

U.S. GEOLOGICAL SURVEY

# STATEMAP

GEOLOGIC MAPPING FOR THE PUBLIC GOOD

**A**s of 2020, STATEMAP has invested more than \$150 million in 48 State geological surveys, matched dollar for dollar, to complete geologic mapping projects crucial to the health and security of State natural resources and residents. For more information about STATEMAP and other geologic mapping efforts supported by the National Cooperative Geologic Mapping Program, visit <https://ncgmp.usgs.gov>.

The STATEMAP component of the National Cooperative Geologic Mapping Program (NCGMP) is a partnership between the U.S. Geological Survey (USGS), Association of American State Geologists (AASG), and State geological surveys. In 1992, Congress established the NCGMP and its components because, although geologic mapping is a shared interest by Federal and State governments, no single group has the capacity to meet the current and future need for detailed geologic maps. The program's success relies on close

cooperation and mutual support between USGS and AASG.

STATEMAP provides State surveys with 1:1 matching funds to enable new geologic mapping projects in their State, leveraging the expertise and geographic distribution of geologists for the public good. STATEMAP cooperative agreements support the ability of State surveys to meet their State's geological mapping priorities, and to promote collaboration with neighboring States and the USGS to address issues of regional and national

concern. STATEMAP projects focus on areas of high significance and address a variety of issues throughout the United States, including:

- Land-use planning
- Mineral, energy, and water resources
- Earthquake, flood, sinkhole, and landslide hazards
- Urban and infrastructure development
- Coastal resiliency, and
- Groundwater quality.



## Geologic Mapping for Mineral Investment in Alaska

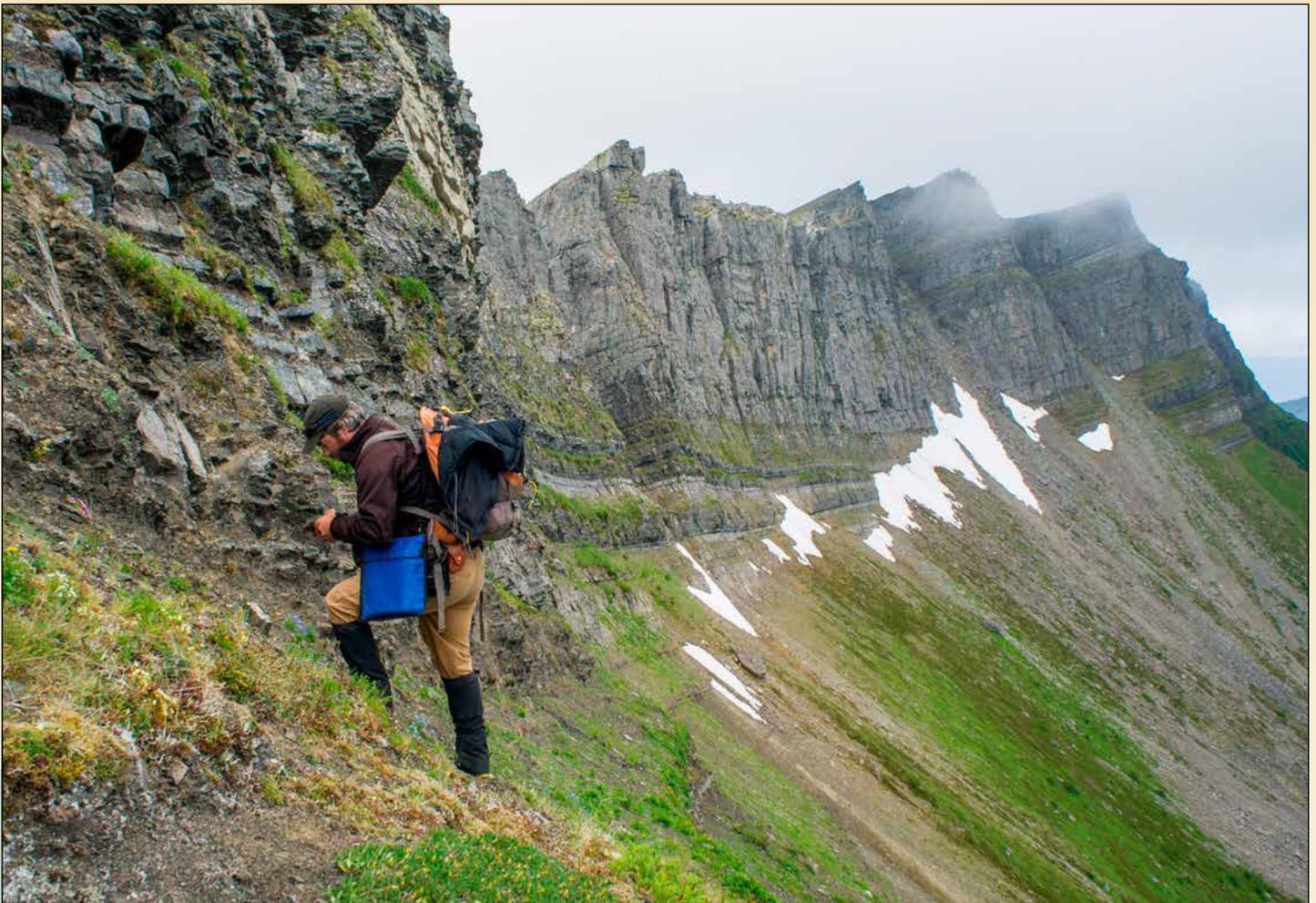
Geologic maps are essential for guiding mineral exploration. Mining companies use geologic maps to more accurately evaluate an area's mineral resources and make exploration-investment decisions. The Alaska Division of Geological & Geophysical Surveys (DGGS) recently completed a STATEMAP-funded geologic map that guided the decision-making process for White Rock Minerals, Ltd., a multinational mineral exploration company interested in the mineral potential of east-central Alaska. The Bonnifield volcanogenic massive sulfide (VMS) district located about

