

**Digital Geologic-GIS Map of the Yellowstone National Park and Vicinity, Wyoming, Montana and Idaho (NPS, GRD, GRI, YELL, YELL digital map) adapted from U.S. Geological Survey maps by Christiansen, Blank, Prostka, Smedes, Pierce, the U.S. Geological Survey, Elliot, Nelson, Wahl, Witkind, Love and others (1956 to 2007), and a Montana Bureau of Mines and Geology map by Berg, Lonn and Locke (1999)**

Metadata also available as

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## What does this data set describe?

*Title:*

Digital Geologic-GIS Map of the Yellowstone National Park and Vicinity, Wyoming, Montana and Idaho (NPS, GRD, GRI, YELL, YELL digital map) adapted from U.S. Geological Survey maps by Christiansen, Blank, Prostka, Smedes, Pierce, the U.S. Geological Survey, Elliot, Nelson, Wahl, Witkind, Love and others (1956 to 2007), and a Montana Bureau of Mines and Geology map by Berg, Lonn and Locke (1999)

*Abstract:*

The Digital Geologic-GIS Map of the Yellowstone National Park and Vicinity, Wyoming, Montana and Idaho is composed of GIS data layers and GIS tables, and is available in the following GRI-supported GIS data formats: 1.) a 10.1 file geodatabase (yell\_geology.gdb), a 2.) Open Geospatial Consortium (OGC) geopackage, and 3.) 2.2 KMZ/KML file for use in Google Earth, however, this format version of the map is limited in data layers presented and in access to GRI ancillary table information. The file geodatabase format is supported with a 1.) ArcGIS Pro map file (.mapx) file (yell\_geology.mapx) and individual Pro layer (.lyrx) files (for each GIS data layer), as well as with a 2.) 10.1 ArcMap (.mxd) map document (yell\_geology.mxd) and individual 10.1 layer (.lyr) files (for each GIS data layer). The OGC geopackage is supported with a QGIS project (.qgz) file. Upon request, the GIS data is also available in ESRI 10.1 shapefile format. Contact Stephanie O'Meara (see contact information below) to acquire the GIS data in these GIS data formats. In addition to the GIS data and supporting GIS files, three additional files comprise a GRI digital geologic-GIS dataset or map: 1.) this file (yell\_geology\_gis\_readme.pdf), 2.) the GRI ancillary map information document (.pdf) file (yell\_geology.pdf) which contains geologic unit descriptions, as well as other ancillary map information and graphics from the source map(s) used by the GRI in the production of the GRI digital geologic-GIS data for the park, and 3.) a user-friendly FAQ PDF version of the metadata (yell\_geology\_metadata\_faq.pdf). Please read the yell\_geology\_gis\_readme.pdf for information pertaining to the proper extraction of the GIS data and other map files. Google Earth software is available for free at: <https://www.google.com/earth/versions/>. QGIS software is available for free at: <https://www.qgis.org/en/site/>. Users are encouraged to only use the Google Earth data for basic visualization, and to use the GIS data for any type of data analysis or investigation. The data were completed as a component of the Geologic Resources Inventory (GRI) program, a National Park Service (NPS) Inventory and Monitoring (I&M) Division funded program that is administered by the NPS Geologic Resources Division (GRD). For a complete listing of GRI products visit the GRI publications webpage: For a complete listing of GRI products visit the GRI publications webpage: <https://www.nps.gov/subjects/geology/geologic-resources-inventory-products.htm>. For more information about the Geologic Resources Inventory Program visit the GRI webpage: <https://www.nps.gov/subjects/geology/gri.htm>. At the bottom of that webpage is a "Contact Us" link if you need additional information. You may also directly contact the program coordinator, Jason Kenworthy ([jason\\_kenworthy@nps.gov](mailto:jason_kenworthy@nps.gov)). Source geologic maps and data used to complete this GRI digital dataset were provided by the following: U.S. Geological Survey and Montana Bureau of Mines and Geology. Detailed information concerning the sources used and their contribution the GRI product are listed

in the Source Citation section(s) of this metadata record (yell\_geology\_metadata.txt or yell\_geology\_metadata\_faq.pdf). Users of this data are cautioned about the locational accuracy of features within this dataset. Based on the source map scale of 1:62,500 and United States National Map Accuracy Standards features are within (horizontally) 63.5 meters or 208.3 feet of their actual location as presented by this dataset. Users of this data should thus not assume the location of features is exactly where they are portrayed in Google Earth, ArcGIS, QGIS or other software used to display this dataset. All GIS and ancillary tables were produced as per the NPS GRI Geology-GIS Geodatabase Data Model v. 2.3. (available at: <https://www.nps.gov/articles/gri-geodatabase-model.htm>).

