

USGS Mineral-Resource Assessment of Sagebrush Focal Areas in the Western United States

U.S. Geological Survey (USGS) scientists have completed an assessment of the mineral-resource potential of nearly 10 million acres of Federal and adjacent lands in Idaho, Montana, Nevada, Oregon, Utah, and Wyoming. The assessment of these lands, identified as Sagebrush Focal Areas, was done at the request of the Bureau of Land Management. The assessment results will be used in the decision-making process that the Department of the Interior is pursuing toward the protection of large areas of contiguous sagebrush habitat for the greater sage-grouse (*Centrocercus urophasianus*) in the Western United States. The detailed results of this ambitious study are published in the five volumes of USGS Scientific Investigations Report 2016–5089 and seven accompanying data releases.



Sagebrush lands in southwestern Wyoming (photograph by Anna Wilson, USGS).

At the request of the Bureau of Land Management (BLM), the U.S. Geological Survey (USGS) assessed the mineral-resource potential of nearly 10 million acres of Federal and adjacent lands in the Western United States. The assessment results will be used in the decision-making process that the Department of the Interior is pursuing toward the protection of large areas of contiguous sagebrush habitat for the greater sage-grouse (*Centrocercus urophasianus*). The request for USGS involvement was made in October 2015, with the need to provide preliminary results to BLM by mid-July 2016 so that those results could be used by BLM to inform the National Environmental Policy Act process and aid in environmental impact statement preparation. The results of the assessment are published in the five volumes of USGS Scientific Investigations Report (SIR) 2016–5089 (chapters A–E) and seven accompanying data releases (<http://dx.doi.org/10.3133/sir20165089>).

What was Studied and Where?

The USGS Sagebrush Mineral-Resource Assessment (SaMiRA) evaluated the potential for deposit types that contain locatable minerals and describes the occurrence of leasable and salable minerals within study areas that include Western lands being considered for withdrawal from mineral entry under U.S. mining laws. The proposed withdrawal areas lie within seven Sagebrush Focal Areas (SFAs) in Idaho, Montana, Nevada, Oregon, Utah, and Wyoming. In addition to the seven SFAs, two areas in Nevada, referred to in the report as the “Nevada additions,” were included in the USGS assessment to help inform the Department of the Interior’s analysis of alternatives. These areas were identified by the State of Nevada as potential substitute areas to be considered for withdrawal in lieu of other areas within the boundaries of the SFAs that have been identified for potential withdrawal.

The USGS study areas are Public Land Survey System townships that include the lands proposed for withdrawal. Larger study areas were chosen because of the complex shapes of the BLM proposed withdrawal areas. Inclusion of private or other lands in the assessment has no implications regarding land values, management alternatives, or recommendations for disposition. Native American lands were excluded from study.

How was This Study Accomplished?

A team of 61 USGS experts in regional geology, geochemistry, geophysics, mineral deposits, and assessment methods conducted the assessment with input from State Geological Surveys and other agencies. Mineral-resource potential was assessed qualitatively, following the approach prescribed in BLM Manual Sections 3031 and 3060, using

