area. If relocation is not possible, undesignate that entire corridor during the planning process.

General sage-grouse habitat areas

- Make general sage-grouse habitat areas “avoidance areas” for new ROWs.

- Where new ROWs are necessary, co-locate new ROWs within existing ROWs where possible.

2. Land Tenure Adjustment

Priority sage-grouse habitat areas

- Retain public ownership of priority sage-grouse habitat. Consider exceptions where:

  - There is mixed ownership, and land exchanges would allow for additional or more contiguous federal ownership patterns within the priority sage-grouse habitat area.
Under In priority sage-grouse habitat areas with minority federal ownership, include an additional, effective mitigation agreement for any disposal of federal land. As a final preservation measure consideration should be given to pursuing a permanent conservation easement.

- Where suitable conservation actions cannot be achieved, seek to acquire state and private lands with intact subsurface mineral estate by donation, purchase or exchange in order to best conserve, enhance or restore sage-grouse habitat.

3. Proposed Land Withdrawals

Priority sage-grouse habitat areas

- Propose lands within priority sage-grouse habitat areas for mineral withdrawal.

- Do not approve withdrawal proposals not associated with mineral activity unless the land management is consistent with sage-grouse conservation measures. (For example, in a proposed withdrawal for a military training range buffer area, manage the buffer area with sage-grouse conservation measures that have been demonstrated to be effective.)

Range Management

- For range management and free-roaming horse and burro management, sage-grouse habitat objectives are based on, in priority order, potential natural community within the applicable Ecological Site Description, Connelly et al. (2000: 977, Table 3), or other objectives that have been demonstrated to be associated with increasing sage-grouse populations.

- All prescriptions for range management apply to priority sage-grouse habitat, general sage-grouse habitat, and restoration habitat, unless otherwise stated.

1. Planning and Health Assessments

- Within priority sage-grouse habitat, incorporate measurable sage-grouse habitat objectives and management considerations and triggers for changed management into all BLM and Forest Service grazing allotments through amendments to RMPs or LMRPs, applicable to all AMPs or permit renewals.

- Work cooperatively on integrated ranch planning within sage-grouse habitat so operations with deeded/BLM and/or Forest Service allotments can be planned as single units.

- Prioritize completion of land health assessments and processing grazing permits within priority sage-grouse habitat areas. Focus this process on allotments that have the best opportunities for conserving, enhancing or restoring habitat for sage-grouse. Utilize Ecological Site Descriptions (ESDs) sage-grouse habitat objectives to conduct land health assessments to determine if standards of rangeland health are being met.
• Conduct land health assessments that include (at a minimum) indicators and measurements of structure/condition/composition of vegetation specific to achieving sage-grouse habitat objectives (Doherty et al. 2011). Failure to meet sage-grouse habitat objectives is a failure to meet rangeland health standards. If local/state seasonal habitat objectives are not available, use sage-grouse habitat recommendations from Connelly et al. 2000b and Hagen et al. 2007.

• Establish and maintain sufficiently large areas free of livestock as reference areas to aid in describing ecological site potential and as a measure of the comparative effects of livestock grazing—and relief from livestock grazing—on sage-grouse populations.

2. Implementing Management Actions after Land Health and Habitat Evaluations

• Within one year of adopting the planning amendment, develop specific objectives to conserve, enhance or restore priority sage-grouse habitat based on sage-grouse habitat objectives, ESDs and assessments (including within wetlands and riparian areas). If an effective grazing system that meets sage-grouse habitat requirements is not already in place, analyze at least one alternative that conserves, restores or enhances sage-grouse habitat in the NEPA documents prepared for the permit renewal (Doherty et al. 2011b, Williams et al. 2011).

• Manage for vegetation composition and structure consistent with ecological site potential and within the reference state to achieve sage-grouse seasonal habitat objectives.

• Implement management actions (RMPs, LMRPs, grazing decisions, AMP/Conservation Plan development, establishment of ungrazed reference areas, or other plans or agreements) to modify grazing management to meet seasonal sage-grouse habitat requirements (Connelly et al. 2011c). Consider singly, or in combination, changes in:

6. Season, timing, and/or frequency of livestock use;
7. Numbers/AUMs of livestock (includes temporary non-use or livestock removal);
8. Distribution of livestock use;
9. Intensity of livestock use; and
10. Type of livestock (e.g., cattle, sheep, horses, llamas, alpacas and goats) (Briske et al. 2011).

