Chapter 10: Mining

Mining activities have occurred throughout the range of sage-grouse since the mid-1800s (Legends of the West 2014, p.1; Nevada Mining Association 2015), and continue today (American Mining Association 2014). Historically mining in the West used both hand and mechanical tools; the advent of new methods in the late 19th century facilitated the expansion of mining activities~~., and introduced additional negative impacts such as vehicle noise and collisions.~~ Currently, surface and subsurface mining activities, extracting at least 50 mineral products ((Minerals Education Coalition 2015, National Mining Association 2014a), are conducted in all 11 States across the sage-grouse range.

~~There are at least 50 minerals mined throughout the range of the sage-grouse (Minerals Education Coalition 2015, National Mining Association 2014a; Table X-1).~~ Mining is generally divided into three categories based upon the type of mineral extracted (i.e., locatable, leasable, and salable minerals); each type with its own regulations. The extent of mining for any individual mineral varies widely, ~~and ranges from a single mine per State (e.g., lithium) (USGS 2013c, p.94) to many (e.g., coal).~~as does the size and activity of ~~Additionally~~, individual mines ~~vary in size and activity levels,~~ making~~which make~~ generalizations of impacts difficult~~. to quantify.~~

~~Table X-1: Minerals and Elements Mined in Sage-Grouse Range~~

~~MINERALS~~		
~~Andesite (BP)*~~	~~Crushed Stone~~	~~Phosphate Rock~~
~~Antimony (BP)*~~	~~Diatomite~~	~~Platinum (BP)*~~
~~Arsenic (BP)*~~	~~Diorite~~	~~Potash~~
~~Asbestos~~	~~Dolomite (limestone)~~	~~Pumice~~
~~Aurichalicite~~	~~Feldspar~~	~~Quartzite~~
~~Barium~~	~~Galena (BP)*~~	~~Salt~~
~~Basalt (stone)~~	~~Gold~~	~~Sand & Gravel~~
~~Bentonite~~	~~Gypsum~~	~~Sandstone~~
~~Beryllium~~	~~Iron~~	~~Selenium~~
~~Calcite (limestone)~~	~~Lead~~	~~Shale~~
~~Clays~~	~~Limestone~~	~~Silver~~
~~Coal~~	~~Lithium~~	~~Sodium Carbonate (Soda Ash)~~

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~~Cobalt~~	~~Mercury (historical)~~	~~Sulfur~~
~~Conglomerate (borates)~~	~~Molybdenum~~	~~Talc~~
~~Conglomerate (sand & Gravel)~~	~~Nickel (BP)*~~	~~Uranium~~
~~Copper~~	~~Perite~~	~~Zeolites~~
~~Creedite~~	~~Phosphate Rock~~	~~-~~
~~* BP = by product contained in other minerals; Sources: Minerals Education Coalition, USGS (various)~~		

Current impacts

Surface and subsurface mining for mineral resources results in direct loss of sagebrush habitats. The amount of direct habitat loss varies widely with the type and size of mine, ranging from many thousands of acres for large industrial mines (e.g., coal, copper, gold, trona) to 10 acres or less for smaller operations (e.g., gravel and sand). The direct impact from surface mining is typically greater than it is from subsurface mining. Habitat loss from mining can be exacerbated by the storage of overburden (soil removed to reach subsurface resources) in otherwise undisturbed habitat. If the construction of mining infrastructure is necessary, additional loss of habitat could result from associated infrastructure common to all types of mines, including haul and access roads and fences which can pose collision risks to sage-grouse.

~~Depending on the resource being mined, however, a variety of additional support structures may be constructed including but not limited to buildings, equipment staging areas, waste rock disposal areas, railroad tracks, transformers and distribution power lines, heap leach pads, processing ponds and plants, tailings storage facilities, water supply wells and delivery/storage systems.~~

Indirect impacts from mining activity include degradation and fragmentation of the area surrounding the mine. The habitat quality of the surrounding area is reduced for sage-grouse through increased levels of human activity, disturbance and noise from traffic, increased dust, reduced air quality, changes in

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vegetation and topography, and increased abundance of predators (Moore and Mills 1977, entire; Brown and Clayton 2004, p. 2). Blasting, to remove overburden or the target mineral and seismic surveys to locate minerals also produce noise and ground shock. The full effect of ground shock on wildlife is unknown, but repeated use of explosives during the breeding season could potentially result in lek or nest abandonment (Moore and Mills 1977, p. 137). ~~In addition, sage-grouse and nests could be directly affected by trampling or vehicle collisions.~~ Noise from mining activity could mask vocalizations resulting in reduced female attendance and yearling recruitment as seen in sharp-tailed grouse (*Pedioecetes phasianellus*) (Amstrup and Phillips 1977, pp. 23, 25–27; Recent research has demonstrated that sage-grouse are sensitive to noise (Blickley *et al* 2012, p. 467). ~~Leks exposed to noise typical of oil and gas development, intermittent traffic, and relatively continuous drilling noise (at 70 decibels), showed a significant decline in male and female lek attendance (Blickley *et al* 2012, pp. 465, 467). The magnitude of decline differed by noise type; traffic noise had a more negative impact on lek attendance than drilling noise. Chronic noise (from either source) increased stress hormone levels and masked the male vocalizations that females use to locate leks and assess potential mates (Blickley *et al* 2012, p. 5; Blickley and Patricelli 2012, pp. 30–32; Koch *et al*. 2015, pp. 353–357).~~ Noise from mining activities, which includes traffic noise, could have similarly negative impacts on sage-grouse. Amstrup and Phillips (1977) found that coal mining activities produced considerable noise that was continuous across days and seasons and did not diminish as it traveled from its source. Maximum and mimimum noise levels recorded at distances of almost 0.5 km (0.3 mi) were 83 and 28 decibels, respectively (Amstrup and Phillips 1977, p. 24), which exceed recommendations of no more than ambient noise plus 10dB to minimize impacts to sage-grouse (Patricelli et al. 2013, p. 124). Habitat loss and fragmentation could preclude seasonal habitat movements (Connelly *et al*. 2011b, pp. 82–83; Knick and Hanser 2011, entire).