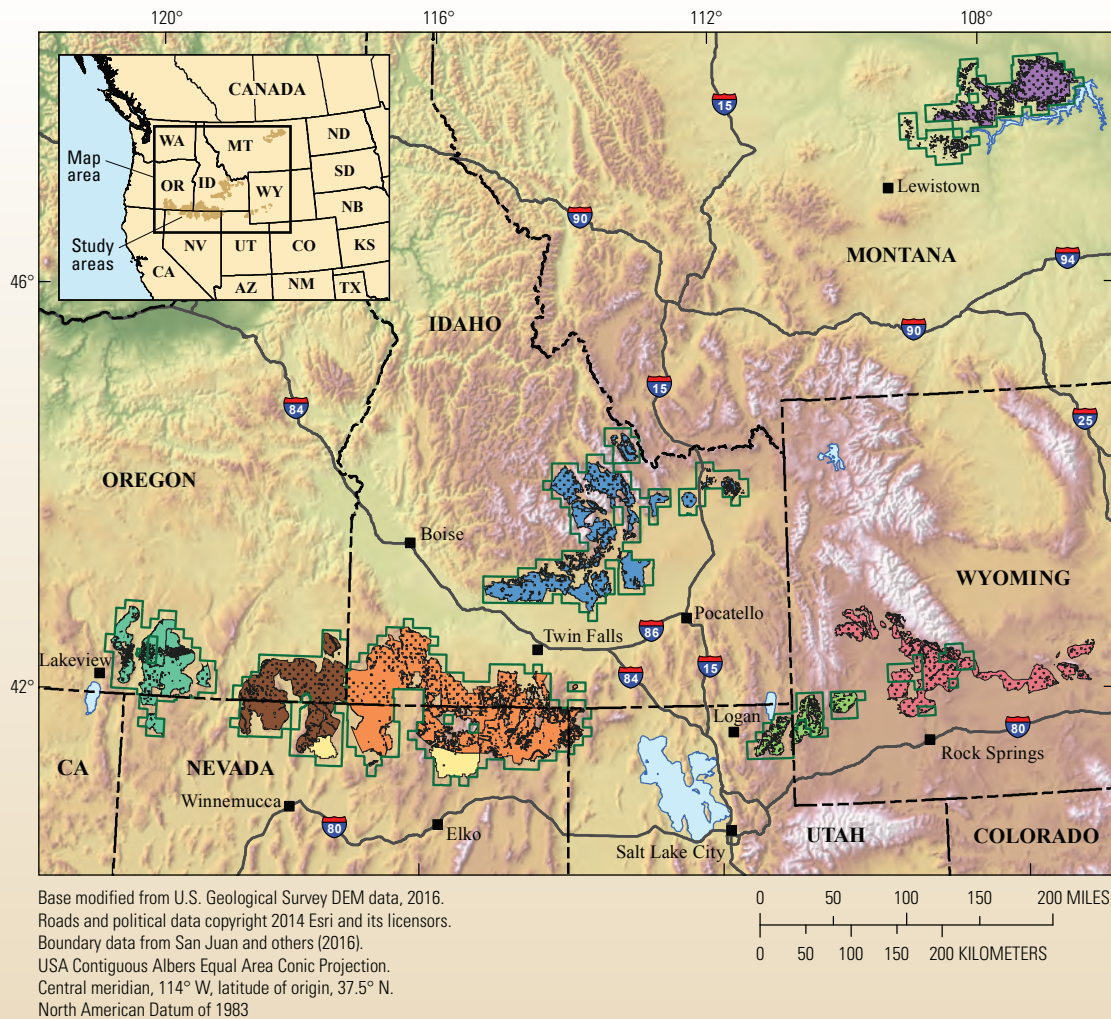
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Mineral-Deposit Terms

Leasable minerals—A mineral or mineral commodity that is leasable by the Federal Government under the Mineral Leasing Act of 1920 and similar legislation. This includes coal, oil and gas, oil shale and tar sands, potash, phosphate, sodium, and geothermal steam.