• To achieve sage-grouse habitat objectives, utilization levels should not exceed 25 percent annually on uplands, meadows, flood plains and riparian habitat (Holecheck et al. 2010; BLM & USFS 1994).23

• Rest at least 25 percent of each sage-grouse planning area from livestock grazing annually.

23 “A community is considered to be at its natural potential when the existing vegetation is between 75-100 percent of the site’s potential natural plant community.” BLM & USFS 2004: 3-26.
Reduce grazing in advance of predicted drought so that, to the degree possible, sagebrush habitat continues to meet sage-grouse habitat objectives. During drought periods, prioritize evaluating effects of the drought in priority sage-grouse habitat areas relative to their biological needs for food and cover, as well as drought effects on ungrazed reference areas. Since there is a lag in vegetation recovery following drought (Thurow and Taylor 1999; Cagney et al. 2010), ensure that post-drought management allows for vegetation recovery that meets sage-grouse needs in priority sage-grouse habitat areas based on sage-grouse habitat objectives.

3. Riparian Areas and Wet Meadows

- Manage riparian areas and wet meadows for proper functioning condition within priority sage-grouse habitats.

- Manage riparian and wetland areas to meet proper functioning condition which is indicated by adequate moisture from surface water and vegetation for dependent wildlife needs and vegetation adequate to protect steam banks and dissipate stream flow energy from high stream flow events, that reflects the potential natural community, contains a diverse age structure and composition, shows high vigor, and provides food, cover and other habitat needs for dependent animal species (BLM 1997).

- Within priority and general sage-grouse habitats, manage wet meadows to maintain a component of perennial forbs with diverse species richness and productivity relative to site potential (e.g., reference state) to facilitate brood-rearing. Also conserve or enhance these wet meadow complexes to maintain or increase the amount of edge and cover within that edge to minimize elevated mortality during the late brood-rearing period (Hagen et al. 2007; Kolada et al. 2009; Atamian et al. 2010).

- Where riparian areas and wet meadows meet proper functioning condition, strive to attain potential natural community reference state vegetation relative to the ecological site description.

  - For example: Within priority sage-grouse habitat, reduce hot season grazing on riparian and meadow complexes to promote recovery or maintenance of appropriate vegetation and water quality. Utilize fencing/herding techniques or seasonal use or livestock distribution changes to reduce pressure on riparian or wet meadow vegetation used by sage-grouse in the hot season (summer) (Aldridge and Brigham 2002, Crawford et al. 2004, Hagen et al. 2007).

- Authorize no new water developments for diversion from spring or seep sources only when within priority sage-grouse habitat would benefit from the development. This includes developing new water sources for livestock as part of an AMP/conservation plan to improve sage-grouse habitat.
• Analyze springs, seeps and associated water developments pipelines to determine if modifications are necessary to maintain the continuity of the predevelopment riparian area within priority sage-grouse habitats. Make modifications where necessary, including dismantling water developments considering impacts to other water uses when such considerations are neutral or beneficial to sage-grouse.

The following vegetation management prescriptions have been incorporated in the new Vegetation Management section.

**Treatments to Increase Forage for Livestock/Wild Ungulates**

Priority sage-grouse habitat areas

- Only allow treatments that conserve, enhance or restore sage-grouse habitat (this includes treatments that benefit livestock as part of an AMP/Conservation Plan to improve sage-grouse habitat).

- Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses in and adjacent to priority sage-grouse habitats to determine if they should be restored to sagebrush or habitat of higher quality for sage-grouse. If these seedings are part of an AMP/Conservation Plan or if they provide value in conserving or enhancing the rest of the priority habitats, then no restoration would be necessary. Assess the compatibility of these seedings for sage-grouse habitat or as a component of a grazing system during the land health assessments (Davies et al. 2011):
  - For example: Some introduced grass seedings are an integral part of a livestock management plan and reduce grazing pressure in important sagebrush habitats or serve as a strategic fuels management area.

4. **Structural Range Improvements and Livestock Management Tools**

Priority sage-grouse habitat areas

- Avoid all new structural range developments and location of supplements (salt or protein blocks) in priority sage-grouse habitat unless independent peer-reviewed studies show that the range improvement structure or nutrient supplement placement benefits sage-grouse. Design any new structural range improvements and location of supplements (salt or protein blocks) to conserve, enhance, or restore sage-grouse habitat through an improved grazing management system relative to sage-grouse objectives. Structural range improvements developments, in this context, include but are not limited to: cattleguards, fences, exclosures, corrals or other livestock handling structures; pipelines, troughs, storage tanks (including moveable tanks used in livestock water hauling), windmills, ponds/reservoirs, solar panels and spring developments. Potential for invasive species establishment or increase following construction must be considered in the project planning process and monitored and treated post-construction. Consider the comparative cost of changing grazing management instead of constructing additional range developments.
• When developing or modifying water developments, use best management practices (BMPs, see Appendix C)\textsuperscript{24} to mitigate potential impacts from West Nile virus (Clark et al. 2006; Doherty 2007; Walker et al. 2007b; Walker and Naugle 2011).

