

**U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY**

Digital mining claim density map for Federal lands in Montana: 1996

by

Harry W. Campbell¹ and Paul C. Hyndman²

Open-File Report 98-489

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards. Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

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¹ Retired, U.S. Geological Survey, Spokane, WA 99201

² U.S. Geological Survey, Spokane, WA 99201

CONTENTS

ACKNOWLEDGEMENTS.....	3
INTRODUCTION.....	3
Extent and scope.....	3
DATA SOURCES, PROCESSING, AND ACCURACY.....	5
Mining claim data summary.....	5
Obtaining Digital Data.....	5
Obtaining Paper Maps.....	6
CONCLUDING REMARKS.....	6
REFERENCES CITED.....	6
APPENDIX A: GIS Map Attributes.....	7
APPENDIX B: Detailed Metadata.....	8

Figure

Figure 1 Page-sized version of plot file, mt_clms.hp, which accompanies this report.....	4
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ACKNOWLEDGEMENTS

We gratefully acknowledge Cheryl Laudenbach, Denver Service Center, U.S. Bureau of Land Management (BLM) for providing assistance in obtaining digital mining claim recordation data and digital data codes for the BLM Mining Claim Recordation System database. We also acknowledge the Natural Resources Information System, Montana State Library, for use of several digital coverages, especially the section coverage of the Public Land Survey of Montana.

INTRODUCTION

This report describes a digital map and data files generated by the U.S. Geological Survey (USGS) to provide digital spatial mining claim information for Federal lands in Montana as of March, 1997. Statewide, 159,704 claims had been recorded with the Bureau of Land Management since 1975. Of those claims, 21,055 (13%) are still actively held while 138,649 (87%) are closed and are no longer held. Montana contains 147,704 sections (usually 1 section equals 1 square mile) in the Public Land Survey System, with 8,569 sections (6%) containing claim data. Of the sections with claim data, 2,192 (26%) contain actively held claims. Only 1.5% of Montana's sections contains actively held mining claims. The four types of mining claim are lode, placer, mill, and tunnel. A mill claim may be as much as 5 acres or 1/128th (0.78125%) of a square mile. A lode claim, about 20 acres, would cover 1/32nd (3.125%) of a square mile.

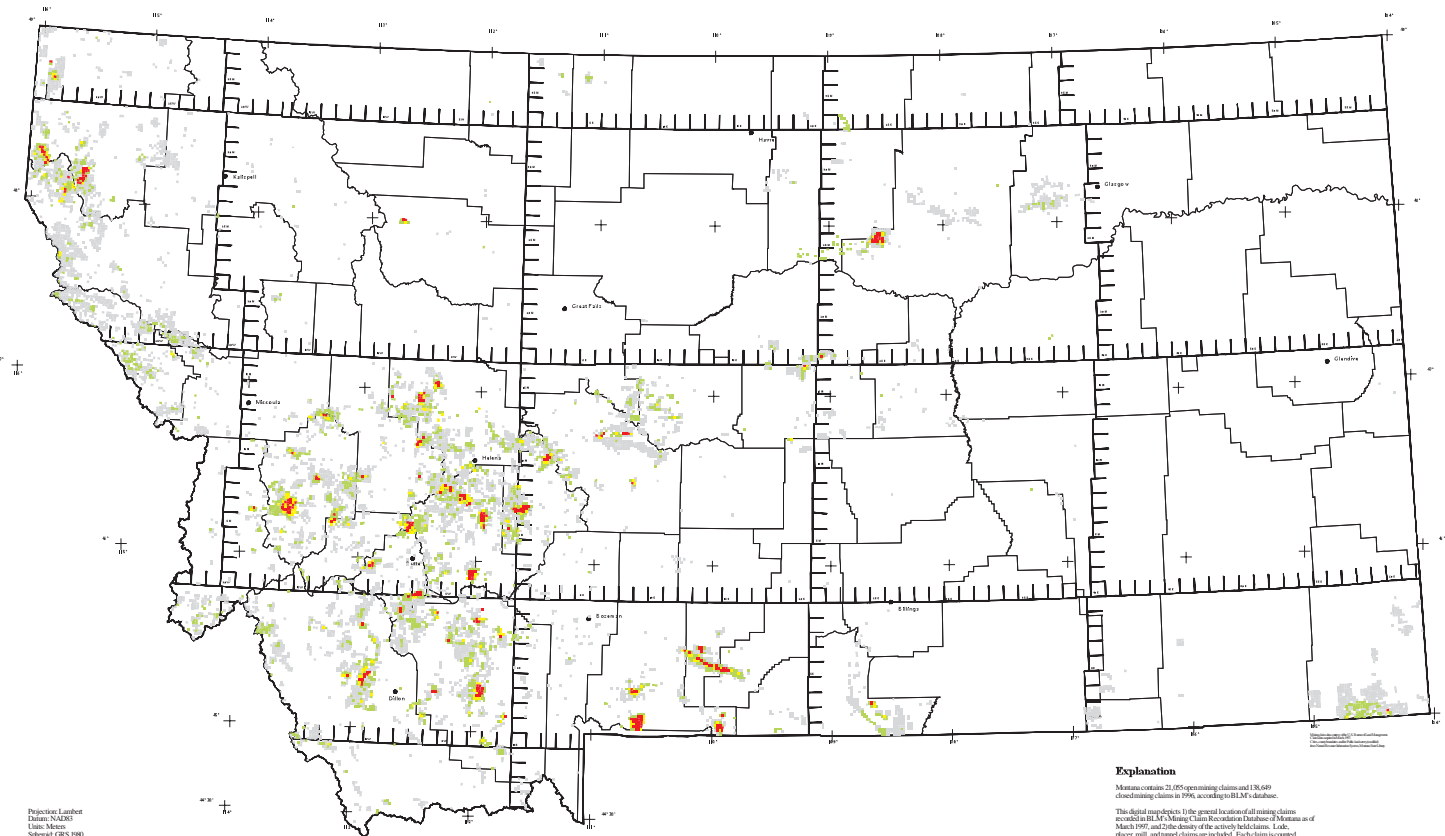
Mining claim data is earth science information deemed to be relevant to the assessment of historic, current, and future ecological, economic, and social systems. The digital map (figure 1) and data files that are available in this report are suitable for geographic information system (GIS)-based regional assessments at a scale of 1:100,000 or smaller.