~~An increase in human presence potentially exposes sage-grouse and other wildlife to pathogens introduced from septic systems and waste disposal (Moore and Mills 1977, pp. 114–116, 135).~~ Mining operations can contribute contamination to water sources in sage-grouse habitat as a result of blasting chemicals (ammonium nitrate, fuel oil) or metal leachate from waste rock or overburden (Moore and Mills 1977, pp. 115, 133; Adams and Picket 1998, p. 486; Ramirez and Rogers 2002, p. 434–435). Altering of water regimes could lead to decreased surface water and eventual habitat degradation from wildlife or domestic livestock concentrating at remaining sources. ~~Sage-grouse do not require water other than what they obtain from plant resources (Schroeder *et al*. 1999, p. 6); therefore, local water quality deterioration or dewatering is not expected to have population-level impacts.~~ Degradation of riparian areas~~, however, could~~ resulting in a loss of brood habitat. Alternatively, creation of settling ponds could provide breeding areas for mosquitos and increase the risk of West Nile virus (Walker and Naugle 2011, p. 141; see ***Disease*** section).

~~The specific type and magnitude of impacts from mining will vary with the mining technique and the size of the operation. Impacts typically increase with the size of the mine. All types of mines occur within the range of sage-grouse and include tunnel (subsurface) mines, open pit mines, placer mines and~~

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~~surface sediment mines. Direct impacts from mining result in a lowering of populations by direct mortality or a decrease in population fitness or size by limiting the habitat availability. Other direct impacts include a reduction in lek attendance due to noise (Blickley and Patricelli 2012, entire, 2013, entire, Blickley *et al.* 2012, entire). The presence of tall structures providing nesting and perching sites for avian predators (Baruch-Mordo *et al.* 2013, entire; Connelly *et al.* 2000, entire; Connelly *et al.* 2011a, p. 65), the potential for providing breeding areas for mosquitos in new settling ponds that could carry West Nile virus (Walker and Naugle 2011, p. 141), or a potential reduction in fitness by interference with seasonal movement patterns (Connelly *et al.* 2011b, pp. 82–83; Knick and Hanser 2011, entire) are all potential indirect impacts~~

Few studies have specifically examined the impact of mining on sage-grouse. Male lek attendance declined at leks within 2 km (1.3 mi) of three active surface coal mines ~~However, in a study~~ in North Park, Colorado. ~~, male attendance declined at leks within 2 km (1.3 mi) of three active surface coal mines~~. One lek became inactive and the others declined, likely as a result of declining recruitment of juvenile males~~; i.e., no yearling males were trapped on these leks in 1982–1983~~ (Braun 1986, pp. 228–229; Remington and Braun 1991, pp. 131–132). ~~A new lek formed 4 km farther from one of the disturbed leks and it was hypothesized this new lek might be an alternate site for recruitment of yearlings from the disturbed lek (Remington and Braun 1991, p. 132)~~. ~~Additionally, t~~Two leks that were abandoned adjacent to mine areas were reestablished when mining activities ceased or were operating at greatly reduced levels, suggesting disturbance rather than habitat loss was the limiting factor (Remington and Braun 1991, p.132). Those leks never achieved pre-disturbance lek numbers ~~e two leks, however, only partially recovered; during an approximately 15-year period one lek went from 144 to zero to 49 males, the other went from 94 to five to 62 males~~ (Remington and Braun 1991, pp. 130–131).

Female survival and nest success did not appear to be negatively impacted in a population of sage-grouse near large surface coal mines in northeast Wyoming (Brown and Clayton 2004, p. 1). However, the authors concluded that continued mining would result in fragmentation and eventually impact sage-grouse persistence if adequate reclamation was not employed (Brown and Clayton 2004, p.16). The lek complex monitored for this study was later classified as destroyed as it was eventually excavated as a result of mining activity (USFS 2007, p. 27). Local sage-grouse populations could decline if several leks are affected by coal mining, but the loss of one or two leks in a regional area is not likely to limit local populations (Hayden-Wing Associates 1983, p. 81).

Quantifying how many leks have been lost rangewide due to mining is difficult because the information is not available in published literature, and is instead, anecdotal or only available from the mining companies that did the original work (Braun 1986, p. 227). For example, the Southwest Wyoming Local Sage-grouse Working Group (2013, p. 62) reported that all of the mine sites in southwest Wyoming overlapped with sage-grouse habitat and historical leks near heavily impacted areas had been destroyed or become unoccupied. As of 2006, eight leks within the Powder River Basin coal mining area were classified as destroyed due to coal mining activity (Northeast Wyoming Sage-grouse Working Group 2014, p. 139). Walker *et al.* (2007, p. 2648) excluded 4 leks "known to have been destroyed by coal

mining" from their analysis on impacts to sage-grouse from coal bed methane. ~~In more recent years, as concern for the conservation status of sage-grouse has increased, reporting of this type of impact has become standard, but rangewide the information is lacking and we are unaware of any comprehensive examination of leks lost directly to mining.~~

Unlike research on impacts from mining, there is a substantial amount of information on the impacts of oil and gas development on sage-grouse. Research on oil and gas development has shown significant negative impacts to sage-grouse (avoidance, decreased recruitment, decreased survival; see ***Oil and Gas***, pp. X–X). Because the mechanisms for potential impacts from mining are likely similar to those for oil and gas (e.g., fragmentation, increased noise, road traffic, infrastructure, human activity), we expect similar negative impacts to sage-grouse in areas developed for mining of other minerals.