100 kilometers south of Fairbanks has two known VMS deposits as well as significant potential for hosting additional zinc-silver-lead-gold-copper VMS occurrences. Along with traditional geologic mapping, DGGS collected geochemical data from igneous rocks and ore in the Bonnifield VMS district as part of their STATEMAP project.

In 2016, White Rock initiated a project in the Bonnifield VMS district. Based on DGGS's STATEMAP geologic map and geochemical data, White Rock made key decisions about property evaluation and acquisition, new exploration target identification,

property expansion through additional claim staking, and exploration and drilling plans. As of early 2018, White Rock estimates the two VMS deposits as world-class in potential, having delineated 30 exploration targets favorable for hosting mineralization and expanding their claims from 16 to 143 square kilometers.

STATEMAP work by DGGS in the Bonnifield VMS district contributed toward the scientific foundation for mineral exploration in Alaska. White Rock's utilization of these resources has resulted in a substantial investment in Alaska's economy.



Alaska Division of Geological & Geophysical Surveys scientist mapping on the Iniskin Peninsula in 2013. Photograph by T.M. Herriot.

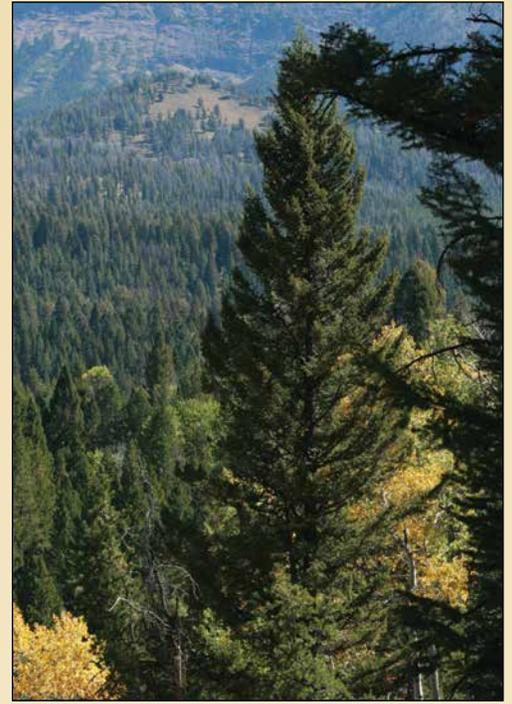
## Using Geologic Maps to Predict and Address Timberland Health in Idaho

Geologic maps provide information that can help to identify and understand the links between ecology and geology. In northern Idaho, forest managers have utilized information from STATEMAP maps created by the Idaho Geological Survey to develop forest health guidelines in commercial timberlands.

Tree growth, mortality, effective fertilization, and replanting success are all controlled in part by the bedrock and surface geology where the trees are planted. Nutrient-poor rock types can reduce soil fertility, just as nutrient-rich rocks can support more fertile soils, so by understanding the spatial distribution of the geologic units on a geologic map

and their physical and chemical properties, forest managers can predict areas where rock type could affect tree health.

Forest managers with the Potlatch Corporation observed that tree health issues in their nearly 600,000 acres of forest correlated to the distribution of certain rock types. Using Idaho Geological Survey's STATEMAP geologic maps and reports, Potlatch's forest managers were able to identify and locate the problematic rock types in the field and adjust their management practices accordingly. Based on the characteristics of the geology, solutions ranged from adjusting fertilizer application in some areas to planting alternative tree species in other areas.



Timberland in Idaho. Photograph by A.B. Smith.