Campbell (1996) summarized the methodology and GIS techniques that were used to produce the mining claim density map of the Pacific Northwest. Campbell and Hyndman (1997) displayed mining claim information for the Pacific Northwest that used data acquired in 1994. Appendix A of this report lists the attribute data for the digital data files. Appendix B contains the GIS metadata.

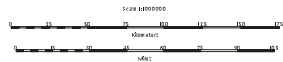
Extent and scope

Mining claim data were obtained from the BLM Mining Claim Recordation System (MCRS) database in March 1997. The data are current to that date. An assumption was made that the data properly represented the claim history to the end of 1996, hence the title includes the year 1996. BLM officially releases its mining claim database quarterly. The March, 1997 release includes claim records submitted at the end of 1996 which would not have been included in the December 1996 MCRS data release.

In accordance with the Federal Land Policy and Management Act of 1976 (FLPMA), all unpatented mining claims, mill, and tunnel sites are required to be recorded in the appropriate BLM state office. BLM maintains a cumulative computer listing of mining claims in the MCRS database with locations given by township, range, and section. Digital data are presented in a format that is suitable for compilation at a scale of 1:100,000 or smaller. Additional potentially useful information is available in the BLM digital mining claim database, but is not included in the digital products presently being released.



Project: Lambert
Datum: NAD83
Units: Meters
Spheroid: GRS 1980
1st standard parallel: 49°00'00"
2nd standard parallel: 49°00'00"
central meridian: 109°30'00"
false easting (meters): 441250
false northing (meters): 6100000



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Digital Mining Claim Density Map for Federal Lands in Montana: 1996

By Harry W. Campbell and Paul C. Hyndman

1998

Explanation

Montana contains 21,055 open-mining claims and 178,699 closed-mining claims in 1996, according to BLM's database.

This digital map depicts 1) the general location of all mining claims recorded in BLM's Mining Claim Record on the Database of Montana as of March 1997, and 2) the density of the actively held claims. Each place, creek, and named claim are included. Each claim is counted once and is represented once on the map, even if it occurs in more than one section. A March 1997 list of the database allowed claims submitted at the end of 1996 to be entered into the database.

The smallest unit depicted on the map is a section of the Public Land Survey System. A section is typically one square mile, or 640 acres.