We recognize, however, that although mechanisms for impacts are similar, they may not be entirely representative of the direct and indirect impacts for various mining techniques. For example, large individual mines and their associated infrastructure can be concentrated in a relatively small area in comparison with more dispersed oil and gas development. However, there is some evidence that the spatial configuration of development on the landscape can have biological consequences for sage-grouse (Doherty 2008, p. 79; Gregory and Beck 2014, p. 7). Areas of dense mine development with many closely situated mines exist in the occupied range of sage-grouse, which makes the potential for impacts in these areas high.

Restoration of sage-grouse habitats following mining is challenging due to the changes in micro-climate and topography resulting from surface mining. Additionally, mine restoration on private lands is dictated by the surface owner, often resulting in permanent habitat conversion if returning to sage-grouse habitat is not the desired condition. In sagebrush areas where restoration to pre-existing habitat conditions is desired, ~~and rehabilitation of mine sites continues to be problematic. Sagebrush habitats are slow growing, not fire resistant, and subject to invasive plants. Because sage-grouse conservation is a concern for many western states, however, there has been a growing focus on reclamation strategies that will benefit sage-grouse. R~~reclamation seed mixtures typically ~~now more frequently contain mixtures of seeds that~~ include native forbs and sagebrush. There have been some limited successes in sagebrush re-~~shrub~~establishment~~. For example, in 2010 Cloud Peak Energy received the National Excellence in Surface Mining and Reclamation Award from the Office of Surface mining for their successful shrub establishment project on reclaimed lands in northeastern Wyoming.~~, and w~~W~~e anticipate that restoration techniques for sagebrush habitats will be further improved as the science improves. ~~becomes better understood, but c~~Currently recovery of impacts from mining is slow, and often not fully successful.

~~BLM has limited the level of disturbance until a proportional amount of the land is reclaimed. For example, if 65 ha (160 ac) is part of a locatable claim area available for mining, only 10 to 20 percent is active at any one time, rather than the entire claim.Mining activities on Federal lands, and their target minerals, vary in location.~~

Location and extent

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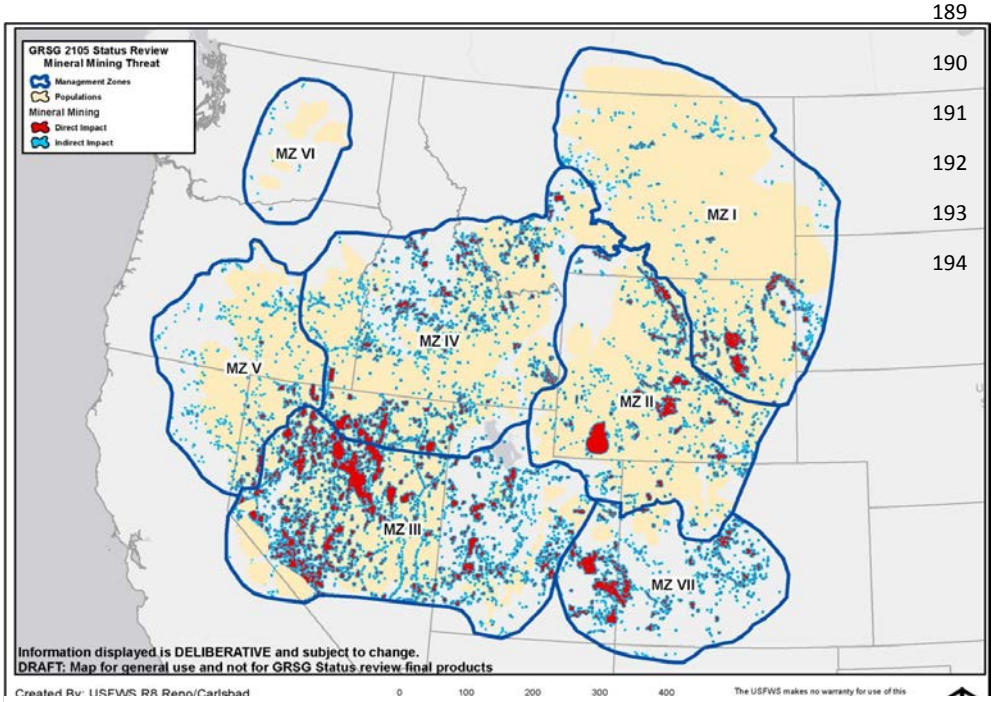
Minerals are not distributed evenly across the sage-grouse landscape. For instance, coal and uranium, mining are more prevalent in Wyoming and Montana (MZs I and II), while gold and other hard rock mining is more common in Nevada and Utah (MZs III, IV and VII). Coal is primarily found in the Rocky Mountain States while lithium has been mined exclusively in Nevada (although a more recent discovery has been made in southwestern Wyoming (Mining.com 2014). Precious metals, while being mined to some degree in all 11 states across the sage-grouse range, primarily occur in Nevada and Colorado (USGS 2013b). As a result, depending upon the type of mineral, the associated mining activities tend to be localized or regional, and their impacts likewise tend to be similarly localized.

