Summary of STATEMAP Geologic Mapping Program in the United States and the National Cooperative Geologic Mapping Program in 2001

Produced by the Kansas Geological Survey
for the Association of American State Geologists in cooperation
with the United States Geological Survey

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Association of American State Geologists

in cooperation with

United States Geological Survey

USGS science for a changing world

National Cooperative Geologic Mapping Program

FEDMAP

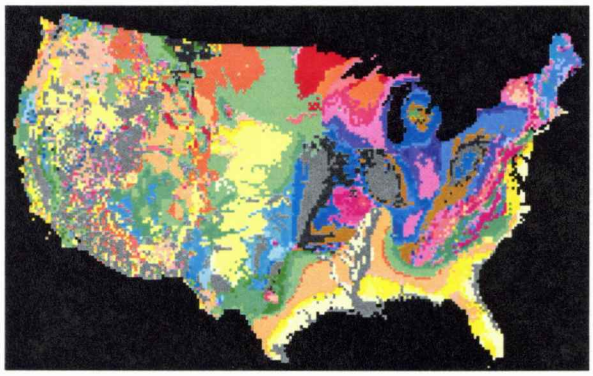
USGS geologic mapping projects—
- Address issues crossing jurisdictional boundaries between the states
- Develop new applications for the resolution of basic earth-science processes
- Study Federal lands, such as our National Parks, to guide wise management of these public lands
- Build the National Geologic Map Database on the Internet to facilitate community access to geologic-map information

STATEMAP

The responsibilities of the various State Geological Surveys differ from state to state. All function as basic scientific information sources for all branches of their State governments. Some have regulatory responsibilities for water, oil and gas, and land reclamation. Many are associated with State university systems. Every Federal dollar awarded to a State Geological Survey through an annual competitive grant process is matched by a State dollar.

EDMAP

Prior to passage of the National Geologic Mapping Act, the number of university students being trained to do high-quality geologic mapping was in sharp decline. The EDMAP component of the National Cooperative Geologic Mapping Program is designed to train tomorrow's geologic mappers. Every Federal dollar awarded to a university through an annual competitive process is matched by a university dollar.



Societal Value of Geologic Maps

Modern digital geologic maps constitute a fundamental and objective scientific foundation on which land-use, water-use, and living-resource-use decisions are based. Decisionmakers at the local, State, and national levels increasingly require specific kinds of science information. A geologic map records the distribution of rock and soil materials at and near the land surface, and is the best science product to display the information that decisionmakers need to identify and protect valuable resources and make wise use of our land. However, those with primary responsibility for geologic mapping, the U.S. Geological Survey (USGS) and the State Geological Surveys, are struggling to keep up with the increasing demand for modern digital geologic maps.

National Geologic Mapping Act Responds to Growing Need

The 102nd Congress recognized that the USGS and the State Geological Surveys needed a coordinated program to prioritize the geologic mapping needs of the Nation, and to increase production of these geologic maps. The National Geologic Mapping Act (Public Law 103–285) was signed into law in 1992, and created the National Cooperative Geologic Mapping Program. This law has been reauthorized twice since then, most recently by the 106th Congress in 1999. In the latest reauthorization, both the Administration and the Congress supported doubling the authorized funding levels to $64 million by the year 2005.

National Cooperative Geologic Mapping Program

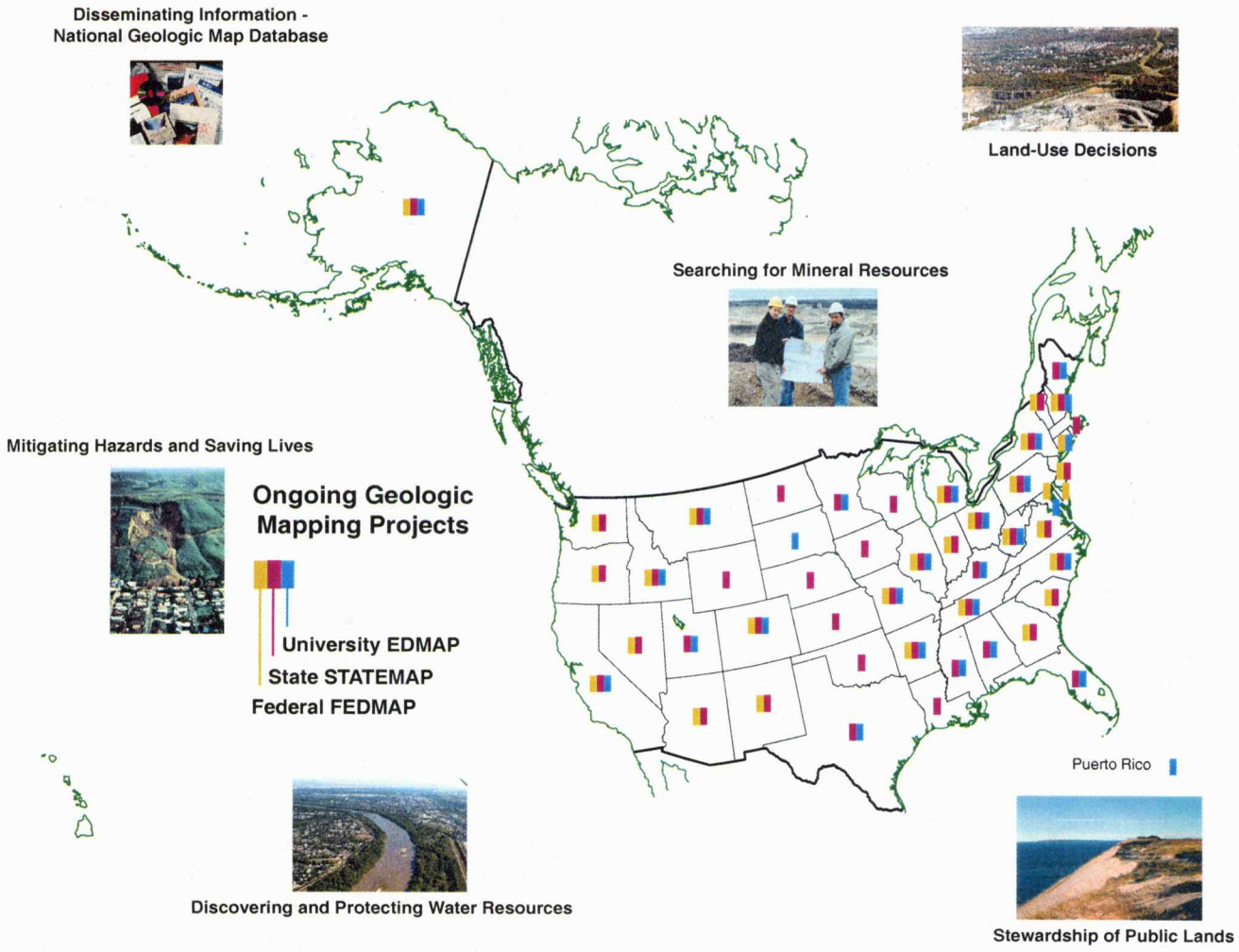
The National Cooperative Geologic Mapping Program represents nearly a decade of successful cooperation among Federal, State, and university partners striving to deliver modern digital geologic maps to the communities that need them. Each of these three partners has a unique role, yet all work cooperatively to determine the areas of highest priority for new geologic mapping.

Contact Information:

U.S. Geological Survey National Cooperative Geologic Mapping Program
Program Coordinators: Peter T. Lyttle (703/648-6943); Martha N. Garcia (703/648-6978)
http://ncgmp.usgs.gov/

"The National Geologic Map Database is providing the public with access to all geoscience maps in the United States, and through its standards-development effort is significantly increasing the cooperation among the Nation's Geological Surveys."
Thomas Berg, State Geologist of Ohio

National Geologic Mapping Act: Successful Partnering



Funding levels for the National Cooperative Geologic Mapping Program in millions of dollars

	1993	1994	1995	1996	1997	1998	1999	2000	2001
EDMAP	0	0	0	0.44	0.44	0.44	0.45	0.46	0.59
STATEMAP	1.58	2.07	1.48	4.38	4.38	4.44	4.54	4.76	7.86
FEDMAP	20.40	20.94	20.40	17.06	17.06	17.28	17.56	14.56	17.73
TOTAL	21.98	23.01	21.88	21.88	21.88	22.16	22.55	19.78	26.18

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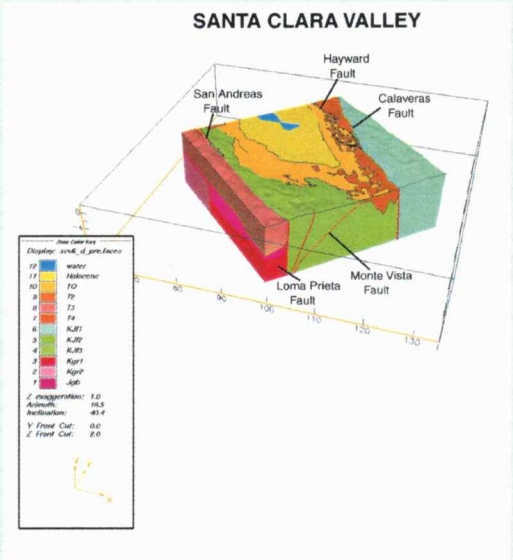
National Efforts

The **National Geologic Map Database** is a national catalogue of spatial geologic maps and geophysical, geochemical, geochronologic, and paleontologic information. The project is building a database to serve as a distributed system with a primary entry point on the World Wide Web for search and retrieval of information. Currently, the database contains all USGS map publications and 20% of State Geological Survey map publications. The project began a new direction in FY01 to develop comprehensive digital geologic map coverage for the United States at various scales as a "living" database, which is updated as new map information becomes available. The database will be tested through a series of prototypes using geologic map data compiled through a partnership with the Kentucky state survey, as well as FEDMAP efforts in California and in the Washington, D.C.–Baltimore, MD area.

The **Three-Dimensional Geologic Maps and Visualization Project** is developing techniques to construct three-dimensional geologic maps that retain all the information of traditional geologic maps while providing a more detailed picture of the subsurface. Computer-based representations extend beyond the capability of a standard Geographic Information System to provide continuous quantitative information for land-use planning, hazard mitigation, and resource management. Such representations allow the non-geologist user to 'walk around' in the earth to examine data and extract information. The projects utilizing geologic map data from the San Francisco Bay Area to compile 3-D geologic maps of a broad region centered on Silicon Valley. These maps will be used as a framework for ground-shaking estimation, refined earthquake and fault location, resource exploration, contaminant-source and dispersion-pathway definition, ground-water flow modeling, and landslide modeling.



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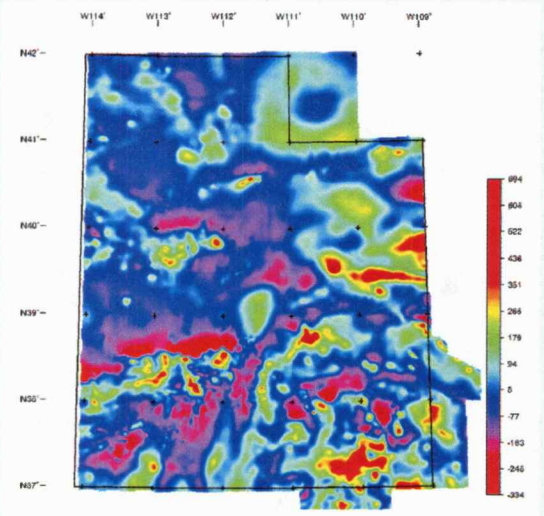
The **North American Magnetic Anomaly Database Project** is constructing a modern digital database of magnetic anomaly data spanning the United States to merge with data from Mexico and Canada and is supported by all geologic programs within the USGS. An integrated, readily accessible, digital database will be a valuable asset for government, private industry, and academic studies of crustal structure, discovery and assessment of natural resources, assessment of natural hazards and environmental issues such as wastewater and disposal management, land-use planning, and environmental restoration. Composite data sets allow a view of continental-scale trends that individual data sets do not and link widely separated areas of geologic studies.



Science in the National Parks

The NCGMP is the principal USGS partner involved with coordinating and prioritizing geologic mapping studies in cooperation with our sister agency, the National Park Service (NPS). Since 1995, the Program has increased funding of its FEDMAP budget for mapping on public lands from 10 to 14 percent. Projects are developed and selected jointly by NPS and the NCGMP. The resulting geologic data is made available in digital and standard formats needed for Park Service land-use management, educational outreach, inventory, and monitoring of natural resources. USGS collaborates with the NPS Division of Geological Resources and Systems Support Offices to meet national and regional earth science needs of the NPS. Additionally, the effort supports the development of geologic interpretive products to assist the National park Service in translating and transmitting USGS research focused on geologic resources, geologic hazards, and groundwater. USGS geologists work directly with NPS staff to increase their awareness of potential links between USGS research and land-management issues and to communicate geologic information to the millions of annual visitors to the nation's parks.

NCGMP has been active in the following parks:

- Bandelier National Monument
- Buffalo National River
- Death Valley National Park
- Chesapeake & Ohio Canal National Historical Park
- City of Rocks National Reserve
- Colorado National Monument
- Delaware Water Gap National Recreation Area
- Denali National Park & Preserve
- El Malpais National Monument
- Grand Canyon National Park
- Grand Teton National Park
- Great Smoky Mountains National
- Golden Gate National Recreation Area
- Hawaii Volcanoes National Park
- Jewell Cave National Monument
- Joshua Tree National Park
- Lake Mead National Recreation
- Mojave National Preserve
- Ozarks Scenic Riverway
- Point Reyes National Seashore
- National Capitol Parks
- Santa Monica Mountains National Recreation
- Shenandoah National Park
- Wind Cave National Park
- Wrangell – St. Elias National Park & Preserve

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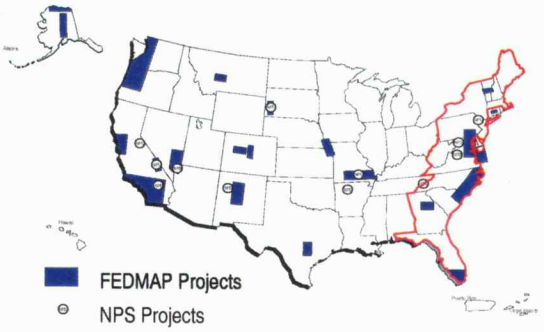
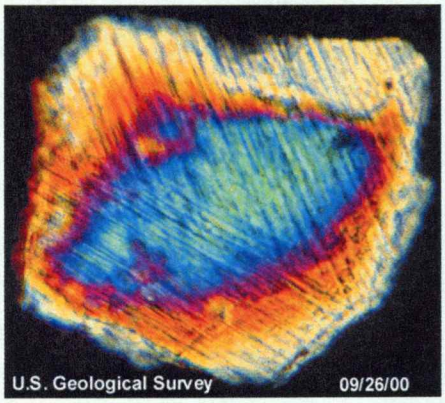


Eastern United States



The **Chesapeake Bay Impact Crater Project** is contributing to a five-year federal-state cooperative aimed at providing a geologic framework for a revision of the regional ground-water-flow model for the Coastal Plain of the Commonwealth of Virginia. Thirty-five million years ago, near what is now the mouth of the Chesapeake Bay, a large meteor struck the continental shelf of eastern North America and blasted through water and thousands of feet of sediments into the underlying continental crust. The resulting 56-mile-diameter crater corresponds to an unusually large, inland salt-water reservoir that severely impacts the ground-water resources of southeastern Virginia. The project is developing new geologic maps and subsurface information to improve understanding of the effects of the impact and resulting crater on the hydrologic, tectonic, geologic, and seismic evolution of southeastern Virginia, as well as providing important data for interpreting the processes involved during and after a large impact in a marine-shelf environment.

The new **Carolina Continental Margin Project** begins in FY 2001 as a consortium of universities, State Geological Surveys, and the Coastal and Marine Geology and NCGM Programs. Through geologic mapping and extensive drilling, this project will better define the evolution of the Coastal Plain and improve understanding of ground-water resource and quality issues. The project is built on the foundation provided by the Southeast Coastal Plain Project, a geologic mapping and subsurface stratigraphy project, which ended in FY2000. This project has significantly improved our understanding of three-dimensional sedimentary architecture of the Coastal Plain of South Carolina, and has again demonstrated that Passive Margins are not Passive, and simple layer-cake sedimentary models, used in previous ground-water flow modeling of the Coastal Plain, are misleading. The sedimentary architecture provides insight into the evolution of the Coastal Plain and the uplift and erosion history of the southern Appalachians. It is also crucial to understanding the structure and continuity of aquifers that supply drinking water in the Charleston area and that are used to resolve multi-state issues of ground-water quality related to the Savannah River Site.

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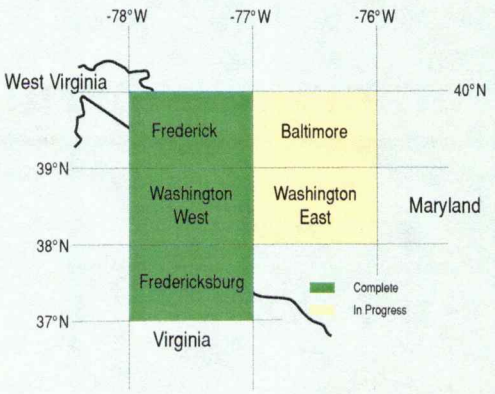
Spatial geologic information is needed to address societal issues in the Mid-Atlantic region where rapid development is superimposed on three centuries of urban growth. The **Appalachian Regional Geology and Hydrology (ARGH) Project** is responding to this need by creating geologic maps that are data delivery systems to support interdisciplinary research. ARGH produces digital geologic maps and databases of bedrock and surficial deposits for use in solving land use issues. ARGH is completing the most comprehensive geologic map and database in the eastern United States and researching how the data can best contribute to understanding ground water in fractured rock, the distribution of industrial minerals, and the origin of soils.



Surficial Processes and Landslides in the Central and Southern Appalachian Highlands Project is developing methods to quantitatively assess landslide hazards based on field mapping of historic and prehistoric debris-flow events and GIS analyses of spatial data sets. Emphasis is placed on debris flows caused by tropical storms in the central and southern Appalachians and threshold rainfall criteria for triggering debris flows, which can be applied to real-time warning systems. The project is providing guidance for state and local decisionmakers for mitigation of future disasters.

The **Bedrock Regional Aquifer Systematic Study** performs geologic mapping and related structural studies to better understand the geologic controls on ground-water resources. A large percentage of drinking water supply wells in the United States withdraw water from fractured bedrock. State and local governments are increasingly facing issues of water quantity, quality, and protection in bedrock terrains where the hydrology is poorly understood and, at the present time, cannot be modeled reliably. Aquifer location and yield is also difficult to predict and no credible guidelines exist for protection of these aquifers. Comprehensive geologic maps provided by the effort are recording the locations and characteristics of fractures and other geologic structures that can provide the framework for understanding fractured-rock aquifers. NCGMP efforts in the field are conducted in cooperation with the USGS Water Resources Division and State Geological Surveys.

The **Atlantic Estuarine Systems Project** is providing critical environmental data needed to formulate sustainable restoration strategies for the Chesapeake Bay. The Chesapeake Bay is under intense scrutiny by scientists and politicians at local, state, and federal levels regarding ways to restore and maintain its health. The Project is contributing to the development of regional models that provide an understanding of the influence that climate change and disturbance exert on the Bay and will help managers establish realistic goals. These studies will move to other Atlantic estuaries in future years. Cooperator include the NOAA National Estuary Reserve Program, the Fish and Wildlife Service Programs, the Alliance for Chesapeake Bay, the Chesapeake Bay Foundation, EPA region 3 and 4 estuaries programs, and National Wildlife Refuges.

Past NCGMP efforts in the Eastern United States include:

- Florida Cooperative Mapping Project (1995 – 1998)
- Southeastern Coastal Plain Project (1995 – 2000)

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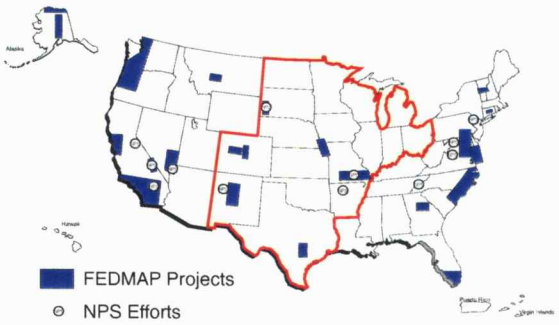
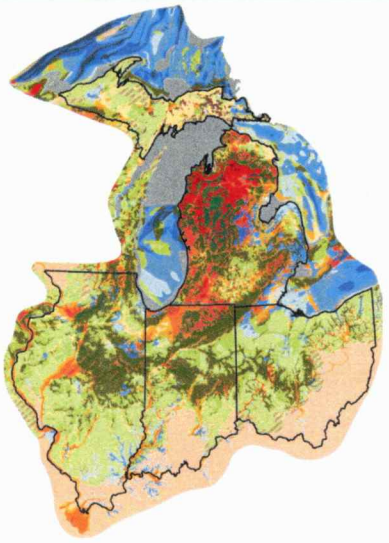


Central United States

The Central Great Lakes Geologic Mapping Coalition is a geologic mapping partnership between the USGS and the State geological surveys of Indiana, Illinois, Ohio, and Michigan to better understand the geologic framework of the glacial deposits of the Central Great Lakes Region. The economy of the region supports one third of the Nation's population as well as extensive manufacturing and agricultural industries. This strong industrial and agricultural base is built on an exceedingly complex network of glacial deposits, in which domains of high and low susceptibility to contamination are interspersed. Consequently, geologic maps of the glacial deposits are crucial guides to land and water resource management decisions. These deposits also provide the natural resources needed for sustained development. NCGMP efforts provide critical geologic map information on the three-dimensional distribution and characteristics of the glacial deposits and continually meets with stakeholders and customers to best align priorities and to coordinate work plans.



The **Geohydrologic Framework of the Edwards and Trinity Aquifers Project** is evaluating the complex aquifer system that serves as the source of water for more than 2 million people who live near San Antonio, TX. The City's water needs compete with those of agricultural interests west of the city and threaten discharges from natural springs that sustain surface-water rights, endangered species, and tourism. A better understanding of the complex hydrogeologic processes that control the availability of water from the aquifer is needed. Geologic mapping efforts by the Project are supporting a ground-water-flow model to help managers evaluate the merits and shortcomings of optimization alternatives

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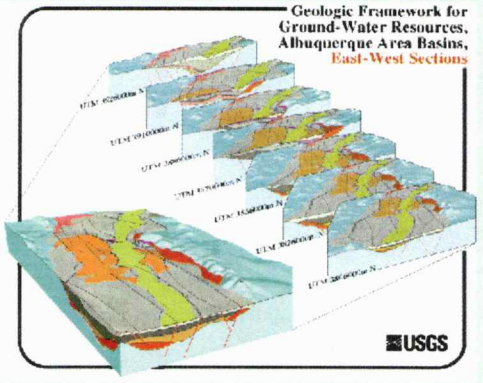
and to better prioritize future data collection. This work will leverage on prior studies by USGS Water Resource Districts, the Texas Bureau of Economic Geology, the University of Texas at Austin, the Edwards Aquifer Authority, and the San Antonio Water System.

The **Mid-continent Karst Systems and Geologic Mapping Project** is evaluating land-use, water resource, mineral resource, and hazard issues for selected areas of the Ozark Plateaus of Missouri and Arkansas, and the Black Hills of South Dakota. Geologic mapping contributes to three-dimensional frameworks that are being used by federal agencies to make decisions and formulate policies related to potential lead mining adjacent to National Parks, to protect caves from human contamination, to protect water quality in areas of urban development, and to define aquifers that are vulnerable to agricultural pollutants. These frameworks are also being used to assess mineral reources and the environmental impact of mining. Additionally, the effort contributes to the development of a regional tectonic framework for a corridor from St. Louis to Memphis addressing regional seismic-hazard potential by defining the tectonic framework of the mid-continent, determining the seismic history, and providing insights into the processes that earthquakes. The project works with a USGS National Mapping Division project designed to increase the knowledge of geospatial and geologic data to support the requirements of geologic and seismic hazards mapping, and risk assessment.

The **Middle Rio Grande Basin Project** is part of a multi-agency study of the geology and hydrology of the Middle Rio Grande basin, source for ground water in central New Mexico and for maintaining treaty rights to water in the Rio Grande River. The project, which contributes new geologic maps at 1:24,000 and 1,100,000-scale as well as three-dimensional geologic map-based models, is supported by all three components of the Program, FEDMAP, STATEMAP, and EDMAP. New surface and subsurface data contribued to a three-dimensional model of the basin structure, which allows, water allocation policies to be formulated on a more technically rigorous basis.



Past efforts in the Central United States include:

- Central Region State/USGS Cooperative Mapping Project (I-70) (1995 – 2000)
- Aggregrate Geologic Mapping Project (19995 – 1998)
- Omaha Kansas City Urban Project (1995 – 1999)

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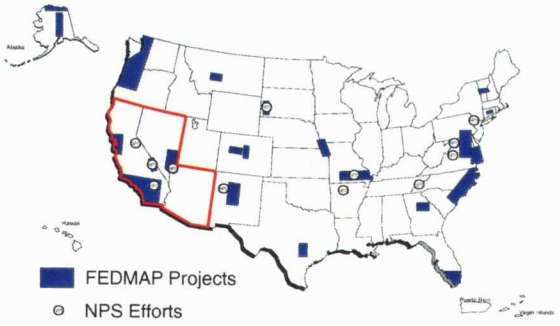

Southwestern United States

The **Southern California Areal Mapping Project** is a cooperative project between the USGS and the California Division of Mines and Geology. Research products include geologic and geophysical maps and technical reports that describe the geologic setting and geologic history of southern California. These products are used to better understand the locations and mechanisms of faulting along the complex mosaic of active faults along the southern San Andreas Fault system. These maps also define the geometry, extent, and stratigraphy of ground-water basins to support water resource needs of the populous desert region and are being used by the Focus on Quaternary Stratigraphy in the Los Angeles region Project to develop a regional-scale stratigraphic model for the Los Angeles basin. The model will be used for ground-water resource management, remediation of contaminants, and evaluating earthquake potential and distribution.

The central Death Valley region is the area of principal discharge for regional ground-water flow from an extensive ground-water system encompassing greater then 15,000 square miles in southern Nevada and southeastern Californian. The **Geologic Framework of the Central Death Valley Region Project** is one component of a multi-agency effort to develop an integrated tectonic, geologic and hydrogeologic data model for the central and southern Death Valley region. The project also works with the National Park Service to develop a regional geologic map database for Death Valley National Park, assess geologic hazards associated with Park Facilities, provide detailed 1:24,000-scale geologic map coverage in areas of principal spring discharge in support of Park management issues related water quality and quantity, and develop interpretive material for public dissemination.

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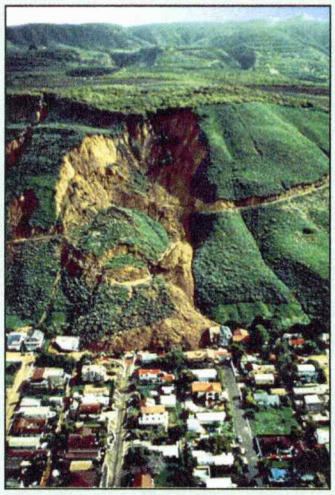
The **Surficial Geology of the Arid Southwest Project** is a new effort in FY01. This project will construct a new surficial geologic map of the United States at 1:2,500,00-scale. The project will also build geologic map databases of near-surface geology at scales of 1:1,000,000 and 1:100,000, The project seeks to understand and present earthquake and landslide hazards, ecosystem processes, climate history and surface process information at multiple scales. Building upon geologic mapping and ecosystem studies underway by several USGS projects, State Surveys, the Desert Research Institute, and academic research programs, the mapping effort will include regional projects that demonstrate the value of surficial geologic mapping to the evaluation of seismic shaking hazards in the eastern Los Angeles basin and to relations between geology and plant habitats, including invasive species, in other regions.

The **Hydrogeologic Framework of Aquifer Systems in the Desert Southwest Project** is a new effort for FY01. Surface-waters in this part of the country are largely allocated and much of the southwest depends of ground water for municipal, industrial, and agricultural supplies. Working with the USGS Ground-water Resources Program, the project will categorize and characterize complex regional hydrogeologic frameworks and develop three-dimensional geologic maps of ground-water basins. Once categorized, basins will be prioritized for more detailed study based on the potential impacts from human influences such as population demographics, agricultural development, and natural resource extraction. These studies will be closely coordinated and designed with federal, tribal, state, and local entities to address specific water-resource management issues.

Northern California Landslide Working Group is a new FY-2001 partnership project co-funded by the Landslides and Coastal Programs of the USGS. Through geologic mapping and landslide process studies, the project will make hazard analyses for different landslide conditions. The initial focus will be to produce prototype scenario-based landslide hazard maps for the FEMA Project Impact cities of Oakland Berkeley. These scenarios include hazards from both rainfall and earthquake-induced land sliding.



As part of the **Impacts of Climate Change and Land Use in the Southwest Project** supported in cooperation with the USGS Earth Surface Dynamics Program, the NCGMP has begun a new geologic-mapping and land-use effort in Hopi Buttes, part of the Navajo and Hopi Reservations to examine the relations of human health to an environment with known uranium and arsenic contamination. Geologic mapping will characterize geologic and ground-water features and relationships to water quality. A recent analysis of water sources in the Hopi Buttes area indicated that over half of the sources exceed the EPA levels for arsenic. Elevated arsenic levels have been linked to an increased risk of diabetes, a disease prevalent among the local Navajo and Hopi populations. Combined water sampling and geologic characterization of springs and well sites will be used to evaluate conditions responsible for high arsenic levels in ground water and to develop a ground-water flow model that can be used to identify geologic setting s to produce good quality water.