• Evaluate existing structural range developments and location of supplements (salt or protein blocks) to document that make sure they conserve, enhance or restore sage-grouse habitat.

  o To reduce outright sage-grouse strikes and mortality, remove, modify or mark fences in high risk areas of moderate or high risk of sage-grouse strikes within priority sage-grouse habitat based on proximity to lek, lek size, and topography (Christiansen 2009; Stevens 2011).

  o Monitor for, and treat invasive species associated with existing range developments (Gelbard and Belnap 2003; Bergquist et al. 2007).

5. Retirement of Grazing Privileges

• In each planning process, identify grazing allotments where permanent retirement of grazing privileges would be potentially beneficial to sage-grouse.

• Maintain retirement of grazing privileges as an option in priority sage-grouse habitat areas when base property is transferred or the current permittee is willing to retire grazing on all or part of an allotment. Analyze the adverse impacts of no livestock use on wildfire and invasive species threats (Crawford et al. 2004) in evaluating retirement proposals.

  \textit{Planning direction Note}: Each planning effort will identify the specific allotment(s) where permanent retirement of grazing privileges is potentially beneficial.

• Encourage partners to monitor effects of retiring grazing permits in sage-grouse habitat.

\textbf{Wild Free-Roaming Horse and Burro Management}

1. Ongoing Authorizations/Activities

• Manage \textit{wild} free-roaming horse and burro populations \textit{at levels demonstrated to achieve and maintain sage-grouse habitat objectives}, within established Appropriate Management Levels (AML).

• Prioritize gathers in priority sage-grouse habitat, unless removals are necessary in other areas to prevent catastrophic environmental issues, including herd health impacts.

\textsuperscript{24} Listed appendices are original to the corresponding prescriptions in the NTT report.
2. Proposed Authorization/Activities

- Within priority sage-grouse habitat, develop or amend herd management area and herd area plans (HMAPs) to incorporate sage-grouse habitat objectives and management considerations for managing all BLM herd management areas (HMAs) and USFS herd areas (HAs).
  
  - For all HMAs within priority sage-grouse habitat, prioritize the evaluation of all AMLs based on indicators that address structure/condition/composition of vegetation and measurements specific to achieving sage-grouse habitat objectives.

- Coordinate with other resources (Range, Wildlife, and Riparian) to conduct land health assessments to determine existing structure/condition/composition of vegetation within all BLM HMAs and USFS HAs.

- When conducting NEPA analysis for wild free-roaming horse and burro management activities, water developments or other rangeland improvements for wild free-roaming horses in priority sage-grouse habitat, address the direct and indirect effects to sage-grouse populations and habitat. Implement any water developments or rangeland improvements using the criteria identified for domestic livestock in priority habitats. Consider the comparative cost of changing grazing management instead of constructing additional range developments.

Minerals

1. Fluid Minerals

   a. Unleased Federal Fluid Mineral Estate

      (Alternative A)

      - Close priority sage-grouse habitat areas to fluid mineral leasing. Upon expiration or termination of existing leases, do not accept nominations/expressions of interest for parcels within priority areas.

      - Allow geophysical exploration within priority sage-grouse habitat areas to obtain exploratory information for areas outside of and adjacent to priority sage-grouse habitat areas. Allow geophysical operations only by helicopter-portable drilling methods and in accordance with seasonal timing restrictions and/or other restrictions that may apply.

      (Alternative B)

      - Close priority sage-grouse habitat areas to fluid mineral leasing, and within 4 miles of active sage-grouse leks. Consider an exception:

      When there is an opportunity for the BLM to influence conservation measures where surface and/or mineral ownership is not entirely federally owned (i.e., checkerboard
ownership). In this case, a plan amendment may be developed that opens the priority area for new leasing. The plan must demonstrate long-term population increases in the priority area through mitigation (prior to issuing the lease) including lease stipulations, and off-site mitigation, etc., and avoid short-term losses that put the sage-grouse population at risk from stochastic events leading to extirpation.