*Supplemental Information:*

The data layers (feature classes) that comprise the Digital Geologic-GIS Map of the Yellowstone National Park and Vicinity, Wyoming, Montana and Idaho include: YELLHZL (Hazard Feature Lines), YELLGLF (Geologic Line Features), YELLGSL (Geologic Sample Localities), YELLLIN (Trend Lines), YELLASHA (Ash Contacts), YELLASH (Ash Units), YELLFLD (Folds), YELLGLN (Linear Geologic Units and Dikes), YELLATD (Geologic Attitude Observation Localities), YELLSEC (Geologic Cross Section Lines), YELLSYM (Map Symbolology), YELLFLT (Faults), YELLGLG (Geologic Units), YELLGLGA (Geologic Contacts), YELLAMAA (Alteration and Metamorphic Area Boundaries), YELLAMA (Alteration and Metamorphic Areas) and YELLGPT (Point Geologic Units). In addition to the data layers, there are three GIS tables, the Geologic Unit Information Table (yellunit) Table, the short-version of the Geologic Unit Information Table (yellunit\_short) Table, and the Source Map Information Table (yellmap) Table. Refer to the NPS GRI Geology-GIS Geodatabase Data Model v. 2.3 (available at: <https://www.nps.gov/articles/gri-geodatabase-model.htm>) for detailed data layer (feature class) and table specifications including attribute field parameters, definitions and domains, and implemented topology rules and relationship classes. For the KML/KMZ format all or only some of the data layers are available. The KMZ file also possesses on-line links to the GRI program and its products, and to this readme document, the GRI ancillary map information document and the FAQ metadata pertaining to this dataset/map. The GIS data projection is NAD83, UTM Zone 12N, however, for the KML/KMZ format the data is projected upon export to WGS84 Geographic, the native coordinate system used by Google Earth.

**1. How should this data set be cited?**

National Park Service (NPS) Geologic Resources Inventory (GRI) program, 20200616, Digital Geologic-GIS Map of the Yellowstone National Park and Vicinity, Wyoming, Montana and Idaho (NPS, GRD, GRI, YELL, YELL digital map) adapted from U.S. Geological Survey maps by Christiansen, Blank, Prostka, Smedes, Pierce, the U.S. Geological Survey, Elliot, Nelson, Wahl, Witkind, Love and others (1956 to 2007), and a Montana Bureau of Mines and Geology map by Berg, Lonn and Locke (1999).

**2. What geographic area does the data set cover?**

*West\_Bounding\_Coordinate:* -111.250785528  
*East\_Bounding\_Coordinate:* -109.750730891  
*North\_Bounding\_Coordinate:* 45.2499462324  
*South\_Bounding\_Coordinate:* 43.9998937296

**3. What does it look like?**

Not applicable  
No browse graphic provided

**4. Does the data set describe conditions during a particular time period?**

*Calendar\_Date:* 16-Jun-2020  
*Currentness\_Reference:* ground condition

**5. What is the general form of this data set?**

*Geospatial\_Data\_Presentation\_Form:* map

**6. How does the data set represent geographic features?**

- a. **How are geographic features stored in the data set?**
- b. **What coordinate system is used to represent geographic features?**

*Grid\_Coordinate\_System\_Name:* Universal Transverse Mercator  
*Universal\_Transverse\_Mercator:*  
*UTM\_Zone\_Number:* 12  
*Transverse\_Mercator:*  
*Scale\_Factor\_at\_Central\_Meridian:* 0.999600  
*Longitude\_of\_Central\_Meridian:* -111.0  
*Latitude\_of\_Projection\_Origin:* 0.000000  
*False\_Easting:* 500000.000000  
*False\_Northing:* 0.000000

Planar coordinates are encoded using coordinate pair  
Abcissae (x-coordinates) are specified to the nearest 0.000007  
Ordinates (y-coordinates) are specified to the nearest 0.000007  
Planar coordinates are specified in meters

The horizontal datum used is North American Datum of 1983.  
The ellipsoid used is Geodetic Reference System 80.  
The semi-major axis of the ellipsoid used is 6378137.000000.  
The flattening of the ellipsoid used is 1/298.257222.

