

Digital Mapping Techt, are tare to the the the tare to the the tare to the the tare to the

00th year anniversary of the establishment of the National Park Service. To onal Park Service has established several fun and exciting programs, including th 'Find Your Park" campaign. Park-specific events will be occurring throughout the year. Information tennial programs and events can be found a ttps://www.nps.gov/subjects/centennial/index.ht

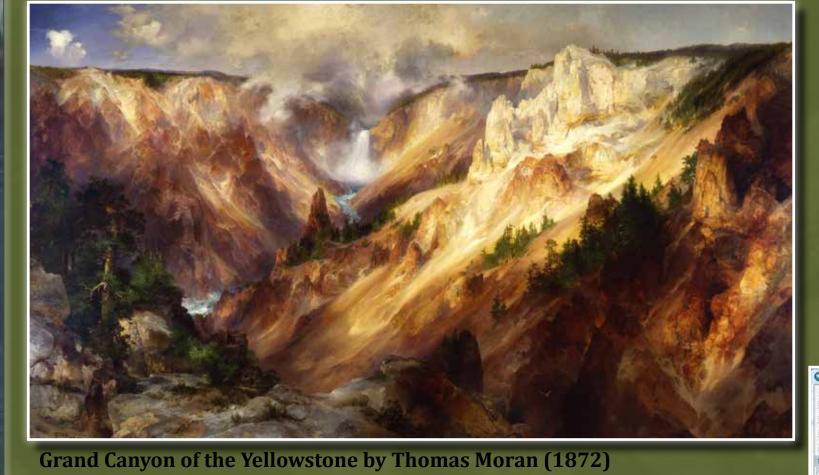
#### Geology and Our National Park Units

Geology is an important, if not the primary, reason why many parks are unique, inspiring, and beautiful, and thus deserving of national recognition and ocesses have sculpted and transformed the incredible and diverse landscapes entrusted to the NPS, ranging free the serene glacial-carved beauty of Yosemite Valley to the hydrothermal wonders of Yellowstone to the vast exposures of almost two billion years of geologic history in the rocks of the Grand Canyon.

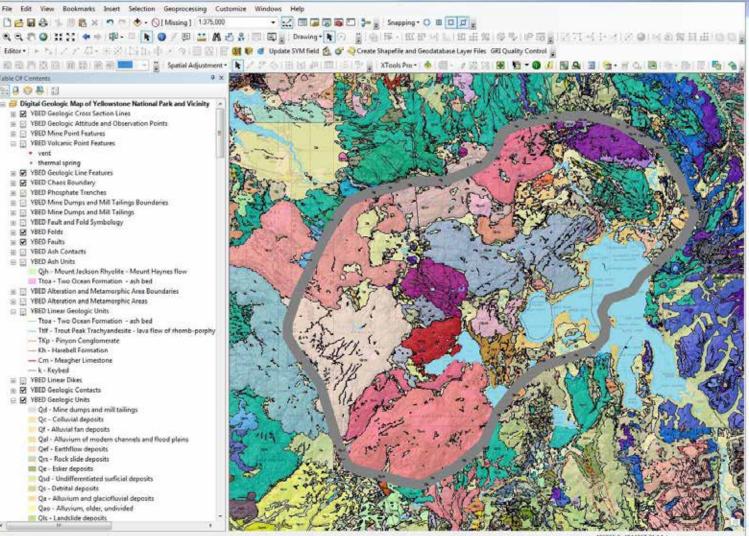
Fo commemorate the 100th anniversary of the National Park Service, the Geologic Resources Inventory (GRI) Program Map Team has selected ten park units with significant and often spectacular geology. For each, we offer a brief history of the park, a snapshot of our digital geologic-GIS product for the park, and a "geology fact", complete with photographs and figures about each park's geology. Parks are presented in their establishment order, as indicated along the timeline at the base of the poster. Source maps and digital data used by the GRI for each digital geologic-GIS map are presented with that GRI map product.

Additional information about the NPS Geologic Resources Inventory (GRI) Program and our products, digital geologic-GIS map and geology reports, can be found in the lower right corner of this poster.