- **Upon expiration or termination of existing leases, do not accept nominations/expressions of interest for parcels within priority areas.**

- **Allow geophysical exploration within priority sage-grouse habitat areas to obtain exploratory information for areas outside of and adjacent to priority sage-grouse habitat areas. Only allow geophysical operations by helicopter-portable drilling methods and in accordance with seasonal timing restrictions and/or other restrictions that may apply. Geophysical exploration shall be subject to seasonal restrictions that preclude activities in breeding, nesting, brood-rearing and winter habitats during their season of use by sage-grouse.**

b. **Leased Federal Fluid Mineral Estate**

Priority sage-grouse habitat areas

Apply the following conservation measures as Conditions of Approval at the project and well permitting stages, and through RMP implementation decisions and upon completion of the environmental record of review (43 CFR § 3162.5), including appropriate documentation of compliance with NEPA. In this process evaluate, among other things:

A. Whether the conservation measure is “reasonable” (43 CFR § 3101.1-2) with the valid existing rights; and

B. Whether the action is in conformance with the approved RMP.

Provide the following conservation measures as terms and conditions of the approved RMP:

- **Do not allow new surface occupancy on federal leases within priority habitats, this includes winter concentration areas (Doherty et al. 2008, Carpenter et al. 2010) during any time of the year. Consider an exception:**
  - If the lease is entirely within priority habitats, apply a 4-mile NSO around the lek, and limit permitted disturbances to 1 per section with no more than 3% surface disturbance in that section.
  - If the entire lease is within the 4-mile lek perimeter, limit permitted disturbances to 1 per section with no more than 3% surface disturbance in that section. Require any development to be placed at the most distal part of the lease from the lek, or, depending on topography and other habitat aspects, in an area that is less demonstrably harmful to sage-grouse.
- Apply a seasonal restriction on exploratory drilling that prohibits surface-disturbing activities during the nesting and early brood-rearing season in all priority sage-grouse habitat during this period. This seasonal restriction shall also apply to related activities that are disruptive to sage-grouse, including vehicle traffic and other human presence.

- Do not use Categorical Exclusions (CXs) including under the Energy Policy Act of 2005, Section 390 in priority sage-grouse habitats due to resource conflicts.

- Complete Master Development Plans in lieu of Application for Permit to Drill (APD)-by-APD processing for all but wildcat wells.

- When permitting APDs on existing leases that are not yet developed, the proposed surface disturbance cannot exceed 3% per section for that area. Consider an exception if:
  - Additional, effective mitigation is demonstrated to offset the resulting loss of sage-grouse.
  - When necessary, conduct additional, effective mitigation in 1) priority sage-grouse habitat areas or—less preferably—2) general sage-grouse habitat (dependent upon the area-specific ability to increase sage-grouse populations).
  - Conduct additional, effective mitigation first within the same population area where the impact is realized, and if not possible then conduct mitigation within the same Management Zone as the impact, per 2006 WAFWA Strategy—pg 2-17.

- Require unitization with no surface occupancy stipulations for sensitive habitats when deemed necessary for proper development and operation of an area (with strong oversight and monitoring) to minimize adverse impacts to sage-grouse according to the Federal Lease Form, 3100-11, Sections 4 and 6.

- Prohibit the surface disposal of coalbed methane wastewater, as well as the construction of evaporation or infiltration reservoirs to hold wastewater. Inject coalbed methane wastewater underground into a formation of equal or lower water quality.

- Identify areas where acquisitions (including subsurface mineral rights) or conservation easements, would benefit sage-grouse habitat.

- Require a full reclamation bond specific to the site. Insure bonds are sufficient for costs relative to reclamation (Connelly et al. 2000; Hagen et al. 2007) that would result in full restoration. Base the reclamation costs on the assumption that contractors for the BLM will perform the work.

- Make applicable Best Management Practices (BMPs, see Appendix D) mandatory as Conditions of Approval within priority sage-grouse habitat.
C. Solid Minerals

a. Coal

Priority sage-grouse habitat areas

- *Surface mines:* Find unsuitable all surface mining of coal under the criteria set forth in 43 CFR § 3461.5.

- *Sub-surface mines:* Grant no new mining leases unless all surface disturbances (appurtenant facilities) are placed outside of the priority sage-grouse habitat area.

- For coal mining operations on existing leases:
  
  o *Sub-surface mining:* in priority sage-grouse habitat areas, place any new appurtenant facilities outside of priority areas. Where new appurtenant facilities associated with the existing lease cannot be located outside the priority sage-grouse habitat area, co-locate new facilities within existing disturbed areas. If this is not possible, then build any new appurtenant facilities to the absolute minimum standard necessary. Abate wastewater associated with coal mining to mitigate potential impacts from West Nile virus.