**7. How does the data set describe geographic features?**

*Entity\_and\_Attribute\_Overview:*

Refer to the NPS GRI Geology-GIS Geodatabase Data Model v. 2.3 (available at: <https://www.nps.gov/articles/gri-geodatabase-model.htm>) for detailed feature class and table attribute field parameters, definitions and domains, and implemented relationship classes, as well as for implemented feature class topology rules.

*Entity\_and\_Attribute\_Detail\_Citation:*

NPS GRI Geology-GIS Geodatabase Data Model v. 2.3. (available at: <https://www.nps.gov/articles/gri-geodatabase-model.htm>)

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## Who produced the data set?

1. **Who are the originators of the data set?** (may include formal authors, digital compilers, and editors)
  - o National Park Service (NPS) Geologic Resources Inventory (GRI) program
2. **Who also contributed to the data set?**

James Winter, James R. Chappell, Philip M. Reiker, Jason Isherwood, Stephanie O'Meara, Ron Karpilo, Sarah Lowe, Jake Suri, Georgia Hybels and Chase Winters (Colorado State University and NPS Geologic Resources Division)

3. **To whom should users address questions about the data?**

Stephanie O'Meara  
Colorado State University  
Research Associate, Geologist/GIS Specialist/Data Manager  
1201 Oak Ridge Drive, Suite 200  
Fort Collins, Colorado 80525  
USA

(970) 491-6655 (voice)  
[stephanie\\_o'meara@partner.nps.gov](mailto:stephanie_o'meara@partner.nps.gov)

*Hours\_of\_Service:* 9:00 a.m. to 5:00 p.m. (MST), Monday - Friday

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## Why was the data set created?

The data are intended to assist NPS personnel in the protection and management of Yellowstone National Park.

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## How was the data set created?

1. **From what previous works were the data drawn?**

**USGS unpublished digital data (Two Ocean Pass )** (source 1 of 34)

U.S. Geological Survey, 2002, Digital Geologic Map of the Two Ocean Pass Quadrangle, Yellowstone National Park and Vicinity, Wyoming: unpublished digital data (Two Ocean Pass ), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished digital data (Tower Junction)** (source 2 of 34)

U.S. Geological Survey, 2002, Digital Geologic Map of the Tower Junction Quadrangle, Yellowstone National Park, Wyoming and Montana: unpublished digital data (Tower Junction), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished digital data (Mount Hancock)** (source 3 of 34)

Love, J.D., 2003, Digital Geologic Map of the Mount Hancock Quadrangle, Yellowstone National Park and Vicinity, Wyoming: unpublished digital data (Mount Hancock), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Geologic Quadrangle Map GQ-1190** (source 4 of 34)

Christiansen, R.L., Blank, H.R., 1974, Geologic Map of the Madison Junction Quadrangle, Yellowstone National Park, Wyoming: Geologic Quadrangle Map GQ-1190, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished digital data (Huckleberry Mountain)** (source 5 of 34)

Love, J.D., 2003, Digital Geologic Map of the Huckleberry Mountain Quadrangle, Yellowstone National Park and Vicinity, Wyoming: unpublished digital data (Huckleberry Mountain), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Professional Paper 609** (source 6 of 34)

Witkind, I.J., 1969, Geology of the Tepee Creek Quadrangle, Montana-Wyoming: Professional Paper 609, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished digital data (Grassy Lake)** (source 7 of 34)

U.S. Geological Survey, 2002, Digital Geologic Map of the Grassy Lake Reservoir Quadrangle, Yellowstone National Park and Vicinity, Wyoming: unpublished digital data (Grassy Lake), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured,

formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished digital data (Pelican Cone)** (source 8 of 34)

U.S. Geological Survey, 2002, Digital Geologic Map of the Pelican Cone Quadrangle, Yellowstone National Park and Vicinity, Wyoming: unpublished digital data (Pelican Cone), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Miscellaneous Geologic Investigations Map I-711** (source 9 of 34)

U.S. Geological Survey, 1972, Geologic Map of Yellowstone National Park: Miscellaneous Geologic Investigations Map I-711, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 125000

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Miscellaneous Geologic Investigations Map I-816** (source 10 of 34)