Past NCGMP efforts in the Southwestern United States include:

- Las Vegas Urban Corridor/Nevada Test Site Project (1995 – 1999)
- San Francisco Bay Mapping Project (1995 – 2000)

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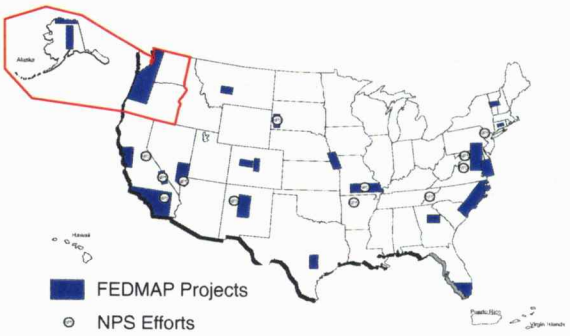
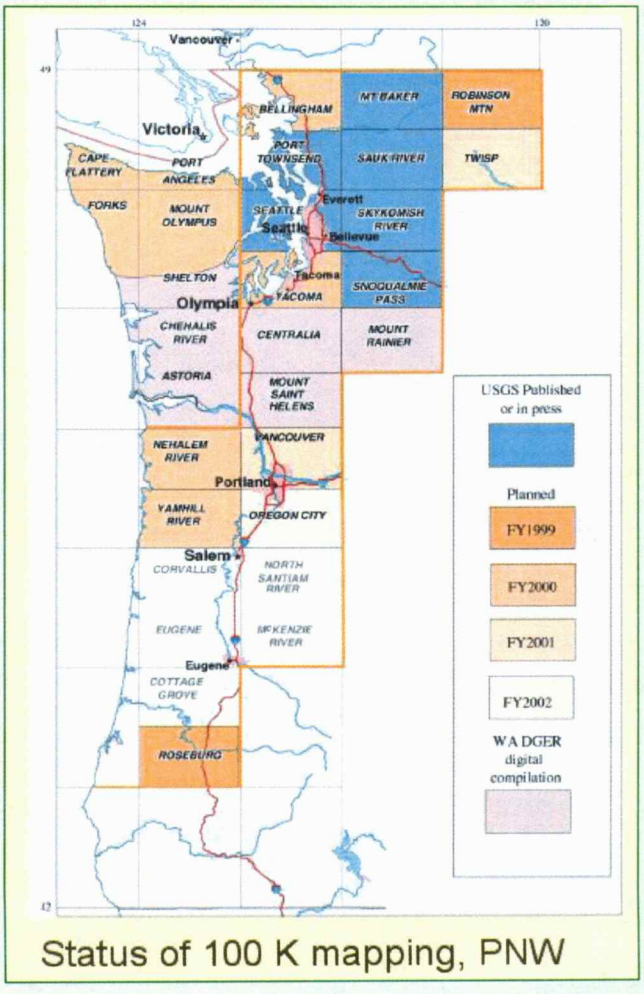


Pacific Northwest

The **Pacific Northwest Urban Corridor Geologic Mapping Project** conducts detailed geologic mapping and high-resolution geophysical surveys of the Puget Sound Lowlands, including newly recognized active faults, which pose earthquake hazards to the rapidly urbanizing Seattle–Portland corridor. The geologic mapping, which is a cooperative effort between the USGS, the University of Washington, and the City of Seattle, provides hazard and resource information for growing urban areas around Seattle and other lowland Washington cities prone to seismic shaking, ground failure, and damage from earthquakes. Field investigations guided by airborne laser terrain mapping have revealed that previously unknown active surface ruptures have occurred along a strand of the Seattle fault. The new geologic field mapping shows great promise for accurately mapping active fault structures, landslides, surficial deposits, and water-courses throughout the Puget Lowland. As part of the Seattle Urban Seismic Mapping Project, geologic mapping will be incorporated into hazard maps and landslide susceptibility maps for the city of Seattle. These maps have a direct impact on building codes, seismic-retrofit decisions, and planning. Additionally, geologic three-dimensional basin models provide important constraints on ground-water flow and surface-water–ground-water interactions.



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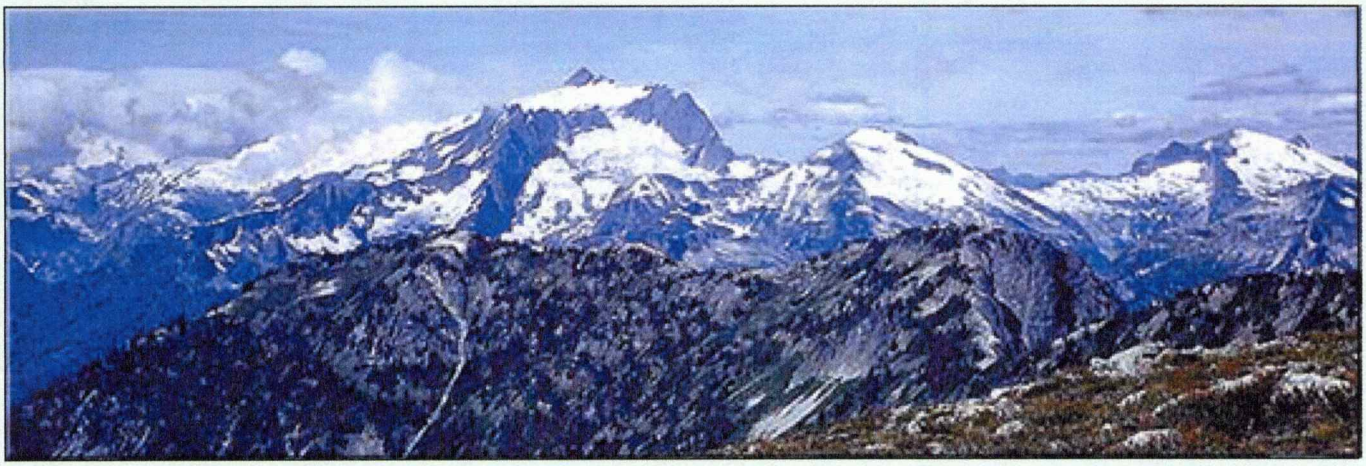


Geologic Mapping in Support of Land and Resource Issues in Alaska is a cooperative effort conducted with the Alaska Division of Geological and Geophysical Surveys to undertake reconnaissance geologic mapping and data compilation as an initial step in assessing geologic-mapping needs for a proposed transportation corridor in Alaska. The projected societal impact of increasing oil prices has galvanized interest in developing gas reserves under Alaska's North Slope and adjacent Yukon Territory. Critical to development of these vast gas resources is identification and geologic characterization of a transportation corridor for the proposed gas pipeline. As was the case with the Trans-Alaska Oil Pipeline, evaluation of potential corridor routes requires detailed geologic information, including information on natural hazards and engineering issues along the route. Canadian regional governments have completed geologic surveys of potential corridors crossing the Yukon. Responsible planning and evaluation of proposed gas pipeline routes through Alaska is an issue with national energy distribution and international trade implications.

In the past 200 years, more than 50 volcanoes in the United States have erupted, many repeatedly, causing significant hazardous impacts and societal and economic disruption. The NCGMP is conducting geologic mapping studies for the **Volcanic Geology, Petrology, and Processes Project** of the USGS Volcano Hazards Program to determine the likelihood of renewed activity at potentially destructive volcanoes in the Western US, assess the probably hazard to people and property, and communicate hazard-related information to civil authorities, the news media, and affected communities.

The **Digital Geologic Maps of Northern Alaska** is a cooperative pilot project between the USGS and the Alaska Division of Geological and Geophysical Surveys aimed at providing geologic map coverage along the entire width of northern Alaska. The map products will cover key areas where both oil and mineral exploration development efforts are focused including large parts of the National Petroleum Reserves and the Lead-Zinc-Silver belt. The maps will provide Federal, State, Native, and private sector organizations with digital geologic maps in an area of highly visible resource-management issues as well as providing a digital base for ongoing and future earth-science research thrusts in northern Alaska.

Association of American State Geologists

STATE OF ALABAMA GEOLOGICAL SURVEY

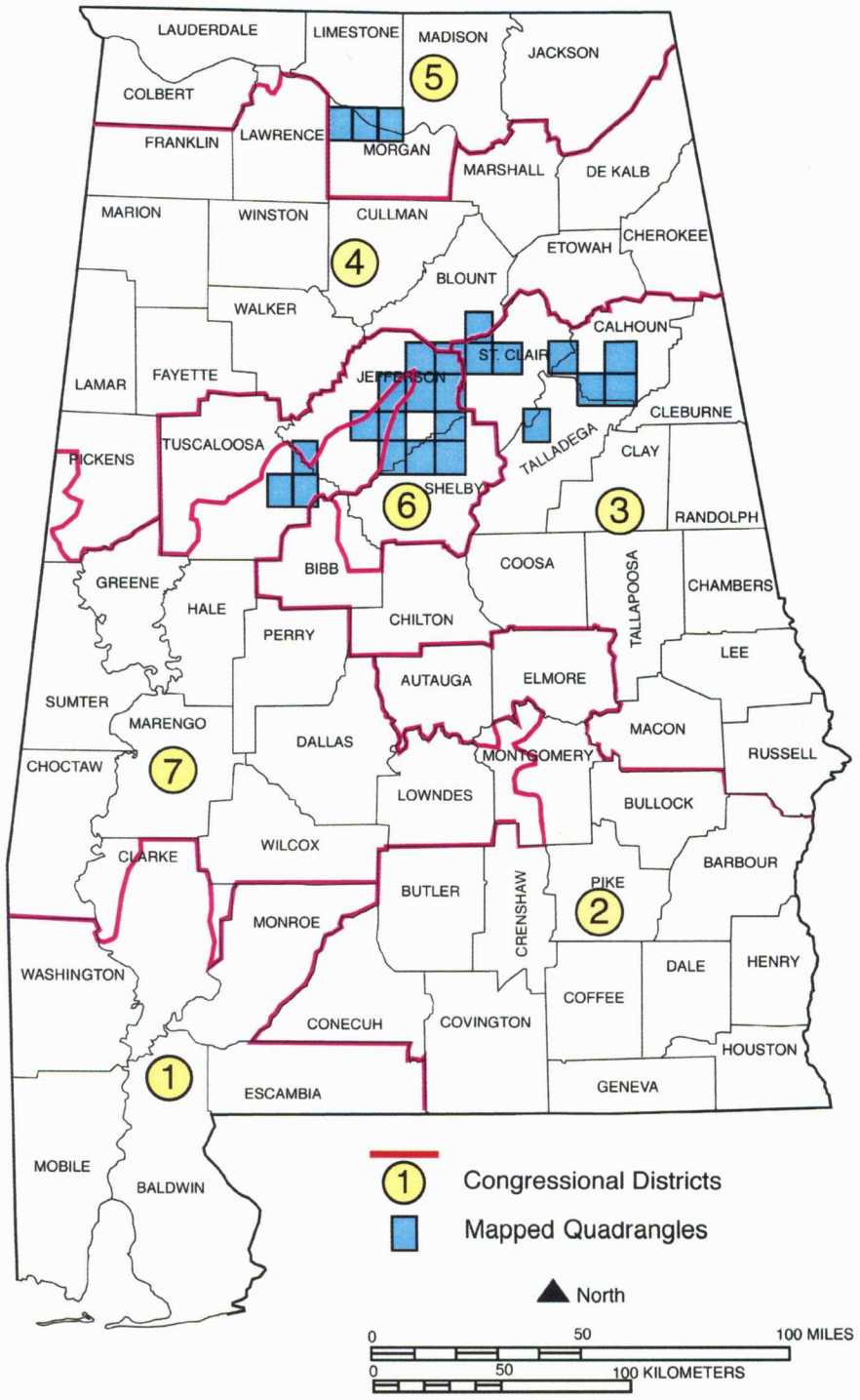
United States Geological Survey

USGS science for a changing world

National Cooperative Geologic Mapping Program

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

ALABAMA



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U.S.G.S. Geologic Mapping Program Office
Program Coordinators: Peter T. Lyttle (703/648-6943)
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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN ALABAMA

Federal Fiscal Year	Project Title and Scale	State Dollars	Federal Dollars	Total Project Dollars
93	Leeds Quadrangle, 1:24,000	$20,000	$20,000	$40,000
94	Helena Quadrangle, 1:24,000	17,608	17,608	35,216
95	Alabaster and Anniston Quadrangles, 1:24,000	30,000	30,000	60,000
96	Anniston area, 1:24,000	66,293	66,293	132,586
97	Tuscaloosa–Birmingham corridor, 1:24,000	75,053	75,053	150,106
98	North Birmingham, Year 1, 1:24,000	51,456	51,456	102,912
99	North Birmingham, Year 2, 1:24,000	106,762	106,762	213,524
00	Shelby County, 1:24,000	102,870	102,870	205,740
01	Honda Plant site and Decatur area, 1:24,000	120,884	120,884	241,768
	TOTALS	**$590,926**	**$590,926**	**$1,181,852**

The STATEMAP part of the National Cooperative Geologic Mapping Program has significantly enhanced the Geological Survey of Alabama's (GSA) ability to produce new 1:24,000-scale geologic maps in Alabama. During the last nine years, STATEMAP has supported geologic mapping in areas of rapid urbanization and development in the state. Areas to be mapped are prioritized by the GSA Geologic Mapping Advisory Committee, which includes geologic professionals representing State government (GSA, Alabama Department of Environmental Management, Department of Transportation), engineering firms, the aggregate industry, consultants, and academia. Priority areas mapped or currently being mapped include the Birmingham–Shelby County area, Anniston area, Birmingham–Tuscaloosa Corridor, North Birmingham growth corridor, the Honda Plant area, and the Huntsville–Decatur area. This new geologic map information is being used in a variety of ways in these rapidly urbanizing parts of the state. For example, geologic mapping aids in the identification of supplies of non-metallic mineral resources (sand, gravel, crushed stone, dimension stone) that support urban and infrastructure construction. In addition, the information will be incorporated into decision making on a variety of issues that include protecting ground water, locating new municipal wells, siting waste-disposal facilities, and addressing a broad spectrum of land-use concerns. Of particular interest in many of these areas is the increase in the development of sinkholes associated with the recent drought. The geologic maps document the distribution of geologic formations most prone to sinkhole development, allowing more informed planning and development.

March 2001

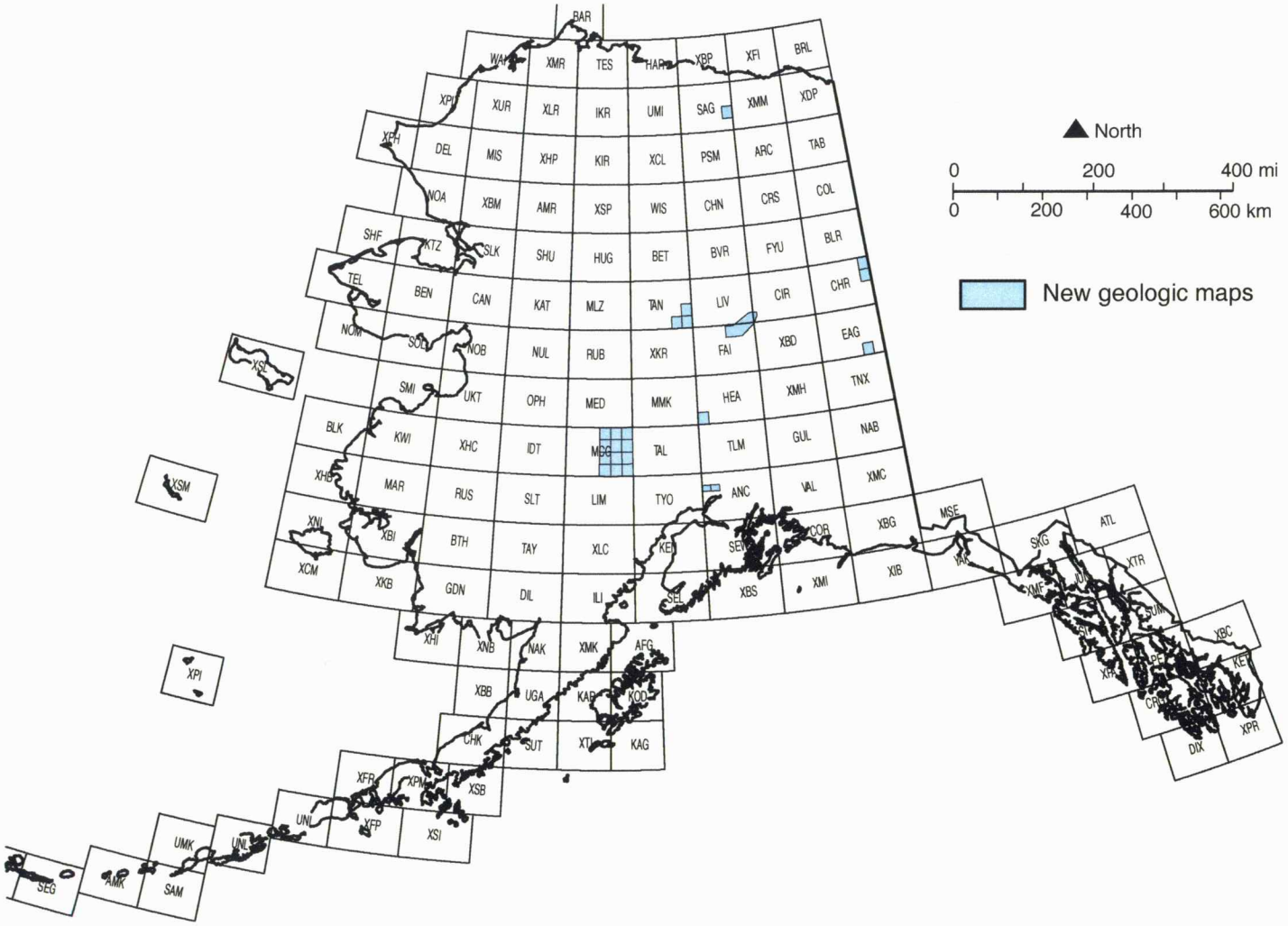
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

ALASKA



Contact information

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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN ALASKA

Federal Fiscal Year	Project Title	State Dollars	Federal Dollars	Total Project Dollars
93	Castle Mountain Fault System	$59,570	$51,993	$111,563
94	Charley River C-1 and D-1 Access Corridor	50,779	50,000	100,779
95	Fairbanks Urban Area & Mining District	31,379	29,984	61,363
96	Rampart Mining District Tanana B-1 Quadrangle	106,041	98,817	204,858
	Digital Compilation of McGrath Quadrangle	40,158	39,865	80,023
97	Rampart Mining District, Tanana A-1 and A-2 Quadrangles	120,564	118,400	238,964
98	Upper Chulitna Mining District, Healy A-6 Quadrangle	122,322	121,500	243,822
99	Sagavanirktok B-1 Quadrangle	276,220	125,000	401,220
00	Fortymile Mining District, Tanacross A-2 Quadrangle	140,413	130,000	270,413
01	Philip Smith C-5 Quadrangle with portions of surrounding quadrangles	150,636	149,640	300,276
	Fortymile Mining District, Eagle A-1 Quadrangle	106,571	106,403	212,974
	TOTALS	**$1,204,653**	**$1,021,602**	**$2,226,255**

Because the STATEMAP program allows each state to establish its own unique program funding priorities, and requires oversight by a broad based in-state citizen advisory board, Alaska STATEMAP projects are focused on high-priority state needs. Every road, mine, oil well, pipeline, port facility, airport, townsite, or other major infrastructure project in Alaska has a geologic component. Since 1993, the National Cooperative Geologic Mapping Program through STATEMAP has made a significant contribution to expanding the geologic knowledge of areas in Alaska that encompass these kinds of current or potential economic-development projects.

Our first STATEMAP project traced the seismically active Castle Mountain fault system that underlies the Palmer–Wasilla residential area, the Parks Highway, and the Alaska Railroad. Subsequent mapping projects have mapped other strategic commercial access corridors, mining districts, and frontier oil and gas provinces. An updated geologic map of the Fairbanks urban area and mining district was completed in the same year that over 100 square miles of new state mining claims were staked in the district and has been used ever since to guide ongoing mineral exploration. Since then, STATEMAP projects have contributed to increased oil and gas lease sales in eastern NPRA, mineral exploration in the Rampart and Chulitna mining districts of east-central Alaska, and have helped Alaska Native corporations evaluate the mineral resources of their lands. This year STATEMAP funds will be used to extend oil and gas exploration concepts westward in NPRA and to complete a 1,000- square-mile mapping project in the Fortymile mining district.

In Alaska, most geologists and geotechnical engineers agree that a geologic map should have detail represented at least at a scale of 1 inch = 1 mile to be useful for serious enterprise decisions. Alaska has about 163,000 square miles of State-owned land upon which to build an economy. Only about 7 percent of that land has been geologically mapped at a scale of 1 inch = 1 mile. The STATEMAP program is helping to expand coverage of geologic maps where they are most needed for future resource exploration and construction projects.

March 2001

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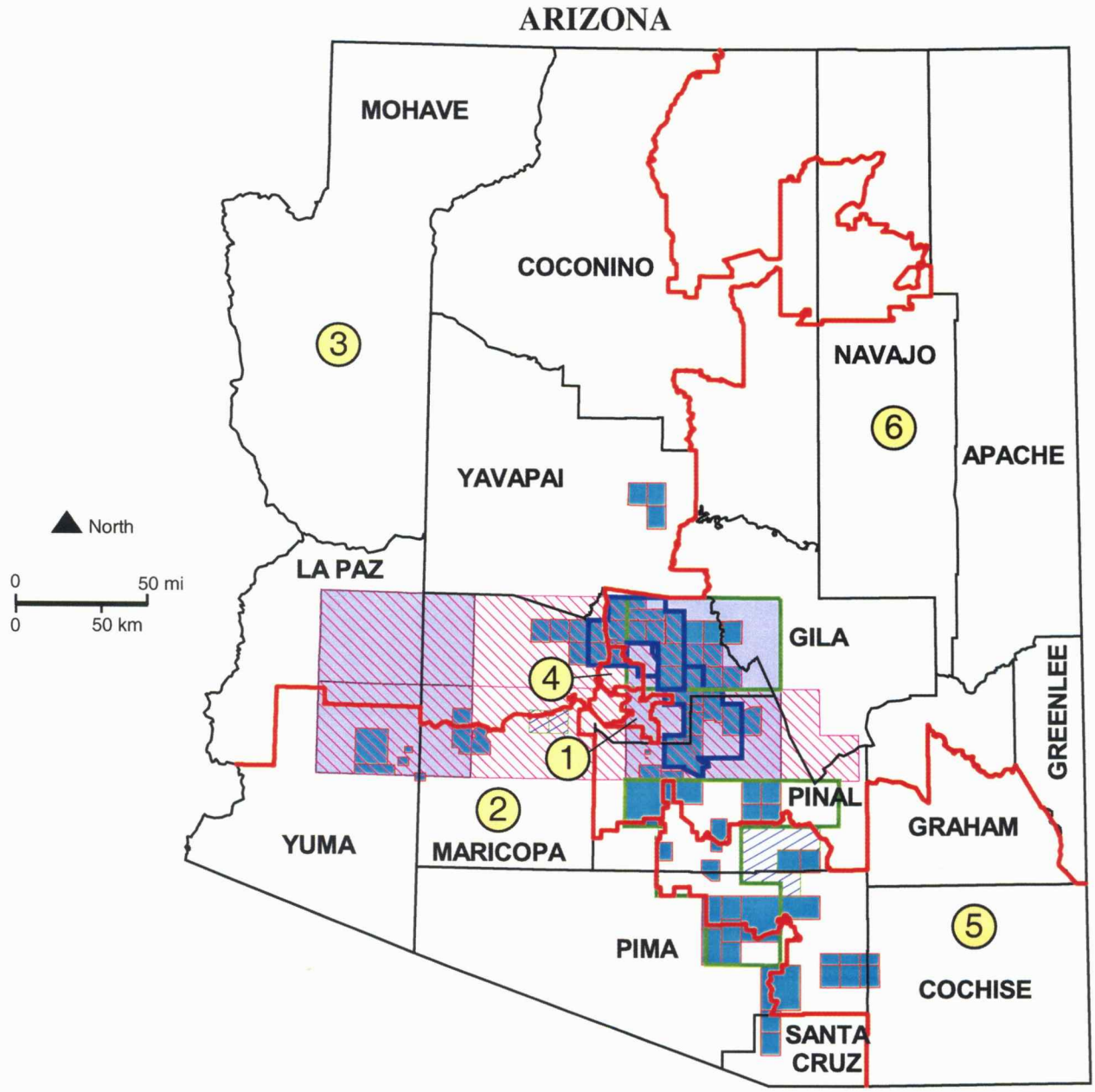

Geologic Mapping and Digital Geologic Database Compilation
Funded by STATEMAP 1994-2002

- Congressional Districts
- 1:100,000 scale digital geologic database
- 1:24000 scale bedrock and surficial mapping 1994-1999

In progress 2000-2001, and funded 2001-2002

- Bedrock and surficial mapping 2000-2001
- 1:24000 digital compilation 2000-2001
- 1:100,000 digital geologic database compilation

Contact information

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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN ARIZONA

Federal Fiscal Year	Project Title	State Dollars	Federal Dollars	Total Project Dollars
1993	Western Arizona: SE Plomosa Mts., 1:12,000; Tank and Palomas Mts., 1:24,000; central Gila Bend Mts., 1:50,000; Salome and Little Horn 30' x 60' sheets, 1:100,000	$92,464	$80,161	$172,625
1994	North and east of Phoenix: Picketpost Mtn., Florence Jnct., Superstition Mountains SW, 1:24,000; east half of Mesa 30' x 60' Quadrangle, 1:100,000; surficial maps of ten 7 1/2' quadrangles north and east of Phoenix	80,000	80,000	160,000
1995	North and east of Phoenix: Apache Junction and Buckhorn 7 1/2' quads, 1:24,000; Mesa 30' x 60', 1:100,000; surficial maps of five 7 1/2' quadrangles NE of Phoenix	55,000	55,000	110,000
1996	East of Phoenix: Mormon Flat Dam and Horse Mesa 7 1/2' Quadrangles, 1:24,000; surficial map of Theodore Roosevelt Lake 30' x 60' Quadrangle, 1:100,000	136,247	136,247	272,494
1997	East of Phoenix: Five 7 1/2' quads, 1:24,000; Digital maps of the Mesa and portions of the Theodore Roosevelt Dam and Globe 30' x 60' Quad; Surficial maps of the Casa Grande area, six 7 1/2' quadrangles	151,042	151,036	302,078
1998	North and west of Tucson: Sawtooth Mts., Samaniego Hills, Picacho Mts., and Ninetysix Hills, 1:24,000; Surficial maps of Tucson Mts.and Catalina Foothills	135,582	135,577	271,159
1999	Greater Tucson area: Western Avra Valley and Roskruge Mountains, six 7 1/2' quads, 1:24,000; Oracle - Catalina area, two 7 1/2' quads, 1:24,000; Green Valley area, four 7 1/2' quads, 1:24,000	127,123	126,401	253,524
2000	Phoenix - Tucson corridor: Mescal - Vail area, four 7 1/2' quads, 1:24,000; surficial maps, Tubac - Amado area, two 7 1/2' quads; digital maps, Tucson - Phoenix corridor, 1:24,000 and 1:100,000	147,633	145,535	293,168
2001	Phoenix - Tucson corridor: Tortolita Mts., Tucson area, 1;24,000; Buckeye Hills, Phoenix area, 1:24,000; Digital map compilation, Tucson - Phoenix corridor, 1:24,000 and 1:100,000	227,614	227,325	454,939
	TOTALS	**$1,152,705**	**$1,137,282**	**$2,289,987**

For the past 50 years, Arizona has had one of the fastest population-growth rates, and rapid growth is expected to continue. Most of the growth has been, and will continue to be, in the metropolitan Phoenix and Tucson areas in southern Arizona. Approximately 80 percent of Arizona's population of 5 million people live in the 20 percent of the state known as the Phoenix–Tucson metropolitan corridor, which also includes many smaller communities along Interstate Highways 8, 10, 17, and 19. The rest of the state also is experiencing rapid population growth, but populations are much smaller.

In recognition of this large and rapidly growing population, and to follow the intent of the National Geologic Mapping Act to address societal needs, the Arizona Geologic Mapping Advisory Committee strongly recommended that the Arizona Geological Survey give highest priority to completing detailed geologic maps and digital map products in the Phoenix–Tucson corridor. The Arizona Geological Survey will soon complete mapping this area. The next phase will be to map outlying, smaller communities and developing areas. The Advisory Committee will recommend priorities.