General sage-grouse habitat

- Apply minimization of surface-disturbing or disrupting activities (including operations and maintenance) where needed to reduce the impacts of human activities on important seasonal sage-grouse habitats. Apply these measures during activity level planning.

- Use additional, effective mitigation to offset impacts as appropriate (determined by local options/needs).

- Abate wastewater associated with coal mining to mitigate potential impacts from West Nile virus.

b. Locatable Minerals

Priority sage-grouse habitat areas

- Propose withdrawal of priority habitat from mineral entry based on risk to the sage-grouse and its habitat from conflicting locatable mineral potential and development (43 U.S.C. § 1714(c)).

- Make any Subject all existing claims within the withdrawal area subject to validity patent exams or buyout. Include claims that have been subsequently determined to be null and void.
in the proposed withdrawal. In plans of operations required prior to any proposed surface disturbing activities, include the following:

- Additional, effective mitigation in perpetuity for conservation (In accordance with existing policy, WO IM 2008-204). Example: purchase private land and mineral rights or severed subsurface mineral rights within the priority area and deed to US Government).

- Consider seasonal restrictions if deemed effective.

- Make applicable Best Management Practices (see Appendix E) mandatory as Conditions of Approval within priority sage-grouse habitat.

c. **Non-energy Leasable Minerals (i.e. sodium, potash)**

Priority sage-grouse habitat areas

- Close priority habitat to non-energy leasable mineral leasing. This includes not permitting any new leases to expand an existing mine.

- For existing non-energy leasable mineral leases, in addition to the solid minerals BMPs (Appendix E), follow the same BMPs applied to Fluid Minerals (Appendix D), when wells are used for solution mining.

d. **Saleable Mineral Materials**

Priority sage-grouse habitat areas

- Close priority habitat to mineral material sales.

- Restore saleable mineral pits no longer in use to meet sage-grouse habitat conservation objectives.

D. **Mineral Split Estate**

Priority sage-grouse habitat areas

- Where the federal government owns the mineral estate, and the surface is in non-federal ownership, apply the conservation measures applied on public lands.

- Where the federal government owns the surface, and the mineral estate is in non-federal ownership, apply appropriate Fluid Mineral BMPs (see Appendix D) to surface development.
**Wind Energy Development**

- Do not site wind energy development in priority sage-grouse habitat (Jones 2012).

- Site wind energy development at least five miles from active sage-grouse leks (Manville 2004; Jones 2012).

- Site wind energy development at least four miles from the perimeter of sage-grouse winter habitat.

The following fuels management prescriptions have been incorporated in the new Vegetation Management section.

**Wildfire Suppression, Fuels Management and Fire Rehabilitation**

**Fuels Management**

**Priority sage-grouse habitat areas**

- Design and implement fuels treatments with an emphasis on protecting existing sagebrush ecosystems.
  - Do not reduce sagebrush canopy cover to less than 15% (Connelly et al. 2000, Hagen et al. 2007) unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of priority sage-grouse habitat and conserve habitat quality for the species. Closely evaluate the benefits of the fuel break against the additional loss of sagebrush cover in the EA process.
  - Apply appropriate seasonal restrictions for implementing fuels management treatments according to the type of seasonal habitats present in a priority area.
  - Allow no treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around or in the winter range and will maintain winter range habitat quality.
  - Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species; Connelly et al. 2000, Hagen et al. 2007, Beck et al. 2009). However, if as a last resort and after all other treatment opportunities have been explored and site specific variables allow, the use of prescribed fire for fuel breaks that would disrupt the fuel continuity across the landscape could be considered, in stands where cheatgrass is a very minor component in the understory (Brown 1982).
  - Rest treated areas from grazing for two full growing seasons unless vegetation recovery dictates otherwise (WGFD 2011).
  - Require use of native seeds for fuels management treatment based on availability, adaptation (site potential), and probability of success (Richards et al. 1998). Where probability of success or native seed availability is low, non-native seeds may be used as long as they meet sage-grouse habitat objectives (Pyke 2011).
Design post-fuels management projects to ensure long-term persistence of seeded or pretreatment native plants. This may require temporary or long-term changes in livestock grazing management, wild horse and burro management, travel management, or other activities to achieve and maintain the desired condition of the fuels management project (Eiswerth and Shonkwiler 2006).

Design fuels management projects in priority sage-grouse habitat to strategically and effectively reduce wildfire threats in the greatest area. This may require fuels treatments implemented in a more linear versus block design (Launchbaugh et al. 2007).

