List of Major Changes, Additions, or Edits

The following document shows major edits to the species report to assist with cover memos.

Overarching clarifications

INTRODUCTION

Updates:

All placeholders were removed, including "Executive summary".

Figure 2-3, percent of range-wide greater sage grouse population by Management Zone, was updated with the re-calculated population index model numbers, as discussed in Fort Collins.

Figures for Occupied Breeding Habitat Distribution Model and the Population Index Model are missing.

An appendix listing the variables used in the habitat modeling is missing.

pp. 32 – 33: Land ownership tables were updated to reflect the re-calculation of breeding habitat density model by Kevin Doherty.

All other edits consisted of deleting erroneous citations, correcting citations, and incorporating missing page numbers in citations.

Missing Information:

Appendix for breeding habitat and population index models is missing – was not received from the modelers and the SLT did not have the information to populate.

IMPACTS ANALYSIS

Fire

Under the Fire section, the following conclusions were removed from the "Assessment of Potential Threat" summary:

- Line 754-756 – "While we do not know the extent to which these regulatory and non-regulatory mechanisms will alleviate the wildfire impact to sage-grouse, we believe that this strategic approach to address the impact of fire is appropriate and significant."

- Line 774-777 – "Thus, barring alterations to the current fire pattern, as well as the difficulties in restoration, the concerns presented by this stressor will continue and likely strongly influence the persistence of sage-grouse, especially in the western half of its range, in the foreseeable future."

p. 46 – Replaced Figure 5.1. Overlapping fires were incorrect in previous version

p. 57 - While we do not know the extent to which these regulatory and non-regulatory mechanisms will alleviate the wildfire impact to sage-grouse, we believe that this strategic approach to address the impact of fire is appropriate and significant.

p. 58 - Thus, barring alterations to the current fire pattern, as well as the difficulties in restoration, the concerns presented by this stressor will continue and likely strongly influence the persistence of sage-grouse, especially in the western half of its range, in the foreseeable future.

On p. 51, the following clarifying text was added to the end of the first sentence under the "Anticipated Changes from Present" section to clarify that the fuel modules discussed were different from the analyses conducted by the Service: "(e.g., see the NIFC Geographic Area Coordination Web site at http://gacc.nifc.gov/rmcc/predictive/firedngr.htm)."

All placeholders were removed, including:

- Table - Acres/Percent of Fires (2009-2014) in Occupied Range by MZ
- Table - Acres/Percent of Fires (2009-2014) in Breeding Distribution by MZ
- Table - Summation of Popl'n Index in Fires (2009-2014) by MZ
- Figure – FIAT Resistance Classes (3)
  - This figure is available (not in the Species Report)
- Figure – Combined Fires with FIAT
- Table - Acres/Percent of FIAT Classes in Occupied Range by MZ
  - This table is available (not in the Species Report)
- Figure - Conservation Actions (Fire Breaks and Fuels Mgmt) overlaid on Fire perimeters by GB Regional scale

Line 367-369: The following sentences were removed because analyses were missing: "Sage-grouse within are X & X times larger than MZs III and V populations respectively. We found X% of birds were within moderate and high resistance categories across the entire Great Basin irrespective of MZs."

Additional data was received from the BLM that was not incorporated:

- On 4/29/15 Secretary Jewell announced over $4 million to protect sagebrush lands threatened by rangeland fire:
  - Idaho will receive $1.78 million
  - Nevada will receive $638,000
  - Utah will receive $811,000

    - Oregon will receive $1.03 million
- On 6/2/15 the BLM provided the Service with new plan and project info from the BLM Fire Center.
- On 6/2/15 the BLM provided the Service with draft data summarizing the status of NEPA (e.g., completed, initialized, or needed) for proposed treatments described in the five FIAT step-down assessments. Additional analyses were conducted by the Service GIS team to describe the percent of each R&R class that contained FIAT projects within the currently occupied range by MZ within the Great Basin region.
- On 6/12/15 the DOI announced $10 million in funding for projects aimed at restoring the health and fire resilience (i.e., Resistant Landscapes Collaborative). Of this ~$7.7 million was allocated to projects within the range of sage-grouse:

    - Bi-State $395,000
    - Bruneau-Owyhee $166,000
    - Greater Sheldon Hart Mountain $3,984,250
    - Southern Utah $2,605,000
    - Southwest Colorado $557,000

Invasive Plants

Updated table 6.3 – now complete

Under the Invasive Plants section, the following conclusion was removed from the "Assessment of Potential Threat" summary:

p. 77 - Based on the ability of invasive annual grasses to out-compete sagebrush and native perennial bunchgrasses, the inability to effectively control invasives once they become established, and the synergistic interaction between invasive plants and other risk factors on the landscape (e.g., wildfire, anthropogenic land use) the concerns presented by this stressor will continue and likely influence persistence of sage-grouse, particularly in the western part of the species' range.

On p. 64, reference to the percent of the modeled sage-grouse distribution impacted by invasives and Table 6-3 were removed as information was to be determined.

Citations by Lockyer 2012 needs to be updated with newly published literature: Lockyer, Z. B., P. S. Coates, M. L. Casazza, S. Espinosa, and D. J. Delehanty. 2015. Nest-Site Selection and Reproductive Success of Greater Sage-Grouse in a Fire-Affected Habitat of Northwestern Nevada. Journal of Wildlife Management DOI: 10.1002/jwmg.899.

Under the "Threat Amelioration Summary" several paragraphs were intended to be updated based information provided by the BLM via pers. comm. and in response to the datacall/CED. On 6/10/15 the Service received an update of the extent of invasive species from the BLM:

Paragraph #1 – original:

"BLM (1996, p. 6) estimated invasives (which may or may not have included Bromus tectorum in their estimate) covered at least 3.2 million ha (8 million ac) of BLM-administered lands as of 1994, and predicted 7.7 million ha (19 million ac) would be infested by 2000. However, a qualitative 1991 BLM survey covering 40 million ha (98.8 million ac) of all BLM-administered land in Washington, Oregon, Idaho, Nevada, and Utah (MZs III, IV, V, and VI) reported that introduced annual grasses were a dominant or significant presence on 7 million ha (17.2 million ac) of public lands within these five states (Pellant and Hall 1994, p. 110). An additional 25.1 million ha (62 million ac) had less than 10 percent B. tectorum in the understory, but were considered to be at risk of B. tectorum invasion (Zouhar 2003, p. 3, in reference to the same survey). More recently, BLM reported that as of 2000, noxious weeds and annual grasses occupied 11.9 million ha (29.4 million ac) of BLM lands in Washington, Oregon, Idaho, Nevada, and Utah (BLM 2007a, p. 3–28). However, when considering all States within the current range of sage-grouse, this number increases to 14.8 million ha (36.5 million ac)."

Paragraph #1 – rewrite:

A recent inventory completed in 2014 by the BLM provides gross estimated acres for 26 selected species on public lands administered by the BLM. The table below provides the state specific data for California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. Annual grasses include downy brome (cheatgrass), red brome, buffelgrass, Mediterranean grass, and medusahead rye accounting for 51,981,594, of the 77,524,925 estimated acres. This is a significant increase from the acres identified in the 2000 survey (BLM, 2000) which reported 28,775,995 acres infested with downy brome, ripgut brome, Japanese brome, red brome, Mediterranean grass, and medusahead rye in for California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming.

