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Maine Geological Survey
DEPARTMENT OF CONSERVATION

USGS
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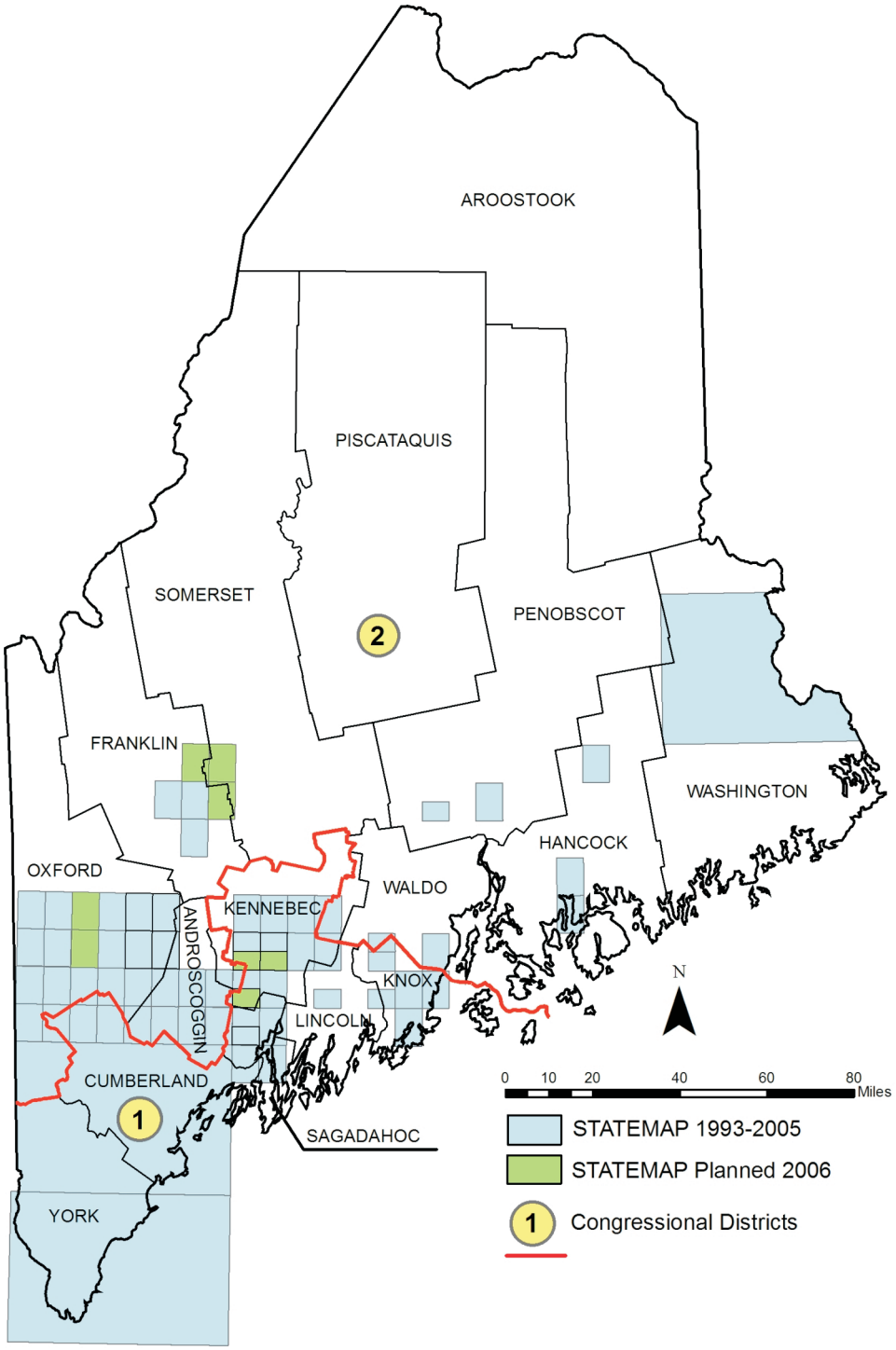
United States
Geological Survey

National Cooperative Geologic Mapping Program

STATEMAP Component: States compete for federal matching funds for geologic mapping.



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Geologic Maps

Geologic maps are important sources of natural resource information. In Maine, we use two types of geologic maps: bedrock geologic maps which show the nature of the solid rock (ledge) at or near the surface, and surficial geologic maps, which show the nature of materials above the bedrock but below the soils.

Bedrock geologic maps show the distribution, rock type, age, and relationships of rocks at or near the surface. Because only a small portion of bedrock is exposed in Maine, geologists must interpret between widely scattered exposures and then depict the bedrock map without the obscuring soil and vegetation. Maine is underlain with a wide variety of rocks including granite and various types of metamorphic rocks that have pronounced layering (gneiss, schist, slate). Maine also has abundant volcanic rocks but no active volcanoes. Bedrock maps also show the nature of geologic structures in the rock (faults, fractures, folds). Because of widespread folding, most of the layering in Maine's metamorphic rocks is tilted on edge. Most of the rock units in Maine are over 400 million years old.

Surficial geologic maps show the nature of the materials above the ledge including sand, gravel, marine clay (often called blue clay), and glacial till. These materials are all products of the most recent glacial episode that covered the state with several thousand feet of ice until it melted between 14,000 and 11,000 years ago. Over much of the state, surficial material thinly covers bedrock but with notable exceptions particularly along some river valleys where the material can be very thick.

Benefits and Uses

Geologic maps form the foundation of site investigations of many types ranging from aggregate resource assessments to ecological analysis. Some specific uses of geologic maps are the following:

Ice formed on a road cut graphically illustrates the role of fractures in determining groundwater quantity. In this example, one near-horizontal fracture provides most of the water.

Groundwater quality and quantity: Maine is heavily dependent on groundwater resources for domestic water needs. More than 50% of the citizens get their water from wells. The quality and quantity of this water is directly dependent on rock type and the nature of the fractures that the water travels through. Mapping the distribution of rock types, for example, will help us understand the source of arsenic in groundwater, a significant problem in Maine. Furthermore, glacial sand and gravel deposits are important groundwater resources for municipalities and the bottled water industry.

Aggregate resources: Sand and gravel deposits are also important sources of materials for our built environment. They are essential to constructing and maintaining our roads, safe winter driving, site work and foundations for buildings, and for septic systems. Also, rock type significantly affects the quality of crushed rock aggregate.

Geologic hazards: Maine's most significant geologic hazards are from landslides and coastal erosion. The marine mud deposited after the glaciers melted is most commonly involved in landslides. Mapping the distribution of these deposits is the first step in understanding this hazard. Sand dunes and bluffs underlain with marine mud are most susceptible to coastal erosion.

A large landslide in marine mud in Rockland in 1996 destroyed two homes.

Siting selection studies: Geologic maps are important tools to ensure that public and private facilities (waste disposal sites, treatment facilities, underground storage tanks) are located properly to reduce hazards to themselves and the environment.

Geologic maps are essential to human use of the landscape. Use of these maps during planning of facilities will reduce the potential future costs of poorly sited facilities. Maine is highly dependent on local geological materials to support our standard of living. Use of geologic maps help protect the quality of our groundwater and ensure that other important resources remain available.

Publications information:

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