May 2001

Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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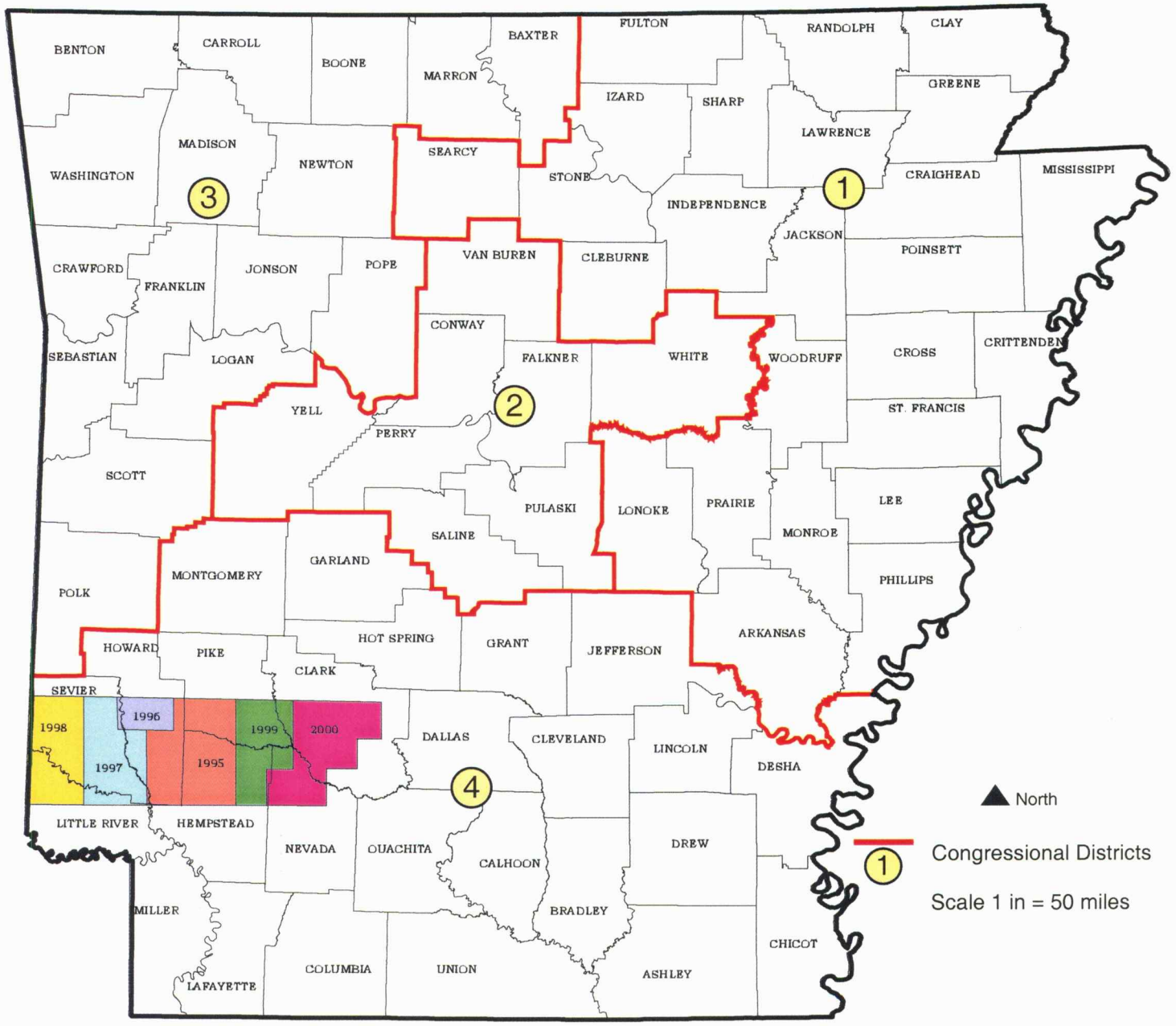
ARKANSAS



Areas and years where STATEMAP Projects have and are taking place.

Contact information

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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN ARKANSAS

Year	Project Title	State Dollars	Federal Dollars	Total Project Dollars
1995-96	Murfreesboro, Nathan, Nashville, McCaskill, Mineral Springs North, Mineral Springs South, Columbus, and Washington 7.5-min quadrangles	$33,987	$25,000	$58,987
1996-97	Center Point and Dierks 7.5-min quadrangles	13,037	10,000	23,037
1997-98	Geneva, Lockesburg, Silver Ridge, Falls Chapel, and Ben Lomond 7.5-min quadrangles	43,410	41,210	84,620
1998-99	DeQueen, Chapel Hill, Horatio, Cerrogordo, Arkinda, Winthrop 7.5-min quadrangles	40,889	40,825	81,714
1999-2000	Antoine, Delight, Pisgah, Piney Grove, and Blevins 7.5-min quadrangles	38,327	38,311	76,638
2000-2001	Arkadelphia, Hollywood, Okolona North, Okolona South, Gurdon, Prescott East, and Prescott West	42,292	38,110	80,402
	TOTALS	**$211,942**	**$193,456**	**$405,398**

The Arkansas Geological Comission is an active participant in the STATEMAP part of the National Cooperative Geological Mapping Program (NCGMP), having participated since 1995. Arkansas recognizes the importance of geological mapping as a tool for decision makers who have a need to understand the nature, composition, and distribution of earth materials.

Geologic mapping has been and is an important information gathering tool. This information is used for informed decision making and for the protection of the state's resources. The more accurate the geologic information is the better developers and planners desicion making abilities can be to protect the environment and serve the public equally.

Since Arkansas began its participation in the STATEMAP program, it has completed 21 surficial maps at a scale of 1:24,000. Seven more 7.5-minute quadrangles are in progress and will be completed by July 1, 2001. This will complete the core area of the Cretaceous rocks in southwest Arkansas. Next year's project area will be in north-central Arkansas. The Onia and Fifty-Six 7.5-minute quadrangles were selected because of the increase in population and their geographic location.

June 2001

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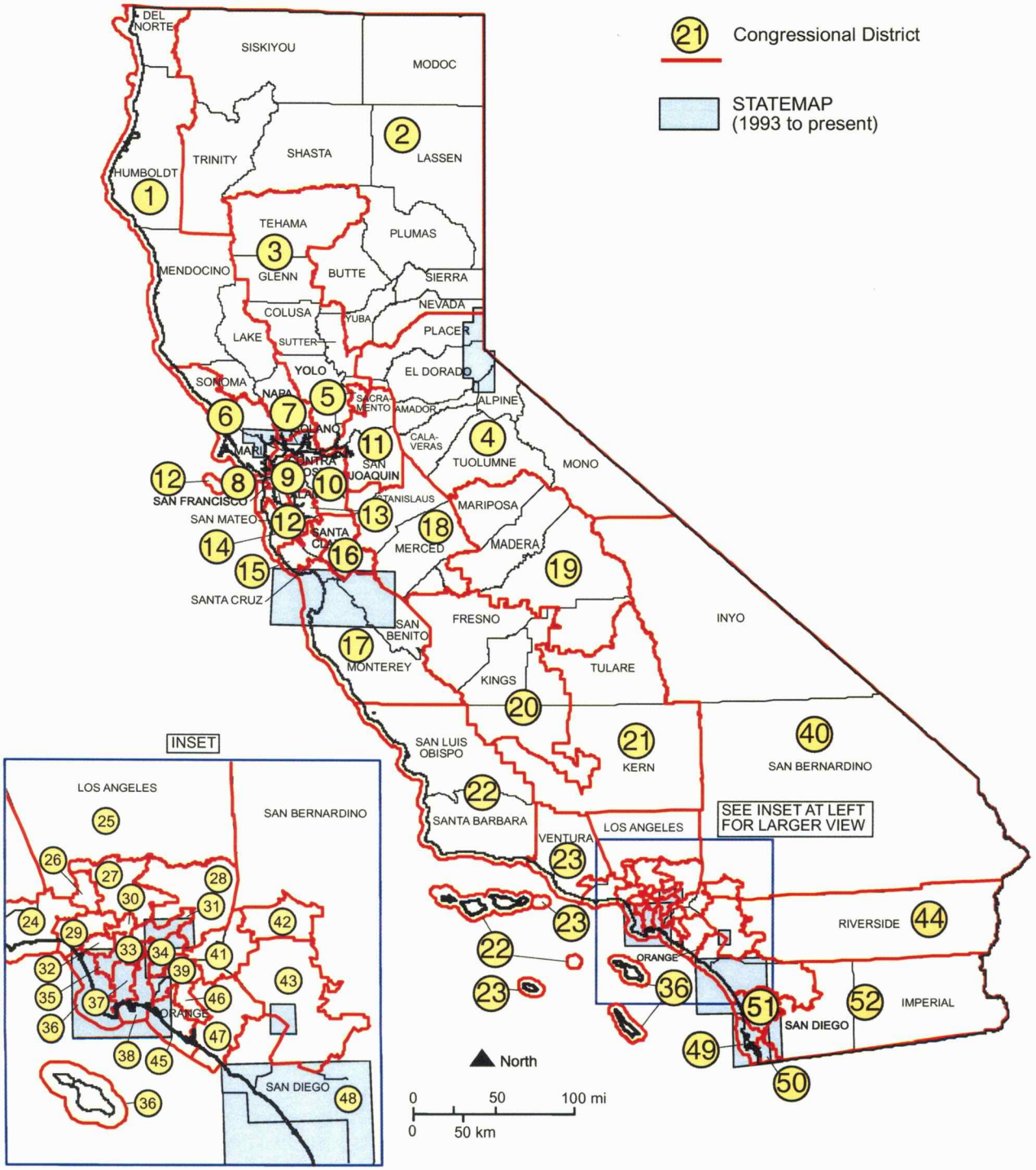
CALIFORNIA



Contact information

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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN CALIFORNIA

Federal Fiscal Year	Projects/Scale	State Dollars	Federal Dollars	Total Project Dollars
1993	Geology of Southwestern California (Part 1)/1:100,000	$105,713	$80,000	$185,713
1994	Geology of Southwestern California (Part 2)/1:100,000	55,000	55,000	110,000
1995	Geologic Map of the Whittier 7.5' quadrangle/1:24,000	66,672	50,000	116,672
1996	Geology of the Long Beach quadrangle/1:100,000 Geology of the El Monte and Baldwin Park 7.5' quadrangles/1:24,000	127,806	127,806	255,612
1997	Geology of the Monterey quadrangle (Part 1)/1:100,000 Geology of the Cordelia and Fairfield South 7.5' quadrangles/1:24,000	158,034	107,624	265,658
1998	Geology of the Monterey and San Diego quadrangles/1:100,000 Geology of the Dana Point, San Clemente, San Onofre Bluff, Valley Center, and Escondido 7.5' quadrangles/1:24,000	157,680	157,680	315,360
1999	Geology of the Fallbrook, Temecula, Pechanga, Bonsall, and Pala 7.5' quadrangles/1:24,000	111,551	111,551	223,102
2000	Geology of the Margarita Peak, Morro Hill, and Las Pulgas Canyon 7.5' quadrangles/1:24,000	100,078	100,078	200,156
2001	Geology of the Cuttings Wharf, Sears Point, Petaluma, Petaluma Point, and Novato 7.5' quadrangles/1:24,000 Geology of the Lake Tahoe Basin/1:100,000 Geology of the San Vincente Reservoir, El Cajon, Jamul Mountains, and Otay Mesa 7.5' quadrangles/ 1:24,000 Geology of the Oceanside quadrangle/1:100,000	292,223	292,223	584,446
	TOTALS	**$1,174,757**	**$1,081,962**	**$2,256,719**

Nowhere in the United States are so many people confronted with so many geologic hazards as they are in California. Over 75% of the state's 34 million people reside in the tectonically active coastal regions where steep mountain ranges composed of weak rocks continue to rise above the intervening valleys. Dollar losses due to earthquakes, landslides, and other geologic hazards amount to hundreds of millions each year. Much of the basic data utilized in efforts to reduce these losses come from geologic maps.

The STATEMAP part of the National Cooperative Geologic Mapping Program (NCGMP) has significantly enhanced the Department of Conservation Division of Mines and Geology's ability to produce new geologic maps in California. STATEMAP has, over the past eight years, helped support geologic mapping in sixteen counties (Alpine, El Dorado, Los Angeles, Merced, Marin, Monterey, Napa, Orange, Placer, Riverside San Benito, Santa Clara, San Diego, Santa Cruz, Solano, and Sonoma). This new geologic map information is regularly incorporated into decision making on a wide variety of local and regional issues that include geologic-hazard mitigation (earthquakes, slope stability, liquefaction), land-use planning, identifying potential aggregate resources, and watershed-basin analysis.

Recent geologic mapping supported by STATEMAP include 27 1:24,000-scale (1" = 2,000') maps. These are used by the Division of Mines and Geology's Seismic Hazards Mapping Program. The Program, which was initiated by the California Seismic Hazard Act of 1990, identifies areas where earthquakes are likely to cause shaking, liquefaction, landslides, or other ground failure, and provides Seismic Hazard Zone Maps to local agencies. In essence, the goal of the program is improve public safety through construction of safer homes and other buildings.

March 2001

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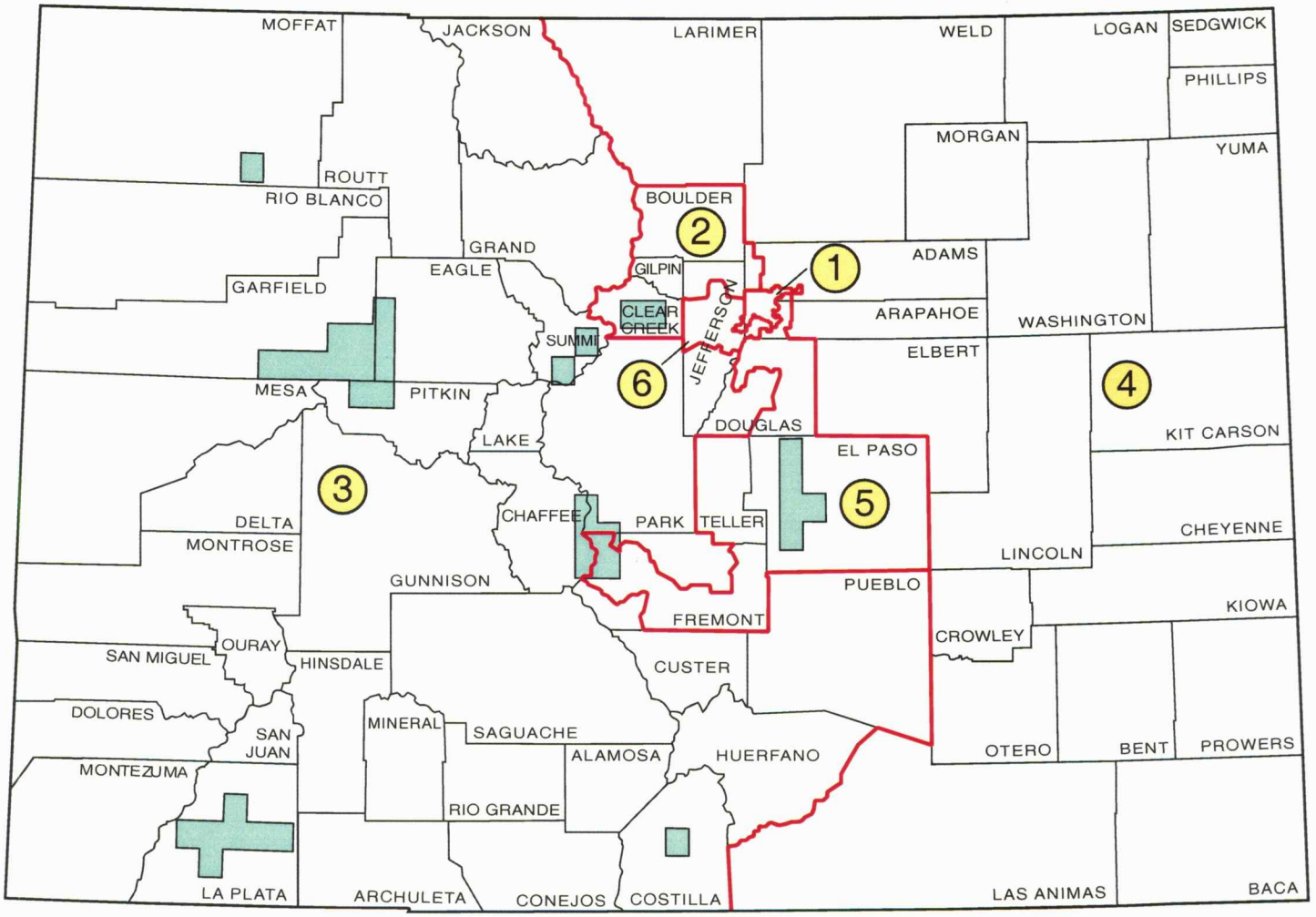
COLORADO



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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN COLORADO

Federal Fiscal Year	Project Title	Scale	State Dollars	Federal Dollars	Total Project Dollars
93	Geologic Map of Glenwood Springs Quadrangle	1:24,000	$10,000	$10,000	$20,000
94	Geologic Map of Glenwood Springs Quadrangle	1:24,000	37,543	35,000	72,543
	Geologic Map of Shoshone Quadrangle	1:24,000			
95	Geologic Map of Center Mtn Quadrangle	1:24,000			
	Geologic Map of Cattle Creek Quadrangle	1:24,000			
96	Geologic Map of Carbondale Quadrangle	1:24,000	86,603	85,897	172,500
	Geologic Map of Dotsero Quadrangle	1:24,000			
	Geologic Map of Cottonwood Pass Quadrangle	1:24,000			
97	Geologic Map of Leon Quadrangle	1:24,000	82,655	82,457	165,112
	Geologic Map of Basalt Quadrangle	1;24,000			
	Geologic Map of Ludwig Mtn Quadrangle	1;24,000			
	Geologic Map of Rules Hill Quadrangle	1:24,000			
98	Geologic Map of Durango East Quadrangle	1:24,000	118,337	118,337	236,674
	Geologic Map of Durango West Quadrangle	1;24,000			
	Geologic Map of Mt Sporis Quadrangle	1:24,000			
	Geologic Map of Hunter Mesa Quadrangle	1:24,000			
99	Geologic Map of Hesperus Quadrangle	1:24,000	102,768	100,518	203,286
	Geologic Map of Colorado Springs Quadrangle	1:24,000			
	Geologic Map of Idaho Springs Quadrangle	1:24,000			
00	Geologic Map of Pikeview Quadrangle	1:24,000	120,446	120,446	240,892
	Geologic Map of Georgetown Quadrangle	1:24,000			
	Geologic Map of Gibson Gulch Quadrangle	1:24,000			
	Geologic Map of Basin Mtn Quadrangle	1:24,000			
	TOTALS		**$583,827**	**$577,655**	**$1,161,482**

STATEMAP has, over the past eight years, helped support detailed mapping of bedrock and surficial deposits in six counties (Clear Creek, Eagle, El Paso, Garfield, La Plata, and Pitkin). This new geologic-map information is regularly incorporated into decision-making on a wide variety of local and county-wide issues that include protecting ground water, locating new municipal wells, siting waste-disposal facilities, identifying potential aggregate resources, and addressing a broad spectrum of land-use concerns.

Recent geologic mapping of surficial materials and bedrock in the Colorado Springs area is being used in a variety of ways in the county with the largest population growth in the state. For example, geologic mapping aids in the identification of supplies of nonmetallic resources (sand, gravel, crushed stone, and dimension stone) that support urban and infrastructure construction. It also is useful in land-use decisions regarding potential geologic hazards, particularly landslide susceptibility because Colorado Springs has suffered losses of $75 million from recent landslides.

Mapping in the high-growth areas of Durango, Georgetown/Idaho Springs, and Glenwood Springs also is used extensively by planners and consultants to mitigate potential hazards.

Association of American State Geologists

Connecticut Geological and Natural History Survey

United States Geological Survey

USGS science for a changing world

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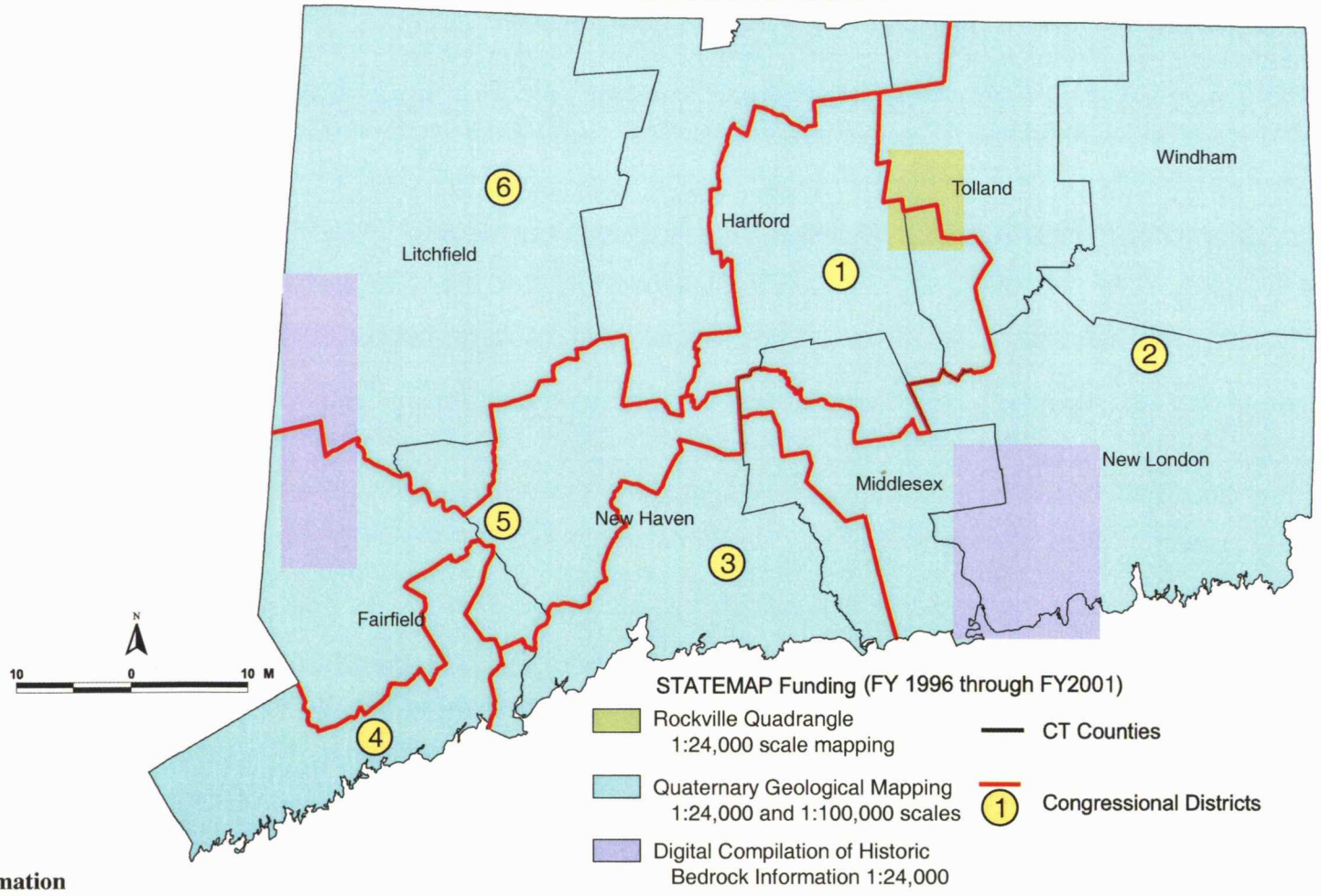
CONNECTICUT



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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN CONNECTICUT

Federal Fiscal Year	Project Title	Federal Dollars	State Dollars	Total Project Dollars
1996	Geologic Mapping of the Rockville quadrangle, 1:24,000 scale Quatenary Geologic Mapping (Digital Compilation Project) 1:24,000 and 1:100,000 scales	$30,000 59,459	$30,000 69,522	$60,000 128,981
2001	Digital Compilation of Historic Bedrock Information and National Geologic Map Database Cooperative	59,719	60,735	120,454
	TOTALS	**$149,178**	**$160,257**	**$309,435**

Benefits and Uses of Geologic Maps

Connecticut is not blessed with oil and gas, coal or abundant metallic ore deposits. Geologic hazards such as large earthquakes and landslides are not the frequent, headline-grabbing occurrences that they are elsewhere, yet geology and access to timely, relevant geologic information is critical to Connecticut's future well being. In addition to the direct contribution that traprock and sand and gravel mining make to our economy, there are indirect but substantial economic and quality of life contributions that result from adequate, clean water supplies (surface and ground) and the preservation of geologically and ecologically significant land. Our ability to attract a high caliber work force and to compete economically with our New England neighbors depends on a host of natural-resource management decisions that are supported by geologic information.

STATEMAP initiatives in the Rockville quadrangle (bedrock mapping) and throughout the state (Quaternary geology) have been designed to support Connecticut's future through a better understanding of water supplies and aggregate resources. As development moves from the valleys to the hills of Connecticut, bedrock aquifers will become increasingly important as necessary water supplies. The Rockville work is providing new insights into the aquifer potential of fractured crystalline rock. The availability of digital, quadrangle-scale surficial and Quaternary geologic maps significantly increases our ability to understand how our glacial deposits yield water, are susceptible to contamination, and can safely serve as sources of aggregate.

Project Descriptions

Geologic mapping of the Rockville Quadrangle was conducted to help determine the role of bedrock fractures in ground-water well yields. A newly created database of located water wells was used to analyze trends in both localized and regional ground-water flow within the bedrock.

The digital compilation of the Quaternary Geologic Mapping involved the production of a state scale (1:100,000) digital product from quadrangle (1:24,000) scale compilation sheets. Both of these mapping projects are useful tools for assessment of Connecticut ground-water resources and aquifer protection.

These and other digital geologic and natural-resource data are available through the Connecticut Geological and Natural History Survey, Environmental and Geographic Information Center, Department of Environmental Protection http://dep.state.ct.us/store/

May 2001

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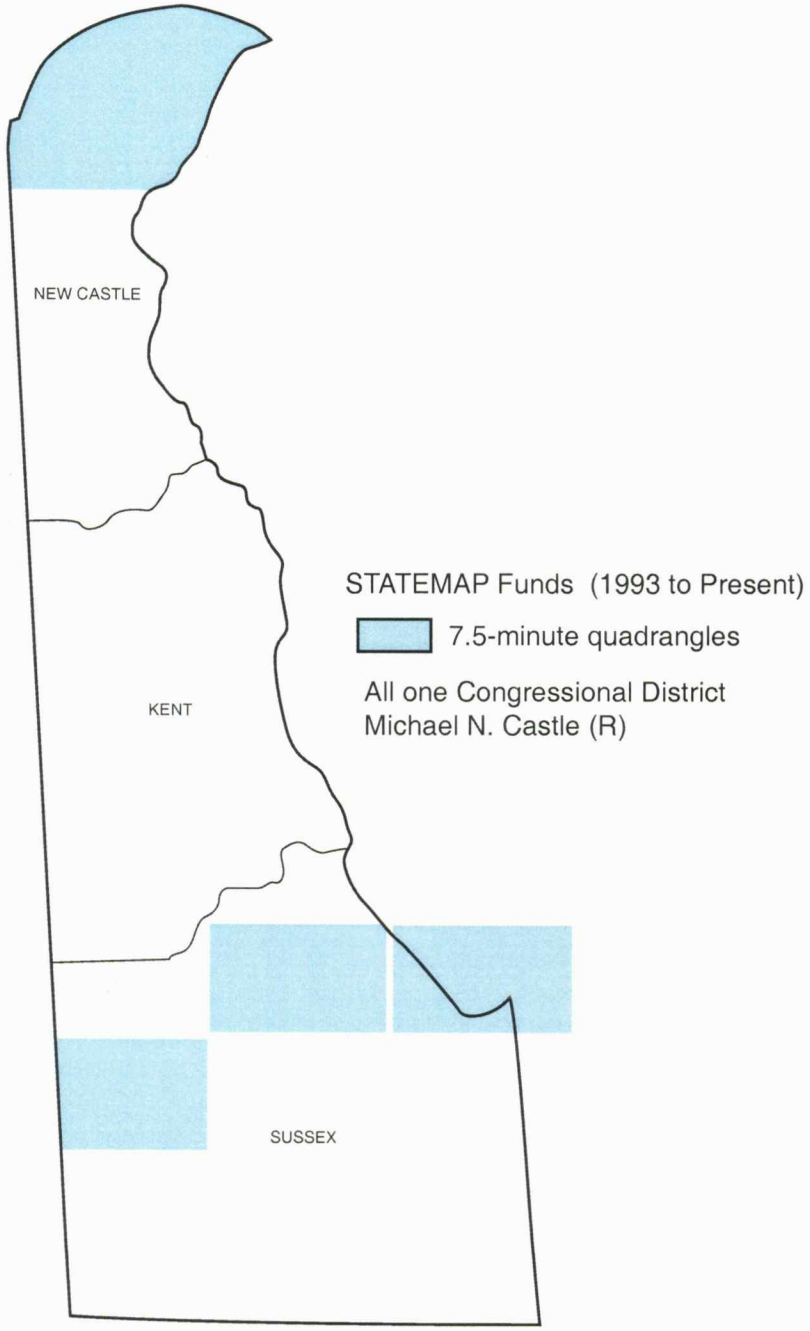
DELAWARE



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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN DELAWARE

Federal Fiscal Year	Project Title	State Dollars	Federal Dollars	Total Project Dollars
1993	Geologic Map of the Seaford East and Seaford West Quadrangles Scale 1:24,000	$68,727	$18,290	$87,017
1997	Geologic Map of the Milton and Ellendale Quadrangles Scale 1:24,000	123,617	49,076	172,693
1998	Geologic Map of the Ellendale Quadrangle Scale 1:24,000	92,038	30,000	122,038
1999	Geologic Map of the Lewes and Cape Henlopen Quadrangles Scale 1:24,000	80,071	30,000	110,071
2001	USGS Digital Geologic Map Database Development	14,619	8,000	22,619
	TOTALS	**$379,072**	**$135,366**	**$514,438**

The Delaware Geological Survey has a continuing program to map the geology of the entire state at the detailed scale of 1:24,000. The STATEMAP component of the National Cooperative Geologic Mapping Program has contributed significantly to our surficial geologic mapping program. This work has entailed not only new geologic mapping, but also the digital compilation of previous mapping. Products resulting from this program include file formats that can be downloaded and printed from the web as geologic map products and imported into GIS software as georeferenced layers.

