# Impact Summary Table: Changes Since 2010

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
|---|---|---|---|
| **Fire** | III<br>IV<br>V<br>VI | **PRIMARY THREAT** | **IMPACTS INDIVIDUALS, MAY IMPACT SOME POPULATIONS** |
| | | • In 2010, we concluded that fire is one of the primary factors linked to population declines of sage-grouse.<br>• We found that the regulatory and non-regulatory conservation approach to ameliorating the threat of wildfires was appropriate and significant. | • Our knowledge of wildfire as an ecological process and how it impacts sage-grouse has not changed significantly since our 2010 finding.<br>• Fires are larger and more frequent, and the positive feedback loop between cheatgrass and fires facilitates future fires.<br>• From 1984 to 2013, the total area burned in the Great Basin has increased, and all three FIAT classes burned equally compared to the proportion available.<br>o Habitats are lost to wildfire faster than they recover.<br>• Since 2010, our partners have updated and developed wildfire management strategies and planning tools, including the FIAT and the Secretarial Order. These are non-regulatory conservation efforts.<br>o The extent to which these regulatory and non-regulatory mechanisms may alleviate the impact of wildfire on sage-grouse is unknown in the absence of implementation, but we continue to believe that this strategic approach to address fire is appropriate and significant. |
| **NOTES:** | | | |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
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| **Invasive Plants and Annual Grasses** | All | **THREAT** | **IMPACTS INDIVIDUALS, MAY IMPACT SOME POPULATIONS** |
| | | • In 2010, we found that invasives were a serious threat rangewide and one of the highest risk factors for sage-grouse. | • Since 2010, more literature addresses the negative effects of invasives on the distribution and abundance of sage-grouse at local and landscape scales.<br>• Since 2010, there has been a significant increase in control and prevention activities and more efforts to raise public awareness regarding invasive plants.<br>o Some noxious weed control efforts are successful at small scales, but early detection and fire prevention are the only available tools to prevent or minimize the loss of habitats from invasive plants at important landscape scales.<br>• Because invasive annual grasses outcompete native vegetation and interact synergistically with other impacts, such as wildfire and anthropogenic land uses, and cannot currently be controlled once established, invasive plants will likely continue to influence the persistence of sage-grouse, particularly in the western part of the species' range.<br>• We anticipate invasive plants and associated wildfires will occur on the landscape for the next 100 years or more. Noxious weeds will likely continue to influence the persistence of sage-grouse in the future, particularly in the Great Basin. |
| **NOTES:** | | | |
| **[illegible]** | | **NOT A RANGEWIDE THREAT** | **NO CHANGE: IMPACTS INDIVIDUALS AND SOME POPULATIONS** |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
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| | III VI V (locally rangewide) | • In 2010, we determined that although conifer was found throughout the range, conifer encroachment was not a rangewide threat to the sage-grouse. | • Although conifer encroachment is generally more of a problem in the western portion of the range (MZs III, IV, and V), it is less of a concern in the Rocky Mountain States (MZs I, II and VII), including Wyoming and Montana.<br>• Since 2010, our partners have used a variety of techniques to remove conifers from sage-grouse habitats.<br>o Since 2010, SGI has cut invasive conifer from 405,241 acres. Approximately 84 percent of the removal effort was focused in the Great Basin.<br>o The Great Basin appears to be more susceptible to conifer encroachment than other portions of the range.<br>• Based on past trends and the current distribution of conifers relative to sagebrush habitats, conifers will continue to expand at varying rates and continue to reduce habitats within the western part of the sage-grouse range, especially in MZs III, IV, and V. |
| **NOTES:** | | | |
| **a 1** | | **PRIMARY THREAT** | |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
|---|---|---|---|
| | I<br>IV<br>VI | • We identified agricultural conversion as one of the three primary factors reducing and fragmenting sage-grouse habitats in the 2010 Finding.<br><br>• Agricultural conversion shaped the current sagebrush ecosystem by affecting the past distribution, population numbers, and connectivity of sage-grouse. | • Since 2010, there has been no restoration of lost habitat due to agricultural conversion<br><br>• We received no new information on the rate or amount of habitats converted to agriculture since 2010.<br><br>• A new modeling effort has more precisely identified the extent and future exposure of sage-grouse to agricultural conversion.<br>o Most lands suitable for supporting crops have already been converted.<br>o In MZ I future risk exposure appears minimal.<br>o In MZ IV, it is possible that some private lands could be converted to agriculture, but no data on risk.<br>o Land ownership patterns may minimize the risk<br><br>• Since 2010, our partners have established many conservation easements to prevent conversion to agriculture, but their efficacy has been not assessed.<br>o Easements may help reduce impacts associated with agricultural conversion, but they are not currently in the "correct" areas.<br><br>• Proposed regulatory mechanisms would likely reduce impacts associated with agricultural conversion on Federal lands.<br><br>• Future impacts associated with agricultural conversion do not appear to be significant. |
| **NOTES:** | | | |
| **ne rg** | | **PRIMARY THREAT** | **IMPACTS INDIVIDUALS AND SOME POPULATIONS** |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