Pierce, W.G., Nelson, W.H., Prostka, H.J., 1973, Geologic Map of the Pilot Peak Quadrangle, Park County, Wyoming: Miscellaneous Geologic Investigations Map I-816, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished digital data (Abiathar Peak)** (source 11 of 34)



U.S. Geological Survey, 2002, Digital Geologic Map of the Abiathar Peak Quadrangle, Yellowstone National Park, Wyoming and Montana: unpublished digital data (Abiathar Peak), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**MBMG Open-File Reports MBMG-387** (source 12 of 34)

Berg, Richard B., Lonn, Jeffrey D., and Locke, 1999, Geologic Map of the Gardiner 30' x 60' Quadrangle, South-Central Montana: Open-File Reports MBMG-387, Montana Bureau of Mines and Geology (MBMG), Butte, Montana.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 100000

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Miscellaneous Investigations Series Map I-1084** (source 13 of 34)

Elliott, J.E., 1979, Geologic Map of the southwest part of the Cooke City Quadrangle, Montana and Wyoming: Miscellaneous Investigations Series Map I-1084, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 24000

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished mylar (Buffalo Lake)** (source 14 of 34)

Christiansen, R.L., 2007, Mylar of the Buffalo Lake Quadrangle: unpublished mylar (Buffalo Lake), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* mylar

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished digital data (Canyon Village)** (source 15 of 34)

U.S. Geological Survey, 2002, Digital Geologic Map of the Canyon Village Quadrangle, Yellowstone National Park, Wyoming: unpublished digital data (Canyon Village), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished digital data (Frank Island)** (source 16 of 34)

U.S. Geological Survey, 2002, Digital Geologic Map of the Frank Island Quadrangle, Yellowstone National Park, Wyoming: unpublished digital data (Frank Island), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished digital data (Madison Junction)** (source 17 of 34)

U.S. Geological Survey, 2002, Digital Geologic Map of the Madison Junction Quadrangle, Yellowstone National Park, Wyoming: unpublished digital data (Madison Junction), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished mylar (Mammoth)** (source 18 of 34)

Christiansen, R.L., Prostka, H.J., Ruppel, E.T., Sm, 1972, Geologic Map of the Mammoth Quadrangle, Wyoming and Montana: unpublished mylar (Mammoth), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* mylar

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished digital data (Norris Junction)** (source 19 of 34)

U.S. Geological Survey, 2002, Digital Geologic Map of the Norris Junction Quadrangle, Yellowstone National Park, Wyoming: unpublished digital data (Norris Junction), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Geologic Quadrangle Map GQ-1667** (source 20 of 34)

Smedes, H.W., M'Gonigle, J.W., Prostka, H.J., 1989, Geologic Map of the Two Ocean Pass Quadrangle, Yellowstone National Park and Vicinity, Wyoming: Geologic Quadrangle Map GQ-1667, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished digital data (West Thumb)** (source 21 of 34)

U.S. Geological Survey, 2002, Digital Geologic Map of the West Thumb Quadrangle, Yellowstone National Park, Wyoming: unpublished digital data (West Thumb), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished mylar (West Yellowstone)** (source 22 of 34)

Christiansen, R.L., 2007, Mylar of the West Yellowstone Quadrangle: unpublished mylar (West Yellowstone), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* mylar

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Geologic Quadrangle Map GQ-1244** (source 23 of 34)

Prostka, H.J., Ruppel, E.T., Christiansen, R.L., 1975, Geologic Map of the Abiathar Peak Quadrangle, Yellowstone National Park, Wyoming and Montana: Geologic Quadrangle Map GQ-1244, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Geologic Quadrangle Map GQ-1192** (source 24 of 34)

Christiansen, R.L., Blank, H.R., 1975, Geologic Map of the Canyon Village Quadrangle, Yellowstone National Park, Wyoming: Geologic Quadrangle Map GQ-1192, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Geologic Quadrangle Map GQ-1209** (source 25 of 34)

Blank, H.R., Prostka, H.J., Keefer, W.R., Ch, 1974, Geologic Map of the Frank Island Quadrangle, Yellowstone National Park, Wyoming: Geologic Quadrangle Map GQ-1209, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Geologic Quadrangle Map GQ-1459** (source 26 of 34)

Christiansen, R.L., Blank, H.R., Love, J.D., Reed, , 1978, Geologic Map of the Grassy Lake Reservoir Quadrangle, Yellowstone National Park and Vicinity, Wyoming: Geologic Quadrangle Map GQ-1459, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Geologic Quadrangle Map GQ-1193** (source 27 of 34)