Geologic maps show the distribution of rock units and other geologically related information, and are important sources of natural-resource and environmental information including, but not limited to, water resources and building materials. Geologic maps are the fundamental bases from which derivative maps and applications are generated. Uses for geologic maps include:

- Development and protection of ground- and surface-water resources (occurrence, distribution, availability, quantity, and quality)
- Mapping of ground-water recharge and wellhead-protection areas
- Evaluation of geologic hazards (earthquakes, land subsidence, coastal erosion, stream and river flooding, landslides)
- Planning transportation and utility routes
- Land-use planning and evaluation of land-use proposals
- Environmental assessment and protection planning (underground storage tanks, landfills, spray irrigation sites, aquifer contamination, best management practices)
- Natural-resource assessment, exploration, development, and management (sand and gravel, clay, aggregate)
- Regulatory decision-making
- Site selection for public facilities (schools, landfills, water-treatment facilities, waste-disposal sites, reservoirs)
- Agriculture
- Education
- Recreation

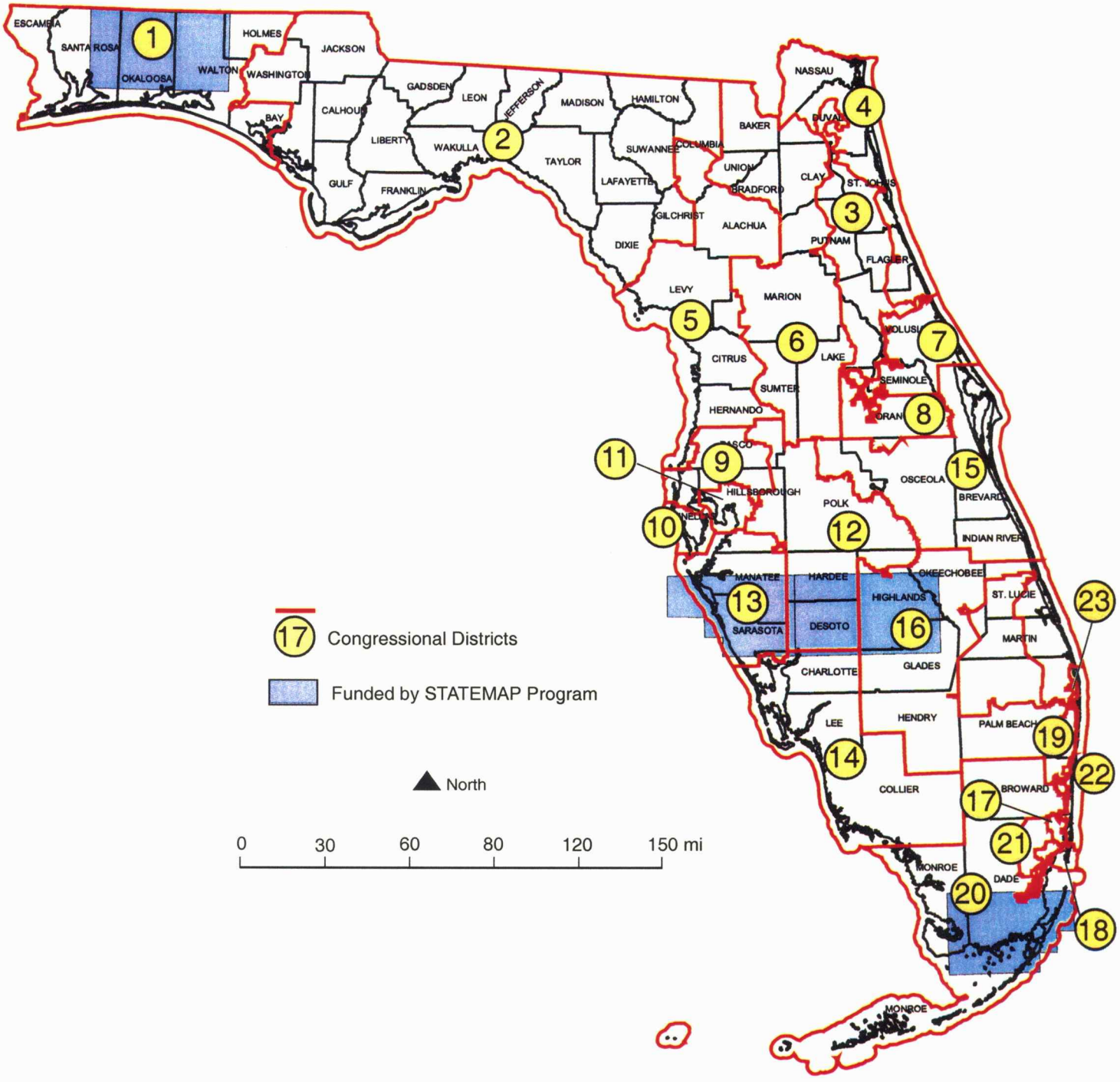
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

FLORIDA



Contact information

Florida Geological Survey
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U.S.G.S. Geologic Mapping Program Office
Program Coordinators: Peter T. Lyttle (703/648-6943)
Martha Garcia (703/648-6978)
http://ncgmp.usgs.gov/

STATUS OF STATEMAP
GEOLOGIC MAPPING IN FLORIDA

Federal Fiscal Year	Project Title and Scale	Federal Dollars	State Dollars	Total Project Dollars
1993	N/A	$0	$0	$0
1994	Geologic map of the eastern portion of the USGS 1:100,000 scale Homestead quadrangle	30,000	30,000	60,000
1995	Geologic map of the western portion of the USGS 1:100,000 scale Homestead quadrangle	30,000	30,000	60,000
1996	Geologic map of the western portion of the USGS 1:100,000 scale Sarasota quadrangle	70,000	70,000	140,000
1997	Geologic map of the eastern portion of the USGS 1:100,000 scale Sarasota quadrangle and the western portion of the 1:100,000 scale Arcadia quadrangle	95,547	95,547	191,094
1998	Geologic map of the eastern portion of the USGS 1:100,000 scale Arcadia quadrangle	104,414	104,414	208,828
1999	Geologic map of the northern portion of the USGS 1:100,000 scale Crestview quadrangle	105,000	105,000	210,000
2000	Geologic map of the southern portion of the USGS 1:100,000 scale Crestview quadrangle (Current project)	106,021	106,021	212,042
2001	Geologic map of the western portion of the USGS 1:100,000 scale Marianna quadrangle (NEXT project, not started yet)	120,990	120,990	241,980
	TOTALS	**$661,972**	**$661,972**	**$1,323,944**

The State of Florida has undergone significant population growth during the last several decades. This growth has impacted the state's ground-water, mineral, and environmental resources and has threatened the citizens' quality of life. Understanding the geology of a region is essential to the wise use of resources without adversely affecting the populace. This is especially important in and around the rapid-growth areas of Florida.

The last peer-reviewed state geologic map was published in 1964. The Florida Geological Survey (FGS) has been conducting field investigations aimed toward developing a new statewide geological map. This statewide geologic map is presently in the peer-review process and will be published at a 1:750,000 scale.

Over the last seven years, the FGS has mapped the Homestead 1:100,000 quadrangle (1994–96), the Sarasota and Arcadia 1:100,000 quadrangles (1996–99), and the northern portion of the Crestview 1:100,000 quadrangle (1999–2000) utilizing funds from STATEMAP and matching FGS funding. Currently, the FGS is mapping the southern portion of the Crestview 1:100,000 quadrangle under the 2000–01 STATEMAP program. This ongoing mapping effort includes augering, core drilling, field reconnaissance, and cuttings/core description. Mapping of this portion of the Crestview quadrangle began July 1, 2000, with the deliverables due June 30, 2001.

For the 2001–02 STATEMAP project, the FGS proposes to map the western portion of the Marianna 1:100,000-scale quadrangle. The Marianna quadrangle includes some of the most complex outcrop patterns in the state, including some of the oldest rocks cropping out. Lithostratigraphic units exposed within the proposed study area include the Eocene Ocala Limestone, the Oligocene Marianna Limestone, the Oligocene Suwannee Limestone, the Miocene Alum Bluff Group, and the Pliocene–Pleistocene Citronelle Formation. Additionally, large areas of residuum developed on Oligocene and Eocene carbonate units lend to the complexity of problems posed by geologic mapping in the area.

April 2001

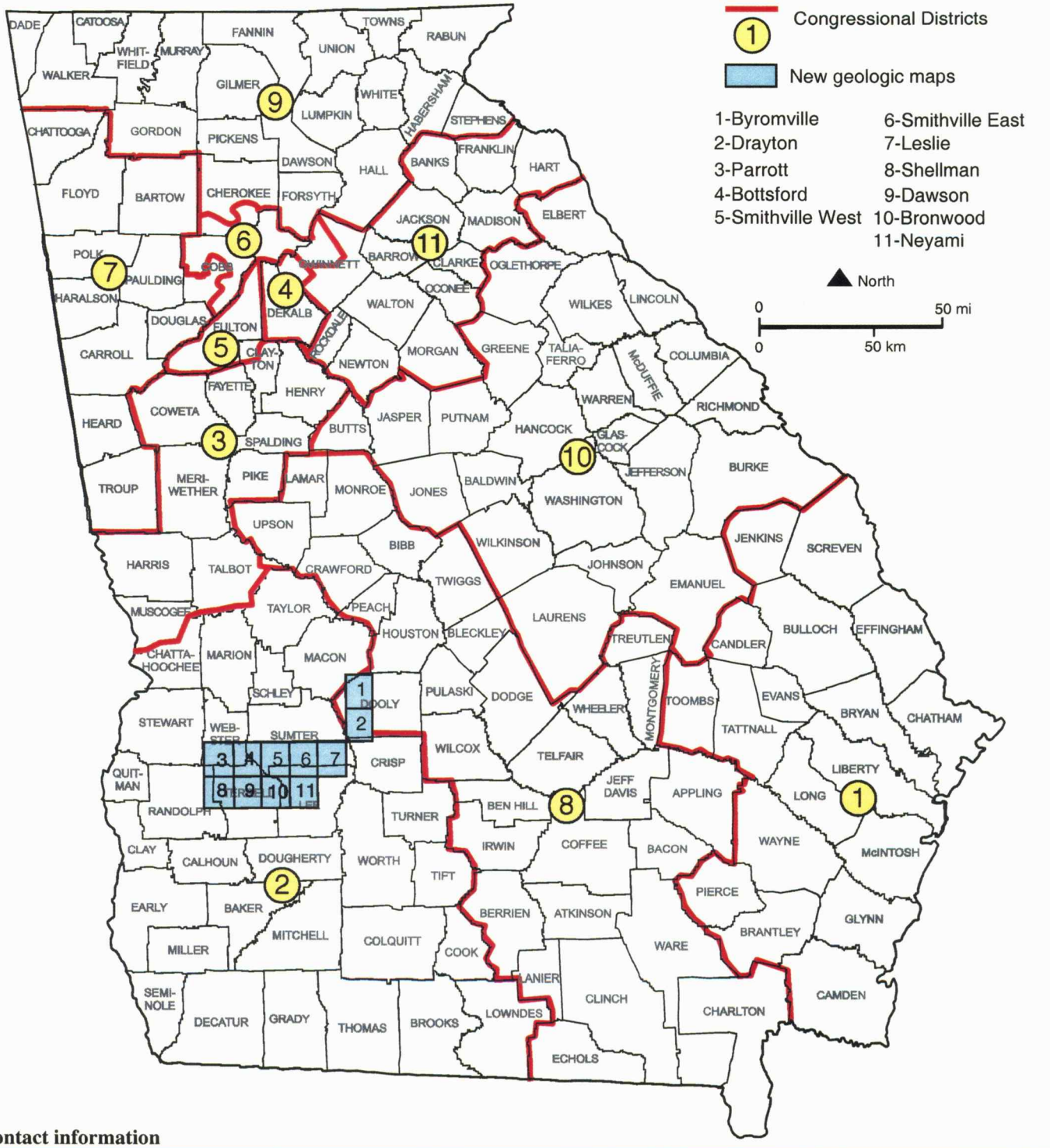
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

GEORGIA



Contact information

Georgia Geological Survey
State Geologist: William H. McLemore (404/656-3214)
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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN GEORGIA

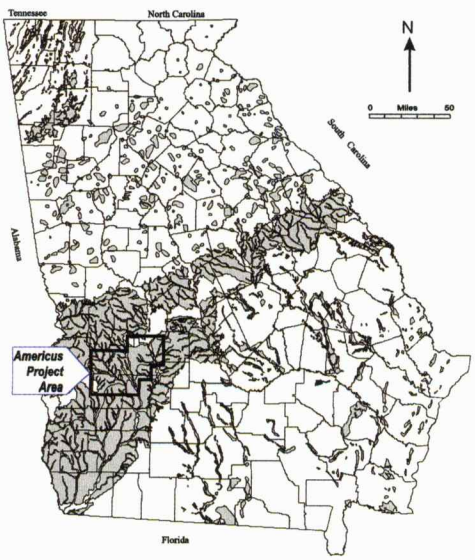
For three years the STATEMAP part of the National Geologic Mapping Program has contributed to the completion of new geologic maps in Georgia. Federal funding for new geologic mapping is matched with State funds. Proposals for funding are submitted annually by the Geologic Survey Branch of the Georgia Department of Natural Resources Environmental Protection Division to the United States Geological Survey. Geologic maps provide important natural-resource information including the type, age, and horizontal and vertical distribution of bedrock near the earth's surface. Geologic structures (faults, fractures, and folds) that would be exposed if the surficial soils were removed are shown. The maps are often prepared on a base that depicts roadways, utility lines, rivers and streams, urban areas, county boundaries, building locations, elevation contours, and other physical features.

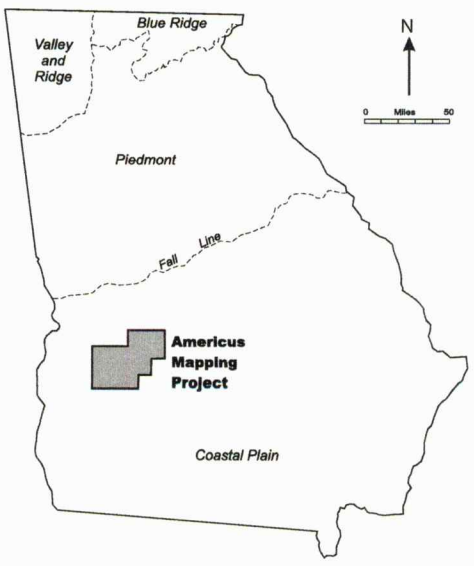
Geologic maps are useful for many purposes, including site selection for public utilities, planning transportation and utility routes, evaluating geologic hazards, land-use planning, environmental assessment and protection planning, development and protection of ground water, regulatory decisions, and natural-resource exploration and development. The maps are used for engineering and construction projects (buildings, dams, roads, bridges, etc.), city and county planning, and for a variety of environmental concerns. They are used for siting waste-disposal facilities, locating new municipal wells, and identifying aggregate sources (sand, gravel, crushed stone and dimension stone) that support urban and infrastructure construction. Geologic maps are useful for evaluating and predicting the consequences of natural and human activities on the environment, and can assist in preventing or minimizing environmental impact or problems.

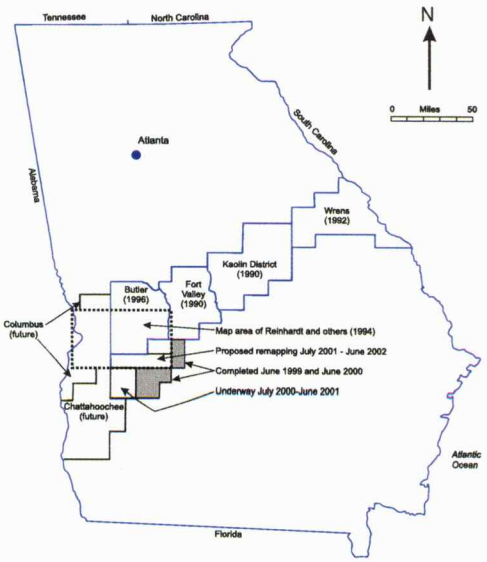
Federal funding provided by the STATEMAP program (matched by State funds) has been awarded to the Geologic Survey Branch for three years as follows:

Year 1 (7/1/98 - 6/30/99)	Federal $68,631	State $69,082	(three quadrangles)
Year 2 (7/1/99 - 6/30/00)	Federal $80,000	State $81,197	(four quadrangles)
Year 3 (7/1/00 - 6/30/01)	Federal $83,361	State $83,383	(four quadrangles)
Totals	$231,992	$233,662	

The new mapping supported by the STATEMAP program (the Americus Mapping Project) will assist in completing the geologic mapping of the Georgia Coastal Plain south of the Fall Line, which is an important area of recharge for some of the most productive aquifers in the state. The mapping has been performed in portions of Macon, Dooly, Crisp, Sumter, Lee, Webster, Terrell, and Randolph counties. The severe drought conditions experienced in Georgia during the past two years, and the resulting impacts upon ground-water availability and river/streamflow, have significantly increased the importance of accurate and detailed geologic maps which can assist in evaluating and predicting future ground-water and surface-water availability and limitations.







March 2001

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IDAHO GEOLOGICAL SURVEY

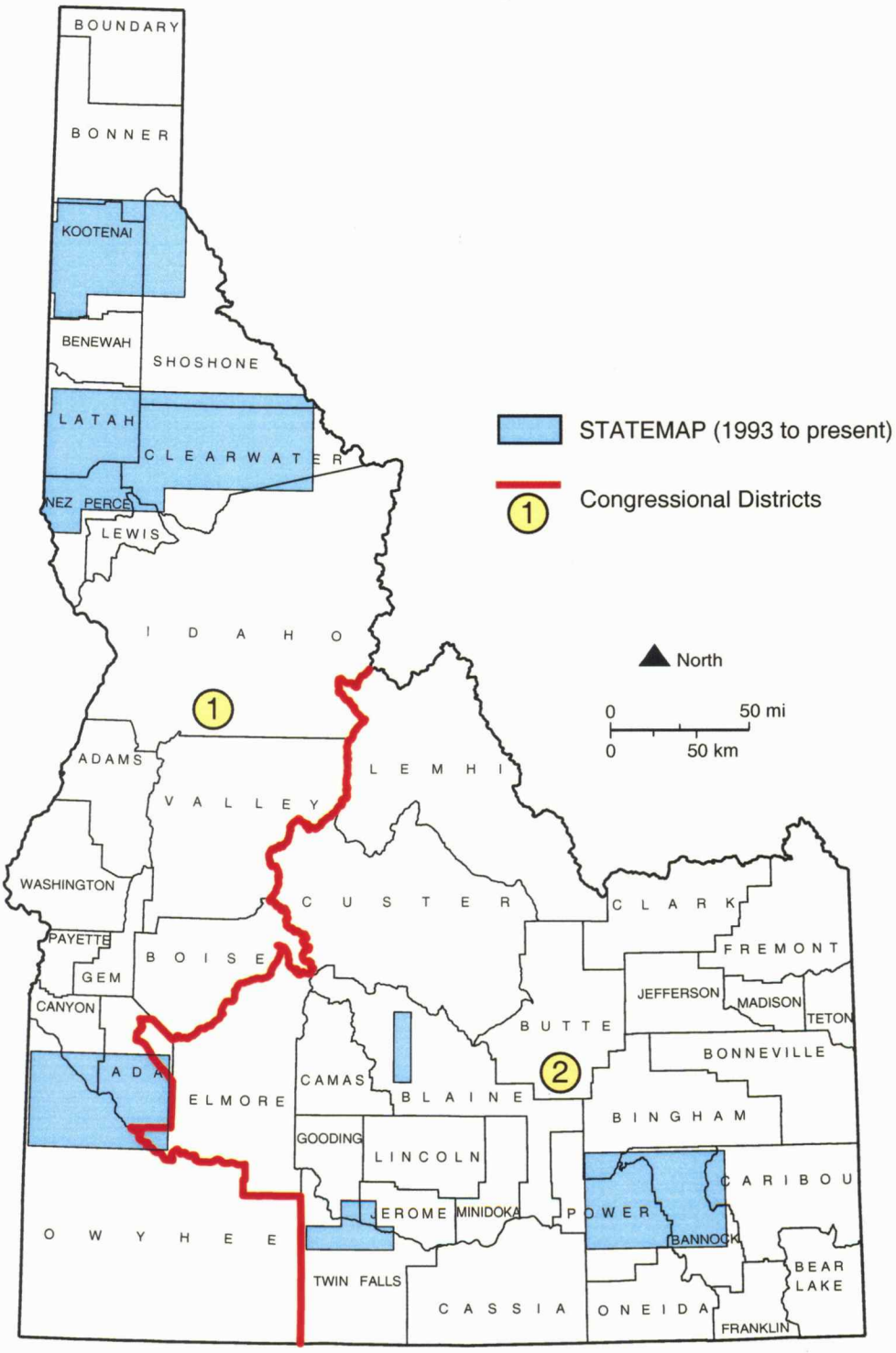
United States Geological Survey

USGS science for a changing world

National Cooperative Geologic Mapping Program

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

IDAHO



Contact information

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U.S.G.S. Geologic Mapping Program Office
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Martha Garcia (703/648-6978)
http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN IDAHO

Federal Fiscal Year	Project Title	State Dollars	Federal Dollars	Total Project Dollars
93	Idaho Geologic Mapping	$15,000	$15,000	$30,000
94	Idaho Urban Geologic Mapping	50,199	50,000	100,199
95	Idaho Urban Geologic Mapping	35,783	35,000	70,783
96	Idaho Urban Geologic Mapping	79,704	105,859	158,259
97	Idaho Urban Geologic Mapping	108,229	106,461	214,690
98	Idaho Urban Geologic Mapping	91,601	90,115	181,716
99	Idaho STATEMAP	109,020	108,265	217,285
00	Idaho STATEMAP	122,869	122,869	245,738
01	Idaho STATEMAP	208,883	208,450	417.333
	TOTALS	**$821,288**	**$814,715**	**$1,636,003**

March 2001

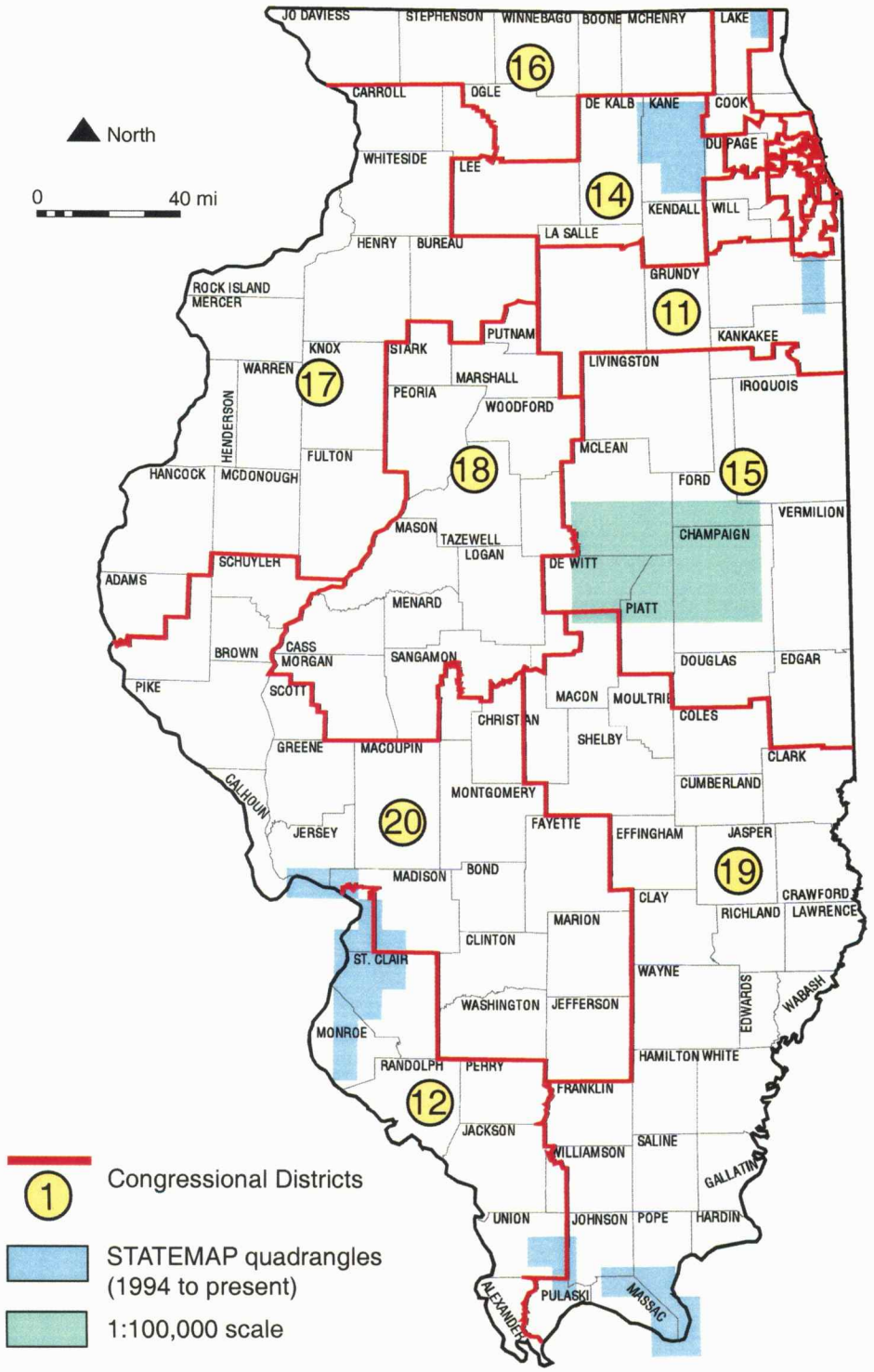
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

ILLINOIS



Contact information

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U.S.G.S. Geologic Mapping Program Office
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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN ILLINOIS

Federal Fiscal Year	Quadrangles Mapped	Federal Dollars	State Dollars	Total Project Dollars
1993	Champaign 30' x 60' Quadrangle; Mermet and Reevesville 7.5 min.	$72,395	$126,768	$199,163
1994	Elburn & Geneva; Anna, Cypress, & Mt. Pleasant	80,000	128,270	208,270
1995	Brownfield, Paducah NE, Smithland, Paducah E and Little Cypress	34,999	69,581	104,580
1996	Henry Co.; Sugar Grove & Aurora N; Alton & Grafton	108,921	109,409	218,330
1997	Pingree Grove & Elgin; Elsah & O'Fallon	100,000	100,000	200,000
1998	Hampshire & Maple Park; Cahokia, French Village, & Millstadt	153,827	263,853	417,680
1999	Beecher W & Steger N; Columbia, Waterloo, & Renault	119,856	196,036	315,892
2000	Wadsworth; Wood River, Monks Mound, Granite City, & Collinsville	138,935	139,176	278,111
	TOTALS	**$808,933**	**$1,133,093**	**$1,942,026**

The Illinois State Geological Survey has a continuing project to map the geology of the entire state, in three dimensions, from land surface down to and into the bedrock, at the detailed scale of 1:24,000 (1 inch = 2000 feet). The STATEMAP part of the National Cooperative Geologic Mapping Program has contributed significantly to advancing this project. From its inception in 1993, STATEMAP-supported projects have been focused in three areas: 1) mapping the bedrock and surficial deposits exposed in southernmost Illinois, primarily to seek evidence of relatively recent faulting in this earthquake-prone area astride the New Madrid and Wabash Valley seismic zones; 2) mapping the glacial deposits and bedrock in the rapidly urbanizing area on the Illinois side of the Mississippi River opposite St. Louis, 3) mapping the glacial deposits in rapidly urbanizing areas of the western Chicago suburbs, and 4) mapping the glacial deposits at a proposed site for a third airport in the Chicago region. The STATEMAP program also contributed to an important pilot project to create a 3-dimensional model at the 1:100,000 -scale (1 inch = about 1.6 miles) of the complex glacial geology that underlies the Champaign area.

Illinois' geology is dominated by complexly layered deposits of clay, sand and gravel and boulders laid down by continental glaciers that repeatedly flowed across the land and melted away during the last 1.6 million years. With few outcrops to study, geologists must rely on drilling to map these deposits in the subsurface, an inherently expensive process. Our state's rich farmland, some of the most productive in the world, owes its fertility to the abundant mineral nutrients in the finely ground rock materials that are the parent materials of the state's soils. The glacial deposits also are the primary source of drinking water for 37% of the state's total population, and more than 90% of the rural population, and contain abundant supplies of sand and gravel for use as construction materials. The people of Illinois, who live on and use the state's earth materials, need more information about the state's geology to successfully maintain natural areas and restore unique habitats, locate new drinking-water sources and keep existing ones free of contamination, and to properly site landfills and other potentially harmful but essential industries.

Careful economic analysis of the costs and benefits of having and using geologic maps, based on the use of geologic maps in Kentucky, the only state that has been fully mapped at the 1:24,000-scale, showed that every dollar invested in geologic mapping will return at least 25 to 39 dollars.