2014 BLM Weed Inventory Summary

State	Acres Annual Grasses[1]	Acres Other Invasive/Noxious Weeds[2]	Total Gross Estimated Acres
California	4,395,500	635,739	5,031,239
Colorado	1,567,736	445,098	2,012,834
Idaho	5,373,002	1,965,322	7,338,324
Montana	231,965	863,390	1,095,355
Nevada	25,929,222	4,571,896	30,501,118
North Dakota	0	173	173
Oregon	6,557,658	13,898,636	20,456,294
South Dakota	14	1,205	1,219
Utah	7,596,812	3,078,255	10,675,067
Washington	44,342	594	44,936

Wyoming	285,343	83,023	368,366
TOTAL ACRES	51,981,594	25,543,331	77,524,925

1. Includes downy brome (cheatgrass), red brome, buffelgrass, Mediterranean grass, and medusahead rye.
2. Other Invasive/Noxious Weeds includes bull thistle, Canada thistle, dalmatian toadflax, diffuse knapweed, dyer's woad, halogeton, hoary cress, leafy spurge, Italian thistle, malta starthistle, musk thistle, perennial pepperweed, plumeless thistle, Russian knapweed, Russian olive, salt cedar (tamarisk), scotch thistle, spotted knapweed, squarrose knapweed, yellow starthistle, and yellow toadflax.

Paragraph #2 - original:

"Areas with established annual grasses that receive less than 22.9 cm (9 in.) of annual precipitation are less likely to benefit from restoration (Connelly et al. 2004, p. 7–17, Carlson 2008b, pers. comm.). Consequently, BLM focuses most (98 percent) of their restoration efforts in areas receiving more than 22.9 cm (9 in.) of annual precipitation where there is greater chance of success. Of the BLM treatments in annual grasslands, only 10 percent of acres treated in areas receiving less than 22.9 cm (9 in.) of annual precipitation were considered to be effectively treated. In areas receiving between 22.9 cm (9 in.) and 30.5 cm (12 in.) of annual precipitation, 33.6 percent of the acres were treated effectively, and 3.3 percent of the acres were treated effectively in areas receiving greater than 30.5 cm (12 in.) of annual precipitation (Carlson 2008b, pers. comm.). Since the BLM treatments in annual grassland monocultures included both the re-establishment of native shrub and grass species and green-stripping efforts to reduce the frequency of fires in annual grassland monocultures, it is unclear how many of these successfully treated acres are attributed to restoration versus prevention."

Paragraph #2 – rewrite:

Areas with established annual grasses that receive less than 22.9 cm (9 in.) of annual precipitation are less likely to benefit from restoration (Connelly et al. 2004, p. 7–17, Carlson 2008b, pers. comm.). In 2010 it was stated that BLM focuses most (98 percent) of their restoration efforts in areas receiving more than 22.9 cm (9 in.) of annual precipitation where there is greater chance of success. Of the BLM treatments in annual grasslands, only 10 percent of acres treated in areas receiving less than 22.9 cm (9 in.) of annual precipitation were considered to be effectively treated. In areas receiving between 22.9 cm (9 in.) and 30.5 cm (12 in.) of annual precipitation, 33.6 percent of the acres were treated effectively, and 3.3 percent of the acres were treated effectively in areas receiving greater than 30.5 cm (12 in.) of annual precipitation (Carlson 2008b, pers. comm.). Using export data provided to the BLM from the Conservation Effects Database (CED) on March 2015, involving efficacy determination of treatment projects involving noxious weed/annual grasses management, 97% of the 405 projects, involving treatment of greater than 500 acres, were rated as being effective or highly likely effective. Only 3% rated as unlikely or uncertain in efficacy determination. The projects involved in the analysis represented greater than 2 million treated acres.

Paragraph #3 - original:

" If noxious weeds are spreading at a rate of 931 ha (2,300 ac) per day on BLM-administered lands (BLM 1996, p. 1), this amounts to 339,815 ha (839,500 ac) per year, which includes both suitable and

nonsuitable habitat for sage-grouse. It is unclear whether this estimate is limited to noxious weeds or if it includes other invasives (e.g., Bromus tectorum). Still, we can compare this estimate to the area of all invasives (excluding conifers) treated by the BLM between October 2005 and September 2007, which totaled 259,897 ha (642,216 ac), i.e., approximately 86,632 ha (214,072 ac) treated annually.