# Yellowstone National Park, Wyoming, Idaho, and Montana



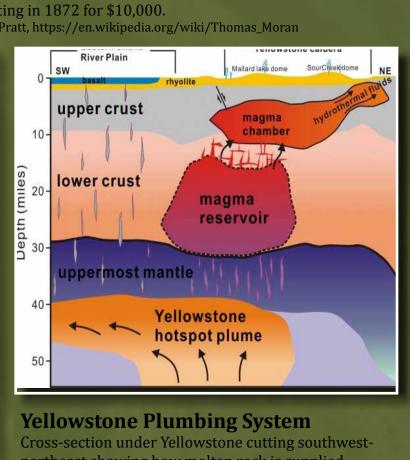
On March 1, 1872, the Yellowstone National Park otection Act was signed into law by President es S. Grant. The act states "the tract of land... ng near the headwaters of the Yellowstone River.. nereby reserved and withdrawn from settlement, supancy, or sale under the laws of the United ites, and dedicated and set apart as a public park or und for the benefit and enjoyment of the



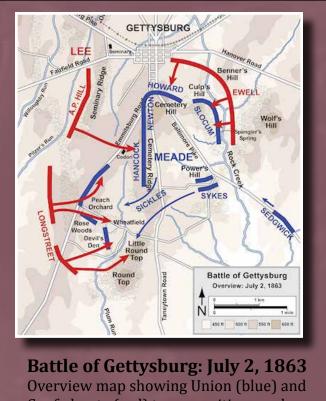
tal Geologic Map showing the Yellowstone Calder

Geology Fact #1 New research suggests that a deeper and larger magma reservoir exists (see graphic to the right). This reservoir is over 4 times the size of the upper chamber and contains enough magma to fill the Grand Canyon (~1000 cubic miles in volume) 11.2 times.

Source: http://earthsky.org/earth/huge-magma servoir-discovered-under-yellowstone-supervolo



**Gettysburg National Military Park, Pennsylvania** 

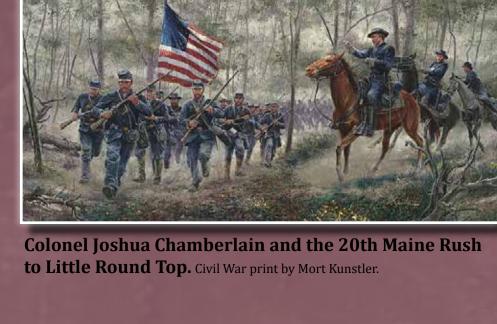


ements on the second day of the ba

ap by Hal Jespersen, www.cwmaps.com.

National Military Park was established in 1895 ed to the National Park Service in 1933) to protect the scape of the Battle of Gettysburg, fought during the America:

attle of Gettysburg (July 1 – 3, 1863) he 3-day battle between the Confederate and Union armies ould conclude the "high-water mark of the confederacy", and sulted in the largest number of casualties of any battle of the merican Civil War



**Geology Fact #2** At Little Round Top soldiers lefending the southern end of the union line couldn't solidly "dig in" or entrench as the rock that forms the prominent hilltop is of a hard resistant riassic-age diabase. As a result th<mark>e defending union soldie</mark>rs suffered higher than expected causalities compared to the attacking confederates. ource: Brown, Andrew, 1962, Geology and the

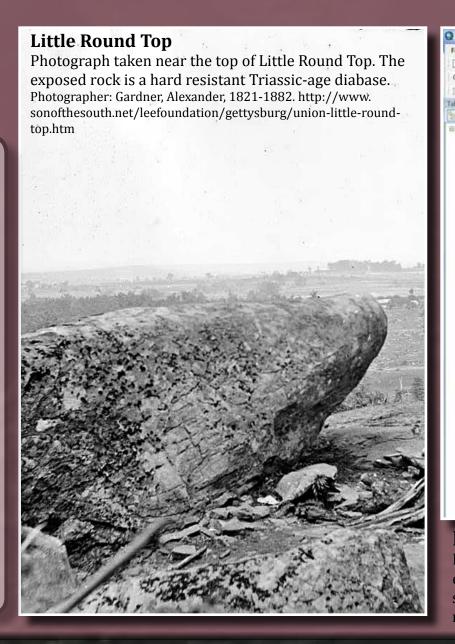
ettysburg Campaign: Pennsylvania Department of

l6p. (http://www.dcnr.state.pa.us/cs/grou

cuments/document/dcnr\_014596.pdf)