~~The Conservation Objectives Team report (USFWS 2013, Table 2, pp. 16–29) indicates MZ VI as the only MZ without known mining activity. In the remaining six MZs, mining was characterized as present and widespread for areas occupied by 18 of the 39 populations (USFWS 2013, Table 2, pp. 16–29). An additional seven populations are indicated as having some localized mining activities, but at a potentially low level. Coal production continues to represent a significant mining activity, primarily in Wyoming and Montana (Braun 1998. p. 5, USGS 2013a, p. 74). Coal mining also occurs in Colorado, Utah, and North Dakota, but to a lesser degree.~~ Currently non-coal mining activities are primarily impacting Management Zones II, III, IV, and VII ~~(Tables 1-3 and 1-4)~~. Coal mining is exclusively impacting Management Zones I, II, III, and VII ~~(Table 1-2)~~

PLACEHOLDER FOR GIS ANALYSES AND MAPS. Until these analyses are received we cannot assess the actual impact of mining on sage-grouse.



~~Figure X-4: Location of Mining Activities[1] in Sage-Grouse Management Zones[2]~~

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[1]. [1]Represents a combined data layer of locatable, non-energy leasable, saleable – excludes coal.

[2] Actual sizes of impact areas are exaggerated to enhance visualization of smaller sites.

(NOTE: The following tabular data and graphic above are preliminary, and are currently being revised by the GIS team)

Table X-2: Summary of Present Day Mining (all types excluding geothermal, oil & gas, and coal)

Management Zone	Total Acres	Acres Directly Impacted	%
I	86,778,743	803,156	0.93
II	60,277,823	1,955,239	3.24
III	78,519,688	5,840,233	7.44
IV	79,976,963	2,268,147	2.84
V	40,175,611	313,979	0.78
VI	15,992,753	966	0.01
VII	38,693,518	1,486,477	3.84
Overall:	400,415,099	12,668,197	3.16

Table X-3: Summary of Present Day Coal Mining

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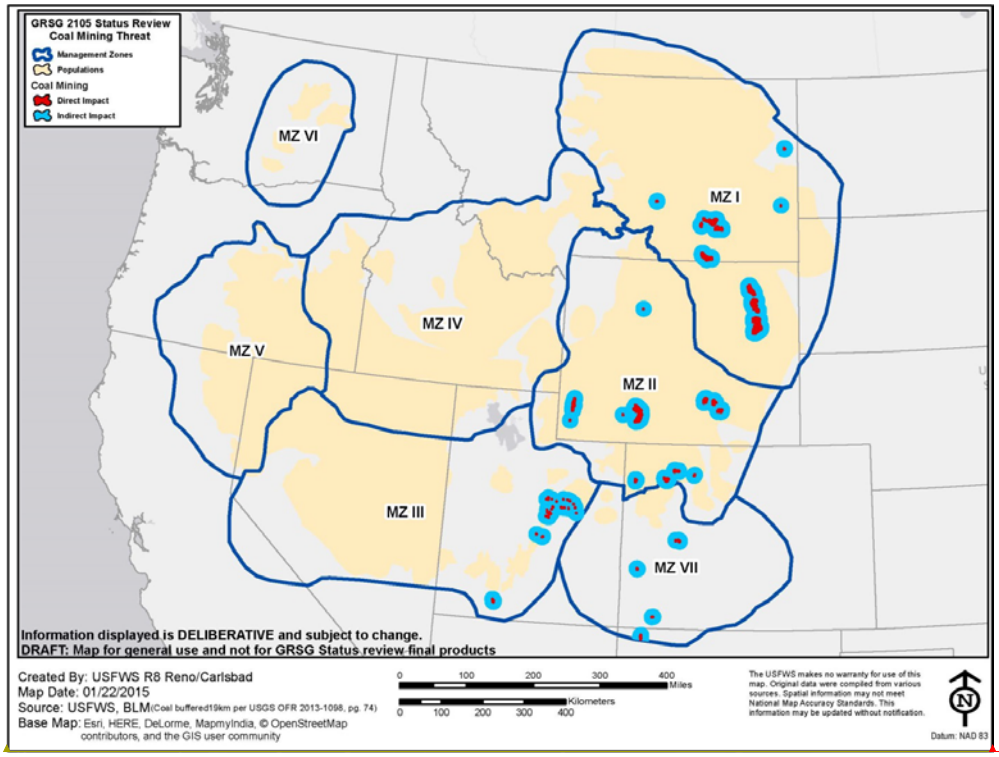
Management Zone	Total Acres	Acres Directly Impacted	%

Management Zone	Total Acres	Acres Directly Impacted	%
I	86778743	246201	0.28
II	60277823	71799	0.12
III	78519688	3108	0
IV	79976963	0	0
V	40175611	0	0
VI	15992753	0	0
VII	38693518	2593	0.01
Overall:	4E+08	323701	0.08



~~***Figure X-5: Location of Present Day Coal Mining in Sage-Grouse Management Zones***~~

~~***1. Actual sizes of impact areas are exaggerated to enhance visualization of smaller sites; includes permit application data.***~~

~~***(NOTE: The foregoing tabular data and map are preliminary, and are currently being revised by the GIS team)***~~

~~***projected Future impacts***~~

~~*Timescale for Projecting this Threat*~~

~~***It is anticipated that mining activities within the range of the sage-grouse will continue indefinitely.***~~

Likelihood of future impacts

Market prices for any specific mineral commodity ~~can~~ vary greatly making projections of continued and new mining activities difficult. ~~As such, the extent of mining activities tends to fluctuate with the return on the investment. This makes accurately predicting the future impacts of these activities difficult. We anticipate that impacts will continue on the same trajectory we have witnessed in the recent past.~~ The overall extent of mining activity in the U.S. has remained fairly consistent over the past five years

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Comment [DMD7]: Is this in conflict with O&G or the 2010 finding for energy development which cites a minimum of 50 years?