Paragraph #3 – rewrite:

It was stated, in 1996, that noxious weeds are spreading at a rate of 931 ha (2,300 ac) per day on BLM-administered lands (BLM 1996, p. 1), this equates to 339,815 ha (839,500 ac) per year, which includes both suitable and non-suitable habitat for sage-grouse. Weed inventories, conducted by the BLM, indicate an increase of 180% in acres infested by annual grasses such as downy brome (cheatgrass), ripgut brome, Japanese brome, red brome, Mediterranean grass, and medusahead rye between 2000 and 2014. In a 2014 BLM weed inventory, weed species included downy brome (cheatgrass), red brome, buffelgrass, Mediterranean grass, and medusahead rye increased 28,775,995 infested acres to 51,981,594 acres in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. Duncan and Jachetta cite an average rate of spread, for downy brome and medusahead rye of 14 and 12 percent, respectively. (Invasive Plants of Range and Wildlands and Their Environmental, Economic, and Societal Impacts, 2005)

Paragraph #4 - original:

The number of acres treated annually (86,632 ha; 214,072 ac) is not keeping pace with the rate of spread (339,815 ha; 839,500 ac) especially when considering the inability to treat the problem. We acknowledge that the rate of spread on BLM-administered lands also includes areas that are not sage-grouse habitat. However, the rate of spread may not have included B. tectorum and only part of the invasive treatments completed by BLM (23.6 percent of treatments in annual grassland monocultures and 7.5 percent of treatments in sagebrush with annual grassland understories) were considered to be effective by the BLM (Carlson 2008b, pers. comm.). "

Paragraph #4 – rewrite:

Currently, the BLM treats an average of 175,000 acres BLM-wide, a reduction from 2010. This equates to 0.3% of the total acres infested treated for the management of current weed populations on the public lands administered by the Bureau. 97% of the 405 projects, involving treatment of greater than 500 acres, were rated as being effective or highly likely effective. Only 3% rated as unlikely or uncertain in efficacy determination as reported earlier by the export data provided to the BLM from the Conservation Effects Database (CED) on March 2015, involving efficacy determination of treatment projects involving noxious weed/annual grasses management. The projects involved in the analysis represented greater than 2 million treated acres. The determination of efficacy is influenced by many factors, ranging from the characteristics of the proposed management site prior to, and following the management operation, whether the management operation is targeted grazing, mechanical operations, or use of an herbicide. Projects may involve the re-introduction of desirable vegetation, due to the length of time the site has been infested, of taking advantage of the current species

composition of the site and the removal of the invasive species, allowing the desirable species to re-introduce.

In addition, the BLM conducted a separate analyses on effectiveness of projects entered into the CED and concluded that the effectiveness of BLM treatments was greater than the level in the FWS summary:

- 405 projects >=500 acres with the threat of Noxious Weeds/Annual Grasses = 2,093,937 acres
- 29 of the projects listed with Effectiveness of Uncertain/Unlikely = 51,138 acres (2.4%)
- 174 of the projects listed with Effectiveness of Highly Likely = 988,006 acres (47.2%)
- 202 of the projects listed with Effectiveness of Yes = 1,054,793 acres (50.4%)

Using these acreages, the BLM found 50% of the >=500 acres Noxious Weeds threat projects were reported as being effective.