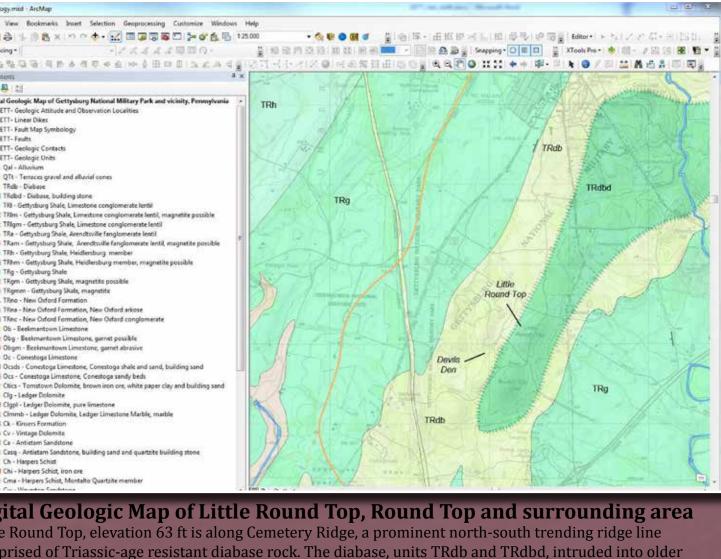
1870

nservation and Natural Resources, Education Serie





nized to be the Gettysburg Sill of the York Haven Diabase.



ones and siltstone of the Gettysburg Formation (unit TRg) during the Triassic. The diabase is now

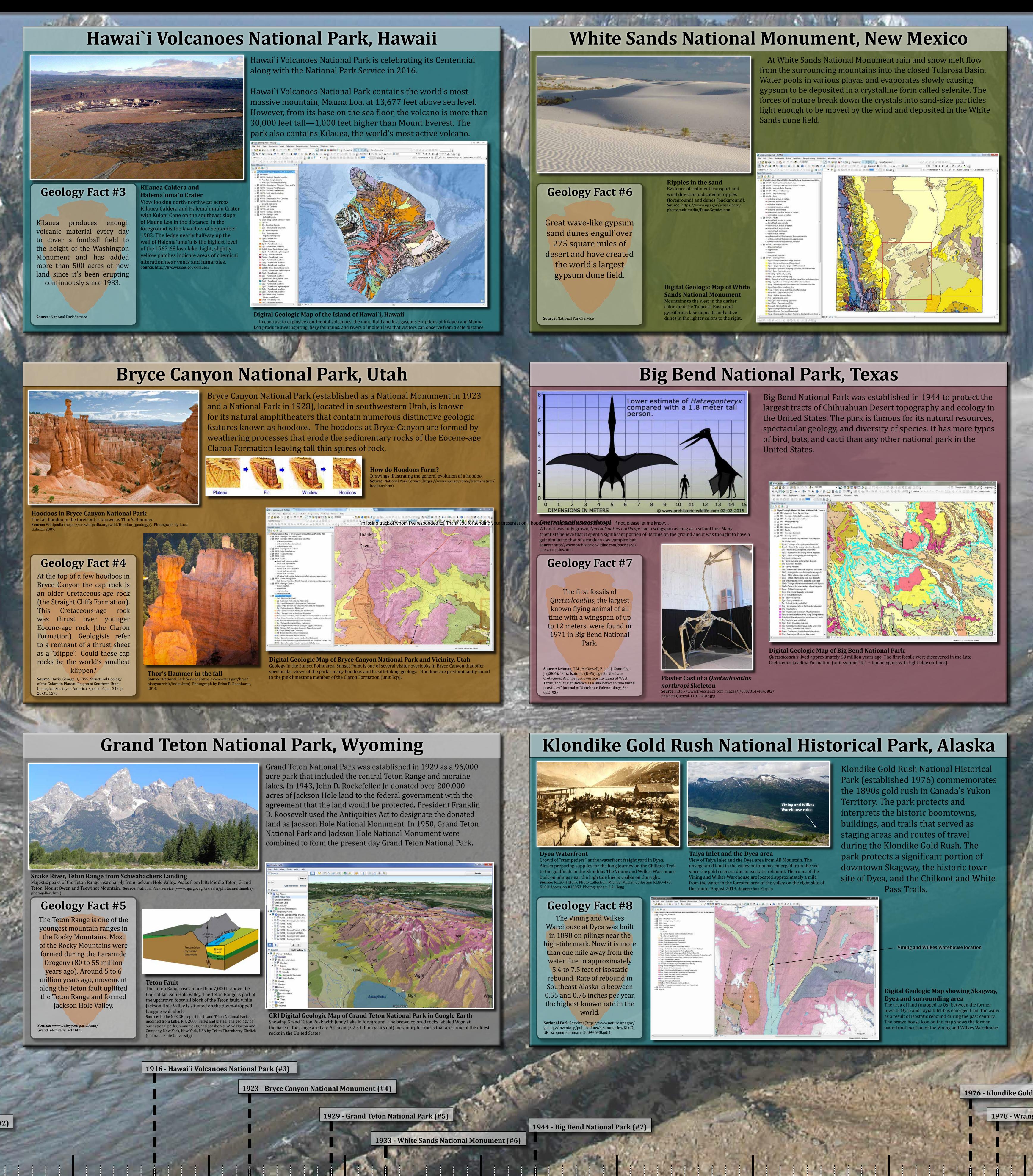
1872 - Yellowstone National Park (#1)