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| | I<br>II<br>VII | • We identified nonrenewable energy development as one of three primary factors resulting in the loss and fragmentation of sage-grouse habitats in the 2010 finding. | • Energy development is anticipated to continue to grow in areas that overlap with sage-grouse<br>• Energy development continues to be a management challenge for sage-grouse conservation.<br>• Extraction techniques continue to evolve, and in some areas the result has been a reduction of both direct and indirect impacts.<br>• Some types of extraction cannot reduce their footprint due to geology.<br>• New regulatory mechanisms are shifting some of the impact out of sage-grouse areas.<br>o Since 2010, the Wyoming Core Area Strategy and the BLM's proposed land use allocation decision have reduced impacts.<br>• A new modeling effort has more precisely identified the extent of the impact.<br>o Land use allocations and conservation efforts are clearly helping to reduce impacts<br>o Exposure to energy development reduces sage-grouse resilience.<br>• Nonrenewable energy development will continue to have negative impacts on sage-grouse, primarily in the eastern portion of the range |
| **NOTES:** | | | |
| **.in .in** | | **IMPACTS INDIVIDUALS, MAY IMPACT SOME LOCAL POPULATIONS** | **IMPACTS INDIVIDUALS, MAY IMPACT SOME POPULATIONS** |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
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| | All | • Surface coal mining and associated activities have negative short-term impacts on sage-grouse population numbers and habitats near mines.<br>• Sage-grouse will return to mined areas after mining, but there is no evidence that population levels will reach previous sizes.<br>• Could reduce local sage-grouse populations. | • No change since 2010.<br>• Mining may impact sage-grouse in specific areas where the target minerals are located.<br>• Regulatory: Federal agencies have discretionary authority over most mineral exploration and production but little discretionary authority over locatable minerals & notice–level activities.<br>• Range-wide, direct disturbance footprints from mineral mining vary locally or regionally from very large to very small, but indirect effects from mining are generally large.<br>• Difficult to predict future mining use, but generally mining production has remained stable for the last decade.<br>• Future mining impacts to sage-grouse will be primarily determined by the location of the minerals with the range.<br>• Mining will continue to provide incremental impacts to sage-grouse populations or regional groups of populations and their habitat, and to interact with other impacts, such as energy development, infrastructure development, etc.) |
| **NOTES:** | | | |
| **Ener gy** | I<br>II<br>III | **NOT A RANGEWIDE THREAT** | **IMPACTS INDIVIDUALS, MAY IMPACT SOME POPULATIONS** |
| | | • In 2010, we concluded that renewable energy did not significantly | • Renewable energy development is increasing, primarily in MZs I and |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
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| | | contribute to the destruction, modification, or curtailment of habitat & range for the sage-grouse . | II, III, and is tied to tax incentives in Idaho and California and state energy goals in Colorado and Nevada.<br>• New research shows decreases in nest and brood survival near turbines (Lebeau *et al*. 2014).<br>• The BLM has restricted wind right-of-ways inside PAC/IPA in most MZs.<br>• Renewable energy development likely impacts sage-grouse populations. Federal regulations do not appear to be applied outside of the PAC/IPAs (PHMAs), and would likely have similar impacts of infrastructure (power lines) in those areas.<br>• Primarily from wind development, renewable energy likely impacts local populations. |
| **NOTES:** | | | |
| **Fences** | All | **THREAT** | **IMPACTS INDIVIDUALS, NOT POPULATIONS** |
| | | • In 2010, we grouped fences with roads, communication towers, and | • Since 2010, new research shows that fence marking can reduce |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
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| | | powerlines under Infrastructure, which concluded that linear structures:<br>o Encouraged the presence of raven;<br>o Fragmented habitats; and<br>o Contributed to the destruction, modification, or curtailment of habitat. | collisions by approximately 83 percent, but it is unlikely to eliminate it.<br>o Potential population level repercussions of reduced collisions not well understood.<br>o A fence Collision Risk Tool is now available to identify high risk areas for collisions between sage-grouse and fences. This tool helps prioritize fence marking projects.<br>o There is no new research on indirect threats from fences.<br>• We lack data on the location and density of fences across the species range.<br>o There is no standardized geodatabase on fencing.<br>• There is no evidence to indicate that fences impact more than individual sage-grouse. |
| **NOTES:** | | | |
| **Range land** | All | **MAY IMPACT SOME POPULATIONS** | **MAY IMPACT INDIVIDUALS AND SOME POPULATIONS** |
| | | • Historical grazing by domesticated livestock, coupled with severe drought, | • No change since 2010. |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
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| | | impacted sagebrush ecosystems.<br>• Livestock grazing is the most pervasive land use across the range of the sage-grouse.<br>• Well-managed grazing may be conducive to sage-grouse, but overgrazing may impact sage-grouse by removing and fragmenting habitats.<br>• Difficult to link grazing impacts to population-level effects, but "the potential for population-level impacts cannot be ignored." | • Federal planning efforts may reduce impacts from poorly managed grazing. |
| **NOTES:** | | | |
| **Roaming** | II<br>III<br>V | **POTENTIAL FOR POPULATION-LEVEL IMPACTS** | **IMPACTS INDIVIDUALS AND SOME POPULATIONS** |
| | | • In 2010, approximately 36,000 free-roaming equids occurred in 10 Western | • Today, approximately 57,000 free-roaming equids occur on BLM- and |