For completed projects only, the numbers only slightly improved:

- 380 completed projects >=500 acres with the threat of Noxious Weeds/Annual Grasses = 1,966,469 acres
- 25 of the completed projects listed with Effectiveness of Uncertain/Unlikely = 47,558 acres (2.4%)
- 156 of the completed projects listed with Effectiveness of Highly Likely = 871,916 acres (44.3%)
- 199 of the completed projects listed with Effectiveness of Yes = 1,046,995 acres (53.2%)

Conifer Encroachment

On pp 86-87, we state, “Furthermore, while many acres have been treated since 2010, treatments are not likely keeping pace with the current rate of conifer encroachment, at least in parts of the species range. For example, while Oregon has treated approximately 8,094 ha (20,000 ac) of juniper to restore native sagebrush habitat between 2003 and early 2008 (about 1,619 ha or 4,000 ac per year; ODFW 2008, p. 3), LANDFIRE data showed at least 106,882 ha (264,110 ac) of juniper occur within 4.8 km (3 mi) of Oregon leks. This distance (4.8 km; 3 mi) reflects the upper estimate of a typical pinyon seed dispersal event, although seeds may be dispersed shorter distances and up to at least 10 km (6.2 mi) (Chambers et al. 1999, p. 12). At this rate, it would take approximately 60 years to remove the threat of juniper encroachment within 4.8 km (3 mi) of sage-grouse leks in Oregon, assuming expansion does not continue.”

Based on new information the Service received from NRCS on 6/2/15, SGI has averaged removal of about 32,250 ac/yr in Oregon (inside PACs). On the current trajectory, NRCS believes they are on track to completely address the conifer encroachment issue on private lands in Oregon, in PACs within the decade.

Newly published literature was not incorporated: Farzan, S., D. J. N. Young, A. G. Dedrick, M. Hamilton, E. C. Porse, P. S. Coates, and G. Sampson. 2015. Western Juniper Management: Assessing Strategies for Improving Greater Sage-grouse Habitat and Rangeland Productivity. Environmental Management

DOI 10.1007/s00267-015-0521-1.

All placeholders were removed, including:

- Table X-1. Acres of conifer woodland and percent of current range, by management zone

Table missing to present Conifer totals (current acres and acres potentially at-risk). Table are available for this chapter (not in species report)

Agricultural Conversion

Figures 8-1, 8-2, and 8-3 referencing the Service's cropland conversion model are missing. All placeholders were removed, including:

- Figure 8-X: Location of known conservation programs throughout the sage-grouse range. A bi-panel showing area of high risk for conversion Figure tillage model and sg population in MZ I?]

Removed from page 54: However, based on the above model results we do not believe that new areas of conversion will have significant impacts on sage-grouse distribution in the future.

Removed from page 58: Therefore, we have to conclude that additional habitat loss and fragmentation due to future agricultural conversion may continue indefinitely.

Removed from page 59: We can no longer state that this factor will be a major cause of future habitat loss and fragmentation based on the minimal exposure of extant populations to areas suitable for crop production. Indirect effects of agricultural activities will likely continue to have negative impacts on sage-grouse near those areas, particularly in MZs I, IV and VI.

CCAA numbers need to be updated.

Non-Renewable Energy Development

Information on page 65 regarding water quality and quantity needs further development and updating.

Information on page 65 regarding gaseous emissions needs to be updated with data from the Pinedale Anticline area – available from contaminants staff in the WYESFO.

Information on the actual rates of development (p. 68) needs to be updated.

Removed from page 79: Therefore, nonrenewable energy development will continue to affect sage-grouse populations, primarily in the eastern portion of the range, but likely at a reduced level than past development.

Likelihood of Future Impacts (~p.105) several updates to text, restructured a couple sentences for clarification.

Updated Figure 9.1 with updated scenarios.

Updated development scenarios from Min, Mean, Max to Low, Baseline, and High.

Updated percentages in 'Anticipated Changes from Present'

Map and table of EXISTING development is available for this chapter (not in species report)

Map and RM Region O&G Reserve Basins is available for this chapter (not in species report)

Mining

GIS analyses and maps for this chapter are missing.

Map and table are available for this chapter (not in species report)

Renewable Energy

On p.130 – removed Figure 11-2 'solar potential' – not cited

Several citation page numbers are missing.