Christiansen, R.L., 1974, Geologic Map of the Norris Junction Quadrangle, Yellowstone National Park, Wyoming: Geologic Quadrangle Map GQ-1193, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Geologic Quadrangle Map GQ-1189** (source 28 of 34)

Christiansen, R.L., Blank, H.R., 1974, Geologic Map of the Old Faithful Quadrangle, Yellowstone National Park, Wyoming: Geologic Quadrangle Map GQ-1189, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Geologic Quadrangle Map GQ-1243** (source 29 of 34)

Prostka, H.J., Smedes, H.W., Christiansen, R.L., 1975, Geologic Map of the Pelican Cone Quadrangle, Yellowstone National Park and Vicinity, Wyoming: Geologic Quadrangle Map GQ-1243, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Geologic Quadrangle Map GQ-1247** (source 30 of 34)

Prostka, H.J., Blank, H.R., Christiansen, R.L., 1975, Geologic Map of the Tower Junction Quadrangle, Yellowstone National Park, Wyoming and Montana: Geologic Quadrangle Map GQ-1247, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Geologic Quadrangle Map GQ-1191** (source 31 of 34)

Christiansen, R.L., 1974, Geologic Map of the West Thumb Quadrangle, Yellowstone National Park, Wyoming: Geologic Quadrangle Map GQ-1191, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* paper

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS Open-File Report OF-99-174** (source 32 of 34)

Christiansen, R.L., and Wahl, R.R., 1999, Digital Geologic Map of Yellowstone National Park, Idaho, Montana, and Wyoming and Vicinity: Open-File Report OF-99-174, U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 125000

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished digital data (Old Faithful)** (source 33 of 34)

U.S. Geological Survey, 2002, Digital Geologic Map of the Old Faithful Quadrangle, Yellowstone National Park, Wyoming: unpublished digital data (Old Faithful), U.S. Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* digital data

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Features and attribution were derived from source digital data. Ancillary map text, including unit descriptions, and graphics, if present on the source map, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**USGS unpublished mylar (Sunlight Peak) (source 34 of 34)**

U.S. Geological Survey, 1956, Geologic Map of the Sunlight Peak  
Quadrangle, Wyoming: unpublished mylar (Sunlight Peak), U.S.  
Geological Survey (USGS), Reston, Virginia.

*Type\_of\_Source\_Media:* mylar

*Source\_Scale\_Denominator:* 62500

*Source\_Contribution:*

Geologic features present on the source map were digitized using a .TIF image of the paper/mylar map that was scanned at 300dpi and georeferenced in NAD83 UTM. The source map scan was also used to attribute features, as well as to check (QC) line quality, both positionally and spatially, and feature attribution. Ancillary source map text, including unit descriptions, and graphics, if present, were captured, formatted and added to the ancillary map information document. See the Process Step section for additional information.

**2. How were the data generated, processed, and modified?**

Date: 16-Jun-2020 (process 1 of 1)

1.) GIS features were produced from source digital data or digitized from a source paper map. See the Source Information Contribution section(s) for specific source map details. GIS features converted from source digital data were imported into a GRI data model compliant geodatabase. For details on the GRI data model see the NPS GRI Geology-GIS Geodatabase Data Model v. 2.3 (available at: <https://www.nps.gov/articles/gri-geodatabase-model.htm>). GIS features captured from a source paper map were digitized from a TIF image of the map scanned at 300dpi and georeferenced in NAD83 UTM. 2.) Line quality of digitized features was checked against the source scan to ensure that GIS features were represented accurately, both positionally and spatially. Line quality of digital data was checked and if warranted edited to ensure good quality linework. 3.) Feature attribution was derived for all features using the source data attribution and the source printed/plotted map if available. 4.) Data Model topology rules were validated on all features and any topology errors corrected. 5.) Quality control (QC) consisted of checking features and their attribution against the source digital data, as well as against the source printed/plotted map if available. A GRI developed ArcObjects tool was run to check for GRI data model validation and feature-related consistency. 6.) The UNIT and MAP tables were populated and checked against the source(s). Relationship classes were also added and used to ensure attribution consistency between feature class and table attribution. 7.) Feature symbology was produced for all feature classes. An attempt was made to best match symbology to its source map, however, in some cases features symbology maybe slightly modified, primarily based on the limitations of the ArcGIS geology styles. In some cases, however, symbology may have been modified to reconcile differences from multiple sources. 8.) An ArcMap Document was produced, in part by a GRI finalize mxd tool, and layer (.lyr) files saved for all data layers. 9.) The ancillary map information PDF document, see the Supplemental Information section for additional information, was produced from textual information and figures present on the source map(s) and/or in digital data files. If applicable, source map images were produced at 150dpi or greater resolution and optical character recognition (OCR) software was used