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(National Mining Association 2014b), although coal production, including the mines within the range of sage-grouse has generally declined since 2008 ((EIA 2015a, Table 6.1). We anticipate that mining will minimally remain a continuous activity with the range of sage-grouse indefinitely. However, the intensity of mining will vary locally depending on the extent of the desired mineral resource, development of new mining techniques, and market conditions.

~~*Anticipated changes from present*~~

~~***Although the need for any specific mineral can vary from year to year, and barring major economic downturns, the overall extent of mining activity in the U.S. has remained fairly consistent over the past five years (National Mining Association 2014b).***~~

~~***Overall coal production in the U.S. has generally declined over the past nine years (Figure 1-9). After reaching a high production level of 1.17 billion metric tons in 2008, it has consistently declined to a value of 9.96 million metric tons in 2014 (EIA 2015a, Table 6.1). Within the range of sage grouse, production in each of the five states mining coal has similarly dropped (Figure 1-9; EIA 2015b-2015g). This pattern indicates that coal production will continue to decline, or remain stable, for the foreseeable future.***~~

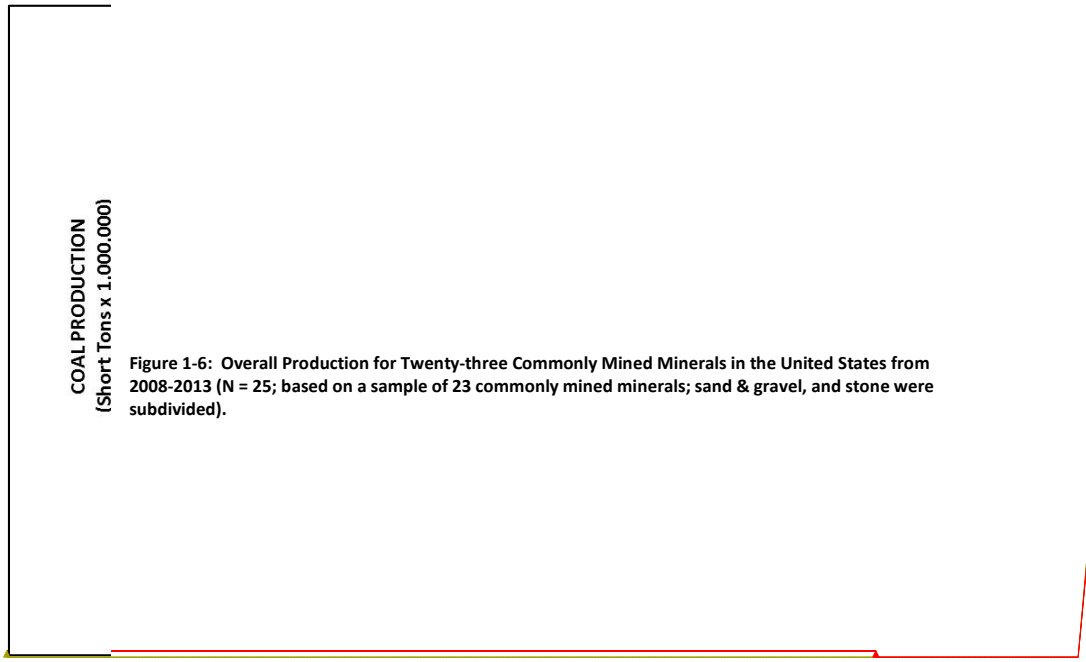

Figure 1-6: Overall Production for Twenty-three Commonly Mined Minerals in the United States from 2008-2013 (N = 25; based on a sample of 23 commonly mined minerals; sand & gravel, and stone were subdivided).

~~***Figure 1-9. Coal Production in Sage-Grouse Range by State from 2007 to 2013.***~~

~~***Threat amelioration***~~

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In the U.S., mining activity is authorized under an array of statutes primarily administered or leased by the BLM, both on Federally-administered lands as well as other lands where mineral rights have been reserved to the U.S. (i.e., split-estate lands). Coal is administered by the Office of Surface Mining Reclamation and Enforcement (OSM), which in turn may delegate their authority to the States. Statutory authority for mining originated with The General Mining Law of 1872, as amended (30 USC 22-54 and 43 CFR 3809); subsequent statutes have provided additional standards and processes for Federal administrative oversight for specific classes of mineral deposits. ~~In 1976, the Federal Land Policy and Management Act (FLPMA), as amended (43 USC 1701–1784) authorized the promulgation of regulations for the administration of applicable mining statutes, in order to ensure that mining operators and claimants prevent the unnecessary or undue degradation of public lands, by adherence to performance standards, reclamation of disturbed areas, and complying with all applicable Federal and state laws related to environmental protection and the protection of cultural resources.~~

~~The BLM published implementing regulations for the various mining statutes in 1981.~~ The BLM's statutory and regulatory authority depends upon the nature of the mineral deposit (i.e., leasable, salable or locatable). ~~Leasable deposits refer to substances such as coal (43 CFR 3400), oil and gas (aka fluid minerals; 43 CFR 3100), and non-energy leasables, such as potassium and potash (43 CFR 3500), administered under the Mineral Leasing Act of 1920 (30 USC 181 et seq.). Salable deposits include common variety substances (e.g., sand, gravel, pumice, stone, soil and clay) regulated under the Materials Act of 1947, as amended (30 USC 601 et seq. and 43 CFR 3600). Locatable refers to mostly metallic minerals (e.g., gold, silver, lead, uranium) and uncommon varieties of clays and building stone, which continue to be regulated under the General Mining Law of 1872, as amended (cited above, see also the regulations at 43 CFR 3809).~~

~~T~~The General Mining Law of 1872 called for all locatable mineral deposits in on Federal lands to be free and open to exploration and purchase (BLM 2011, entire), limiting the ability to manage these activities for sage-grouse conservation. Only areas that have been withdrawn to mineral entry by a special act of Congress, regulation, or public land order are truly closed to locatable mineral entry.