1895 - Gettysburg National Military Park (#2)

1880 1890 imeline showing the establishment dates of the National Park Service Units presented in this poster. 1900

# **Celebrate the National Park Service Centennial with 10 Fun Geology Facts** Stephanie A. O'Meara, Ronald D. Karpilo Jr., James R. Chappell, James R.H. Winter, and Georgia A. Hybels

# **Colorado State University, Department of Geosciences**



1910

1920

1940

1960

# Wrangell-St. Elias National Park & Preserve, Alaska



St. Elias National Park & Preserve (established as a ent in 1978 and Park & Preserve in 1980) is the gest area managed by the National Park Service with a total area of ver 20,587 square miles, which is larger than the combined area of etts and Vermont. The park has been shaped by plate cs. volcanism, and glaciation. Glaciers cover y 25 percent of the park. The park also includes al volcanoes and a significant portion of the Saint Elias intains, which include peaks that rise dramatically as high as 18,00 (Mount St. Elias), yet are within 10 miles of the coast

### **Geology Fact #9** world; about the size of Rhode Island. The Hubbard Glaci

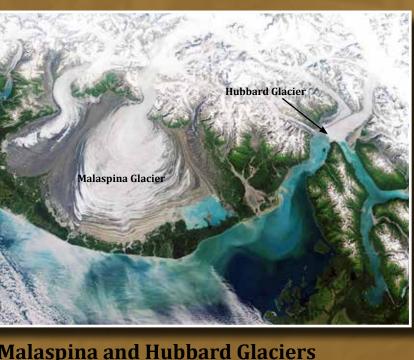
is North America's large tidewater glacier and is 76miles long, 7 miles wide, an 600 feet tall at its terminal face, of which 250 feet is submerged

Source: National Snow and Ice Data Center (https://

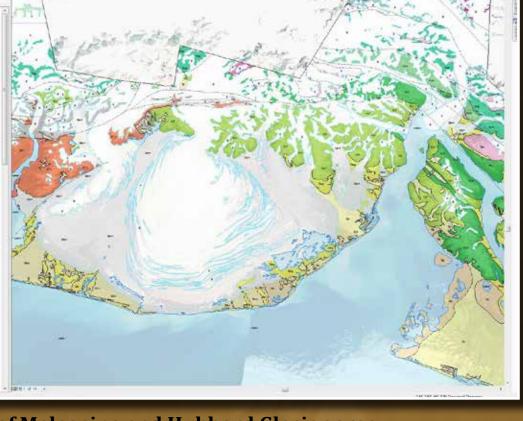
nsidc.org/cryosphere/glaciers/gallery/piedmont.htm

rn/nature/glaciers.htm)