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| | | States on BLM-managed lands.<br>• In 2010, Free-roaming equids impacted approximately 12 percent of the sage-grouse's range.<br>• In 2010, free-roaming equid population on BLM-managed lands was approximately 134 percent of the recommended maximum appropriate management level (AML). | FS-lands, or a 58 percent increase since 2010.<br>• Free-roaming equids impact approximately 12 percent of the sage-grouse's current range.<br>• The current population of free-roaming equids is double the recommended appropriate management level (AML) and is increasing.<br>• Nevada is home to half of the free-roaming equids, and MZs II, III, V are more heavily impacted than in other MZs.<br>• BLM is limited in management options to control equid populations. Without additional management actions by BLM, FS, and other entities, the impact of free-roaming equids will increase**.** |
| **NOTES:** | | | |
| **Exurban Devel** | All | **THREAT**<br>• Urban and exurban development contribute individually and collectively to | **IMPACTS INDIVIDUALS AND SOME POPULATIONS**<br>• Since the 2010 12-month finding, the NRCS has enrolled more |

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| | | the present and threatened destruction, modification, and curtailment of sage-grouse habitat and range. | than 450,000 acres within the species' current range in permanent conservation easements, protecting these lands from future development.<br><br>• Urban and exurban development directly impact between 0.2 percent to 1 percent of the various MZs. Approximately 0.4 percent of the species' current habitat is impacted rangewide.<br><br>• Urban and exurban development is considered the primary stressor to the Eagle-South Routt and Middle Park sage-grouse populations in Colorado (Wyoming Basin MZ 2). However, we conclude that, by itself, urban/exurban development is not a threat at a management zone or rangewide scale.<br><br>• Urban/exurban development exacerbates several other stressors including: infrastructure, fences, predation, invasive species, and recreation. |
| **NOTES:** | | | |
| **Recreation** | All | **NOT IMPACTING LOCAL POPULATIONS OR RANGEWIDE** | **IMPACTS INDIVIDUALS** |
| | | • No evidence that recreational activities impacting sage-grouse populations. | • No change since 2010. |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
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| | | | • Recreational use impacts from lek viewing are negligible<br>• Recreational activities in GRSG habitat occurs across the range, unlikely that these have large-scale impacts on GRSG populations<br>• BLM and FS plans will likely play role in reducing impact of OHVs<br>• No major changes since 2010. |
| **NOTES:** | | | |
| **Climate Chan** | | **INFLUENCES OTHER THREATS** | **REPLACE THIS TEXT WITH A SUMMARY OF THE CONCLUSION** |
| | | • Climate change plays a potentially important role in intensifying some of | • Enter text here. |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
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| | | the current significant threats to the species.<br>• The long-term impacts from climate change on sage-grouse has yet to be determined, but a warming climate may increase invasive species, fire frequency and severity, and WNv outbreaks.<br>• Will likely exacerbate existing primary threats. | |
| **NOTES:** | | | |
| **Drought** | | **NOT A RANGEWIDE THREAT** | **IMPACTS INDIVIDUALS** |
| | | • Drought is pervasive throughout the sagebrush ecosystem, and drought historically reduced populations of sage-grouse.<br>• Drought is only a limiting factor where habitats have been impacted by | • No change since 2010<br>• Future impacts to sage-grouse from drought are likely to increase from climate change and increasing demand for water. |