Threat amelioration

~~As mentioned above, mining activities fall into discrete management categories and are governed by different statutes. Locatable minerals and notice-level activities represent categories of mining which are mostly non-discretionary for land managers, and as such their ability to manage or limit locatable mining and notice level activities is highly limited. However other types of mineral extractions (i.e., fluid minerals, non-energy leasable minerals, salable minerals) allow resource agencies discretionary actions to prevent or otherwise manage their activities. Policies for the management of such discretionary (i.e., non-locatable, non-notice-level) mining, and the amelioration of mining threats, can include a wide variety of possible planning actions, ranging from closure of highly sensitive areas (i.e., "withdrawal", "exclusion" or "closure"), to Avoidance with No Surface Occupancy (NSO; with or without exceptions, modifications, stipulations), to the imposition of Required Design Features (RDF) or Best Management Practices (BMP). Management can also include the requirement of projects to follow the recommended Avoid-Minimize-Compensate scenario as described in the USFWS Mitigation Framework (USFWS 2014a, entire) or similar State mitigation plans.~~

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In April, 2014, the National Policy Team (NPT 2014) provided specific allocations for minerals for BLM and USFS to use in their land use plan amendments (Table 1-4).

Table X-4: National Policy Team Suggested Mineral Land Use Allocations (NPT 2014)

Non-Energy Leasable Minerals	
Great Basin Region (NV, CA, OR, ID[1], UT)	Rocky Mountain Region (WY, MT, CO)
Priority Habitat: These areas will be "Closed" to new permits. **Expansion of existing operations could be considered if the disturbance is within the cap and subject to compensatory mitigation.**	Same as Great Basin Region Wyoming only: these areas will be "Open," but are subject to the disturbance cap and stipulations. Consider closing these areas.
General Habitat: These areas will be "Open" subject to stipulations that will protect sage grouse and its habitat. However, sub-regions may consider closing these areas.	Same as Great Basin Region
Mineral Materials (Salable Minerals)	
Great Basin Region (NV, CA, OR, ID1, UT)	Rocky Mountain Region (WY, MT, CO)
Priority Habitat: These areas will be "closed" to new mineral material sales. **These areas would be "open" to free use permits and the expansion of existing active pits, subject to the disturbance cap.** **Existing active pits will be subject to the disturbance cap.** **Expansion of existing operations could be considered if the disturbance is within the cap and subject to compensatory mitigation.** **The disturbance cap and required design features would be applied to all free use permits.**	Same as Great Basin Region
General Habitat: These areas will be "Open" subject to stipulations that will protect sage grouse and its habitat. However, sub-regions may consider closing these areas.	Same as Great Basin Region

Conservation Efforts Data Base Projects

Comment [acn9]: I have no idea what this means for sage-grouse based on any of the information presented in this chapter. So this is just suggestions? What does that mean?

Comment [DMD10]: Move to section on regulatory mechanisms?

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~~1. For Idaho/SW Montana EIS, Medial Habitat would follow the same management regime as Priority Habitat~~

~~By eliminating or restricting new non-energy leasable and salable mineral easements over the life of the land use plan amendments (i.e., 20 years), potential mining impacts (excluding potential impacts from oil and gas, or geothermal mining) to sage-grouse habitats are essentially those that will be derived from non-discretionary locatable minerals. Currently, habitats of significant conservation value (i.e., strongholds or Sagebrush Focal Areas) have been proposed to the BLM and USFS by the Service for inclusion into their conservation plans as withdrawal areas for locatable mineral exploration and development (USFWS 2014b). If these areas are withdrawn, added significant conservation for the sage-grouse will be realized.~~

Through the Conservation Efforts Database (CED), the Service collected information relating to conservation actions that were completed, in progress, or planned. Fifteen projects addressing mining were entered in the CED as "completed" by data providers (~~Table X a~~Appendix C). Of the projects deemed completed by the project proponents the Service reviewed projects in MZs II, III, and V as these MZs are the key areas in the sage-grouse range where this threat occurs, or is likely to occur. ~~Totals provided for each MZ cannot be summed; t~~Two projects in Montana (totaling 281,000 acres) listed more than one MZ in their CED entry, but the total number of acres reported for these projects were not allocated among MZs~~. in the data provided in the CED (Table X a). We have not allocated those acres here, but instead repeated them for all MZs where they were reported by the data provider.~~

Table X: Summary of projects determined to be as effective in the Service review of completed CED projects addressing mining. Some of the projects addressed more than one threats (e.g., easements precluding mining and urban development), or spanned more than one MZ. Those are indicated separately in the following table.