Several corrections to decimal points and percentages in every table.

Replaced figure 11-1, to remove wind farm symbology.

Infrastructure

Several citation page numbers are missing.

Conclusions removed from lines 4041-4042: "Therefore, the Wyoming and Idaho state plans are existing regulatory mechanisms that effectively reduce the threat of infrastructure in these States on applicable lands."

Conclusions removed from lines 4054-4056: "Therefore, state plans in Montana and Utah do not effectively reduce the threat of infrastructure on lands where they apply in these States."

Conclusion removed from lines 4111-4114: “Therefore, based on the best available science, we conclude that infrastructure continues to be a primary threat to the species by directly contributing to the destruction, modification, and curtailment of sage-grouse habitat and range (Factor A) and indirectly increasing predation (Factor C) and that these will continue to increase into the foreseeable future.”

ALL tables have been updated to reflect corrected totals rangewide.

Secondary Road tables are missing - table is available for this chapter (not in species report)

Replaced Figure 12-1, in order to remove AOI which we did not intend to display

Replaced Figure 12-3, in order to remove AOI which we did not intend to display

Replaced Figure 12-4, missing some data

Fences

On page 124 the justification for using non-species specific literature has not been made.

On page 124 the citations for Boundless and Cook need to be revised to reflect they are internet sites.

Removed from page 129: Further, we expect the presence of fences in sage-grouse habitat is likely to persist indefinitely as they are integral to the operation of the livestock grazing industry and of land development in the western U.S. Since 2010, fences have continued to be a source of mortality and injury to sage-grouse and we expect this to continue, even with threat amelioration measures in place, given the widespread distribution of fences across the range of the species.

Grazing

Table 14-1: the intersect of grazing allotments authorized with the population index is incomplete.

Removed from page 141:

- None of the individual components discussed above (loss of cover, competition for food, etc.) have been demonstrated to have population level impacts to sage-grouse, although they have undoubtedly had localized effects. Range management treatments are the exception, where negative population responses have been recorded, although a rangewide impact has not been documented. Given the inconclusive nature of the scientific literature we cannot determine an overall impact of domestic livestock grazing on sage-grouse persistence.
- We are also unable to determine if there is a change in the impact of grazing from our 2010 warranted determination

Free-roaming Equids

Information on overlap of herd management areas and actual equid distribution was updated on page 142.

Removed from page 148: This would cause a greater increase in impacts to sagebrush ecosystems and sage-grouse.

Removed from page 149: Therefore, Nevada's plan does not effectively reduce impacts associated with free-roaming equids at this time.

The "Candidate Conservation Agreements with Assurances and Candidate Conservation Agreements" section was removed because it was incorporated into the Grazing chapter and the language was not appropriate for the Free-roaming equids chapter:

"In addition to the conservation efforts described above, lands currently enrolled in CCAAs reduce equid impacts through implementation of appropriate grazing management plans (e.g., appropriate timing, location, duration, frequency, types of livestock). Approximately 0.17 percent of occupied range in MZ I, 0.78 percent of MZ II, 2.47 percent of MZ IV, and 4.67 percent of MZ V are enrolled in CCAAs in Wyoming and Oregon. Federal lands enrolled in CCAs in Wyoming, Oregon, and Idaho account for 0.04 percent of occupied range in MZ I, 0.21 percent of MZ II, 3.13 percent of MZ IV, and 4.67 percent of MZ V. See the Non-regulatory Conservation Efforts section and Table 28-7 for approximate acreages and additional information."

Under the "Threat Amelioration Summary" the following was removed:

- "However, without a broader look at the impacts on the larger landscapes of these locations, it is difficult to assess the effectiveness of these actions."

Updated Table 15-1. With corrected acreages, etc. (~p.181)

Urbanization

Removed from page 157: Consequently, we anticipate that urban and exurban development will contribute to the present and threatened destruction (i.e., direct habitat loss), modification (i.e., compounded effects from associated infrastructure, fences, predation, invasive plants, recreation, and energy development), and curtailment (i.e., fragmentation) of sage-grouse habitat and range indefinitely.