Caution: One claim in a section causes the entire section to show on the map. A single 5-acre mill claim or a 30-acre lode claim, for example, is represented by a full-acre section on the map. Twenty acres represents 1/32nd or 0.03125 of a square mile.

- Only closed claims in this section
- 1-22 open claims per section
- 23-24 open claims per section
- Greater than 24 open claims per section

DATA SOURCES, PROCESSING, AND ACCURACY

The base for the mining claim density map of Montana is the statewide 1:100,000-scale Public Land Survey System (PLSS) digital file. This file was acquired from the Montana Natural Resources Information System (NRIS), Montana State Library. Information on this digital file is available from NRIS. A separate digital map of the meridian reference grid was derived from the PLSS digital file. The county boundaries and the cities were also acquired from NRIS.

Mining claim data were obtained as a digital text file from the BLM Denver Service Center on 9-track magnetic tapes. Information on this file is available from the Denver Service Center. Mining claims were totaled for each section (square mile) by using computer procedures developed specifically for this purpose (See Campbell, 1996). Mining claim totals per section were imported from the digital text file to dBase and then attached as attributes to corresponding section records in the appropriate state ARC/INFO PLSS digital files. The map was processed with ARC/INFO GIS version 7.1.1 on a Sun Sparc workstation using Solaris 2.5.1. The positional accuracy of the mining claim data as reported by the BLM is generalized to the section. The first section listed for a mining claim is the section used for this study. Each claim is counted only once. Mining claim data represented in the digital files are considered accurate enough for geographic representations for the purposes of regional assessments at a scale of 1:100,000 or smaller.

Every mining claim record was accounted for. The mining claim database contained 159,704 claims in 8,569 sections. After attaching the data to the PLSS the total remained the same in the digital map. The fit of the mining claim data to the PLSS is considered 100% complete.

Mining claim data summary

A mining claim is considered to be closed when the claim is relinquished or a formal BLM decision declaring the mining claim null and void has been issued and the appeal period has expired. All other mining claims filed with BLM are considered to be open and actively held.

Statewide, 159,704 claims had been recorded with BLM since 1975. Of those, 21,055 (13%) are still actively held while 138,649 (87%) are no longer held. The following table summarizes particular data for each type of claim - lode, placer, mill, or tunnel:

	Lode	Placer	Mill	Tunnel	Total Claims
Open	15,939	3,594	1,505	17	21,055
Closed	121,502	13,471	3,574	102	138,649

Montana contains 147,704 sections in the PLSS, with 8,569 sections (6%) containing claim data. Of the sections with claim data, 2,192 (26%) have open claims and 6,377 (74%) have only closed claims in them. Only 1.5% of Montana's sections contain actively held mining claims. The sections with only closed claims contain 92,721 (58%) of all the claims recorded with BLM in the State. The rest of the closed claims, 45,928, occur within sections containing open claims. They may represent claims that were discontinued and later located by another claimant.

Obtaining Digital Data

The digital mining claim files created for this report are available in Arc/Info GIS export format from the following USGS public access World Wide Web site on the internet:

URL = <http://wrgis.wr.usgs.gov/open-file/of98-489/>

or Anonymous FTP from:

wrgis.wr.usgs.gov

from the directory: **pub/open-file/of98-489/**

These Internet sites contain the mining claim density files of Montana in GIS digital files in ARC/INFO export file format. Use of this data requires a GIS capable of reading ARC/INFO export formatted files and a computer capable of reading UNIX ASCII files. To use these files on a DOS computer, the files must be modified with a UNIX-to-DOS filter.

Obtaining Paper Maps

Paper copies of Figure 1 are not available from the USGS at this time. A 1:1,000,000-scale paper copy of the figure can be made from a file available from the USGS Web site on the Internet.

The file, **mt_clms.hp**, is in HPGL2 graphics language. Any large-format graphics plotter that can interpret the HPGL2 language can plot this file. The finished plot is 28 by 40 inches in size.

CONCLUDING REMARKS

This digital mining claim information can be compared to other types of digital data by using a GIS. One must remember that one claim within a section (640 acres or 1 square mile) results in the entire section being represented. A single lode claim of about 20 acres, 1/32nd (3.125%) of a square mile, will be represented in the digital map as 640 acres. Similarly, a single mill claim of 5 acres, or 1/128th (0.78123%) of a square mile, will also be represented as 640 acres. This inaccuracy is due to the smallest unit of the PLSS available at the time of this study being one section (generally one square mile). As digital maps become available with 5-acre units, the extent of mining claims will be more accurately represented.