National Park Service (https://www.nps.gov/wrst/



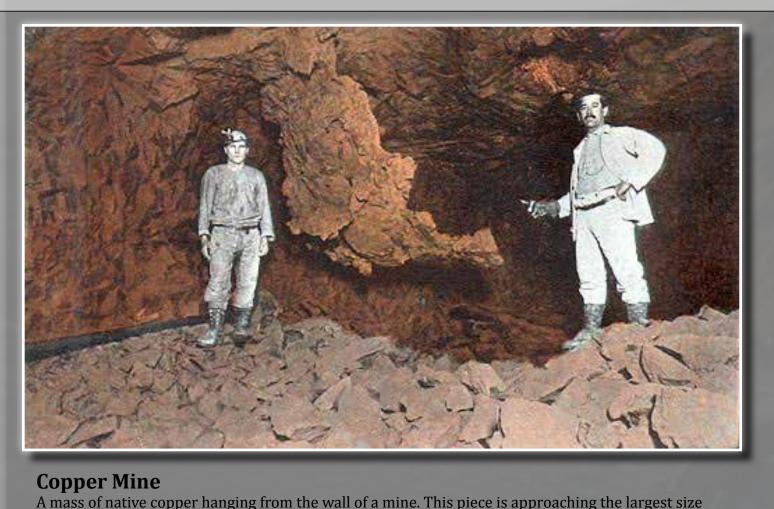
ulv 22. 2014. ource: NASA Earth Observatory, OLI Landsat 8



Digital Geologic Map of Malaspina and Hubbard Glacier area iers), spill out from the Saint Elias Mountains onto the coastal plain along the Gulf of Alaska betwe

Bay and Yakutat Bay. The Hubbard Glacier is 76 miles long and terminates in Russell Fiord and

# **Keweenaw National Historical Park, Michigan**



hat could be handled without cutting up the copper in the min

Geology Fact #10

1) Keweenaw National

Historical Park is the only

place on earth where

large scale, economical

ecoverable, 97% pure, nat

copper is found.

2) Copper artifacts made by

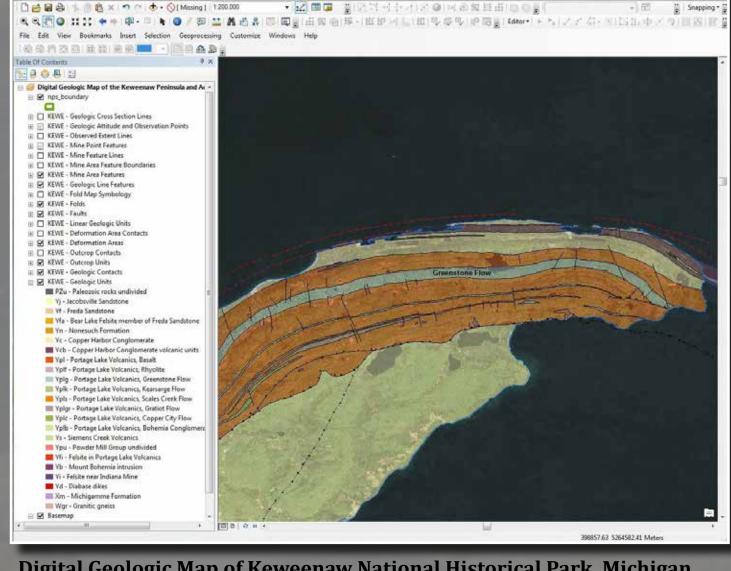
ancient Indians were trade

Source: Source: Public Law 102-543 (Oct. 27, 1992);

106 STAT. 3569

as far south as present da

Keweenaw National Historical Park is located on the upper peninsula of Michigan. The National Historical Park was established to preserve an extensive cultural history of mining in a geologically remarkable place. Lava flows in the area contain some of the largest volumes of copper found anywhere on earth. Over 7000 years ago native people began to mine Keweenaw copper to make tools and jewlery. These opper deposits were mined for coins and copper wire which played a pivotal role in the proliferation of electricity across the



igital Geologic Map of Keweenaw National Historical Park, Michiga wing the Greenstone Flow and Surrounding Are

#### The Geologic Resources Inventory

Halfbreed Specimen from the

urce: http://www.mindat.org/min-11390.ht

ock. This particular specimen was most likely recovered

om a mill becuase it is partially rounded. Halfbreed is

only found in the native copper deposits of the upper

**Keweenaw Peninsula** 

peninsula of Michigan.