March 2001

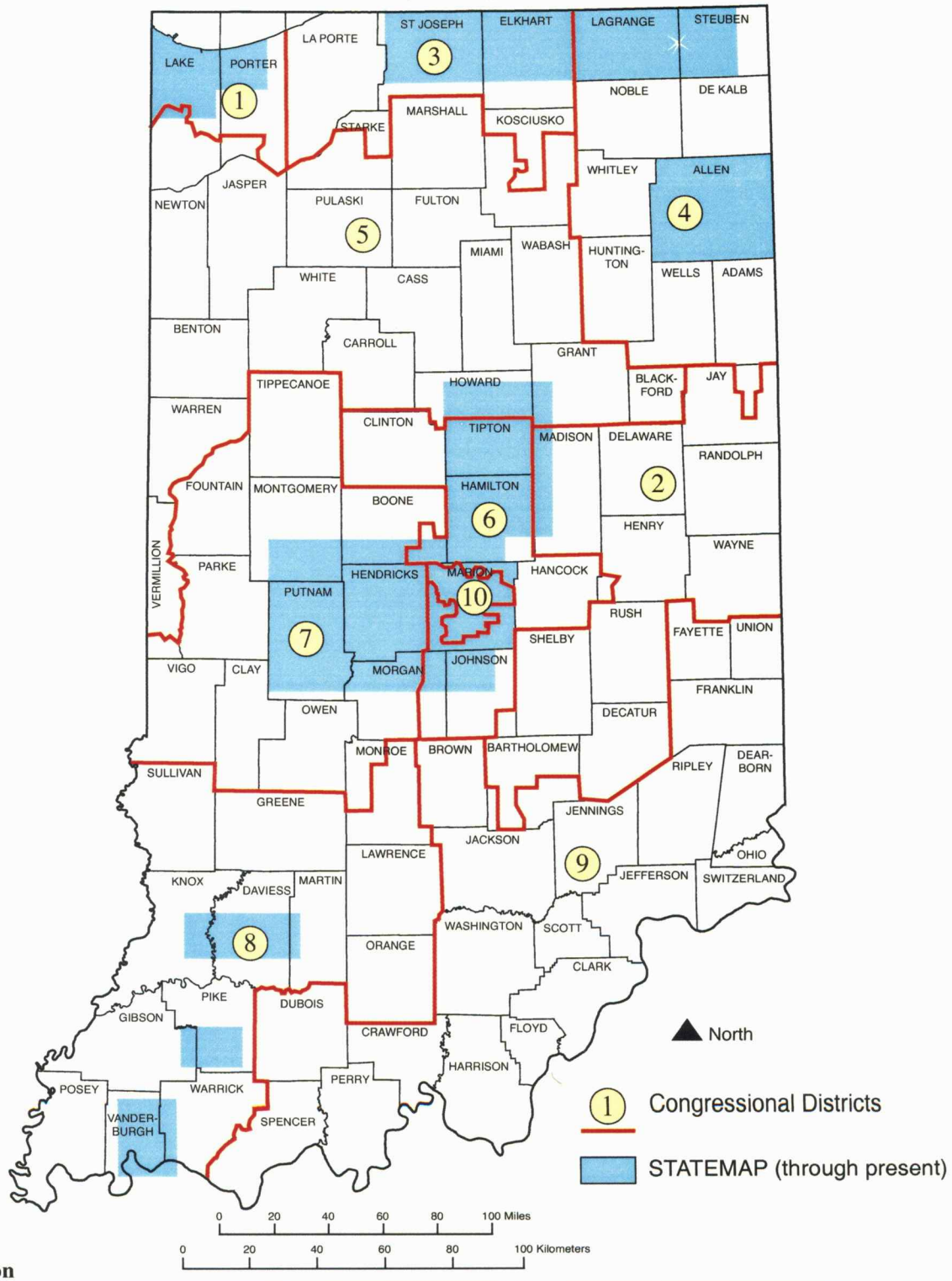
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

INDIANA



Contact information

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http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN INDIANA

Federal Fiscal Year	Project Title	Federal Dollars	State Dollars	Total Project Dollars
93	Glacial Terrain Map: Chicago 30' x 60' quadrangle, Phase 1: scales 1:100,000 & 1:24,000	$24,426	$64,160	$88,586
94	Glacial Terrain Map, Chicago 30' x 60' quadrangle, Phase 2: scales 1:100,000 & 1:24,000	57,938	79,418	137,356
	Quaternary–Materials Terrain Map, Evansville Metro quadrangles, Phase 1: scale 1:24,000	30,000	50,079	80,079
95	Glacial Terrain Map, Dyer, Crown Point, and Saint John quadrangles: scale 1:24,000	35,000	53,203	88,203
	Quaternary - Materials Terrain Map of Evansville Metro quadrangles: Newburgh and Daylight 7.5-min: scale 1:24,000	15,000	19,429	34,429
96	Glacial Terrain Maps: Shipshewana, Topeka, Middlebury, Millersburg, and Indiana portion of the Sturgis 7.5-min quadrangles: scale 1:24,000	51,446	51,673	103,119
	Geological Terrain Map of the Evansville Metropolitan quadrangles: The Daylight Quadrangle: scale 1:24,000	16,771	18,787	35,558
	Systems Mapping of Bedrock and Nonlithified Deposits in Daviess and Knox Counties, Vincennes 30' x 60' quadrangle: Systems Mapping of the Loogootee and Montgomery 7.5-min quadrangles: scales 1:100,000 & 1:24,000	52,135	85,433	137,568
	Digital Conversion of Maps and Report of Allen County.	12,290	13,191	25,481
97	Glacial Terrain Maps of Mongo and Wolcottville 7.5-min quadrangles, LaGrange and Elkhart Counties: scale 1:24,000	44,827	45,101	89,928
	Systems Mapping of Bedrock and Nonlithified Overburden in the Washington and Wheatland 7.5-min quadrangles, Daviess and Knox Counties: scale 1:24,000	62,586	78,891	141,477
98	Glacial Terrain Maps of the Middlebury, Millersburg, Bristol, Goshen, Stroh, Orland, and Indiana Part of the Bronson South 7.5-min quadrangles, LaGrange, Steuben, and Elkhart Counties: scale 1:24,000	56,045	57,008	113,053
	Systems Mapping of Bedrock and Nonlithified Overburden in the Oakland City and Augusta 7.5-min Quadrangles, Pike County: scale 1:24,000	16,261	54,771	71,032
99	Geological Mapping Michiana Corridor: scale 1:24,000	62,950	63,052	126,002
	Geological Mapping Indiana Heartland (Central): scales 1:100,000 & 1:24,000	30,160	30,449	60,609
	Geological Mapping Indiana Heartland (Northeast): scale 1::24,000	16,890	17,163	34,053
00	2000 STATEMAP Indiana Geol. Survey: New Mapping, Michiana Corridor: Scale 1:24,000	63,775	64,502	128,277
	2000 STATEMAP Indiana Geol. Survey: New Mapping, Indiana Heartland (Central); scales 1:100,000 & 1:24,000	34,990	35,732	70,722
	2000 STATEMAP Indiana Geological Survey: New Mapping, Indiana Heartland (Northeast): scale 1:24,000	40,807	41,023	81,830
01	2001 STATEMAP Indiana Heartland: scale 1:100,000	197,152	197,366	394,518
	Entering Indiana geoscience map references in the National Geologic Map Database	6,000	6,000	12,000
	TOTALS	**$927,449**	**$1,126,431**	**$2,053,880**

Geologic Mapping: A STATE NEED

The Indiana Geological Survey (IGS) STATEMAP program addresses a variety of societal, scientific, and operational needs within the context of the IGS long-term mapping plan. Mapping priorities are determined on the basis of several criteria, including the practical need to concentrate mapping efforts in corridors and centers of growth, the distribution of completed and in-progress work, the availability of data, opportunities for inter-agency cooperation, and opportunities for education and outreach. Through their mapping efforts, IGS staff hope to promote broad-based geological understanding amongst our citizens, our most important customers, and bridge the gap between the highly technical nature of science and the need for general earth information.

How are geologic maps used?

The primary use of geologic maps and associated products is education. These products bring to the *common* table a combination of the most up-to-date data, interpretation, and illustration. Their intent is to be a cornerstone of the public forum on land-use issues.

Geologic-map products are utilized for making informed land-use decisions involving:

- Geologic framework of aquifers and their recharge and discharge areas
- Ground-water resources: location, amount, protection
- Mineral and energy resources and the environmental impact of their extraction
- Local and regional sensitivity to ground-water contamination: best-management practices, local septic-system issues, solid- and hazardous-wastes disposal
- Earthquake hazards and mitigation

Advances in technology now allow geologists to access, view, and analyze data in ways never before possible. Geographic Information Systems (GIS) and computer databases permit STATEMAP-sponsored geologists to make customized, user-friendly products for end users. Moreover, modern geologic maps are digitally stored for rapid ease of manipulation at minimal cost. These methods of data handling and manipulation in themselves create new mapping challenges and opportunities.

Overall, the intent of modern geologic maps is to permit the citizens of the state to raise the quality of their lives through informed decisions directed toward the wise use of the land.

March 2001

Association of American State Geologists

Kansas Geological Survey

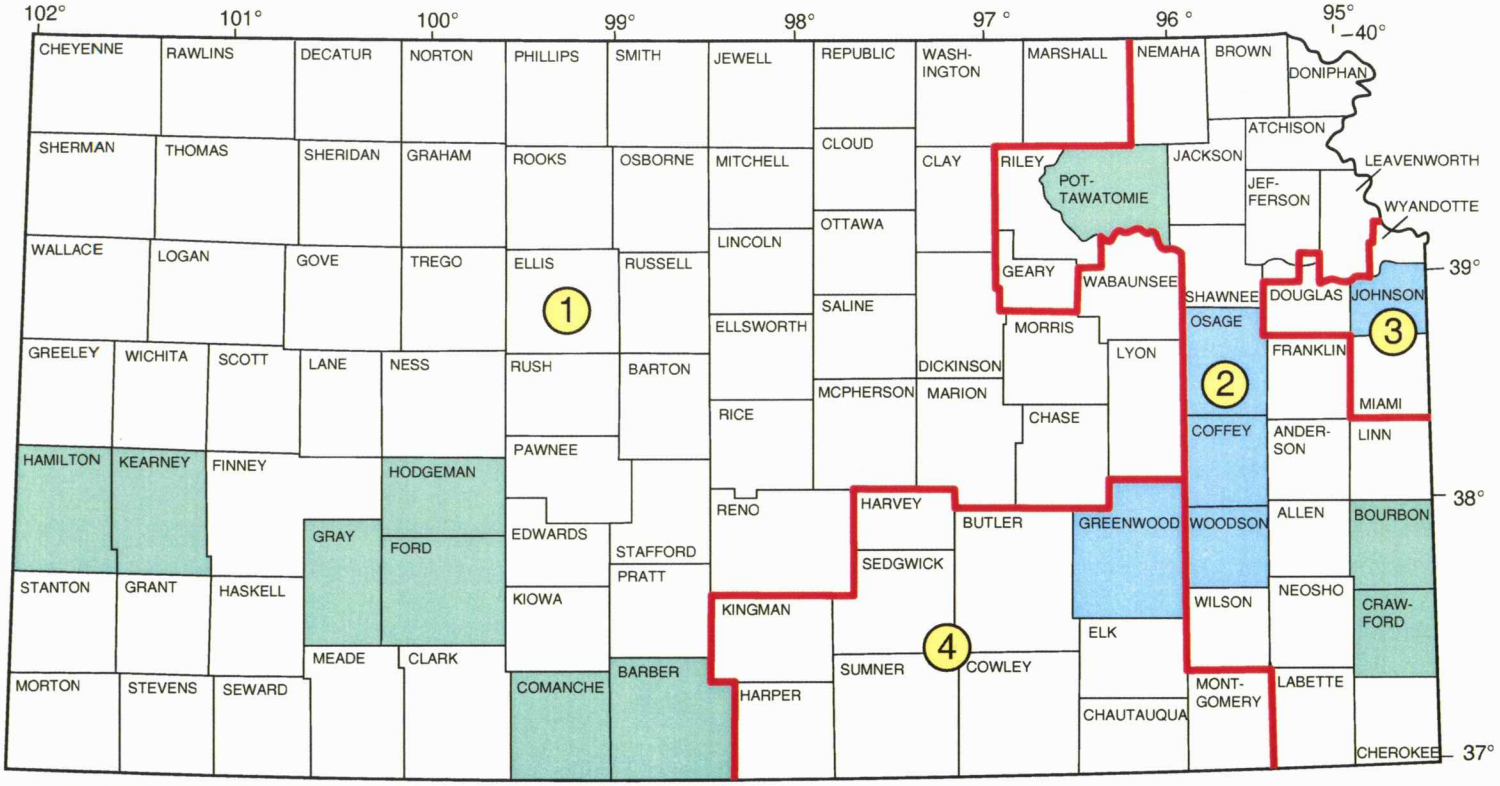
United States Geological Survey

USGS science for a changing world

National Cooperative Geologic Mapping Program

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

KANSAS



STATEMAP Funding (FY1993 through FY2000)

1 Congressional Districts

Map scale: 1:24,000

New geologic maps

Geologic maps in progress

North

0 100 mi

0 100 km

Contact information

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Martha Garcia (703/648-6978)
http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP GEOLOGIC MAPPING PROGRAM IN KANSAS

Federal Fiscal Year	Project Title	State Dollars	Federal Dollars	Total Project Dollars
93	Greenwood, Clark, Comanche, Bourbon, and Ford counties; compilation of digitized data base for state	$131,496	$64,385	$195,881
96	Greenwood and Bourbon counties continued; Comanche, Hamilton, and Kearny counties begun	70,565	70,000	140,565
97	Bourbon, Comanche, Hamilton, and Kearny counties continued	61,101	61,000	122,101
98	Bourbon, Comanche, Hamilton, and Kearny counties continued	74,545	74,544	149,089
99	Barber, Crawford, and Gray counties; compilation of digital geologic bases from existing maps in Johnson and Osage counties	62,460	50,000	112,460
00	Barber, Crawford, and Gray–Hodgeman counties; compilation of digital geologic base from existing map in Pottawatomie County	61,618	60,839	122,457
01	Barber, Crawford, and Hodgeman counties; compilation of digital geologic map bases from existing maps in portions of Pottawatomie and Wabaunsee counties, and 30 × 60 minute El Dorado quadrangle	139,834	139,690	279,524
	TOTAL	**$601,619**	**$520,458**	**$1,122,077**

What Is a Geologic Map?

Geologic maps are an important source of natural-resource information. They depict the bedrock (solid rock at or near the earth's surface), as if the residual soils and vegetation had been removed. Technically, these maps should be called bedrock geologic maps.

Geologic maps graphically show the distribution, rock type, age, and horizontal distribution of bedrock near the earth's surface. In Kansas, bedrock includes limestone, sandstone, and shale. Geologic maps also show the related geologic structures (faults, fractures, and folds) that would be exposed if the soils were stripped away. Thick, surficial materials that have been transported in by wind, water, or ice (e.g., alluvium, loess, sand dunes, glacial drift) also are mapped. Alluvium—thick deposits of unconsolidated sand, gravel, clay, and silt in stream valleys—is younger than the underlying bedrock. In some areas, the bedrock is covered by thick deposits of windblown sand (sand dunes) or silt (called loess). Glacial drift is material transported by glaciers and deposited directly on the land.

A geologic map shows the distribution of rock units and other geologically related information within a specific geographic area. Each rock unit is identified and named based on distinctive characteristics that can be mapped over large distances. Geologic maps provide a way of presenting the three-dimensional shape of the bedrock geology on a flat piece of paper using lines, symbols, and colors.

Benefits and Uses of Geologic Maps

Geologic maps are usually the starting point for any geologically related investigation. They are useful in construction and engineering projects, city and county planning, and in a variety of environmental activities. Large projects (dams, roads, bridges, buildings) require detailed geological analysis because of monetary, health, and safety concerns. Smaller projects, such as surface-water impoundments, houses, and water wells, also benefit from an understanding of the surface bedrock. For example, if a farm pond is located in a porous bedrock unit (such as sandstone), that unit may function as a drain and the pond will not hold water. If placed in a nonporous unit (such as shale), the pond should not leak. This basic information about the local geology can be ascertained from a geologic map. Other examples of how geologic maps can be used are listed below.

- Evaluation of geologic hazards (landslides, earthquakes, land subsidence)
- Planning transportation and utility routes
- Site selection for public facilities (landfills, treatment facilities, waste-disposal sites, schools)
- Land-use planning and evaluation of land-use proposals
- Regulatory decision-making
- Environmental assessment and protection planning (underground storage tanks, landfills, aquifer contamination)
- Development and protection of ground water
- Natural-resource assessment, exploration, development, and management (oil, gas, coal, salt, sand and gravel, aggregate)
- Basic earth-science research

Geologic maps can be used to evaluate and predict the consequences of natural and human-induced activities on the environment. Using the information on geologic maps during a project's planning and design stage produces long-term benefits and reduces problems that may develop after the project is completed.

March 2001

Association of American State Geologists

Kentucky Geological Survey

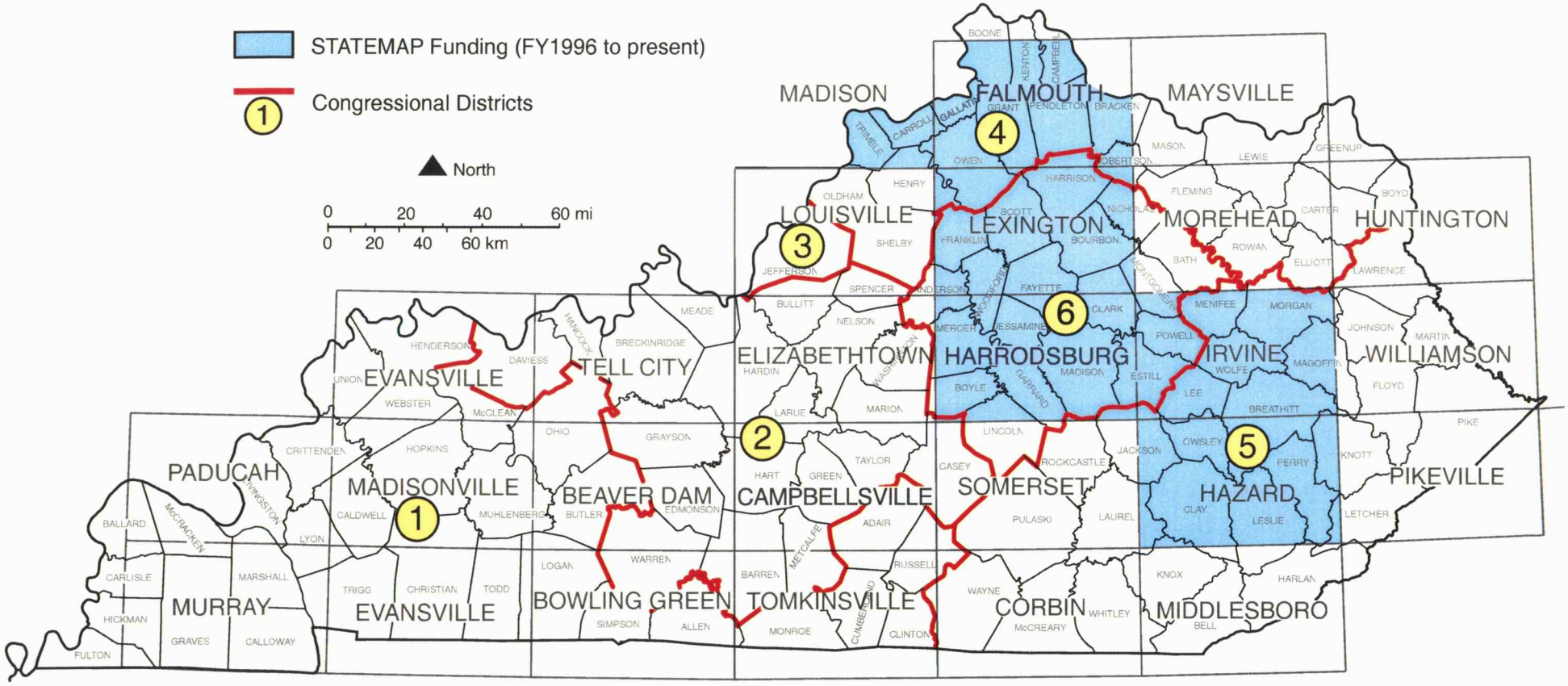
United States Geological Survey

science for a changing world

National Cooperative Geologic Mapping Program

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

KENTUCKY



Contact information

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Martha Garcia (703/648-6978)
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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN KENTUCKY

National Cooperative Geologic Mapping Act of 1992

YEAR	PROJECT TITLE	STATE DOLLARS	FEDERAL DOLLARS	TOTAL
1996–2001	Digital Geologic Mapping of the Hazard, Irvine, Harrodsburg, Lexington, and Falmouth 30 x 60 minute sheets.	$607,121	$480,445	$1,087,566

Federal-State Cooperative Geologic Mapping 1960–1978

YEAR	PROJECT TITLE	STATE DOLLARS	FEDERAL DOLLARS	TOTAL
1960–1978	KGS-USGS Kentucky Areal Geologic Mapping Program at 1:24,000 scale.	$10,025,800	$10,901,700	$20,927,500[1]

Kentucky is the only state of significant size to be completely mapped geologically at a scale of 1:24,000 (1 inch on the map corresponds to 2,000 feet on the ground) and serves as an example to the Nation of the value of geologic mapping. The availability of geologic maps in Kentucky has been a great benefit for economic development. It also has helped avoid damage resulting from natural hazards, as well as protect ground water and the environment. Geologic maps are public goods. As such, they benefit all members of society and are available to everyone. In 1999, a joint project by the Kentucky Geological Survey and the Illinois State Geological Survey produced the first economic evaluation of geologic maps as public goods. Since 1972 a total of 81,000 geologic quadrangle maps for Kentucky have been sold. The cost of the geologic mapping program in Kentucky was an estimated $90 million in 1999 dollars. The value of the maps was calculated to range from a minimum of $2.25 billion to a maximum of $3.53 billion in 1999 dollars. Based on the conservative estimate of the minimum value of $2.25 billion, Kentucky experienced a net gain from the mapping program of $2.16 billion in 1999 dollars[2]. This is a remarkable return on the investment by Federal and State governments in geologic mapping. There is now a great need for these maps to be made publicly available in digital form for use in computer programs. The Kentucky STATEMAP program, as a component of the National Cooperative Geologic Mapping Act (NCGMA), is converting geologic maps into computer format to facilitate their use in society during the 21st century.

[1]Cressman, E. R., and Noger, M. C., 1981, Geologic mapping of Kentucky—A history and evaluation of the Kentucky Geological Survey–U.S. Geological Survey Mapping Program, 1960–1978: U.S. Geological Survey Circular 801, 22 p.

[2]Bhagwat, S. B., and Ipe, V. C., 2000, Economic benefits of detailed geologic mapping in Kentucky: Illinois State Geological Survey, Special Report 3, 39 p.

March 2001

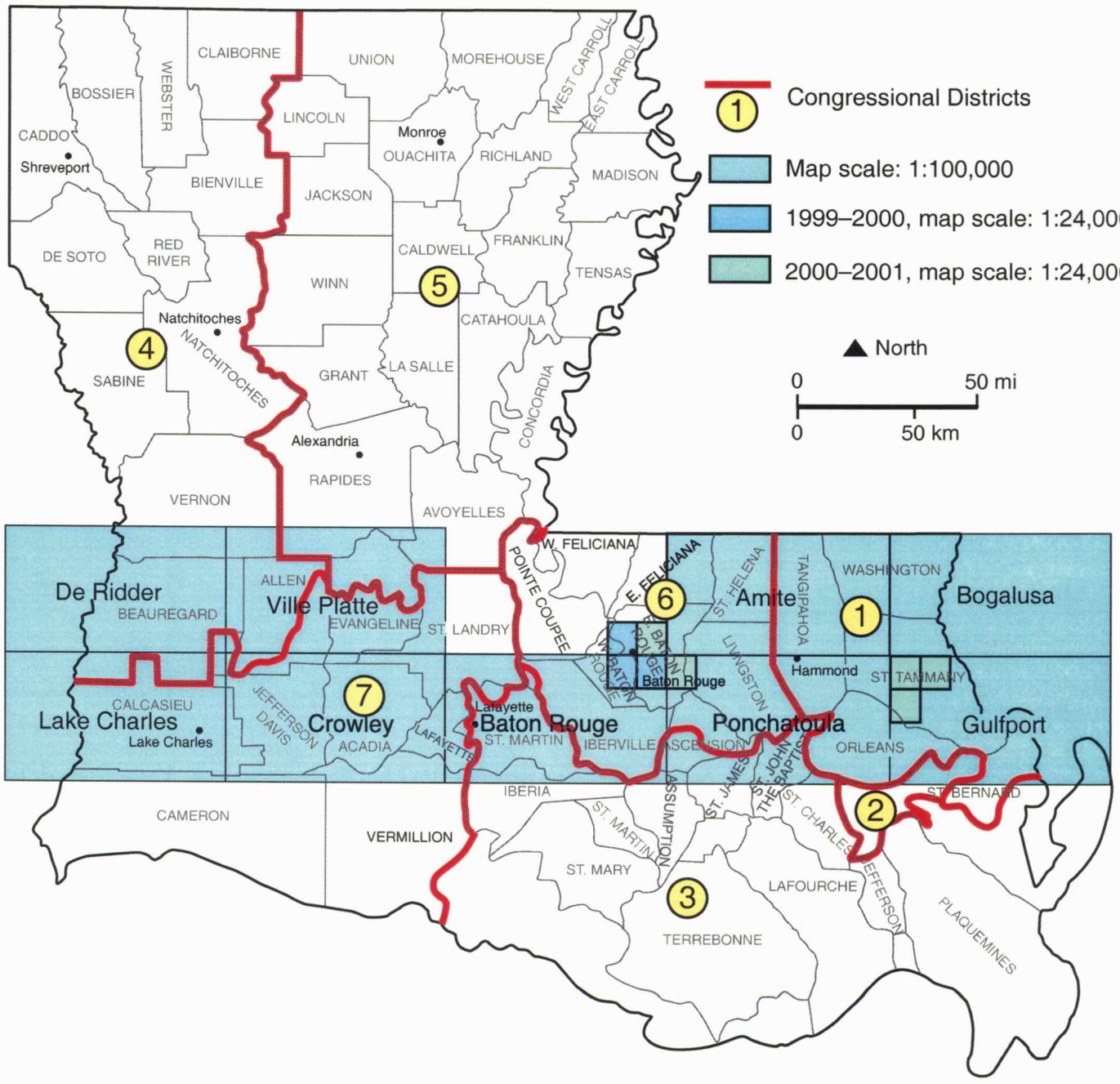
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

LOUISIANA



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SUMMARY OF STATEMAP GEOLOGIC MAPPING PROGRAM IN LOUISIANA

Quadrangle Names	Scale	Years of Project	State Dollars	Federal Dollars	Total Project Dollars
Baton Rouge	1:100,000	1993-94	$23,761	$23,761	$47,522
De Ridder, Ville Platte	1:100,000	1994-95	$25,076	$25,076	$50,152
Lake Charles, Crowley, Amite, Ponchatoula, Bogalusa, Gulfport, *Ville Platte (digital)*	1:100,000	1996-97	$105,857	$105,818	$211,675
Scotlandville, Baton Rouge East, Baton Rouge West	1:24,000	1999-2000	$50,508	$50,510	$101,018
St. Tammany, Hickory, Lacombe, Comite, Denham Springs	1:24,000	2000-2001	$81,083	$81,083	$162,166

[*State dollars* are estimated for project years 1993-94 and 1994-95.]

Intermediate-Scale Compilation Mapping

Cooperative agreements between the USGS and LGS were begun in 1989, initially under the COGEOMAP program, which saw the compilation of the geology of 1:250,000-scale quadrangles in north Louisiana and the beginning of 1:100,000-scale compilations in south Louisiana. With the advent of the National Cooperative Geologic Mapping Program, COGEOMAP was transformed into the current STATEMAP program; together these programs have permitted the systematic and comprehensive new mapping of the geologically youngest river and delta deposits that underlie three-fourths of Louisiana. Since then STATEMAP projects have permitted LGS to complete initial compilation of new, intermediate-scale coverage of the state's upland landscapes and alluvial bottoms above the coastal zone. Stream-bottom deposits, young terrace deposits, and escarpments associated with active surface faults of the coastal plain were mapped from new, high-quality 7.5-minute topographic quadrangles, aerial photographs, and other types of imagery, and then spot-checked in the field; other elements of the geology were compiled from various sources and from field checking. The table of LGS geologic mapping activities conducted as part of the NCGMP shows the importance of cooperative agreements with the USGS to geologic mapping efforts in Louisiana. To date, LGS has published two of the named geologic quadrangle maps, Ville Platte and Baton Rouge, as cartographic products for sale to the public.

Small-Scale Compilation Mapping

Following completion of the state's extracoastal zone at intermediate scales, two projects comprised compilations at 1:500,000 scale to formulate a synthesis of the surface geology based on an integration of the results of the previous mapping. The first was a Quaternary geologic map of the state, designed to formulate a workable, consistent statewide classification of the young surface strata that cover most of the state. This then provided the principal basis for the second small-scale effort, a preliminary new compilation of Louisiana surface geology, to update the previous statewide compilation completed in 1984.

Large-Scale (New) Mapping

During the past two years LGS has begun a program of large-scale mapping of 7.5-minute quadrangles, in two areas in south Louisiana: the greater Baton Rouge metropolitan area, and the "north shore" area north of Lake Pontchartrain. This mapping will provide basic geologic information of particular value to planners in these urbanized and rapidly urbanizing areas.