## Land Use on Texas' Dynamic Coast

Coastal zone environments are ever changing. Geologic maps are used to investigate active erosional and depositional processes that can affect safety and property. In the Texas Gulf Coast region, geologic maps created by the Texas Bureau of Economic Geology

(BEG), through STATEMAP, provide useful baseline data for interpreting and evaluating coastal change, how and if human activity have influenced these changes, and whether planned land-management decisions will have a positive or negative impact on the

environment. Issues facing Texas Gulf and bay shores include habitat loss caused by coastal erosion, subsidence and sea-level rise, channel dredging and ship traffic, saltwater intrusion, and ongoing coastal development.

A coastal atlas developed from STATEMAP geologic maps will be used for the management of the Texas Parks and Wildlife Powderhorn Ranch conservation area, a 17,351-acre tract of unspoiled coastal prairie. It is the largest conservation investment in Texas history. Researchers from the Texas BEG are studying the ecosystems of the conservation area, including upland and wetland vegetation on the Ingleside barrier-strandplain, an ancient barrier system formed during the last Pleistocene interglacial period. These wetlands help protect local communities from storm surges and sea-level rise and help boost the local economy by supporting recreational activities.



Paddleboarders in Texas' Powderhorn Ranch conservation area. Photograph by A.B. Smith.

## Groundwater and Geologic Mapping in Iowa

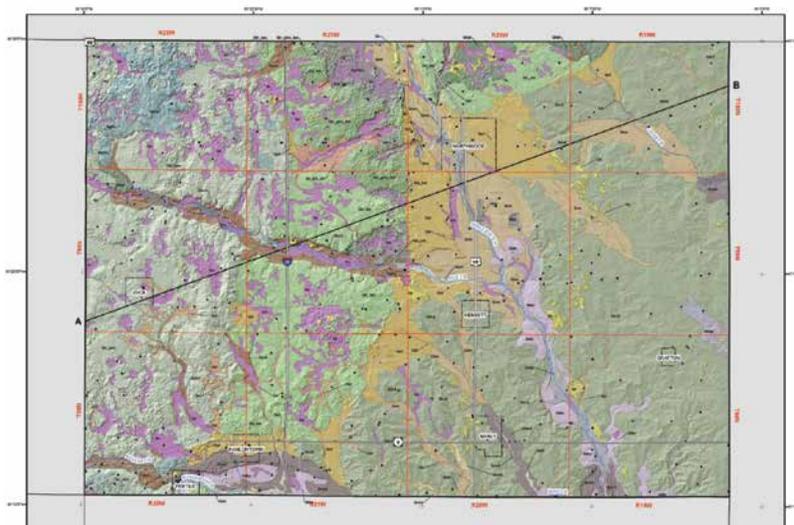
Increasing demand for large quantities of water for agriculture, industry, biofuel production, and domestic use has prompted the Iowa Geological Survey to embark on a study to characterize the overall sustainability of Iowa's surface and groundwater resources. Improving on the existing statewide bedrock geologic map, the Iowa Geological Survey has produced detailed geologic maps allowing for a three-dimensional framework to be established where hydrostratigraphic units can be identified and utilized in hydrogeologic assessments.

Recent geologic mapping in north-central Iowa as part of the STATEMAP program allowed the Iowa Geological Survey to develop shale distribution and thickness maps and structure contour maps. These maps are used to define regions of water storage and to understand the nature of connectivity or barriers to water flow between aquifers. The Iowa Department of Natural Resources water supply group has used these maps to make decisions related to water allocation and water-well interference issues.

In Worth County, Iowa STATEMAP-funded map products are used in assisting the area's well-development plan for irrigation. Detailed geologic maps provide the permittee information for optimal well location both at the surface and at depth to avoid interference with existing wells.

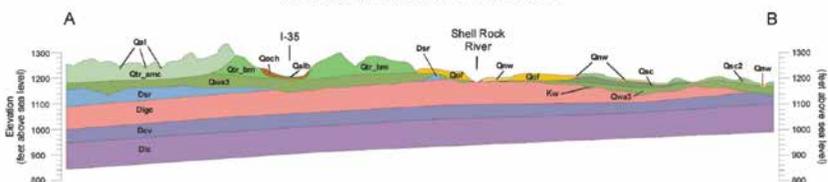
By Abby Ackerman and Darcy K. McPhee  
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## Surficial Geology of Worth County, Iowa

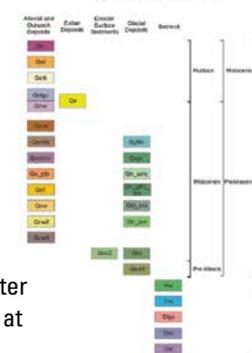


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### GEOLOGIC CROSS-SECTION A-B



### Correlation of Map Units



Map modified from Iowa Geological and Water Survey Open-File Map OFM-12-02, available at <http://publications.iowa.gov/26267>.

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