The Geologic Resources Inventory (GRI) is one of twelve inventories funded by the National Park Service after the Natural Resource Challenge in the 1990s. The goal of the GRI is to increase understanding of the geologic processes in parks and provide accurate geologic information for use in park decision-making. Sound park stewardship relies on understanding natural resources and their role in the ecosystem, of which geology is the foundation. The GRI program is a partnership between the NPS and Colorado State University (CSU), and relies heavily upon source maps and located and locat expertise from the U.S. Geological Survey, state geological surveys, and other organizations to develop its products. CSU research associates work together with NPS staff to facilitate scoping meetings and produce GRI products.

#### **Overview of GRI Products**

The GRI produces 3 products to assist park management and staff in the management and protection of their park. The first product is a digital geologic-GIS map product that is available in three data formats: 1) an ESRI 10.X file geodatabase and accompanying 10.0 ArcMap document fo use with ESRI ArcGIS software, 2) KML/KMZ file for use with Google Earth, and 3) an ESRI 10.2 map service for use with ESRI online web map applications such as ArcGIS Online, or other portal/viewer applications. In addition to the spatial data, each digital geologic-GIS product also cont an introductory readme file, FGDC-compliant metadata, and an ancillary map information document which contains unit descriptions and other ancillary source map graphics and information.

In addition to the geologic-GIS data the GRI produces a basic cartographic layout and a geologic report. The layout displays a park's geologic data over shaded relief of the area along with complete with prominent geologic and geographic features and localities. The report is a comprehensive document that presents a park's: 1) geologic significance, 2) geologic history, and 3) prominent geologic features, processes and issues.

All GRI products are available at http://go.nps.gov/gripubs

Software ArcGIS 10.X, Environmental Systems Research Institute (ESRI) Inc., 380, New York St., Redlands, CA 92373, http://www.esri.com Google Earth, Google Inc., http://www.google.com/earth/index.htm ESRI USA Topo, Imagery and World Shaded Relief Web Map Services, 2015 (topographic base map of USGS scanned topographic maps using National Geographic Society, i-cubed)

1976 - Klondike Gold Rush National Historical Park (#8)

**1992 - Keweenaw National Historical Park (#10) 1978 - Wrangell-St. Elias National Monument (#9)** 

1990

2000

2010

#### **Celebrate the National Park Service Centennial with 10 Fun Geology Facts**

By Stephanie O'Meara, Ron Karpilo, James Chappell, James Winter, and Georgia Hybels (Colorado State University and the National Park Service Geologic Resources Inventory) Colorado State University/Cooperator to the National Park Service Phone: 970-491-6655 Email: stephanie.omeara@colostate.edu

On August 25, 1916, President Woodrow Wilson established the National Park Service (NPS) to oversee and manage our nation's national parks and monuments. Since 1916, the NPS mission has evolved to include the management and protection of over 400 park units that now also includes national historical and military parks, military cemeteries, national recreation areas, national scenic rivers, lakeshores, seashores, and trails. This year marks the 100th year anniversary of the establishment of the National Park Service. To celebrate, the National Park Service has established several fun and exciting programs, including the "Find Your Park" campaign. Park-specific events will be occurring throughout the year. Information about centennial programs and events can be found at: https://www.nps.gov/subjects/centennial/index.htm.

To commemorate the 100th anniversary of the National Park Service, the Geologic Resources Inventory (GRI) Program Map Team has selected ten park units with significant and often spectacular geology. For each, we offer a brief history of the park, a snapshot of our digital geologic-GIS product for the park, and a "geology fact", complete with photographs and figures about each park's geology.

Additional information concerning the importance of geology in our national parks, as well as information about the NPS Geologic Resources Inventory (GRI) Program and our products is also present on the poster.