During fuels management project design, consider the utility of using livestock to strategically reduce fine fuels (Diamond et al. 2009), and implement grazing management that will accomplish this objective Davies et al. 2011 and Launchbaugh et al. 2007). Consult with ecologists to minimize impacts to native perennial grasses.

The following habitat restoration prescriptions have been incorporated in the new Vegetation Management section.

**Habitat-Restoration**

- Prioritize implementation of restoration projects based on environmental variables that improve chances for project success in areas most likely to benefit sage-grouse (Meinke et al. 2009).
  - Prioritize restoration in seasonal habitats that are thought to be limiting sage-grouse distribution and/or abundance.

- Include sage-grouse habitat parameters as defined by Connelly et al. (2000), Hagen et al. (2007) or if available, State Sage-Grouse Conservation plans and appropriate local information in habitat restoration objectives. Make meeting these objectives within priority sage-grouse habitat areas the highest restoration priority.

- Require use of native seeds for restoration based on availability, adaptation (ecological site potential), and probability of success (Richards et al. 1998). Where probability of success or adapted seed availability is low, non-native seeds may be used as long as they support sage-grouse habitat objectives (Pyke 2011).

- Design post restoration management to ensure long-term persistence. This could include changes in livestock grazing management, wild horse and burro management and travel management, etc., to achieve and maintain the desired condition of the restoration effort that benefits sage-grouse (Eiswerth and Shonkwiler 2006).

- Consider potential changes in climate (Miller et al. 2011) when proposing restoration seedings when using native plants. Consider collection from the warmer component of the species current range when selecting native species (Kramer and Havens 2009).
• Restore native (or desirable) plants and create landscape patterns which most benefit sage-grouse.

• Make re-establishment of sagebrush cover and desirable understory plants (relative to ecological site potential) the highest priority for restoration efforts.

• In fire prone areas where sagebrush seed is required for sage-grouse habitat restoration, consider establishing seed harvest areas that are managed for seed production (Armstrong 2007) and are a priority for protection from outside disturbances.

**Vegetation Management**

• For vegetation treatments, fuels management and habitat restoration, sage-grouse habitat objectives are based on, in priority order, potential natural community within the applicable Ecological Site Description, Connelly et al. (2000: 977, Table 3), or other objectives that have been demonstrated to be associated with increasing sage-grouse populations.

1. **Vegetation Treatments**

• Ensure that vegetation treatments restore native (or desirable) plants and create landscape patterns which most benefit sage-grouse. Only allow treatments that conserve, enhance or restore sage-grouse habitat are demonstrated to benefit sage-grouse and retain sagebrush height and cover consistent with sage-grouse habitat objectives (this includes treatments that benefit livestock as part of an AMP/Conservation Plan to improve sage-grouse habitat).

• Evaluate the role of existing seedings that are currently composed of primarily introduced perennial grasses in and adjacent to priority sage-grouse habitats to determine if they should be restored to sagebrush or habitat of higher quality for sage-grouse. If these seedings are part of an AMP/Conservation Plan or if they provide value in conserving or enhancing the rest of the priority sage-grouse habitats, then no restoration would be necessary. Assess the compatibility of these seedings for sage-grouse habitat or as a component of a grazing system during the land health assessments (Davies et al. 2011).

  o For example: Some introduced grass seedings are an integral part of a livestock management plan and reduce grazing pressure in important sagebrush habitats or serve as a strategic fuels management area.

• Any vegetation treatment plan must include pretreatment data on wildlife and habitat condition, establish non-grazing exclosures, and include long-term monitoring where treated areas are monitored for at least three years before grazing returns. Continue monitoring for five years after livestock are returned to the area, and compare to treated, ungrazed exclosures, as well as untreated areas.

• The BLM interim guidance on sage-grouse management and planning states that the agency must “meet vegetation management objectives that have been set for seeding projects prior to
returning the area to authorized uses, specifically livestock grazing” (BLM Memo IM 2012-043). This means that grazing cannot resume until a treated site meets sage-grouse habitat objectives. This may be many years as research indicates long-term rest may be required to restore native vegetation (Anderson 1991; Anderson and Inouye 2001; Hormay and Talbot 1961; Mueggler 1975).

2. Fuels Management

- Design and implement fuels treatments with an emphasis on protecting existing sagebrush ecosystems.
  - Closely evaluate the benefits of the fuel break against the additional loss of sagebrush cover in the EA process.
  - Allow no fuels treatments in known winter range unless the treatments are designed to strategically reduce wildfire risk around or in the winter range and will maintain winter range habitat quality.
  - Design fuels management projects in priority sage-grouse habitat to strategically and effectively reduce wildfire threats in the greatest area. This may require fuels treatments implemented in a more linear versus block design (Launchbaugh et al. 2007).