to produce text from source map text. The text, source map images and other ancillary source map information were added to a Help & Manual (.hmxz) template file. The .hmxz file was then compiled to produce the ancillary map information document. Any compilation errors were then checked and corrected and the document was reviewed for content, usability and grammatical errors. 10.) A Google Earth .kmz/.kml file, as well as a OGC GeoPackage and QGIS project file was produced from the finalized file geodatabase and ArcMap document.

Person who carried out this activity:

James Winter  
Colorado State University  
Research Associate, Geologist/GIS Specialist  
1201 Oak Ridge Drive, Suite 200  
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(970) 491-6655 (voice)  
james\_winter@partner.nps.gov

*Hours\_of\_Service:* 9:00 a.m. to 5:00 p.m. (MST), Monday - Friday

Data sources used in this process:

- USGS Geologic Quadrangle Maps GQ-1189, GQ-1190, GQ-1191, GQ-1192, GQ-1193, GQ-1209, GQ-1243, GQ-1244, GQ-1247, GQ-1459 and GQ-1667, USGS Miscellaneous Geologic Investigations Maps I-711 and I-816, USGS Miscellaneous Investigations Series Map I-1084, USGS Open-File Report OF-99-174, USGS Professional Paper 609, USGS unpublished digital data for Abiathar Peak, Canyon Village, Frank Island, Grassy Lake, Huckleberry Mountain, Madison Junction, Mount Hancock, Norris Junction, Old Faithful, Pelican Cone, Tower Junction, Two Ocean Pass and West Thumb, USGS unpublished mylars Buffalo Lake, Mammoth, Sunlight Peak and West Yellowstone and MBMG Open-File Reports MBMG-387

3. **What similar or related data should the user be aware of?**

National Park Service Geologic Resources Inventory (GRI) program, 20200616, Metadata for the Digital Geologic-GIS Map of the Yellowstone National Park and Vicinity, Wyoming, Montana and Idaho (NPS, GRD, GRI, YELL, YELL digital map).

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## **How reliable are the data; what problems remain in the data set?**

1. **How well have the observations been checked?**

Feature and table attribution was derived and checked with the source map(s). Attribution was checked (QCd) for errors. Users of this data are advised to FULLY and CAREFULLY READ the "DISTRIBUTION LIABILITY" section of this metadata before using the data.

**2. How accurate are the geographic locations?**

Data was produced from digital source data and digitized from a georeferenced source map .TIF image(s) (300dpi). Users of this data are cautioned about the locational accuracy of features within this dataset. Based on the source map scale and United States National Map Accuracy Standards features are within (horizontally) 63.5 meters or 208.3 feet of their actual location as presented by this dataset. Users of this data should thus not assume the location of features is exactly where they portrayed are in ArcGIS or other software used to display this dataset. The PRECISION of any Shapefile (.shp) files is DOUBLE. Coordinate tics on the georeferenced (registered and rectified) source map image(s) were checked against control points that had the exact specified coordinates of the tic. The direct distance between the image tic and its control point were measured. All measured distances were less than 50% of the required distance to meet National Map Accuracy Standards (1/50th of an inch for maps at 1:20,000 scale and smaller). Features were checked (QCd) after digitizing for positional accuracy errors using the georeferenced source map image.

**3. How accurate are the heights or depths?**

No vertical coordinates are present in this GRI digital dataset.

**4. Where are the gaps in the data? What is missing?**

All data is considered complete to the extent of the source map(s).

**5. How consistent are the relationships among the observations, including topology?**

GIS data in 10.1 file geodatabase, OGC geopackage and 2.2 KML/KMZ file formats.