* * * * * * * * * * * *

The NCGMP-supported geologic mapping in Louisiana has a multitude of uses of importance to many timely issues. For example, a critical problem in our state is coastal land loss; geologic maps provide basic information applicable to the guidance of development in Louisiana's coastal zone. Detailed mapping of permeable and impermeable sediments in the coastal zone and the lower Mississippi River floodplain is crucial in the effort to rationally plan the permitting of activities in the coastal zone in ways that minimize the threat of land loss. It also is essential to the proper siting of waste-treatment facilities relative to the recharge zones of aquifers that are important sources of drinking water—the Chicot aquifer is the principal source of ground water for 13 parishes in southwestern Louisiana, yet the surface unit corresponding to the outcrop of the uppermost portion of the aquifer historically has been a favored setting for the siting of solid-waste repositories. Detailed mapping of active, but apparently non-earthquake-producing, surface faults of the south Louisiana coastal plain provides a framework for assessment of fault-related damage potential and damage-reduction strategies. There can be little doubt that such basic geologic information will figure prominently in the addressing of additional environmental issues with ever-greater importance in years to come.

March 2001

Association of American State Geologists

MAINE DEPARTMENT OF CONSERVATION
Maine Geological Survey

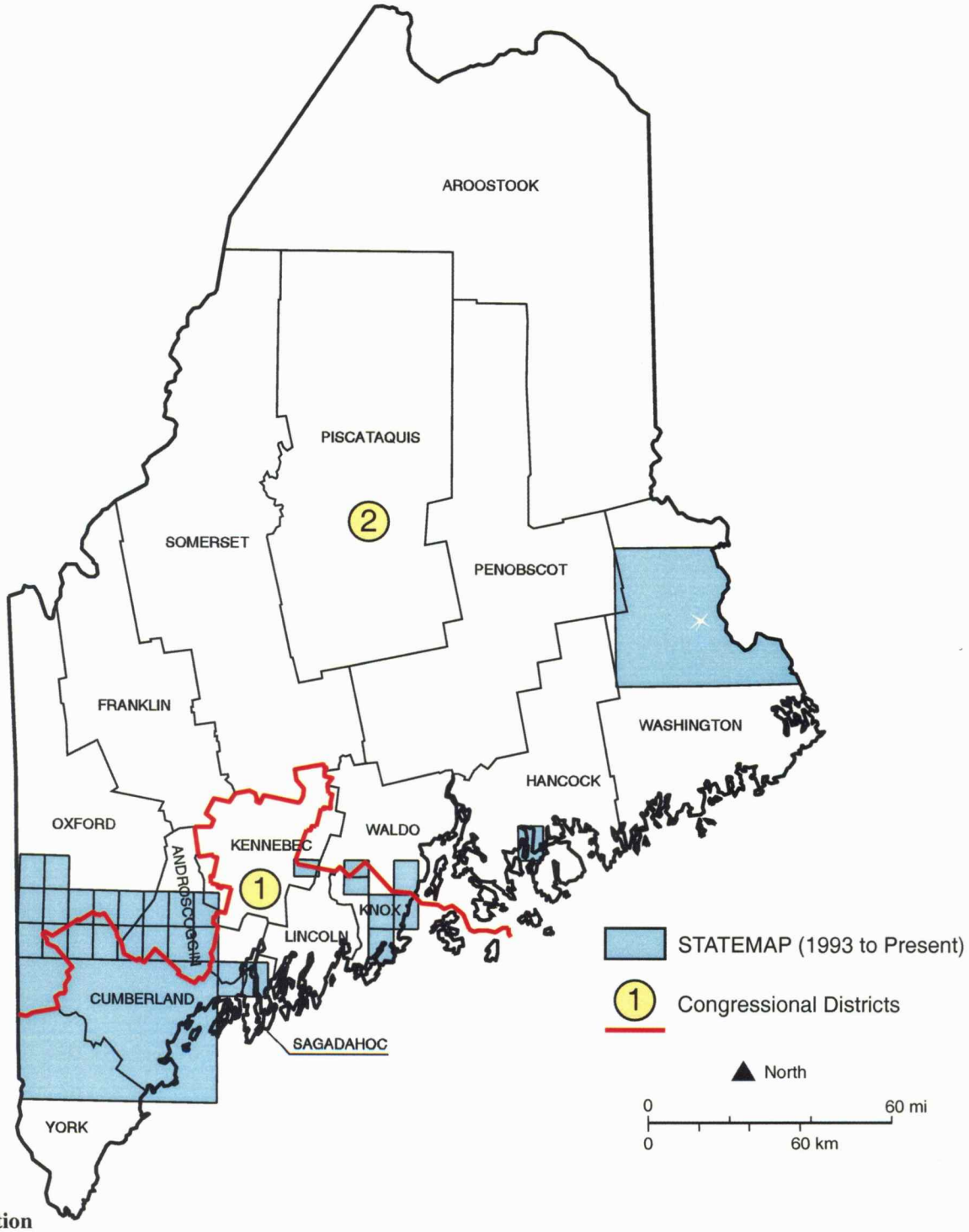
United States Geological Survey

USGS science for a changing world

National Cooperative Geologic Mapping Program

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

MAINE



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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 as if all the vegetation and soils have been removed. Maine is underlain with a wide variety of rock types 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 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 these 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 this unit 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 ensure that important resources remain available and protect the quality of our groundwater.

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Association of American State Geologists

United States Geological Survey

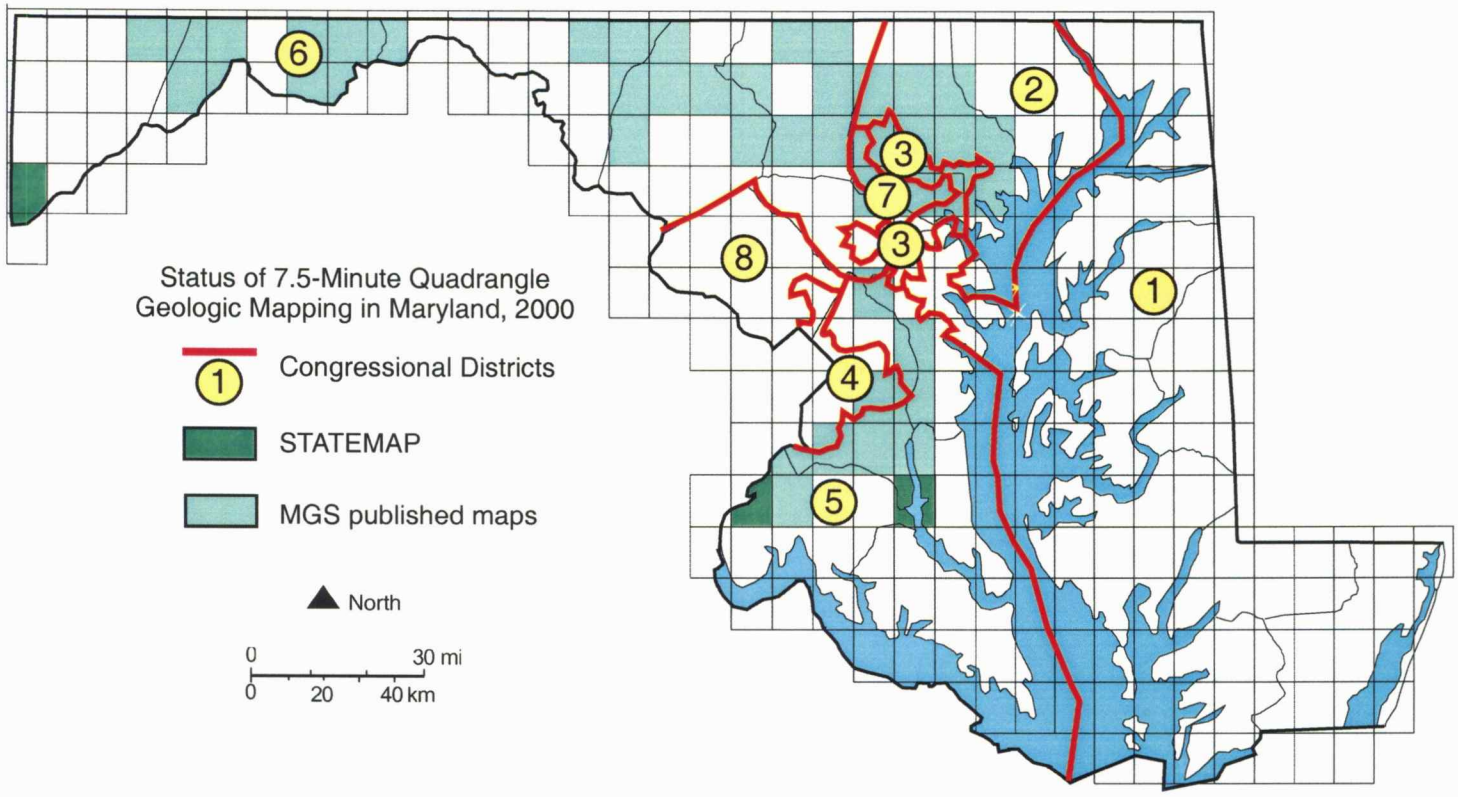
USGS science for a changing world

Environmental Geology and Mineral Resources
Maryland Geological Survey
Maryland Department of Natural Resources

National Cooperative Geologic Mapping Program

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

MARYLAND



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http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN MARYLAND

Federal Fiscal Year	Project Title	Federal Dollars	State Dollars	Total Project Dollars
99	Maryland STATEMAP	$24,900	$24,900	$49,800
00		0	0	0
01	Maryland STATEMAP	68,380	71,980	140,360
	TOTALS	**$93,280**	**$96,880**	**$190,160**

For more than two decades, the Maryland Geological Survey (MGS) has systematically mapped the bedrock geology of the state at 7.5-minute scale. Since 1975, this effort has resulted in the publication of geologic maps for 46 7.5-minute quadrangles (scale 1:24,000) and for 14 of Maryland's 23 counties (scale 1:62,500). Unpublished maps have been produced for an additional 22 quadrangles.

In 2000, the Environmental Geology and Mineral Resources Program decided to produce only digital geologic maps. Starting with FY2001, the STATEMAP part of the National Cooperative Geologic Mapping Program (NCGMP) has significantly enabled MGS to initiate the production of digital geologic maps. Digitization will allow MGS to begin to clear the backlog of the 22 unpublished quadrangle maps and to keep pace with mapping in progress.

In FY 2000, a STATEMAP grant provided the resources to map the Indian Head and Benedict quadrangles in Southern Maryland. FY 2001 funding will be used to digitize the Indian Head, Benedict, Table Rock and Davis quadrangles. Indian Head and Benedict quadrangles are facing growing population and development pressures in the Baltimore–Washington metropolitan area; Table Rock and Davis quadrangles are in the Western Maryland coal fields. These geologic data are easily incorporated by government agencies at all levels, environmental and engineering consultants, academia, and the general public for a host of applications such as land-use planning, environmental-ecosystem assessment and management, mineral-resource assessment, hydrogeologic assessment, and geohazard delineation.

A second auxiliary STATEMAP grant is currently supporting the first phase of the development of an MGS database for incorporation into the National Geologic Map Database. The MGS database will contain information on an estimated 350 maps, representing quadrangle, county, and state geologic maps and assorted hydrogeological, engineering, structural, physiographic, and other applied and derivative maps.

Association of American State Geologists

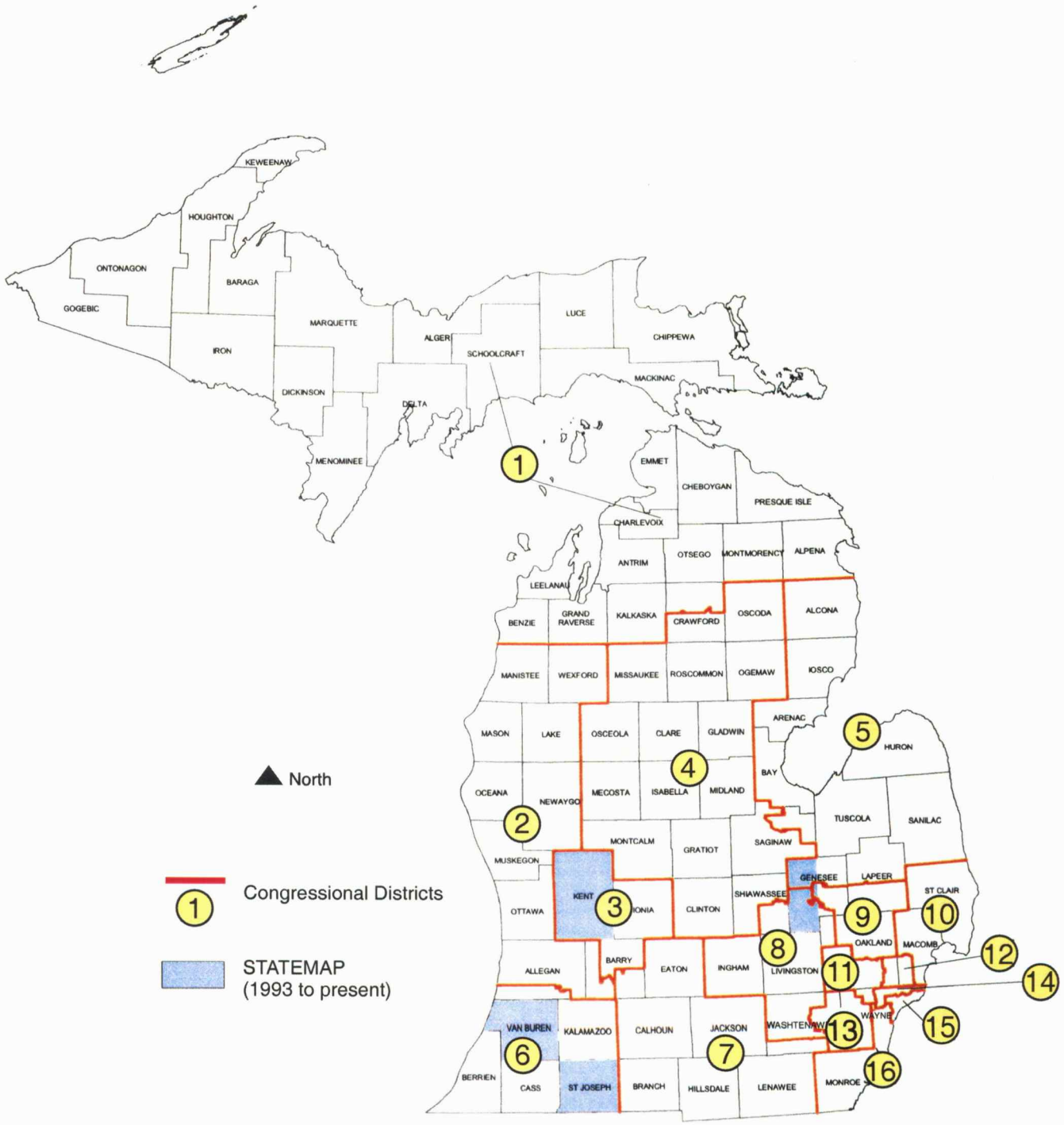
State of Michigan
Department of Environmental Quality
Geological Survey Division

United States Geological Survey

National Cooperative Geologic Mapping Program

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

MICHIGAN



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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN MICHIGAN

Federal Fiscal Year	Project Title and Scale		State and Local Funding	Federal Funding	Total Project Funding
1995	Surficial Geology of St. Joseph County, 1:24,000	Year 1	$ 15,088	$ 15,000	$ 30,088
1996	Western Michigan University	Year 2	51,940	51,826	103,766
1997		Year 3	45,494	45,386	90,880
1996	Surficial Geology of Kent County, 1:24,000	Year 1	25,420	25,420	50,840
1998	Michigan State University	Year 2	45,864	40,000	85,864
1999		Year 3	54,842	52,837	107,679
1998	Surficial Geology of Van Buren County, 1:24,000	Year 1	21,962	21,000	42,962
1999	Western Michigan University	Year 2	40,580	40,575	81,155
2000		Year 3	42,503	42,507	85,010
2001		Year 4	46,765	46,183	92,948
2000	Surficial Geology of Genesee County, 1:24,000	Year 1	49,128	49,128	98,256
2001	Michigan State University and the Michigan Geological Survey Division	Year 2	31,217	31,080	62,297
	TOTALS		**$470,803**	**$460,942**	**$931,745**

The STATEMAP portion of the National Cooperative Geologic Mapping Act (NCGMP) has been of great service to the Michigan Department of Environmental Quality, Geological Survey Division's efforts to produce high-quality, large-scale maps of the surficial geology of Michigan. Since 1995, STATEMAP funding has supported mapping the glacial materials that dominate Michigan's land surface. STATEMAP's accomplishments in glacial mapping are important because ground-water yield, soil fertility, erosion potential, drainage, load-bearing capacity, and suitability for construction materials all depend on glacial sediments. Planning officials, industry, and the public will use this new geologic-map information to make informed decisions on issues regarding natural resources for sustainable economic development.

Michigan's continued economic growth and the security of its people and environment are related to fundamental issues involving resources. Competition for land, water, mineral, and biological resources by developers, industrial, and mining interests, environmental-action groups, and private citizens has led to complex and often conflicting public-policy options needed for managing resources. It then becomes a formidable task for local and state decision-makers to ensure and promote economic growth. The water, land, and mineral resource needs of a growing population must be met while managing the environment in a sustainable manner. Decisions made without an adequate base of earth-science information often increase the costs and risks to society and the environment. STATEMAP geologic-mapping projects such as those listed above provide local government with basic earth-science information that is critical for evaluating land-use activities and ensuring that enacted policies reflect smart growth options.

April 2001

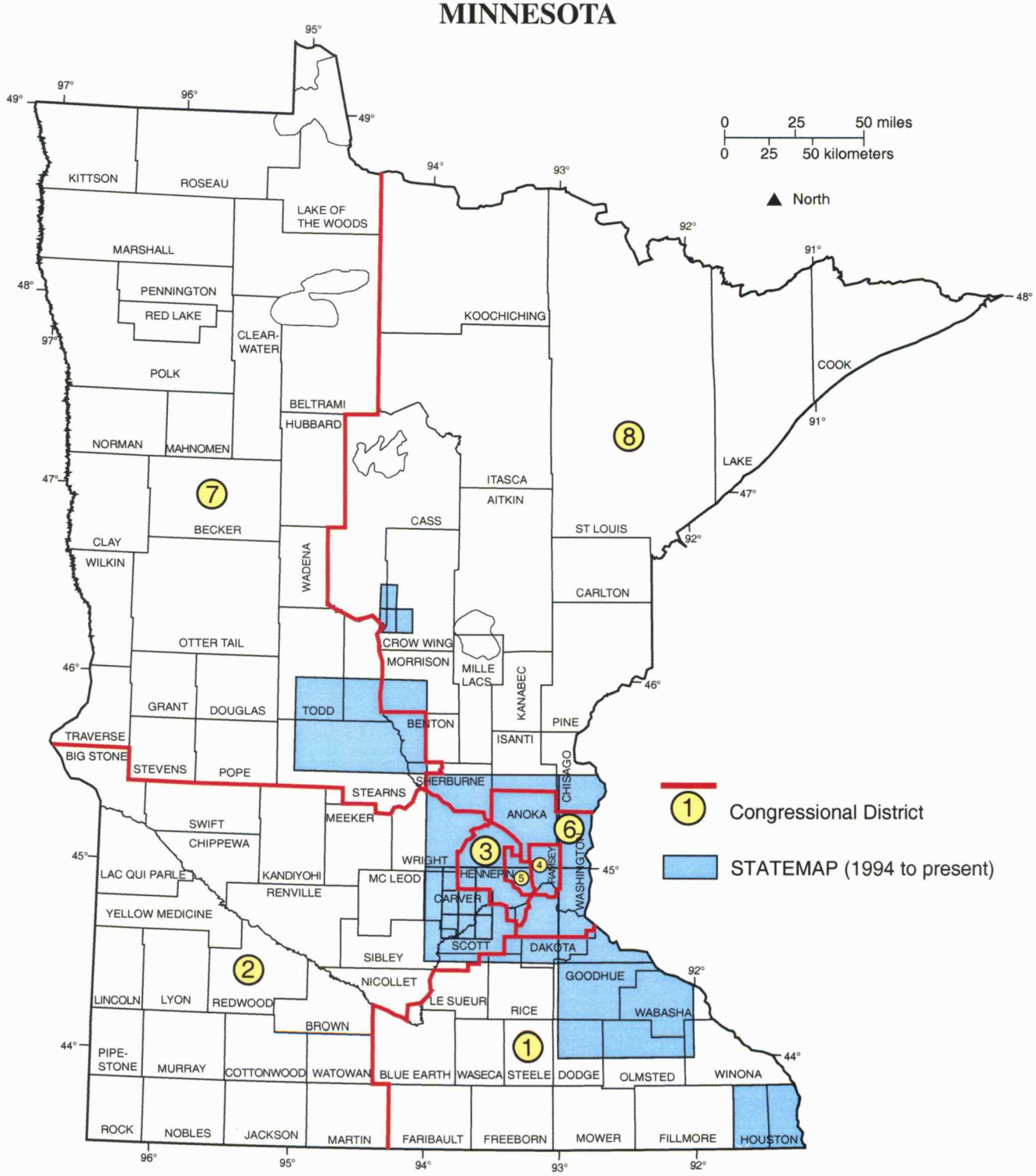
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

MINNESOTA



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SUMMARY OF STATEMAP GEOLOGIC MAPPING IN MINNESOTA

Federal Fiscal Year	Project Title	Scale	State Dollars	Federal Dollars	Total Project Dollars
1993	Digitization of data from COGEOMAP projects (1987-92)		$14,461	$11,980	$26,441
1994	Bedrock Geology of **Houston County** (eastern half)	1:100,000	18,000	18,000	36,000
1995	Bedrock Geology of **Houston County** (western half)	1:100,000	15,000	15,000	30,000
1996	Surficial Geology of the **Shakopee** quadrangle	1:24,000			
	Surficial Geology of the **Anoka** quadrangle	1:100,000	33,529	33,529	67,058
1997	Surficial Geology of the **Jordan East** quadrangle	1:24,000			
	Surficial Geology of the **Victoria** quadrangle	1:24,000	36,734	36,733	73,467
	Surficial Geology of the **Jordan West** quadrangle	1:24,000			
1998	Surficial Geology of the **Mound** quadrangle	1:24,000			
	Surficial Geology of the **Stillwater** quadrangle	1:100,000			
	Surficial Geology of the **Hastings** quadrangle	1:100,000	41,515	41,515	83,030
	Surficial Geology of the **Waconia** quadrangle	1:24,000			
1999	Surficial Geology of the **St. Paul** quadrangle	1:100,000			
	Surficial Geology of the **Rochester** quadrangle	1:100,000	65,867	65,867	131,734
	Surficial Geology of the **Watertown** quadrangle	1:24,000			
	Surficial Geology of the **Belle Plaine N.** quadrangle	1:24,000			
2000	Surficial Geology of the **Gull Lake** quadrangle	1:24,000			
	Surficial Geology of the **Baxter** quadrangle	1:24,000			
	Surficial Geology of the **Brainerd** quadrangle	1:24,000			
	Surficial Geology of the **St. Cloud** quadrangle	1:100,000	76,942	76,912	153,854
	TOTALS		**$302,048**	**$299,536**	**$601,584**

The STATEMAP component of the National Cooperative Geologic Mapping program is a valuable augmentation to the ongoing mapping mission of the Minnesota Geological Survey. To date, Minnesota's STATEMAP projects have focused primarily on surficial (Quaternary) geologic mapping in the "urbanizing crescent," which extends from Rochester in Olmsted County, through the Twin Cities to St. Cloud, in Stearns County. The rate of development in this area has increased substantially in the last decade. The transformation from rural, agricultural land use to urban and suburban development has created resource and environmental issues in which geological factors are significant. Local officials who deal with these issues on a daily basis use regional geologic maps (scale 1:100,000) to obtain a broad view of geological conditions. They use detailed mapping (scale 1:24,000) to more closely identify conditions that may influence decisions relating to aquifer protection and recharge, wetland protection, open-space set-asides, septic-system regulation, and the management of construction-aggregate resources.

Similar environmental and resource concerns exist elsewhere in Minnesota. In the scenic central lakes area of Crow Wing, Cass, and Hubbard counties, the transformation from dispersed to concentrated shoreline development has created increasing concern for the sustainability of high-quality surface-water and and ground-water resources and a heightened awareness of the need for geological information pertinent to the issue. The same is true for the North Shore of Lake Superior, where rapid, relatively large-scale, recreational development is causing concern. STATEMAP projects underway or proposed for these areas will contribute to rational planning and resource management.

The mining industry is a major contributor to Minnesota's economy. Although iron-mining has long been the mainstay, economic deposits of other mineral commodities such as platinum-group metals, gold, copper, nickel, and zinc may well occur in favorable geologic settings. A STATEMAP project to map the geology and mineral potential of the Babbitt NE quadrangle (scale 1:24,000) will start up soon, and other minerals-related projects are planned for future years. This work will dovetail with state programs concerned with the diversification and sustainability of Minnesota's mining economy.

March 2001

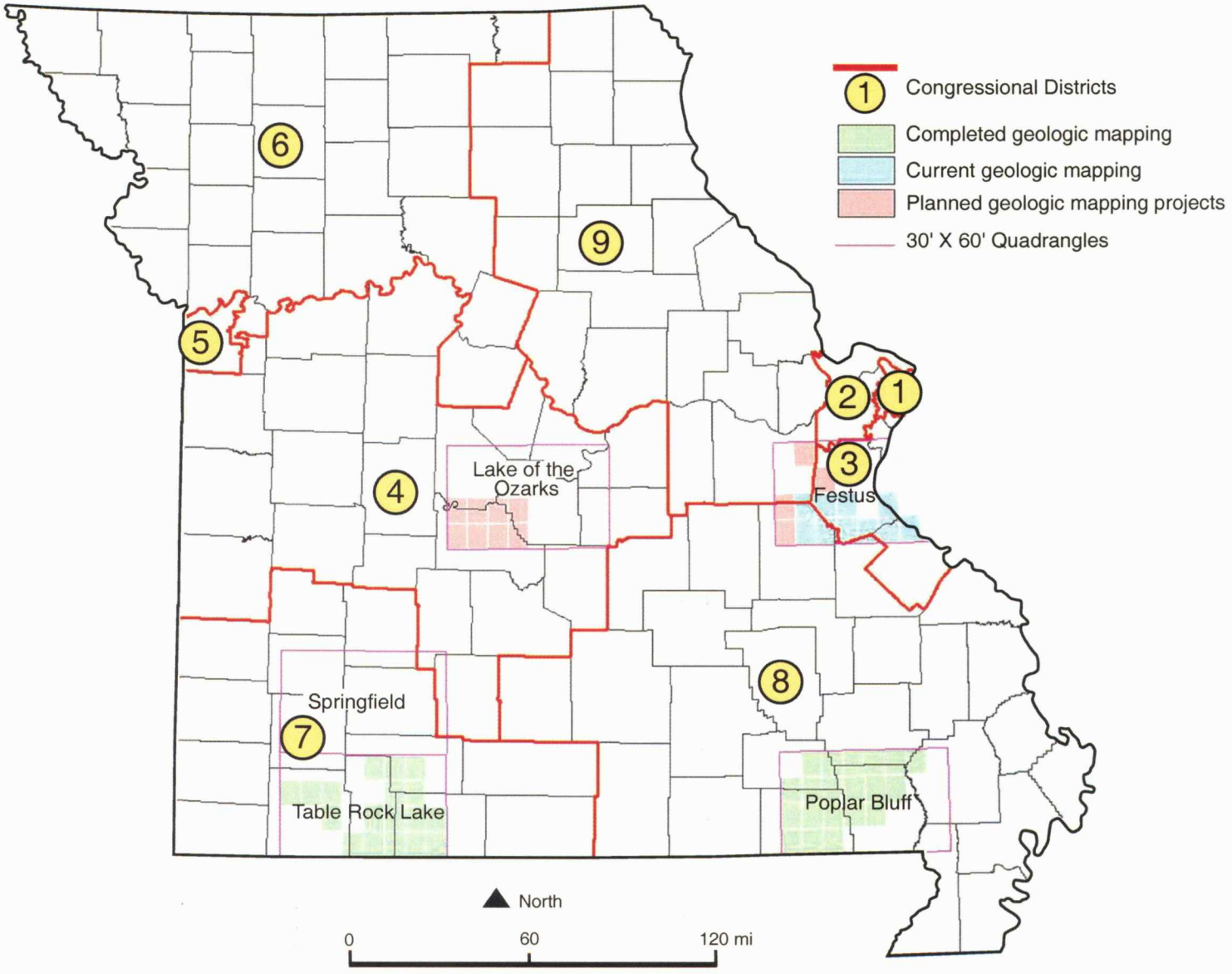
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

MISSOURI



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STATUS OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN MISSOURI

Year	Project Title	Federal Dollars	State Dollars	Total Project Dollars
93-94	Purdy and McDowell 7.5-min quadrangles	$33,629	$36,629	$70,258
94-95	Lampe, Table Rock Dam, and Viola 7.5-min quadrangles	59,316	59,316	118,632
95-96	Garber and Reeds Spring 7.5-min quadrangles	35,000	35,402	70,402
96-97	Branson, Hollister, Mincy, Forsyth, and Shell Knob 7.5-min quadrangles	86,775	86,801	173,576
97-98	Day, Highlandville, Hurley, Jenkins, Selmore, and Spokane 7.5-min quadrangles	101,675	101,921	203,596
98-99	Poplar Bluff 30' x 60' Quadrangle including Briar, Doniphan North, Doniphan South, Ellisnore, Flatwoods (N1/2), Grandin, Grandin SW, Hogan Hollow, Hunter and Poyner 7.5-min quadrangles Compilation of geologic mapping on Table Rock Lake, 30' x 60' Quadrangle	100,000	100,001	200,001
99-00	Poplar Bluff 30' x 60' Quadrangle including Fairdealing, Flatwoods (S1/2), Harvell, Hendrickson, Oxly, Poplar Bluff, Puxico, Rombauer, Stringtown, Wappapello, and Williamsville 7.5-min quadrangles	102,545	139,224	241,769
00-01	Festus 30' x 60' Quadrangle including Bloomsdale, Danby, Desoto, Fletcher, Halifax, Old Mines, Richwoods, Selma, Tiff and Vineland 7.5-min quadrangles Compilation of geologic mapping on Springfield 30' x 60' Quadrangle	130,624	130,626	261,250
01-02	Festus 30' x 60' Quadrangle including Cedar Hill, Cyclone Hollow, Ebo, and Gray Summit 7.5-min quadrangles Lake Ozark 30' x 60' Quadrangle including Bagnell, Barnumton, Bollinger Creek, Camdenton, Green Bay Terrace, Lake Ozark, Sunrise Beach and Toronto 7.5-min quadrangles Digitize existing geologic mapping on Festus 30' x 60' quadrangle including Belew Creek, Festus, Herculaneum, House Springs, Lonedell, Maxville, Moselle, Oakville, Pacific, St. Clair and Valmeyer 7.5-min quadrangles	177,608	164,608*	342,216
	TOTALS	**$827,172**	**$854,528**	**$1,681,700**

* Does not include any match for potential supplemental grants.