- Apply appropriate seasonal restrictions for implementing fuels management treatments according to the type of seasonal habitats present in a priority area.

- Retain Do not reduce sagebrush canopy cover at or above below what is expected for that ecological site, consistent with sage-grouse habitat objectives to less than 15% (Connelly et al. 2000, Hagen et al. 2007) unless a fuels management objective requires additional reduction in sagebrush cover to meet strategic protection of priority sage-grouse habitat and conserve habitat quality for the species.

- Do not use fire to treat sagebrush in less than 12-inch precipitation zones (e.g., Wyoming big sagebrush or other xeric sagebrush species; Connelly et al. 2000; Hagen et al. 2007; Beck et al. 2009). However, if as a last resort and after all other treatment opportunities have been explored and site specific variables allow, the use of prescribed fire for fuel breaks that would disrupt the fuel continuity across the landscape could be considered, in stands where cheatgrass is a very minor component in the understory (Brown 1982).

- Design post fuels management projects to ensure long term persistence of seeded or pretreatment native plants, including sagebrush. This may require temporary or long-term changes in livestock grazing management, wild free-roaming horse and burro management, travel management, or other activities to achieve and maintain the desired condition of the fuels management project (Eiswerth and Shonkwiler 2006). Monitor and control invasive vegetation post-treatment.
3. Fire operations

- In priority sage-grouse habitat areas, prioritize suppression, immediately after life and property, to conserve the habitat.

- In general sage-grouse habitat, prioritize suppression where wildfires threaten priority sage-grouse habitat.


4. Emergency Stabilization and Rehabilitation (ES&R)

- Establish and strengthen networks and financial arrangements with seed growers to assure availability of native seed for ES&R projects.

- Prioritize native seed allocation for use in sage-grouse habitat in years when preferred native seed is in short supply. This may require reallocation of native seed from ES&R projects outside of priority sage-grouse habitat to those inside it. Require the use of native plant seeds for ES&R seedings is required based on availability, adaptation (ecological site potential), and probability of success (Richards et al. 1998). Where probability of success or native seed availability is low (beyond the ability of the federal government to increase and insure native seed availability), non-native seeds may be used as long as they meet sage-grouse habitat conservation objectives (Pyke 2011). Reestablishment of appropriate sagebrush species/subspecies and important native understory plants, relative to site potential, shall be the highest priority for rehabilitation efforts.

- Design post ES&R management to ensure long term persistence of seeded or pre-burn native plants. This may require temporary or long-term changes in livestock grazing, wild free-roaming horse and burro, and travel management, etc., to achieve and maintain the desired condition of ES&R projects to benefit sage-grouse (Eiswerth and Shonkwiler 2006).

- Consider potential changes in climate (Miller at al. 2011) when proposing post-fire seedings using native plants. Consider seed collections from the warmer component within a species’ current range for selection of native seed. (Kramer and Havens 2009).

- Post fire recovery must include establishing adequately sized exclosures (free of livestock grazing) that can be used to assess recovery.

- Livestock grazing should be excluded from burned areas until woody and herbaceous plants achieve sage-grouse habitat objectives.

- Where burned sage-grouse habitat cannot be fenced from other unburned habitat, the entire area (e.g., allotment/pasture) should be closed to grazing until recovered.
5. **Habitat Restoration**

- Identify sage-grouse restoration habitat and prioritize areas for implementation of restoration projects based on environmental variables that improve chances for project success in areas most likely to benefit sage-grouse (Meinke et al. 2009; Pellant et al. 2005).
  - Prioritize restoration in seasonal habitats that are thought to be limiting sage-grouse distribution and/or abundance and where factors causing degradation have already been addressed (e.g., changes in livestock management).
  - Design post restoration management to ensure long term persistence. This could include changes in livestock grazing management, wild free-roaming horse and burro management and travel management, etc., to achieve and maintain the desired condition of the restoration effort that benefits sage-grouse (Eiswerth and Shonkwiler 2006).
  - In fire prone areas where sagebrush seed is required for sage-grouse habitat restoration, consider establishing seed harvest areas that are managed for seed production (Armstrong 2007) and are a priority for protection from outside disturbances.

- Include sage-grouse habitat objectives parameters as defined by Connelly et al. (2000), Hagen et al. (2007) or if available, State Sage-Grouse Conservation plans and appropriate local information in habitat restoration projects objectives. Make meeting these objectives within priority sage-grouse habitat areas the highest restoration priority.