This mining claim density information was produced from digital mining claim recordation files obtained from BLM sources that were used to attribute digital versions of an existing state PLSS map of Montana. Descriptions of the mining claim attributes used to produce Figure 1 are presented in tabular form in Appendix A. A GIS may be used to make other claim density maps by selecting different attributes, for example density of only "placer" claims or density of "open lode" claims. This and other new maps constructed by this method are derivative maps that can be used to answer focused questions. Derivative maps produced from state scale mining claim density maps are an appropriate first step to providing a regional context for land management decisions. Mining claim density information is a potential tool to focus further mineral studies and should be part of the basis for land management decisions.

REFERENCES CITED

Campbell, Harry W., 1996, Procedure from making a mining claim density map from BLM claim recordation digital data: U.S. Geological Survey Open-File Report 96-736, 13 p.

Campbell, Harry W. and Paul C. Hyndman, 1996, Digital mining claim density map for Federal lands in the Pacific Northwest: U.S. Geological Survey Open-File Report 96-737, 11 p.

APPENDIX A: GIS Map Attributes

The Montana mining claim density GIS digital file contains the polygon attributes listed in the following table:

ITEM NAME	START COLUMN	ITEM LENGTH	ATTRIBUTE DESCRIPTION
MTRS	17	18	Meridian, Township, Range, Section Principal Meridian and Baseline
NOLC	35	4	Number of Open Lode Claims
NOPC	39	4	Number of Open Placer Claims
NOMC	43	4	Number of Open Mill site Claims
NOTC	47	4	Number of Open Tunnel Claims
TOC	51	4	Total number of Open Claims in a section
NCLC	55	4	Number of Closed Lode Claims
NCPC	59	4	Number of Closed Placer Claims
NCMC	63	4	Number of Closed Mill site Claims
NCTC	67	4	Number of Closed Tunnel Claims
TCC	71	4	Total number of Closed Claims in a section
TC	75	4	Total number of Claims of all kinds

Selecting and plotting the attributes labeled TOC, TCC, and TC in the table above produced the figure accompanying this report. A mining claim is considered to be closed when the claim is relinquished or a formal BLM decision declaring the mining claim null and void has been issued and the appeal period has expired. All other mining claims filed with BLM are considered to be open and actively held.

APPENDIX B: Detailed Metadata

Refer to NRIS for metadata on the PLSS of Montana. The metadata for the county and city digital map files are contained within their export files. Metadata for the Montana mining claim density GIS digital file is as follows:

IDENTIFICATION INFORMATION:

CITATION

Originator: U.S. Geological Survey

Publication Date: 1998

Title: Mining claim density for Federal lands in Montana: 1996.

Geospatial Data Presentation Form: map

PUBLICATION INFORMATION:

Publisher: U.S. Geological Survey

Online Linkage: http://wrgis.wr.usgs.gov/docs/geologic/northwest_region/of98-489.html

DESCRIPTION

Abstract: Mining claim density on Federal lands in Montana at the end of 1996.

Purpose: Display and analysis of digital mining claim density data for Montana.

TIME PERIOD OF CONTENT OF BLM MINING CLAIM DATABASE

Time Period Information

Range of Dates and Times

Beginning Date: 01/01/1976

Ending Date: 03/31/97

Status

Progress: Complete

Maintenance and Update Frequency: Continuing

KEY WORDS:

Theme

Theme Keyword: Mining claim density Montana BLM lode placer tunnel mill

Place

Place Keyword: Montana

Place Keyword: US

ACCESS CONSTRAINTS: None

Use Constraints: Not for use at scales larger than 1:100,000. Not for accurate determination of section corner or property line locations.

Native Data Set Environment: ARC/INFO version 7.1.1, Solaris version 2.5.1

DATA QUALITY INFORMATION:

Attribute Accuracy Report: No errors in claim density numbers were found when they were spot-checked for selected individual sections, but not every section was checked.

Completeness Report: Data set is complete for Federal lands in the State of Montana.