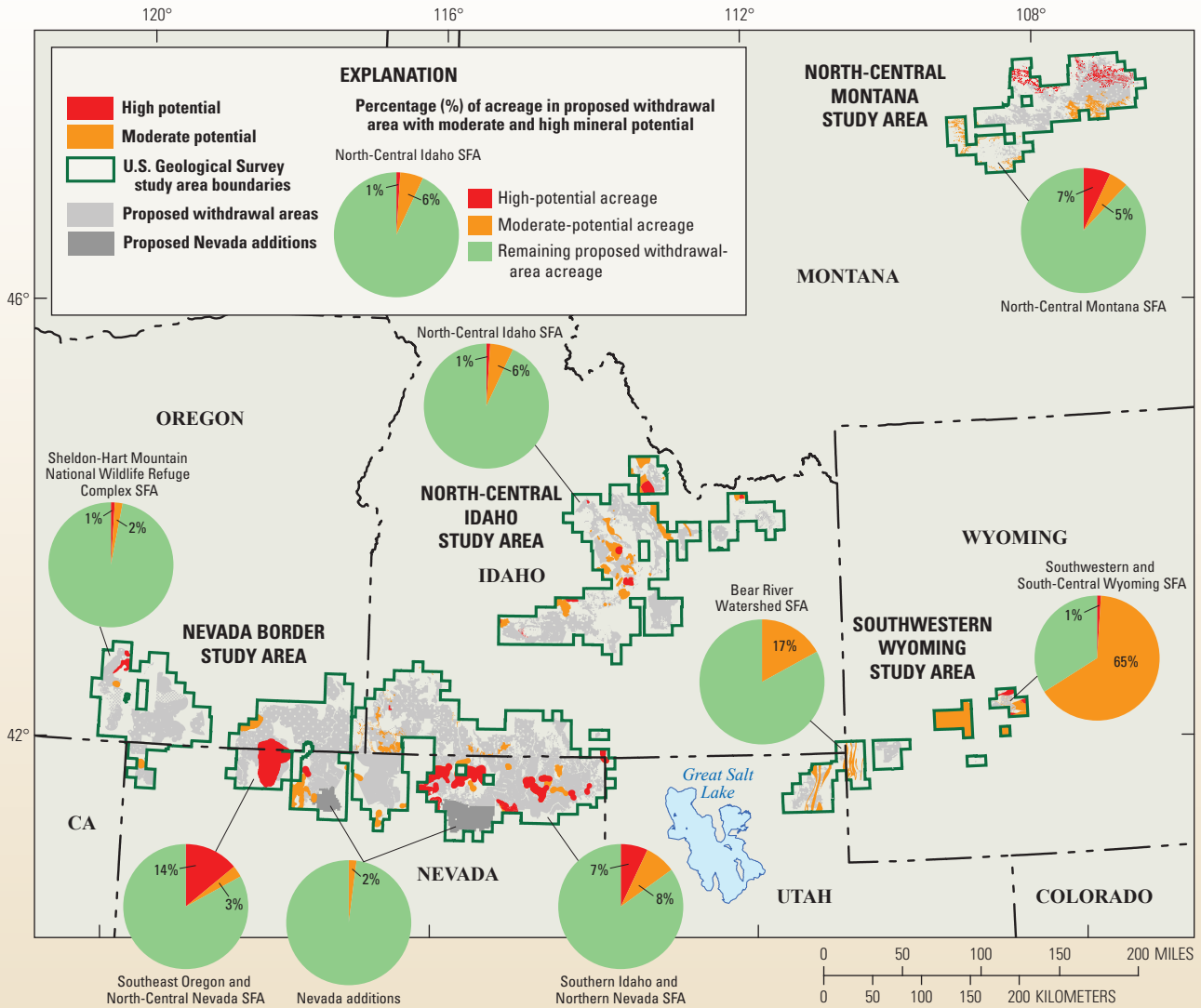
Salable minerals—Mineral commodities that are sold by contract from the Federal Government under the Materials Act of 1947, as amended. These are generally construction materials and aggregates, such as sand and gravel.

Locatable minerals—All valuable minerals (not leasable or salable), acquired through the General Mining Act of 1872, as amended, including antimony, copper, gemstone, gold, lithium, molybdenum, silver, tungsten, zeolite, zinc, and other commodities.



Map showing the seven Sagebrush Focal Areas (SFAs) and U.S. Geological Survey (USGS) study areas in the Western United States. USGS evaluated the potential for deposit types hosting locatable minerals and described the occurrence of leasable and salable minerals within Federal lands being considered for withdrawal from entry under U.S. mining laws. Two areas in Nevada (the “Nevada additions”) were also evaluated. Inclusion of private or other lands in the assessment has no implications regarding land values, management alternatives, or recommendations for disposition. Native American lands were excluded from study.

Potential for Locatable Minerals in Proposed Withdrawal Areas



Map showing high- and moderate-potential areas for locatable minerals within four broad U.S. Geological Survey (USGS) Sagebrush Mineral Resource Assessment study areas. These areas include the Bureau of Land Management proposed withdrawal areas and "Nevada additions." Pie charts show moderate- and high-potential locatable minerals as a percentage of acreage within proposed withdrawal areas and the "Nevada additions."

Generalized matrix of mineral potential and certainty used for the USGS study. Levels of resource potential: N, none; L, low; M, moderate; H, high. Levels of certainty: A, insufficient evidence; B, indirect evidence; C, direct evidence; D, abundant evidence. (See appendix 2 of USGS Scientific Investigations Report 2016-5089-A, <http://dx.doi.org/10.3133/sir20165089A>.)