- Require use of native seeds for restoration based on availability, adaptation (ecological site potential), and probability of success (Richards et al. 1998). Where probability of success or adapted seed availability is low (beyond the ability of the federal government to increase and insure native seed availability), non-native seeds may be used as long as they support sage-grouse habitat objectives (Pyke 2011). Consider potential changes in climate (Miller et al. 2011) when proposing restoration seedings when using native plants. Consider collection from the warmer component of the species current range when selecting native species (Kramer and Havens 2009).

6. **Invasive Plants**

- Monitor and control invasive vegetation in treated, burned or restored sagebrush steppe post-treatment. Rapidly restore burned or disturbed sagebrush steppe to prevent incursion of invasive plants.

- Restrict activities in sage-grouse habitat that facilitate the spread of invasive plants.

- In sage-grouse habitat, ensure that soil cover and native herbaceous plants are at their ecological potential to help protect against invasive plants. Most sagebrush communities important to sage-grouse are expected to have a significant percentage of ground cover in biological crusts at most successional stages (Belnap et al. 2001). Perennial grasses and forb germination is aided by the presence of biological crusts (Belnap and Eldredge 2001).
• Develop and implement methods for prioritizing and restoring sagebrush steppe invaded by nonnative plants.

C. SAGEBRUSH RESERVES

Designate Areas of Critical Environmental Concern (ACECs) (BLM) and Sagebrush Conservation Areas (SCAs) (USFS), respectively, as sagebrush reserves to conserve sage-grouse and other sagebrush-dependent species. A large subset of sage-grouse priority habitat areas should be designated as reserves. Sagebrush reserves would be the basis for enhancing sage-grouse populations and supporting long-term persistence in the face of climate change and continuing land uses on remaining sage-grouse priority and general habitat. These purposes satisfy the relevance and importance criteria for BLM ACECs. The BLM and Forest Service should also support the establishment of Long-Term Ecological Research sites in sagebrush steppe.25

1. Criteria for Designating ACECs and SCAs

• Prioritize areas of high biological value to sage-grouse and other sagebrush-dependent species for designation as ACECs and SCAs, especially areas that are currentlyundeveloped for oil and gas or other uses. These special management areas should be a subset of priority habitat, which includes all active sage-grouse leks (Doherty et al. 2009).
• Designate large sagebrush reserves that encompass centers of sage-grouse abundance on the landscape. Protect a sufficiently large proportion of habitat in each planning area to sustain biological processes, recover species and buffer against the systematic effects of climate change and land uses and related effects, including invasion by nonnative plants and unnatural fire. Undeveloped areas with high biological value should be immediately considered for ACEC and SCA designation.
• Consider prioritizing ACECs and SCAs in areas that meet the previous criteria, and are near high biological value areas that are likely to be developed, in order to support resilience of areas disturbed by development.
• Designate ACECs and SCAs to protect peripheral and/or genetically distinct populations of sage-grouse and preserve or restore habitat connectivity.
• Designate a system of reserves that is large enough to achieve the goals of biological representation, and ecological redundancy and resiliency within an ecosystem.
• Prioritize areas that have moderate or high potential to be maintained or restored.
• ACECs and SCAs can be designated to conserve biological resources, but also to preserve historic, cultural and scenic values. Consider identifying areas for ACEC designation that would include both priority sage-grouse habitat and other vulnerable resources, such as wilderness characteristics, other endangered species, or cultural resources. By taking this approach, BLM and USFS can assure that designation and management of ACECs and SCAs will maximize protection of multiple resources that the agency is obligated to manage.

25 One potential location for a Long-Term Ecological Research site is sage-grouse core area habitat in the Great Divide Basin south of Green Mountain in Wyoming.
2. **Special Management Prescriptions for ACECs and SCAs**

- New ACECs and SCAs will be managed the same as sage-grouse priority habitat, except for the following:
  - ACECs and SCAs shall be withdrawn from locatable and leasable mineral development (43 U.S.C. § 1714(c)).
  - Sagebrush reserves shall be closed to new fluid mineral development.
  - No new surface disturbance shall be allowed in ACECs and SCAs.
  - New rights-of-ways will be restricted in ACECs and SCAs.
  - The removal of infrastructure (including unneeded oil and gas development equipment, roads, range developments and fencing) will be prioritized in ACECs and SCAs.

Existing ACECs in sage-grouse habitat should be managed under these same prescriptions wherever possible.