Removed from page 159: We anticipate that impacts from urban and exurban development will continue to affect sage-grouse, particularly in areas projected for increasing human population growth. However, despite the permanence of impacts, past urban and exurban development has only impacted 0.4 percent of the current range. Therefore, given the very small footprint of this type of development we do not believe urban and exurban development is a threat to sage-grouse at a MZ or rangewide scale.

Updated tables 16.2, 16.3 with corrected figures.

Recreation

Removed from page 160: Therefore, the current assessment is that recreation threats do not result in local or rangewide declines of sage-grouse.

Removed from page 161: Although there may be direct impacts to sage-grouse, it is likely that these may impact sage-grouse at an individual level rather than population level.

Removed from page 162:

- However, impacts from energy development and areas with high human densities likely have more frequent or longer duration of human presence and noise compared to recreational activities.
- Given the continuing influx of people into the western U.S. (Leu and Hanser 2011, p. 255), which is contributed to, in part, by access to recreational opportunities on public lands, we anticipate effects from recreational activities will continue to increase for the foreseeable future.

Removed from page 165: Therefore, the current assessment is that recreation does not result in local or rangewide declines of sage-grouse.

The following was removed from line 5422-5423 because the analyses were missing: "To the Service's knowledge, X areas (X percent of BLM land) within sage-grouse habitat are closed for recreational use."

Climate Change

Removed from the Threat Amelioration Summary section on page 171:

- Nonetheless, by the mid-21st century, climate change is reasonably certain to result in the loss of sagebrush habitat from MZs III, VII, and the southern portions of II and V, and possibly from low-elevation areas farther north.
- Increased winter and spring precipitation, especially in MZs I, II, IV, V, and VI, is likely to benefit growth of cheatgrass and other invasives, which can increase the potential for wildfires and displace herbaceous vegetation and insect production in drought years. An earlier and longer frost-free season will facilitate encroachment by woody vegetation which, along with increased biomass of invasive annual grasses, also results in increased fuel loads and fire risk, especially under conditions of hotter, drier summers. Increasing temperature is likely to benefit mosquito reproduction and replication of West Nile virus, and increase the risk of its transmission to sage-grouse rangewide where other necessary conditions coincide (i.e., suitable breeding habitat for mosquitos and areas such as mesic habitats where sage-grouse tend to congregate when temperature peaks in the summer).

- Based on the new science, we conclude that climate change is likely to exacerbate other major stressors to sage-grouse and their habitat. Regulatory mechanisms and conservation efforts that ameliorate the risk of wildfire and the invasion of sagebrush habitat by native conifers and by nonnative annual grasses—stressors mediated substantially by climate—may also ameliorate the impacts of climate change to sage-grouse habitat.

Several citation page numbers are missing.

All placeholders were removed, including:

- Sagebrush conditions and sage-grouse GIS overlays; Figures 17-x, 17-y, 17-z

Drought

Figure 19-1 needs to be updated to include MZ boundaries and sage-grouse range.

Removed from the Threat Summary section on page 179:

- Presently, drought is impacting individuals and some populations.
- Future drought predictions indicate that impacts will continue and may intensify, particularly for the southern portion of the sage-grouse range, potentially resulting in MZ level impacts.

Hunting

The following summary was removed from page 186:

Threat Summary

States have adopted an adaptive management approach that is structured to allow for a timely reduction or cessation of hunting pressure on populations in decline. Adaptive management requires that States maintain detailed knowledge of population size and dynamics. To date, changes in the management of sage-grouse hunting have resulted in a significant reduction in sage-grouse hunting mortality rangewide. As a result of the flexibility in managing harvest, recreational hunting at current levels likely does not pose a significant threat to the species.