	H/A High potential with insufficient evidence	H/B High potential with indirect evidence	H/C High potential with direct evidence	H/D High potential with abundant direct and indirect evidence
H				
	M/A Moderate potential with insufficient evidence	M/B Moderate potential with indirect evidence	M/C Moderate potential with direct evidence	M/D Moderate potential with abundant direct and indirect evidence
M				
	L/A Low potential with insufficient evidence	L/B Low potential with indirect evidence	L/C Low potential with direct evidence	L/D Low potential with abundant direct and indirect evidence
L				
				N/D No potential
N				
	A	B	C	D
	Level of certainty →			

a matrix originally defined in USGS Open-File Report 84–787 (<https://pubs.er.usgs.gov/publication/ofr84787>) for ranking mineral potential versus level of certainty. Chapter A of SIR 2016–5089 (<http://dx.doi.org/10.3133/sir20165089A>) is an overview of SaMiRA and describes analytical methods, deposit types, commodities, data, and other factors used in the assessment.

The USGS followed standard BLM guidelines to assess locatable mineral potential and assign levels of certainty by deposit type. Each deposit type has its own characteristic geologic setting, commodity types, tonnage and grade range, potential economic value, mining method, and typical surface footprint. For example, gold occurs in many deposit types, including (1) stream-placer deposits, (2) high-grade, low-tonnage near-surface veins, and (3) low-grade but very large tonnage deposits in altered sedimentary rocks. Each study area has its own set of potential deposit types and commodities because of the unique geology of each area. About 40 different types of deposits were assessed.

The assessment used the latest publically available data and interpretive reports. This included geologic maps and geophysical, geochemical, and remotely sensed satellite data, which were compiled for the vast study areas. In addition, a new mineral-deposit database, the USGS Mineral Deposit Database or “USMIN” (<http://dx.doi.org/10.5066/F7J964GW>), was developed that included all publically available data, such as data from company Web sites, National Instrument 43-101 reports, and input to BLM through public comments. Permit and mine-claim data from BLM’s Legacy Rehost System (LR2000) land-status database were summarized in a USGS data release and used in the assessment (<http://dx.doi.org/10.5066/F7RX996K>).

What are the Results of This Study?

SIR 2016–5089 chapters B, C, D, and E and accompanying data releases show assessment results within four groupings of USGS study areas that are within the seven BLM SFAs. Each of the four area reports contains a complete analysis of the data used to generate assessment potential for locatable minerals. Geographic information system (GIS) files in

USGS-Evaluated Potential for Locatable Minerals Summarized by Proposed Withdrawal Area Within Sagebrush Focal Area

Sagebrush Focal Areas (SFAs), listed by report chapter ¹	Proposed withdrawal area, in acres	Moderate potential, in percent of area	High potential, in percent of area
Scientific Investigations Report 2016–5089–B, http://dx.doi.org/10.3133/sir20165089B			
Sheldon-Hart Mountain National Wildlife Refuge Complex SFA	955,068	2	1
Southern Idaho and Northern Nevada SFA	3,517,786	8	7
Southeast Oregon and North-Central Nevada SFA	1,608,269	3	14
Nevada additions	394,288	2	0
Scientific Investigations Report 2016–5089–C, http://dx.doi.org/10.3133/sir20165089C			
North-Central Idaho SFA	1,558,573	6	1
Scientific Investigations Report 2016–5089–D, http://dx.doi.org/10.3133/sir20165089D			
North-Central Montana SFA	876,035	5	7
Scientific Investigations Report 2016–5089–E, http://dx.doi.org/10.3133/sir20165089E			
Southwestern and South-Central Wyoming SFA	138,470	65	1
Bear River Watershed SFA	276,702	17	0
Total	9,325,191	7	6

¹Scientific Investigations Report 2016–5089 (chapters A–E) and related data releases can be found at <http://dx.doi.org/10.3133/sir20165089>.

ArcGIS format of identified areas of mineral potential were compiled as a USGS data release (<http://dx.doi.org/10.5066/F7833Q4R>).

USGS scientists determined that there is moderate or high potential for deposit types that include locatable commodities, such as antimony, barite, bentonite, hectorite, copper, gemstone, gold, gypsum, lead, lithium, mercury, molybdenum, opal, silver, sunstone, tungsten, uranium, zeolite, and zinc. The study-area reports also provide inventories of leasable minerals (such as coal, oil and gas, potash, phosphate, and geothermal energy) and salable minerals (such as sand, gravel, and other common materials).

The USGS Sagebrush Mineral-Resource Assessment contributes to a better understanding of the economic and environmental trade-offs that need to be considered in the decision-making process surrounding the proposed withdrawal of Federal lands to mineral entry. The evaluation of mineral-resource potential will also help inform decisions about the future use of these Federal

lands, the protection of greater sage-grouse and their habitat, and the economies of the Western States.

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