The Missouri Division of Geology and Land Survey (DGLS) is an active participant in the STATEMAP part of the National Cooperative Geologic Mapping Program (NCGMP), having participated since STATEMAP's inception in 1993. Missouri recognizes the importance of geologic mapping as a tool for land-use planners, emergency-management officials, developers, environmental agencies, mining companies, water-well drillers, and many others who have a need to understand the nature, composition, and distribution of earth materials.

Several areas of rural Missouri have undergone rapid growth in recent years. The unique beauty of the Ozarks has drawn thousands of tourists and new homeowners to the Branson, Springfield, and Lake of the Ozarks regions. The rapid development in these areas taxes natural resources and potentially impacts environmental quality. This has created a need for accurate geological information, and the State has responded by targeting geologic-mapping efforts in these areas. The mapping identifies geologically sensitive areas, such as karst areas that could be particularly susceptible to ground-water contamination. Geologic mapping also identifies areas of high-quality ground-water resources to guide the installation of water wells and identifies potential mineral and aggregate resources to support economic development.

Geologic mapping has also been focused in portions of southeast Missouri where geologic hazards are associated with the New Madrid Seismic Zone. Accurate geologic information is an essential tool in the preparation of earthquake-risk maps for use in the proper siting of new buildings, bridges, waste-disposal facilities, and dams. Mapping in both the Poplar Bluff and Festus area has been completed to optimize safe growth and minimize risks from landslides, liquifaction, and sinkhole collapse associated with earthquake hazards.

Since Missouri began its participation in the STATEMAP program, it has completed 38 bedrock and 20 surficial-material maps at a scale of 1:24,000. Ten more 7.5-min quadrangle maps are in progress, along with the compilation of geologic mapping in the Springfield area. In July 2001 Missouri will begin mapping 12 additional quadrangles in areas of rapid development and digitizing 10 previously mapped quadrangles to make this information more accessible by the public and other agencies. During its eight-year involvement in the STATEMAP program, Missouri has received $817,172 in Federal dollars that were matched with additional State funds. By July 2002, approximately 25% of the state will have reliable geologic-mapping information to assist decision makers with difficult resource choices and planning efforts.

March 2001

Association of American State Geologists

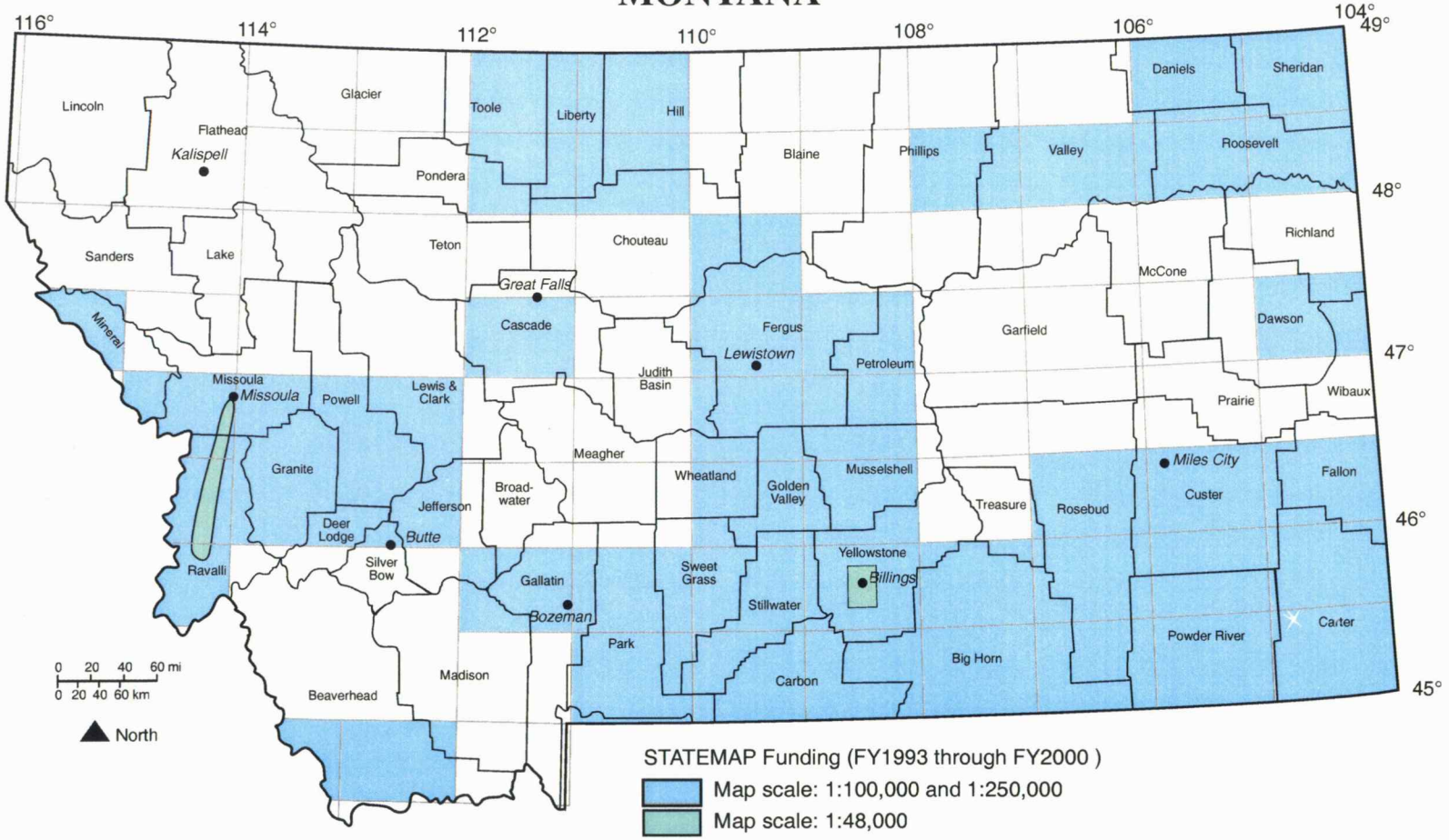
Montana Bureau of Mines and Geology

United States Geological Survey

National Cooperative Geologic Mapping Program

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

MONTANA



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U.S.G.S. Geologic Mapping Program Office
Program Coordinators: Peter T. Lyttle (703/648-6943)
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http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN MONTANA

Federal Fiscal Year	Project Title	Scale	State Dollars	Federal Dollars	Total Project Dollars
1993	Bedrock geology of Conrad, Chester, Lonesome Lake, Sweet Grass Hills, Winifred, Teepee Mountain	1:100,000 1:24,000	$159,923	$105,000	$264,923
1994	Bozeman Metropolitan Billings	1:100,000 1:48,000	123,139	110,000	233,139
1995	Bedrock geology of Billings, Bridger, Hamilton, Nez Perce Pass, Big Snowy Mountains	1:100,000	65,492	40,000	105,492
1996	Bedrock geology of Butte Glendive, Plentywood, Culbertson, Scobey, Wolf Point, Lodge Grass, Hardin Bitterroot Valley	1:250,000 1:100,000 1:48,000	130,961	120,000	250,961
1997	Bedrock geology of Leadore, Missoula West	1:100,000	129,162	120,000	249,162
1998	Bedrock geology of Malta, Glasgow, Winnett, Lewistown, Musselshell, Gardiner, Wallace	1:100,000	151,182	120,000	271,182
1999	Bedrock geology of Great Falls South, Roundup, Livingston, Big Timber, Lima	1:100,000	100,430	100,000	200,430
2000	Bedrock geology of Harlowton, Red Lodge, Forsyth, Lame Deer, Birney, Miles City, Powderville, Broadus, Baker, Ekalaka, Alzada	1:100,000	100,319	100,000	200,319
TOTALS			**$960,608**	**$815,000**	**$1,775,608**

The availability of geologic information for Montana has been significantly advanced by Montana Bureau of Mines & Geology's (MBMG) participation in the STATEMAP part of the National Cooperative Geologic Mapping Program (NCGMP). The initiation of this Pro-gram in 1992 was very timely for MBMG because we had just committed to providing updated geologic maps for the entire state. When MBMG's mapping program began, available geologic maps for the state were mostly at a very small scale and based substantially on early 1900s work.

Water always has been a primary issue in Montana. Management and protection of both surface and ground water require good geologic maps. Now, as the state is undergoing major demographic changes and the related major shifts in land use, the need for adequate geologic information has become critical for all the state's resources, land area, and citizens. Modern geologic maps, at a useful scale, are in great demand—by State and Federal agencies responsible for management of Montana's water, energy, timber, and minerals; by county and municipal agencies responsible for land-use planning decisions on such matters as residential sites, highway routing, and waste disposal; and by economic-resource developers who must delineate and produce commodities in an environmentally acceptable manner. The maps are being used in ground-water characterization, earthquake-hazard evaluation, burn-area remediation, abandoned-mines assessment, location of sand and gravel resources, and many other land- and resource-use issues across the state. Because of the universal need for new maps, MBMG has focused its efforts first at generating coverage for the entire state at a scale of 1:100,000 (1 inch = 1.6 mi). A second effort, also underway, focuses more locally on the state's urban centers and western valleys that are facing immediate concerns at the interface of available resources and increasing population.

MBMG's production of geologic maps on behalf of the state of Montana is about 50% dependent upon the funding received through the National Cooperative Geologic Mapping Program. In this 1:1 matching program, MBMG contributes the salary dollars of the geologists; NCGMP dollars provide the geologists' field expenses and the digital expertise to produce the work. Since 1996, under continued NCGMP funding, MBMG's geologic maps have been produced in digital form. Thus, any agency can obtain our electronic data for integration with its other digital-data layers to permit the best evaluations of land-use plans and issues.

March 2001

Association of American State Geologists

Nebraska Geological Survey

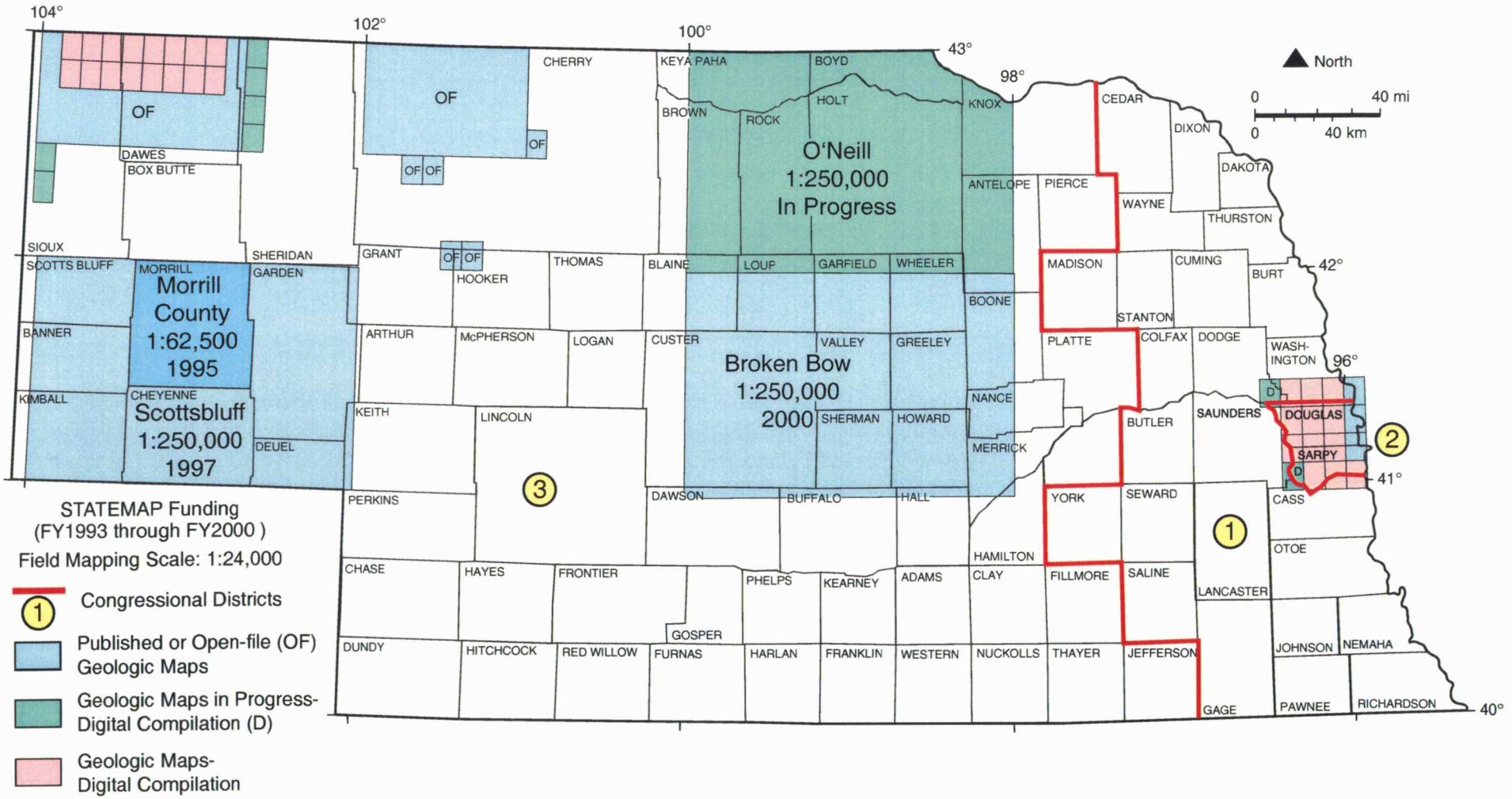
United States Geological Survey

USGS science for a changing world

National Cooperative Geologic Mapping Program

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

NEBRASKA



Contact information

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SUMMARY FOR STATEMAP
RURAL AND URBAN GEOLOGIC MAPPING PROJECTS IN NEBRASKA

Fiscal Year	Federal Dollars	State Dollars	Project Total
1994	$40,002	$109,432	$149,434
1995	0	0	0
1996	76,110	148,002	224,112
1997	25,000	118,893	143,893
1998	79,635	133,165	212,800
1999	102,817	156,919	259,736
2000	102,066	198,980	301,046
Totals	**$425,630**	**$865,391**	**$1,291,021**

The STATEMAP part of the National Cooperative Mapping Program has significantly enhanced the Nebraska Geological Survey's ability to produce geologic maps. STATEMAP has helped support geologic mapping across the state. Mapping in western Nebraska has made available a wealth of information about this geologically rich area of the state. Projects in the Broken Bow and O'Neill areas will assist resource managers in their work protecting the fragile environment in an area important to the agricultural economy. Mapping in the Omaha–Lincoln area will have specific applications in the identification of areas with limitations related to structural stability and on-site waste disposal and the protection and development of ground water and sand and gravel resources.

Geologic maps can be used to evaluate and predict the consequences of natural and human-induced activities on the environment. All of us deal at some times during our lives with materials or structures at or beneath the Earth's surface that can have impacts on our lives. For example, a person might be thinking of buying land outside the city on which to build a home. He or she needs to know if the land is underlain by stable soils and bedrock, if there is an aquifer beneath the property that can supply potable water, if there are any potentially harmful or valuable minerals beneath the land, and if the property floods. Geologic maps include these sorts of information. They are potential aids to people trying to reach an informed decision about the purchase. Using the information on geologic maps during a project's planning and design stages produces long-term benefits and reduces problems that may develop after the project is completed.

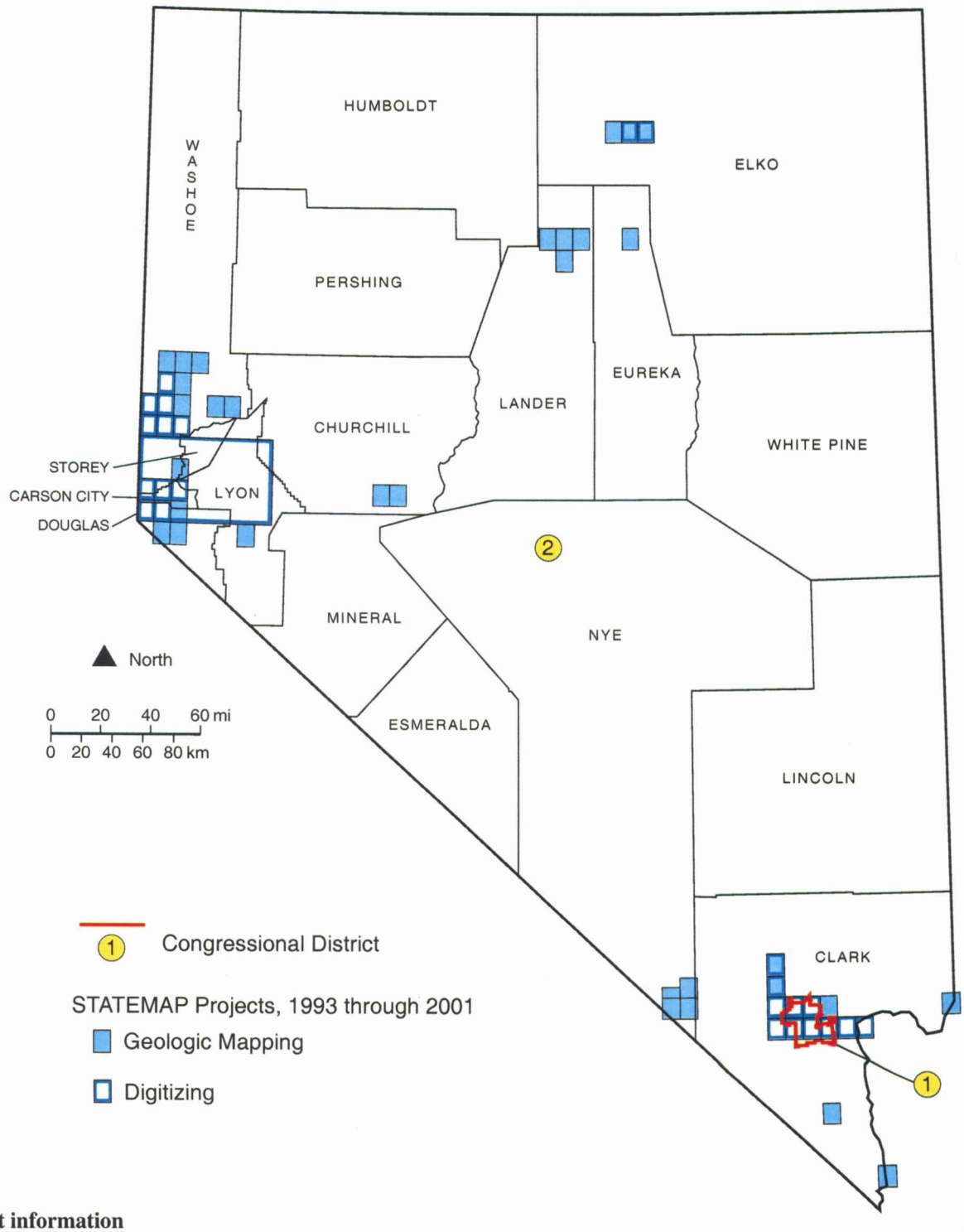
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

NEVADA



Contact information

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SUMMARY OF STATEMAP GEOLOGIC MAPPING PROGRAM IN NEVADA

Las Vegas Area

New geologic maps of 7.5-minute quadrangles at 1:24,000 scale

- Corn Creek Springs (1997)
- Davis Dam (1999)
- Frenchman Mountain (1994)
- Horse Springs (2000)
- Iceberg Canyon (2001)
- Last Chance Range (2001)
- Nelson SW (1998)
- Pahrump (1998)
- Sixmile Spring (2000)
- Tule Springs Park (1996)

Digital versions of previously published 7.5-minute geologic quadrangle maps

- Blue Diamond NE (2001)
- Blue Diamond SE (2001)
- Boulder Beach (2000)
- Corn Creek Springs (2001)
- Henderson (2000)
- Hoover Dam (2000)
- Las Vegas NE (2000)
- Las Vegas NW (2000)
- Las Vegas SE (2000)
- Las Vegas SW (2000)
- Tule Springs Park (2001)

Reno Area

New geologic maps of 7.5-minute quadrangles at 1:24,000 scale

- Dogskin Mountain (2000)
- Fraser Flat (1998)
- Gardnerville (1999)
- Griffith Canyon (1996)
- McTarnahan Hill (1997)
- Minden (2001)
- Olinghouse (1993)
- Sutcliffe (2001)
- Tule Peak (1999)
- Virginia City (2000)
- Wadsworth (1993)
- Yerington (2000)

Digital versions of previously published 7.5-minute geologic quadrangle maps

- Bedell Flat (2001)
- Carson City (2001)
- Genoa (2001)
- Glenbrook (2001)
- Marlette Lake (2001)
- New Empire (2001)
- Reno (2000)
- Reno NE (2000)
- Reno NW (2000)
- Verdi (2000)
- Vista (2000)

Digital versions of previously published 30x60-minute geologic quadrangle maps

- Carson City (2001), 1:100,000 scale

Humboldt River Basin

New geologic maps of 7.5-minute quadrangles at 1:24,000 scale

- Argenta (1999)
- Bateman Spring (1999)
- Battle Mountain (1997)
- Emigrant Pass (1998)
- Mount Blitzen (1996)
- Stony Point (1998)
- Toe Jam Mountain (1997)
- Tuscarora (1997)

Digital versions of previously published 7.5-minute geologic quadrangle maps

- Mount Blitzen (2001)
- Tuscarora (2001)

Other Areas

New geologic maps of 7.5-minute quadrangles at 1:24,000 scale

- Bell Canyon, Churchill County (1995)
- Bell Mountain, Churchill County (1995)

The STATEMAP part of the National Cooperative Geologic Mapping Program has helped Nevadans by significantly increasing the geographic coverage of detailed maps produced by the Nevada Bureau of Mines and Geology. Geologic mapping in the Las Vegas and Reno urban areas is focused primarily on issues related to growth and land management, including earthquake and flood hazards, land subsidence due to ground-water withdrawal, collapsing and expanding soils, landslides, ground-water protection, air quality, and raw materials needed for construction. Mapping in the Humboldt River Basin is providing key information on the origin of precious metal deposits that make Nevada the leading gold and silver producing state and on the environmental and economic impacts of mining and climate change. Planners, scientists, engineers, managers, policy makers, teachers, students, and members of the general public who are interested in the world around them use geologic maps. Only approximately 15% of Nevada's 1,980 7.5-minute quadrangles are adequately mapped with the detail that is needed for most applications.

STATEMAP FUNDING

Federal Fiscal Year	State Dollars	Federal Dollars	Total Project Dollars
93	20,519	20,000	40,519
94	21,746	20,000	41,746
95	15,113	10,000	25,113
96	126,444	123,780	250,224
97	261,357	152,410	413,767
98	258,917	139,424	398,341
99	175,175	115,500	290,675
00	135,520	111,210	246,730
01	205,307	186,041	391,348
	$1,220,098	$878,365	$2,098,463

March 2001

Association of American State Geologists

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

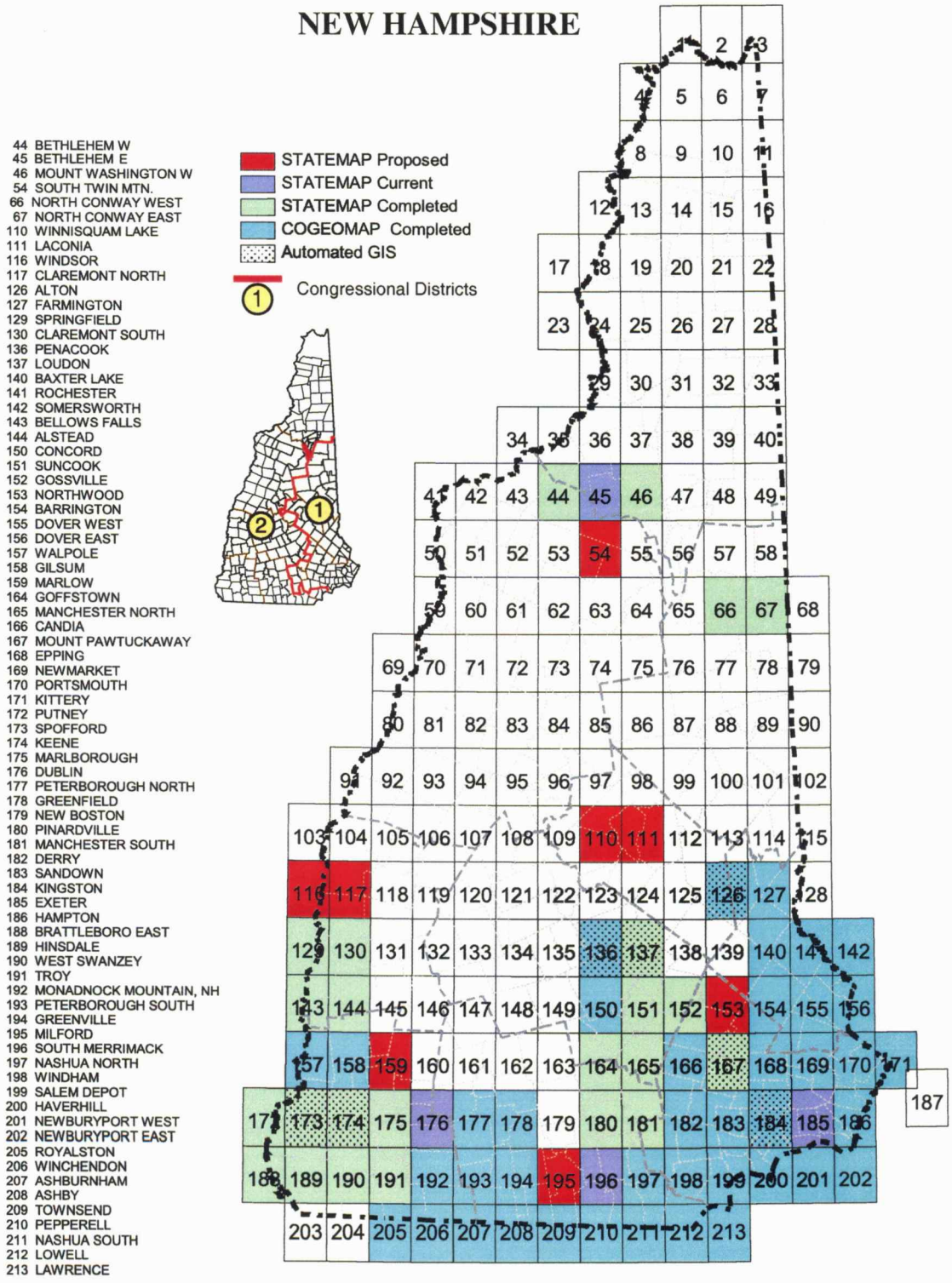
United States Geological Survey

USGS science for a changing world

National Cooperative Geologic Mapping Program

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

NEW HAMPSHIRE



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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN NEW HAMPSHIRE

Federal Fiscal Year	93	94	95	96	97	98	99	00	01	TOTAL
Federal Dollars Awarded to NHDES	0	0	0	$35,000	$50,000	$48,000	$60,000	$25,000	$76,501	$294,501

What is a Geologic Map?

Geologic maps are an important source of natural-resource information. They depict the underlying bedrock (solid rock near the earth's surface) or surficial geologic materials (e.g., alluvium, glacial deposits), as if the soils and vegetation had been removed. In New Hampshire, bedrock includes granite and metamorphic rocks (rocks transformed by heat and pressure). Alluvium—thick deposits of unconsolidated sand, gravel, clay, and silt in stream valleys—is younger than the underlying bedrock. Glacial deposits consist of material that has been transported by glaciers and deposited directly by the ice (glacial till) or by glacial melt water (glacial drift). In some areas, these deposits can be hundreds of feet thick. Geologic maps graphically show the rock type, age, and horizontal distribution of bedrock and surficial deposits near the earth's surface. Geologic maps also show the related geologic structures (faults, fractures, and folds) that would be exposed if the soils were stripped away.

A geologic map shows the distribution of rock units and other geologically related information within a specific geographic area. Each rock unit is identified and named based on distinctive characteristics that can be mapped over large distances. Geologic maps provide a way of presenting the three-dimensional shape of the bedrock geology on a flat piece of paper using lines, symbols, and colors.

Benefits and Uses

Geologic maps are usually the starting point for any geologically related investigation. They are useful in construction and engineering projects, city and county planning, and in a variety of environmental assessments. Large projects (dams, roads, bridges, buildings) require detailed geological analysis because of monetary, health, and safety concerns. Smaller projects, such as surface-water impoundments, houses, and water wells, also benefit from an understanding of the surface bedrock. For example, if a farm pond is located in a porous glacial deposit (such as sand and gravel), these materials may function as a drain and the pond will not hold water. If placed in a less porous unit (such as glacial till, which contains clay), the pond should not leak. This basic information about the local geology can be ascertained from a geologic map. Other examples of how geologic maps can be used are listed below.