On line 6135, the citation and page number for Guttery et al. needs to be updated with recently published literature: Guttery, M. R., T. A. Messmer, M. W. Brunson, J. D. Robinson, and D. K. Dahlgren. 2015. Declining populations of greater sage-grouse: hunter motivations when numbers are low. Animal Conservation doi:10.1111/acv.12213.

Only other changes in this chapter were corrections to citations and addition of citation page numbers.

Scientific and Educational Use:

The following summary was removed from page 189:
Lek viewing is limited and does not likely have any measurable rangewide impact on sage-grouse.

The only other changes made in this chapter were additions of page numbers for citations, and deletion of a sentence because the source could not be verified.

Disease

The following conclusions were removed from "Assessment of Potential Threat" section:

p. 198: Therefore, although we do not currently consider the majority of sage-grouse parasites to be threats to the species, we cannot evaluate their potential to become significant threats within the timeframe of our analysis.

Predation

One erroneous citation was removed (Sauer et al. 2014).

The following was removed:

p. 242: Likelihood of Future Impacts

Because sage-grouse are prey, predation will continue to affect the species. Where habitat is not limited and is of good quality, predation is not a threat impact to sage-grouse persistence. However, the likelihood of elevated levels of predation continuing in areas where sage-grouse habitats have been impacted is high. As more habitats face development, we expect the risk of predation to increase, possibly with negative effects on sage-grouse population trends (Howe et al. 2014, p. 46). Except in places where conservation measures (e.g., removal of anthropogenic structures, restoration of degraded habitat, etc.) are initiated, sage-grouse that exist along the fringe of the species' range or in degraded habitats are expected to experience increased levels of predation due to continued influence from anthropogenic activities (Hagen et al. 2011, p. 100).

The following conclusion was removed from "Assessment of Potential Threat" section:

Mortality due to nest predation by ravens or other human-subsidized predators is increasing in some areas, but there is no indication this is causing a significant rangewide decline in population trends.

Small Popl'ns

Added draft language and draft map.

Contaminants

The following conclusion was removed from "Assessment of Potential Threat" section:

While contaminants may impact sage-grouse individuals, it is unlikely that contaminants will lead to widespread mortality or declines in sage-grouse populations or across MZs, as contamination exposure is typically localized or sporadically occurs across the range.

Military Activities

The following conclusion was removed from the end of this chapter:

Potential impacts to sage-grouse are being mitigated to the extent practicable given the U.S. military's primary mission.

Items missing from consideration for this chapter:

1. Have not received INRMPs from Utah installations.
2. Need to clarify what installations should be included in the analyses:
    - This chapter needs to be cross-walked with regulatory mechanisms to address potential inconsistencies between chapters.
3. Need to address INEL – technically a DOE facility, but is used by the U.S. Navy
    - INL contains primary sage-grouse habitat within its approximately 800,000 acre facility boundary. Approximately 55 leks are located on the site.
    - INL entered into a CCA with FWS (ID ES FO) in 2014 to conserve 75% of the breeding males on leks on the site.
    - INL designated Sage-grouse Conservation Areas (SGCAs) with associated conservation measures similar to the measures on adjacent federal lands. SGCAs are designated as zones where infrastructure will not occur or will only occur with specific conservation measures and mitigation applied.

REGULATORY MECHANISMS

CUMULATIVE AND SYNERGISTIC IMPACTS

No changes made – these sections are incomplete.

APPENDICES

Missing three appendices from the introduction section:

- Description of the habitat variables used in the breeding habitat model (reference p. 26, Introduction);
- Description of the population index (reference p. 28, Introduction); and
- Description of the breeding habitat index (not referenced, but should be referenced in the Introduction).

The inclusion of the above Appendices will necessitate re-ordering of Appendices B-F, with concurrent changes in the text of the Introduction and Impacts sections.

Appendix F: Description of Oil and Gas Model is missing.