~~We determined that mining is a primary threat in MZs II, III, and V. Therefore only those projects in the CED addressing this threat in the relevant MZs were eligible for review by Service biologists. However, the total of acres assessed as effective in our review (Table X b) represent 94 percent of all completed projects addressing mining entered in the CED. For a description of our approach to assessing and summarizing the projects entered as "completed" in CED, see the Regulatory Mechanisms chapter (pp. X–X).~~

~~**Table X b.** Acres evaluated as effective in USFWS review of completed CED projects addressing mining in Management Zones where it is a primary threat.~~

WAFWA Management Zone	~~FIRE Conservation Effort Assessed as Effective by FWS Reviewers~~	Ha/Ac~~res~~
II Wyoming Basin	unique acres (MZ & threat)*	2/5
	same acres & MZ, > 1 threat**	4,627/11,434

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	same acres, > 1 MZ, >1 threat*~~threat~~ **	113,716/281,000
III Southern Great Basin	unique acres (MZ & threat)*	—0
	same acres & MZ, > 1 threat**	421/1,040
V Northern Great Basin	unique acres (MZ & threat)*	~~None in CED~~0
	same acres & MZ, > 1 threat**	—0
TOTAL		118,767/293,479

*projects in one MZ addressing one threat
** projects in one MZ addressing more than one threat
*** projects crossing more than one MZ addressing more than one threat

Candidate Conservation Agreements with Assurances and Candidate Conservation Agreements

Lands currently enrolled in CCAAs typically have split-estate development and therefore surface owners may have limited control of mining development. If mining occurs on lands enrolled in CCAAs, the landowner is required to attempt to negotiate with the mining operator to reduce impacts to sage-grouse and their habitat. 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 Conservation Efforts section (pp. X–X) and Table X for approximate acreages and additional information.

State Plans

Nine of the 11 states within the occupied sage-grouse range recognize sage-grouse as a species of conservation concern (or similar designation). All states within the 11 state range have completed, or are in the process of completing, individual State plans to address sage-grouse conservation. All these State plans address mining to some degree, although their discussions vary significantly in scope. Some states (e.g., Nevada, Colorado, Wyoming) also require projects to provide compensatory mitigation for unavoidable impacts to sage-grouse and its habitat.

State plans in Idaho, Wyoming, Utah, and Montana include regulatory mechanisms that reduce impacts to sage-grouse from mining on applicable lands. The state plans in Idaho and Wyoming incorporate controlled surface use, lek buffers, and seasonal and noise restrictions to reduce impacts on State lands in Idaho and in core areas in Wyoming (Idaho Department of Lands 2015, pp. 25–26; State of Wyoming 2011, p. XX). Montana's state plan is similar to Wyoming's plan and if enacted would include

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controlled surface use, lek buffers, and noise and seasonal restrictions to reduce mining related impacts in core areas on State lands and private lands where state authorization is required (State of Montana 2014, pp. 14–19). Although Utah's state plan does not specifically address mining, regulatory mechanisms in the State require avoidance, minimization, and mitigation on State and Federal lands to reduce impacts to sage-grouse, but these requirements are voluntary on private, SITLA and local government lands (State of Utah 2012, p.19). Therefore, state plans in Idaho, Wyoming, and Utah include existing regulatory mechanisms that effectively reduce impacts associated with mining on applicable lands.

If a mining project will disturb sage-grouse on any lands in the State, Nevada's state plan requires that project proponents consult with the State's Sagebrush Ecosystem Technical Team (SETT) to avoid, minimize, or mitigate potential impacts (State of Nevada 2014, p. 100). If avoidance cannot be reasonably accomplished, Nevada's plan requires that project proponents minimize impacts with design features (State of Nevada 2014, p. 101). Nevada's plan also guides project proponents to bury power lines and install anti-nesting or perching devices on power lines where technically and economically feasible (State of Nevada 2014, pp. 101–102). However, the BLM would be responsible for enforcing this consultation process on the majority of land in Nevada, but this process has yet to be implemented and is not an existing regulatory mechanism.

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MZ(s)	State	Applicable Lands	Acres Covered	State Plan Status	Voluntary or Regulatory - Mining
I, II, IV	Wyoming	All lands	15,000,000 acres	Complete and Implemented	Regulatory
II, III, IV	Utah	All lands within the Sage Grouse Management Areas	7,500,000 acres	Complete and Implemented	Regulatory

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		(SGMAs)			
II, VII	Colorado	All lands	3,855,841 acres	Complete and Implemented	Voluntary
I	South Dakota	All lands	982,834 acres	Complete and Implemented	NA
VI	Washington	State lands	4,864,020 acres	Complete and Implemented	NA
IV	Idaho	State lands	2,400,000 acres	Complete, Not Implemented	Regulatory
I, II, IV	Montana	State lands; private lands where a State authorization is required.	2,400,218 acres	Complete, Not Implemented	Regulatory
I	North Dakota	All lands	416,000 acres	Complete, Not Implemented	Voluntary
II, IV, V	Nevada	All Sage-Grouse Management Area (SGMA) lands	48,627,071 acres	Incomplete, Not Implemented	Regulatory
IV, V	Oregon	All lands	15,000,000 acres	Incomplete, Not Implemented	Voluntary
TOTAL			101,045,984 acres		

BLM Resource Management Plans and USFS Land and Resource Management Plans

Mineral development on federal lands will be managed as per the direction provided in the new Land Use Plans currently being drafted by the BLM and USFS (see ***Regulatory Mechanisms***,

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pp. XX-XX). As currently proposed designated Priority Habitats (similar to PACs and IPAs) will either be closed to new permits, with the exception of Wyoming, and expansion of existing operations will be subject to disturbance caps and compensatory mitigation. These actions should minimize the impacts of future development of mineral resources in priority habitats for the life of the management plans (approx. 20 years). Wyoming will remain open to new mining activities within PACs, but those activities will be restricted by a disturbance and density cap as per the Wyoming Governor's core area strategy (see ***Regulatory Mechanisms***, pp. X-XX). General sage-grouse habitats (those falling outside of priority habitat) will be open to mineral development subject to stipulations to protect sage-grouse. Locally, Federal land managers may close general sage-grouse area. Currently, habitats of significant conservation value (i.e., strongholds or Sagebrush Focal Areas) have been proposed as recommended withdrawal areas for locatable mineral exploration and development (USFWS 2014b). If these areas are withdrawn, disturbance from new locatable mineral development will not be permitted.