LINEAGE OF MINING CLAIM DATA

SOURCE INFORMATION

Originator: Mining claim data from the U.S. Bureau of Land Management

Publication Date: 01/01/1976 and later

Title: BLM Mineral Claim Recordation System database (cumulative)

PUBLICATION INFORMATION

Publication Place: Denver, CO

Publisher: U.S. Bureau of Land Management
Source Scale Denominator: N/A
Type of Source Media: 9-track digital magnetic tape
SOURCE TIME PERIOD OF CONTENT
Beginning Date: 01/01/1975
Ending Date: 03/31/1997
Source Citation Abbreviation: mining claim
Source Contribution: Raw mining claim data.

SPATIAL DATA ORGANIZATION INFORMATION

SPATIAL DOMAIN

Bounding Coordinates

West Bounding Coordinate: -116.30000°
East Bounding Coordinate: -104.00000°
North Bounding Coordinate: 49.00000°
South Bounding Coordinate: 44.00000°

Direct Spatial Reference Method: Vector

POINT AND VECTOR OBJECT INFORMATION

Number of Arcs: 25,590
Number of Polygons: 8,738
Number of Nodes: 17,705
Number of Tics: 116
Number of Arc Segments: 32,789
Number of Polygon Labels: 8,569

SPATIAL REFERENCE INFORMATION

HORIZONTAL COORDINATE SYSTEM DEFINITION

Map Projection Name: Lambert, NAD 83
First Standard Parallel: 45° 00' 00"
Second Standard Parallel: 49° 00' 00"
Longitude of Central Meridian: -109° 30' 00"
Latitude of Projection Origin: 44° 15' 00"
False Easting: 600,000.0
False Northing: 0.0
Planar Distance Units: meters

GEODETIC MODEL

Horizontal Datum Name: GRS 1980 spheroid

ENTITY AND ATTRIBUTE INFORMATION:

Entity Type Definition: Polygon Attribute Table

Attribute Label: MTRS

Attribute Definition: Meridian, Township, Range, and Section composite from PLSS grid.

This item was used to create a unique ID for each section. Examples:

"20 15.0N 2.0E07" is Meridian 20 Township 15 North, Range 2 East, section 7.

Unrepresentable Domain: Character field

Beginning Date of Attribute Values: 03/24/1996

DISTRIBUTION INFORMATION

Metadata Reference Information:

Metadata Date: 1998

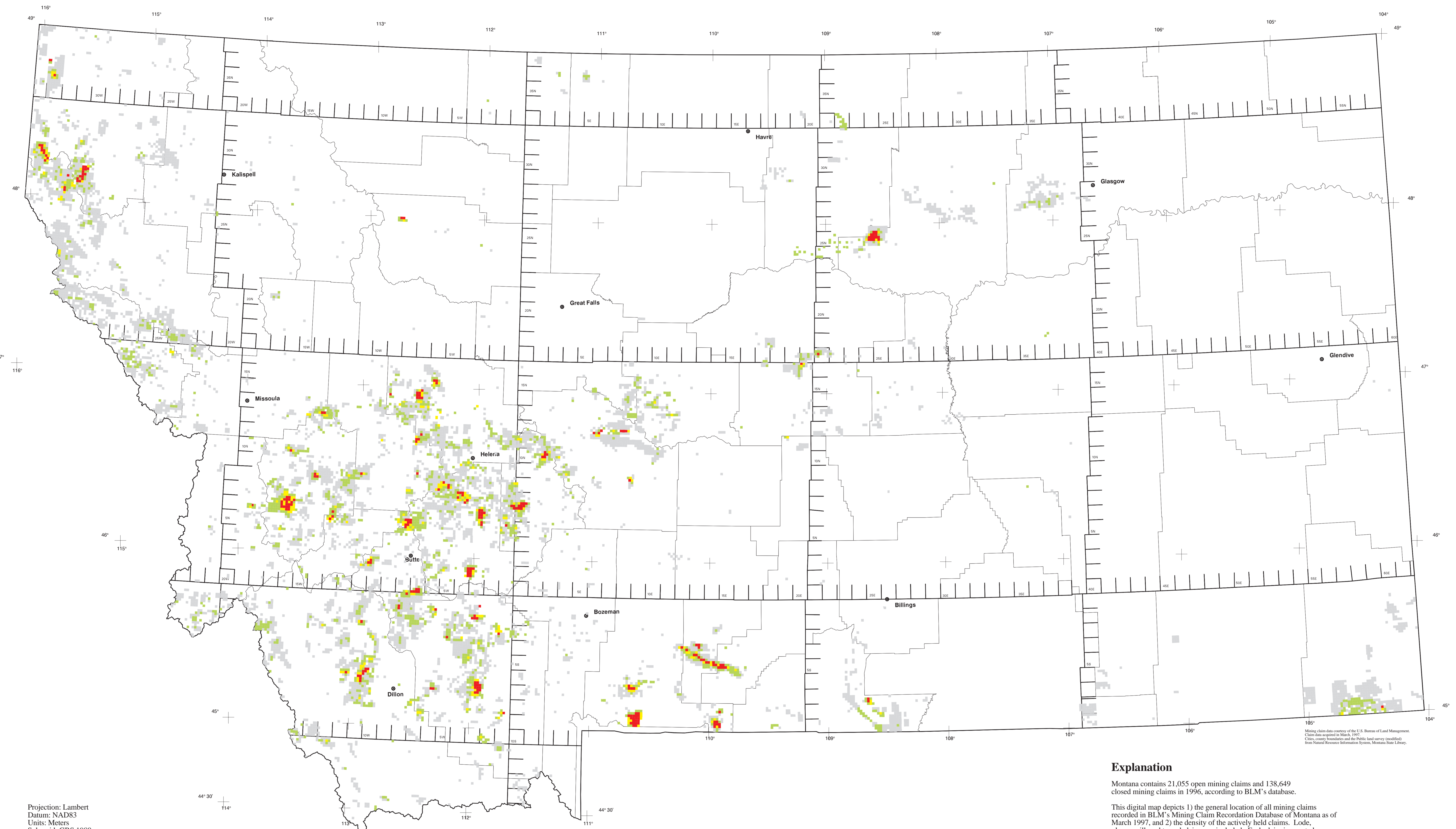
Metadata Contact: Paul Hyndman

West 904 Riverside Avenue, Room 202

Spokane, WA 99201-1087

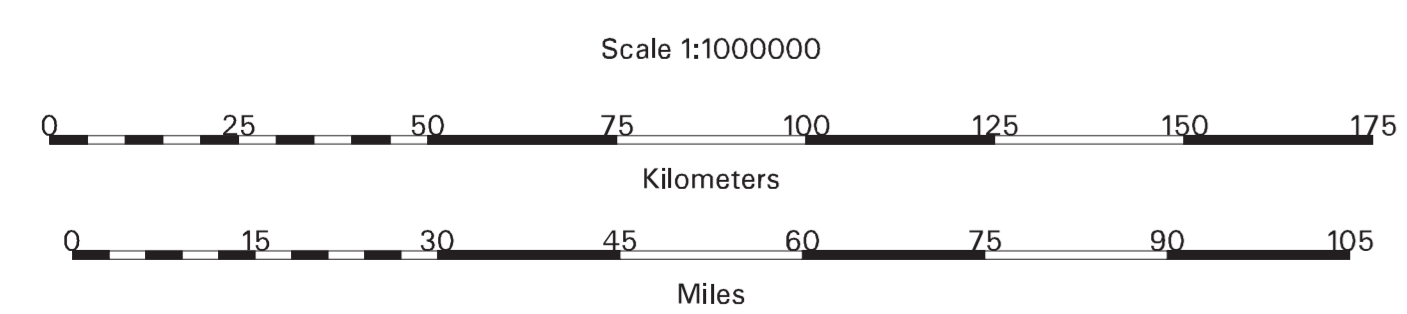
509-353-3176

phyndman@usgs.gov



Mining claim data courtesy of the U.S. Bureau of Land Management. Claim data acquired in March, 1997. Cities, county boundaries and the Public Land Survey (modified) from Natural Resource Information System, Montana State Library.

Projection: Lambert
Datum: NAD83
Units: Meters
Spheroid: GRS 1980
1st standard parallel: 45 00 00
2nd standard parallel: 49 00 00
central meridian: -109 30 00
latitude of projection's origin: 44 15 00
false easting (meters): 600,000
false northing (meters): 0.0



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The smallest unit depicted on the map is a section of the Public Land Survey System. A section is typically one square mile, or 640 acres.

Caution: One claim in a section causes the entire section to show on the map. A single 5-acre mill claim or a 20-acre lode claim, for example, is represented by a 640-acre section on the map. Twenty acres represents 1/32nd or 0.03125 of a square mile.

- Only closed claims in this section
(Closed claims are no longer valid)
- 1 - 12 open claims per section
(Open claims are actively held)
- 13 - 24 open claims per section
- Greater than 24 open claims per section

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