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## **How can someone get a copy of the data set?**

### **Are there legal restrictions on access or use of the data?**

*Access\_Constraints:* None

*Use\_Constraints:*

Not for use at scale greater than 1:62,500 (source map scale). Users of this data are cautioned about the locational accuracy of features within this dataset. Based on the source map scale and United States National Map Accuracy Standards features are within (horizontally) 63.5 meters or

208.3 feet of their actual location as presented by this dataset. Users of this data should thus not assume the location of features is exactly where they are portrayed in Google Earth, ArcGIS, QGIS or other software used to display this dataset.

1. **Who distributes the data set?** (Distributor 1 of 1)

Stephanie O'Meara  
Colorado State University  
Research Associate, Geologist/GIS Specialist/Data Manager  
1201 Oak Ridge Drive, Suite 200  
Fort Collins, Colorado 80525  
USA

(970) 491-6655 (voice)  
stephanie\_o'meara@partner.nps.gov

*Hours\_of\_Service:* 8:00 a.m. to 4:00 p.m. (MST), Monday - Friday

*Contact\_Instructions:*

GRI data are available at: <http://irma.nps.gov/App/Reference/Search>

2. **What's the catalog number I need to order this data set?**

GIS map data available in several GRI-supported GIS data formats

3. **What legal disclaimers am I supposed to read?**

The National Park Service shall not be held liable for improper or incorrect use of the data described and/or contained herein. These data and related graphics are not legal documents and are not intended to be used as such.

The information contained in these data is dynamic and may change over time. The data are not better than the original sources from which they were derived. It is the responsibility of the data user to use the data appropriately and consistent within the limitations of geospatial data in general and these data in particular. The related graphics are intended to aid the data user in acquiring relevant data; it is not appropriate to use the related graphics as data.

The National Park Service gives no warranty, expressed or implied, as to the accuracy, reliability, or completeness of these data. It is strongly recommended that these data are directly acquired from an NPS server and not indirectly through other sources which may have changed the data in some way. Although these data have been processed successfully on a

computer system at the National Park Service, no warranty, expressed or implied is made regarding the utility of the data on another system or for general scientific purposes, nor shall the act of distribution constitute any such warranty. This disclaimer applies to both to individual use of the data and aggregate use with other data.

#### 4. How can I download or order the data?

- **Availability in digital form:**

**Data format:** GDB (version ArcGIS Pro 2.4) GIS (file geodatabase format) data package with a Pro map (.mapx) file (yell\_geology\_gdb\_pro.zip) Size: 32.2

**Network links:** NPS Data Store, <https://irma.nps.gov/DataStore/>

**Data format:** GDB (version ArcGIS 10.1) GIS (file geodatabase format) data package with an ArcMap map document (.mxd) file (yell\_geology\_gdb.zip) Size: 32.2

**Network links:** NPS Data Store, <https://irma.nps.gov/DataStore/>

**Data format:** KML/KMZ (version 2.2) Google Earth (kml/kmz format) data package (yell\_geology\_kml.zip) Size: 43.9

**Network links:** NPS Data Store, <https://irma.nps.gov/DataStore/>

**Data format:** GPKG (version OGC geopackage) GIS (geopackage format) data package with a QGIS project (.qgz) file (yell\_geology\_gpkg.zip) Size: 32.2

**Network links:** NPS Data Store, <https://irma.nps.gov/DataStore/>

**Data format:** PDF (version 9) Ancillary Map Information Document Size: 35.9

**Network links:** NPS Data Store, <https://irma.nps.gov/DataStore/>

**Data format:** PDF (version 9) GIS Readme Document Size: 1.1

**Network links:** NPS Data Store, <https://irma.nps.gov/DataStore/>

**Data format:** PDF (version 9) FAQ Metadata File Size: 0.1

**Network links:** NPS Data Store, <https://irma.nps.gov/DataStore/>

- **Cost to order the data:** None

- **Special instructions:**

Search for the GRI map, then download the GRI data at:  
<https://irma.nps.gov/DataStore/>

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## Who wrote the metadata?

Dates:

Last modified: 16-Jun-2020

Metadata author:

Stephanie O'Meara  
Colorado State University  
Research Associate, Geologist/GIS Specialist/Data Manager  
1201 Oak Ridge Drive, Suite 200  
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USA

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*Hours\_of\_Service*: 9:00 a.m. to 5:00 p.m. (MST), Monday - Friday

Metadata standard:

FGDC Content Standards for Digital Geospatial Metadata (FGDC-STD-001-1998)

Metadata extensions used:

- <http://www.fgdc.gov/standards/>

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