~~The BLM and USFS plans include management actions, land use allocations, and restrictions on timing, distance, and density for mining of solid minerals such as coal. Above-ground and underground mines will be managed for surface use and buffers will be applied to avoid or minimize impacts to sage-grouse, including the 3 percent anthropogenic disturbance cap. Specific management actions in the LUPs include:~~

~~For Mineral Materials, PHMAs are closed to new mineral material sales. However, these areas remain "open" to free use permits and the expansion of existing active pits, only if the following criteria are met:~~

- ~~the activity is within the Biologically Significant Unit (BSU) and project area disturbance cap;~~
- ~~The activity is subject to the provisions set forth in the mitigation framework [Appendix X];~~
- ~~all applicable required design features are applied; and [if applicable] the activity is permissible under the specific sub-regional screening criteria [site location in ADPP where this screening *process is present]*.~~

~~In Wyoming, the plans mimic the Wyoming Executive Order. For additional details, see Federal Regulatory Mechanisms (pp. X–X).~~

Threat Amelioration Summary

TO BE COMPLETED AFTER GIS ANALYSES OF THE THREAT, AND AMELIORATION ACTIVITIES IS COMPLETED

~~Current mining laws provide some level of regulatory environmental protection, but generally lack sage-grouse specific foci. Current Federal regulations, primarily handled through the National Environmental Policy Act (NEPA), but also the OSM and some State regulations, require the avoidance and minimization of general environmental impacts (including sensitive species), and reclamation of sites once projects have been completed. In addition, some states have their own environmental quality laws (e.g., California Environmental Quality Act) affording additional protection of wildlife habitat throughout the state.~~

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~~Restoration and rehabilitation of mine sites continues to be problematic. Sagebrush habitats are slow growing, not fire resistant, and subject to invasive plants. Because sage-grouse conservation is a concern for many western states, however, there has been a growing focus on reclamation strategies that will benefit sage-grouse. Reclamation seed mixtures now more frequently contain mixtures of seeds that include native forbs and sagebrush. There have been some limited successes in shrub establishment. For example, in 2010 Cloud Peak Energy received the National Excellence in Surface Mining and Reclamation Award from the Office of Surface mining for their successful shrub establishment project on reclaimed lands in northeastern Wyoming. We anticipate that restoration techniques for sagebrush habitats will be further improved as the science becomes better understood, but currently recovery of impacts from mining is slow, and often not fully successful. BLM has limited the level of disturbance until a proportional amount of the land is reclaimed. For example, if 65 ha (160 ac) is part of a locatable claim area available for mining, only 10 to 20 percent is active at any one time, rather than the entire claim.Mining activities on Federal lands, and their target minerals, vary in location. Mining for locatable minerals and small (less than 5 ac) notice level activities are mostly non-discretionary with respect to agency approvals. Generally, by incorporating the NPT sage-grouse allocation guidelines, BLM and USFS land use plan amendments will provide a significant level of amelioration for non-energy leasable minerals, and salable minerals. Additional conservation will be garnered if BLM and USFS adopt withdrawal of locatable mining from habitats of significant conservation value (i.e., Sagebrush Focal Areas).~~

Assessment of Potential Threat

It is difficult to accurately predict the future impacts of mining due to the market driven nature of the activity. ~~For example, uranium production was lowest in 2003, climbed steadily to a high in 2008, dropped sharply in 2009 (EIA 2014c, p. 15), and has tended to increase only slightly per year since. Further, a~~As ~~new~~ advances in mining technology are ~~invented and implemented~~developed~~, new~~ mining activity could be ~~realized~~ occur in areas which are currently ~~were previously thought~~ unprofitable. Additionally, the need for new minerals~~future unknown need for minerals~~, not currently required to the extent to make their mining economically viable, could provide new markets, and therefore new pressure, on sage-grouse habitats. ~~Thus, the extent and nature of the impacts from these unknown needs would be primarily determined by the location of the minerals within sage-grouse range, and the expected return on the mining investment fueling new exploration and development.~~ The scattered nature and intensity of this activity, coupled with market uncertainty make it difficult to assess the actual impact to sage-grouse on a rangewide basis. However, mining clearly has significant impacts on local populations of sage-grouse and their habitats.

~~Current and p~~Proposed land use plan ~~regulatory~~ amendments by BLM and USFS, combined~~if incorporating NPT allocation guidelines at a minimum, combined~~ with additional conservation efforts by the individual States, will minimize potential impacts of new mining to in designated priority habitats, and provide additional conservation in remaining general sage-grouse habitats. Expansion of existing operations will also proceed with a reduced impact. These regulatory provisions will be essential in minimizing the future footprint of mining on sage-grouse habitats as restoration efforts are currently minimally unsuccessful. Mining of private minerals on private lands will continue and could be locally significant. ~~sage-grouse by prohibiting or otherwise~~

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~~restricting new discretionary mining in PHMA, and limiting surface disturbance by mining in GHMA.~~

~~Mining in the range of the sage-grouse will continue indefinitely. Sage-grouse habitat and populations will continue to be impacted by mining activities both directly and indirectly. However, the exact location and extent of future mining remains uncertain. Direct impacts tend to be local or regional in nature based on the location of the minerals, thus affecting populations or local groups of populations. Indirect impacts, such as noise, dust, and habitat fragmentation by roads, fences and power lines, are expected to be more widespread, potentially affecting many populations. Based on the best available science, we conclude that mining is considered a significant incremental source of impacts, adding to and interacting with other impacts such as, infrastructure development, predation, and energy development.~~

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