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| | | other factors. | • Since 2010, climate models have continued to predict increased drought risk, including potential for decade and multidecadal scale drought within the GRSG range<br>• Difficult to completely ameliorate drought impacts, through proper grazing and water management reduces impacts on sage-grouse.<br>• Current levels of drought unlikely to have large-scale impacts on sage-grouse populations, but increased drought severity and duration, combined with additional stressors may result in impacts on populations in the future, especially within the southern Management Zones. |
| **NOTES:** | | | |
| **Scientific and Education** | All (closures) | **NOT A THREAT** | **IMPACTS INDIVIDUALS, MAY IMPACT SOME LOCAL POPULATIONS** |
| | | • Overuse of sage-grouse for commercial, recreational, or scientific purposes is not resulting in rangewide population declines. | • The decade average annual hunting mortality is 34 percent lower than the previous decade as a result of both management actions and a decrease in hunter participation. |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
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| | | | • Recreational hunting not driving population dynamics on a rangewide basis.<br>• Negative impacts on local populations have been demonstrated.<br>• All states have more conservative hunting seasons and use adaptive management approaches to react to population declines. |
| **NOTES:** | | | |
| **Disease** | All | **IMPACTS INDIVIDUALS, NOT A RANGEWIDE THREAT** | **IMPACTS INDIVIDUALS AND SOME SMALL ISOLATED POPULATIONS** |
| | | • Except for WNv, few diseases have reduced population levels of sage-grouse.<br>• WNv occurs rangewide, and is likely a "locally significant mortality | • No change since 2010.<br>• WNv is not currently a significant, rangewide threat to sage-grouse. |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
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| | | factor," but a complex set of environmental and biotic conditions that support WNv's infectious cycle must coincide for an outbreak to occur.<br>• The patchy distribution of the disease is minimizing rangewide impacts. | • WNv will remain a localized threat to sage-grouse, esp. small, isolated populations<br>• Other threats to sage-grouse could exacerbate impacts of WNv in the future |
| **NOTES:** | | | |
| **Predation** | | **NOT A RANGEWIDE THREAT** | **IMPACTS INDIVIDUALS AND MAY IMPACT SOME POPULATIONS** |
| | | • Except in localized areas where habitat is compromised, we found no evidence to suggest that predation is limiting sage-grouse populations.<br>• Landscape scale fragmentation is likely contributing to increased predation of the species. | • Where habitat is not limited or fragmented, predation is not likely a contributing factor to declining sage-grouse populations.<br>• No new evidence suggesting a range-wide impact from predators.<br>• "New" predators may be shifting the predator-prey dynamic. |

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| | | | • Predation is synergistic with other factors that fragment habitat or increase human activities. |

**NOTES:**

| | | NOT A THREAT | IMPACTS INDIVIDUALS |
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| **Contaminants** | | • In 2010, we determined that impacts associated with contaminants would continue indefinitely, but that there was no evidence that contaminants resulted in local or range-wide declines | • Our assessment of contaminants has not changed since 2010.<br>• Contaminants impacts individual sage-grouse at local scales and sporadically though time.<br>• Conservation measures and best management practices are important to help reduce potential impacts to sage-grouse from contaminants.<br>o Conservation measures include placing and managing |

| IMPACT | MZ | SUMMARY OF 2010 FINDING | CHANGES SINCE 2010 |
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| | | | sources of contamination outside of sage-grouse habitats.<br><br>• Contaminants do not cause widespread mortality or declines in sage-grouse populations across management zones (MZ). |
| **NOTES:** | | | |