- Evaluation of geologic hazards (landslides, earthquakes, land subsidence)
- Planning transportation and utility routes
- Site selection for public facilities (landfills, treatment facilities, waste-disposal sites, schools)
- Land-use planning and evaluation of land-use proposals
- Regulatory decision-making
- Environmental assessment and protection planning (underground storage tanks, landfills, aquifer contamination)
- Development and protection of ground water
- Natural-resource assessment, exploration, development, and management
- Basic earth-science research

Geologic maps can be used to evaluate and predict the consequences of natural and human-induced activities on the environment. Using the information on geologic maps during a project's planning and design stage produces long-term benefits and reduces problems that may develop after the project is completed.

Geologic Mapping in New Hampshire

The Geology Unit of the New Hampshire Department of Environmental Services actively participates in the U.S.G.S. Federal cooperative STATEMAP program. New Hampshire has been glaciated several times in recent geologic history, and the resulting surficial geologic materials directly affect all forms of land use. As a result, New Hampshire's mapping emphasis has been focused on completing geological mapping of these surficial materials. The engineering properties of these surficial deposits have significant implications for highway and building-foundation construction, and waste management. In addition, much of the water supply for the state's communities is derived from surficial deposits. Geologic maps are important sources of information for aiding in water-supply evaluation and protection, land-use planning, transportation design, resource evaluation, recreation, and seismic-risk evaluation. Comprehensive geologic information is needed to address these issues and to provide the foundation for proper planning and preventative measures to ameliorate these and other environmental problems in the future. To date, New Hampshire has completed surficial mapping in 65 of the 213 quadrangles that encompass the state, which amounts to approximately 31% completion. The map on the opposite side shows the status of surficial mapping for the state.

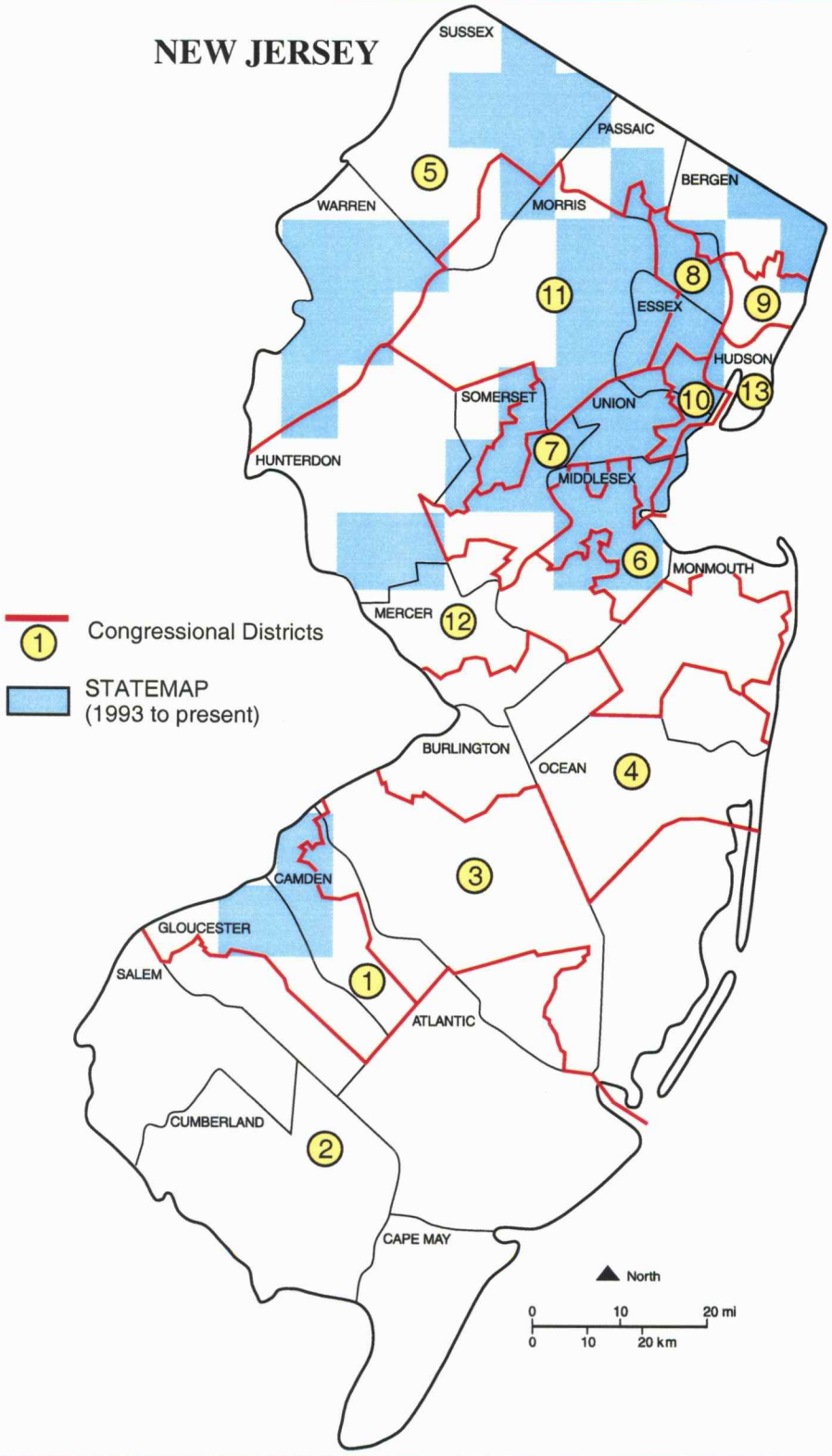
March 2001

Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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



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http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN NEW JERSEY

Federal Fiscal Year	Surficial Geologic Maps (1:24,00)	Bedrock Geologic Maps (1:24,000)	Federal Dollars	State Dollars	Total Project Dollars
1993	New Brunswick, South Amboy	New Brunswick, South Amboy	$30,000	$30,000	$60,000
1994	Hamburg, Franklin, Branchville	Hamburg	40,000	40,000	80,000
1995	Perth Amboy	Plainfield	30,000	30,000	60,000
1996	Tranquility, Blairstown, Washington	Raritan, Perth Amboy, Bound Brook	104,247	104,247	208,494
1997	Orange, Belvidere, Elizabeth	Wawayanda, Chatham, Bernardsville	100,228	100,228	200,456
1998	Yonkers, Nyack, Park Ridge, Runnemede	Morristown, Stockton, Caldwell, Runnemede	99,446	99,446	198,892
1999	Woodbury, Unionville, Portland, Sussex County digital map	Wanaque, Roselle, Pompton Plains, Woodbury, Sussex County digital map	111,309	111,309	222,618
2000	Camden, Paterson, Bloomsbury	Paterson, Boonton, Hopewell, Camden	105,857	105,857	211,714
TOTALS	**22 quadrangles**	**22 quadrangles**	**$621,087**	**$621,087**	**$1,242,174**

STATEMAP-funded geologic mapping in New Jersey provides basic data needed to address a number of significant public issues. Most prominent are issues related to water-resource management. Ground water provides over 40% of the potable water consumed in New Jersey. Geologic maps provide basic framework data needed to identify aquifers, delineate aquifer-recharge areas, assess drought impacts, model ground-water flow, and analyze ground-water quality. Municipalities and counties use geologic maps as a basis for making zoning decisions and protecting recharge areas. Geologic maps also are used by Federal and State agencies and the private sector to locate new water supplies, to determine safe water withdrawals, and to track and remediate ground-water contamination. STATEMAP projects have provided geologic frameworks for several important aquifers in the state including: glacial valley-fill aquifers of northern New Jersey, limestone aquifers in Sussex and Warren counties, the Brunswick shale aquifer of central New Jersey, and the Potomac–Raritan–Magothy aquifer of the Coastal Plain in Middlesex County and the Camden area. The great density of population, contamination sites, and water wells in New Jersey requires accurate, detailed, and complete geologic mapping. For this reason, the New Jersey Geological Survey is working toward full 1:24,000 scale bedrock and surficial geologic map coverage for the entire state. STATEMAP funding is an essential part of this goal.

Other issues requiring geologic map data involve natural hazards. Geologic hazards in New Jersey include sinkholes, naturally occurring contaminants, and earthquakes. Limestone formations in northwest New Jersey are susceptible to dissolution and collapse, forming sinkholes. Areas prone to sinkholes can be predicted from geologic maps. Mapping funded by STATEMAP has provided nearly complete coverage for the areas of the state underlain by limestone. Some formations in the state contain elevated levels of radioactive minerals and heavy metals. These naturally occurring contaminants may present exposure hazards in soil, ground water, or indoor air. Geologic maps show the occurrence of these formations. For example, radon hazards created by uranium-bearing minerals have been mapped under STATEMAP projects in areas of metamorphic and sedimentary rock in northern New Jersey and in marine sediments of the Coastal Plain in southern New Jersey. Damaging earthquakes are rare, but not unknown, in New Jersey. The density and value of seismically vulnerable buildings in New Jersey places the state quite high on national rankings of earthquake risk. Geologic mapping identifies soils that are prone to seismic shaking, and so provides essential information for predicting building damage. STATEMAP has directly contributed to this effort by funding mapping in northeastern New Jersey that was then used for earthquake-vulnerability studies of Hudson, Bergen, and Essex counties.

March 2001

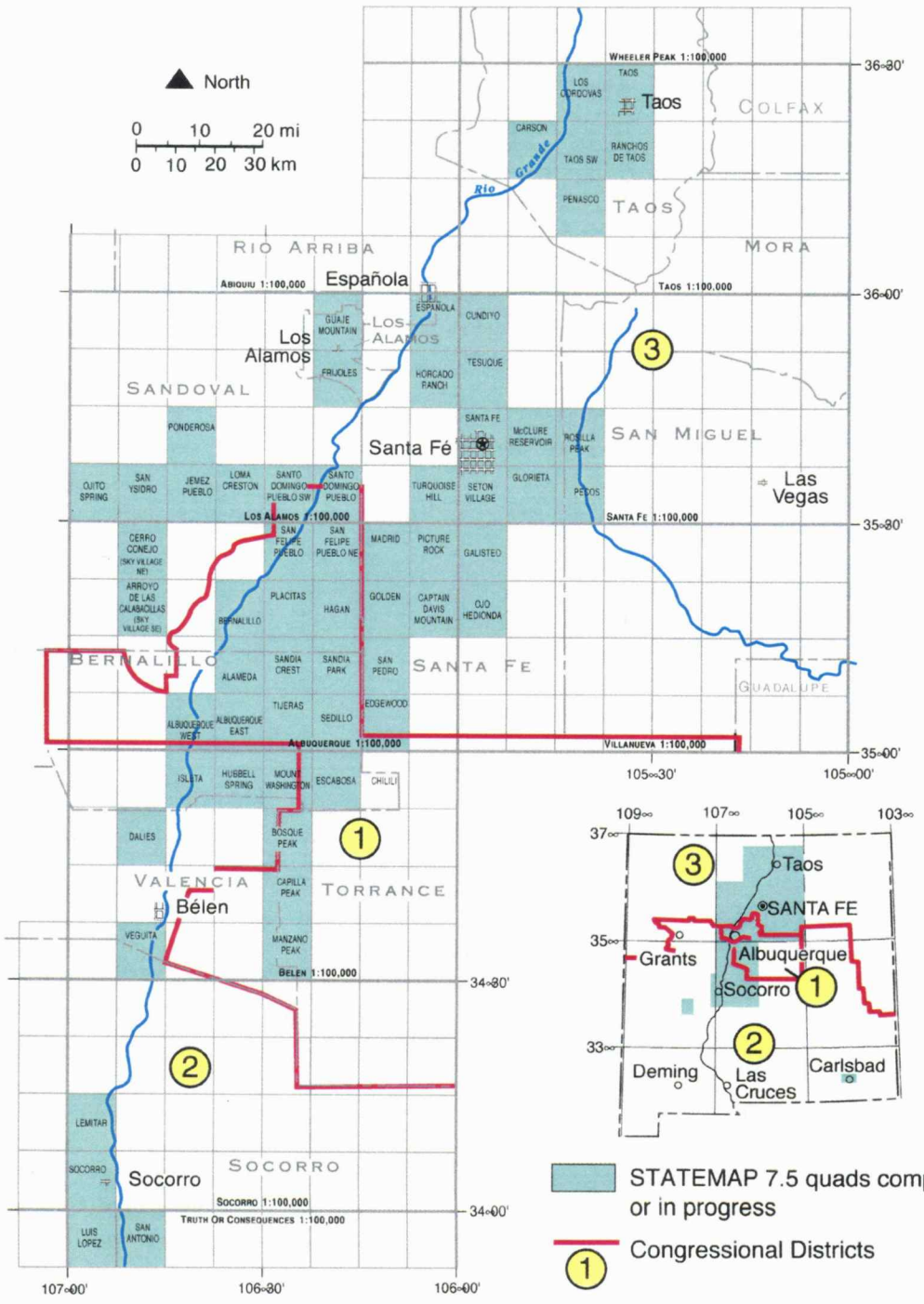
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

NEW MEXICO



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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN NEW MEXICO

Federal Fiscal Year	No. of Quads Mapped	7.5-minute Geologic Quadrangles Napped	Federal Dollars Awarded to NMBMMR	NMBMMR Dollars Matched	Total Project Dollars
1993-4	1	Tijeras	$20,000	$20,000	$40,000
1994-5	3	Albuquerque East, Placitas, Sandia Crest	50,000	50,000	100,000
1995-6	3	Sandia Park, Hubbell Spring, McClure Reservoir	50,000	50,078	100,078
1996-7	6.5	Isleta, Alameda,Taos SW, Mt. Washington, Sky Village SE, Jemez Pueblo (1/2), Santo Domingo Pueblo (1/2), Glorieta (1/2)	165,334	165,330	330,664
1997-8	10.5	Albuquerque West, Bernalillo, San Ysidro, San Felipe Pueblo,, Dalies, Carson, Sedillo, Seton Village (1/2), Bosque Peak (1/2), Loma Creston (1/2), Santo Domingo Pueblo SW (1/2), Jemez Pueblo (1/2), Santo Domingo Pueblo (1/2), Glorieta (1/2)	157,421	157,421	314,842
1998-9	8	San Pedro, Galisteo, Socorro, Edgewood (1/2), San Felipe Pueblo NE (1/2), Santa Fe (1/2), Veguita (1/2), Ranchos de Taos (1/2), Rosilla Peak (1/2), Seton Village (1/2), Bosque Peak (1/2), Loma Creston (1/2), Santo Domingo Pueblo SW (1/2)	150,000	150,052	300,052
1999-0	9.5	Turquoise Hill, Golden, Frijoles, Ojo Hedionda, Captain Davis Mtn. (1/2), Lemitar (1/2), Capilla Peak (1/2), Taos (1/2), Madrid (1/2), Edgewood (1/2), San Felipe Pueblo NE (1/2), Santa Fe (1/2), Veguita (1/2), Ranchos de Taos (1/2), Rosilla Peak (1/2)	128,000	128,004	256,004
2000-1	6.5	Horcado Ranch, Guaje Mtn., Pecos (1/2), Cañada (1/2), Hagan (1/2), Escabosa (1/2), Captain Davis Mtn. (1/2), Lemitar (1/2), Capilla Peak (1/2), Taos (1/2), Madrid (1/2)	130,000	130,017	260,017
TOTALS			**$850,755**	**$850,902**	**$1,701,657**

Modern digital geologic maps are essential for New Mexico's environmental and economic prosperity. Geologic maps are uniquely suited to solving problems involving Earth resources, hazards, and environments, and perhaps most importantly for the people of New Mexico, such maps help identify and protect ground-water aquifers, aid in locating water-supply wells, and are fundamental for all environmental studies and land-use plans.

Of the 121,598 sq miles of New Mexico, less than 15% has been mapped at the standard scale of 1:24,000 (1 inch = 2000 feet). The most critical area is the populated zone along the Rio Grande watershed from the Colorado border to Elephant Butte Reservoir, which contains 50% of the state's population on 4% of its land area. Rapid population growth, shallow alluvial aquifers, large topographic relief, and the alternating scarcity and abundance of precipitation, giving rise to a host of hydrologic and engineering problems.

The New Mexico Bureau of Geology and Mineral Resources geologic mapping program is partly funded by the STATEMAP component of the National Cooperative Geologic Mapping Program. We are now in the eighth year of an aggressive program designed to rapidly produce and distribute state-of-the-art maps. New Mexico is the most successful state in the country in obtaining STATEMAP funds, totaling $1,153,040 federal dollars. By June 2001, we will have mapped 52 quadrangles (3000 sq. miles) in ten counties and all three congressional districts.

Much of the success of STATEMAP is due to the requirement that maps must be designed to address critical societal and scientific problems. Our program has received widespread support and acclaim from political leaders, government agency scientists, university professors, hydrologists, engineers, planners, attorneys, and citizens. The program is cooperative in the broadest sense, as mapping priorities are set annually by the 35-member NM Geologic Mapping Advisory Board consisting of professionals from State, local, Federal, tribal, and private agencies.

March 2001

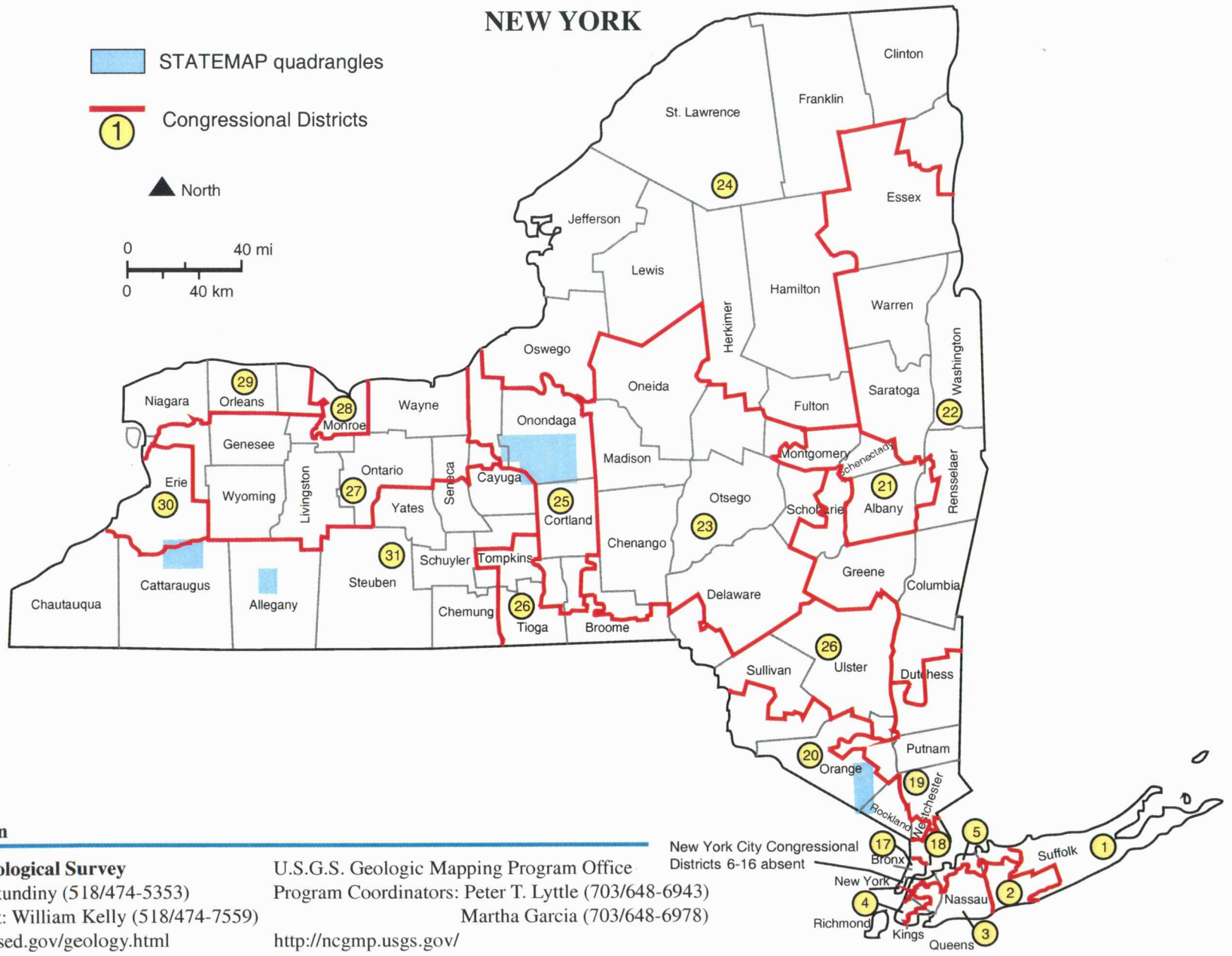
Association of American State Geologists

New York State Geological Survey

United States Geological Survey

National Cooperative Geologic Mapping Program

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



Contact information

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U.S.G.S. Geologic Mapping Program Office
Program Coordinators: Peter T. Lyttle (703/648-6943)
Martha Garcia (703/648-6978)
http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN NEW YORK

Federal Fiscal Year	Surficial Geologic Maps, 1:24,000	Bedrock Geologic Maps, 1:24,000	Federal Dollars	State Dollars	Total Project Dollars
1993	White Plains	White Plains	$9,000	$11,052	$20,052
1994	South Onondaga	South Onondaga	20,000	29,759	49,759
1996	Otisco Valley, Tully	Otisco Valley, Tully, Mt. Kisco	63,663	67,014	130,577
1997	Marcellus, Jamesville	Marcellus, Jamesville, Angellica, Mt. Kisco	85,162	93,939	179,101
1998		Mt. Kisco	10,149	16,489	26,638
1999	Skaneateles	Ashford Hollow, Monroe, Skaneateles	66,848	83,989	150,837
2000	Spafford	West Valley, Sloatsburg, Spafford	79,238	81,739	160,977
2001	Digitize South Onondaga, Tully, Otisco Valley Quads	Digitize South Onondaga, Tully, Otisco Valley, Marcellus Quads	14,000	15,190	29,190
Totals	**8 Quadrangles**	**14 Quadrangles**	**$348,060**	**$399,171**	**$747,131**

STATEMAP-supported geologic mapping in New York provides the fundamental data required to address several issues of immediate importance. Some parts of the state are densely populated and in these areas, the surrounding suburban communities are rapidly expanding. With this growth, roads need to be expanded and new highways constructed. Water supplies must be established. New York requires accurate, detailed, and complete geologic mapping at 1:24,000 scale to meet the needs of state and local officials who deal with the aforementioned issues. Surficial geologic maps indicate the potential location of water supplies and construction aggregates as well as delineate regions wherein drainage or engineering properties of the ground indicate that development should proceed with caution. Such maps are needed to protect ground-water supplies and remediate contaminated ground water. Bedrock geologic maps guide the extraction of mineral resources and provide essential information for major construction projects. Structural data on these maps indicate potential pathways for contaminant migration.

From its inception, the New York STATEMAP project has been directed by several criteria. Mapping projects are designed to be useful at the county level and therefore should provide maps at 1:24,000 scale. Precedence is given, where possible, to counties in which supporting programs in the form of funds, in-kind services, and or existing geographic information systems are available. Areas to be mapped are designated in portions of the state where development or redevelopment is occurring. This includes both urban or suburban areas where population is expanding and rural regions where changes in land-use are in progress. Hence, areas in the central and southeastern part of the state have been mapped. These districts support large cities in the growing bedroom and vacation communities south of Syracuse and the counties immediately north of the New York City Metropolitan Region. Priority is given to regions containing transportation and energy corridors including roads, pipelines, and electric transmission lines. Such areas generally coincide with interstate highways and the St. Lawrence seaway. Finally, mapping is conducted in quadrangles where contaminants are known to be present, such as at the nuclear waste storage facility in Cattaraugus County, south of Buffalo.

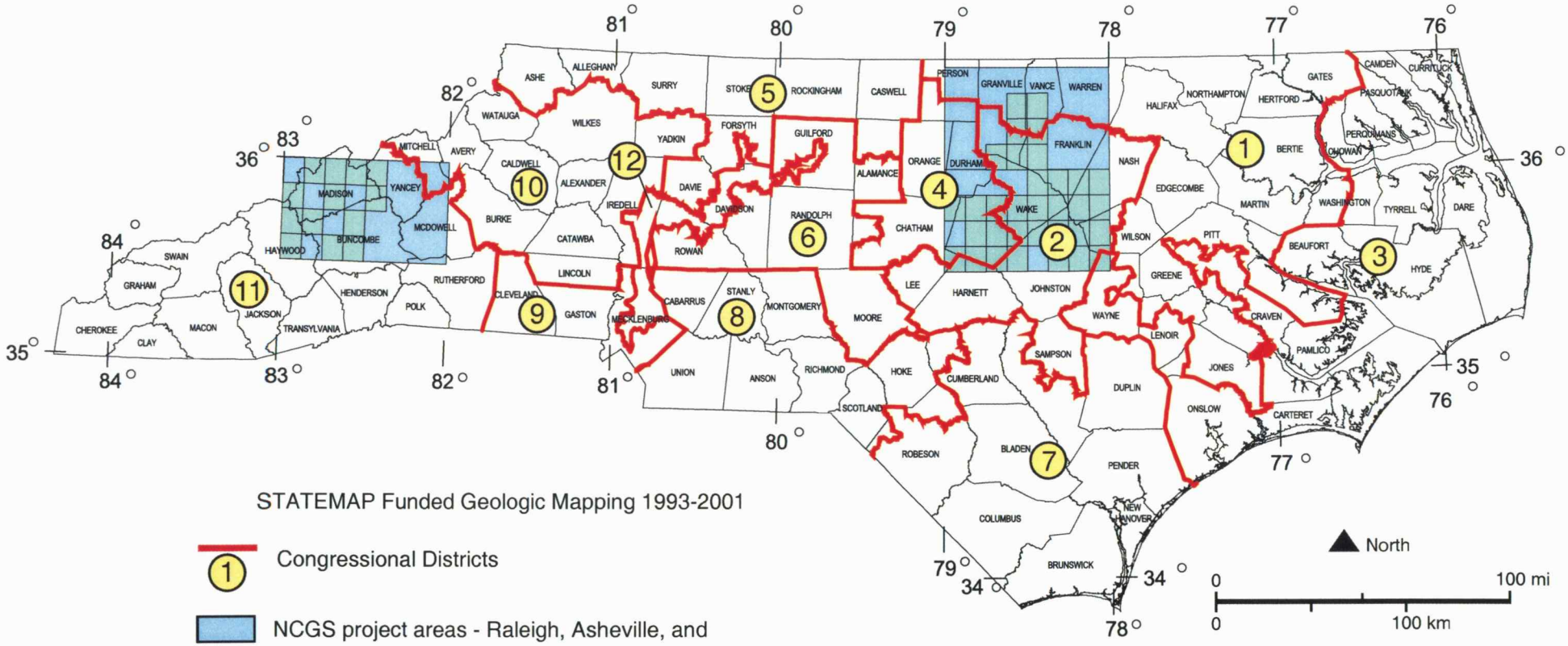
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

NORTH CAROLINA



STATEMAP Funded Geologic Mapping 1993-2001

(1) Congressional Districts

NCGS project areas - Raleigh, Asheville, and Henderson 30' X 60' quadrangles

Mapping complete or in progress - 7.5' quadrangles

Contact information

North Carolina Geological Survey
State Geologist: Charles H. Gardner (919/733-3833)
STATEMAP Contact: Timothy W. Clark (919/733-2423)
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U.S.G.S. Geologic Mapping Program Office
Program Coordinators: Peter T. Lyttle (703/648-6943)
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http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN NORTH CAROLINA

NCGS STATEMAP Year	Federal Fiscal Year	Project Title (All project areas are 7.5-minute quadrangles mapped at 1:24,000 scale.)	State Dollars	Federal Dollars	Total Project Dollars
1	93	Bunn West, Zebulon, Middlesex, Stancils Chapel, Clayton	$21,000	$21,000	$42,000
2	94	Kenly East, Kenly West, Flowers, Selma, Bunn East, Cokesbury, Raleigh West(1/2)	50,000	50,000	100,000
3	95	Spring Hope, Bailey, Lucama, Rolesville, Knightdale, Edmondson, Garner, Angier	60,000	60,000	120,000
4	96	Lucama*, Kenly East*, Kenly West*, Stancils Chapel*, Green Level, Lake Wheeler, Fines Creek, Bald Creek, Enka (1/2)	112,436	112,436	224,872
5	97	Bailey*, Middlesex*, Zebulon*, Flowers*, Selma*, Apex (1/2), Cary (1/2), and Raleigh East	146,264	146,264	292,528
6	98	Clayton*, Knightdale*, Powhatan*, Spring Hope*, Fuquay-Varina	122,009	122,009	244,018
7	99	Angier*, Edmondson*, Sams Gap, Enka (1/2), Asheville (1/2)	117,302	117,302	234,604
8	00	Fuquay-Varina*, Garner*, Lake Wheeler*, Weaverville (1/2), White Rock (1/2), Kittrell (1/4), and Henderson (1/4)	123,577	123,577	247,154
9	01	Bunn East*, Bunn West*, Apex*, Cokesbury*, Lemon Gap, Asheville (1/2), Weaverville (1/2), Marshall (1/2), Creedmoor, Franklinton (1/2), Kittrell (1/4), Oxford (1/4), and Wilton (1/4)	232,506	232,506	465,012
		TOTALS	**$985,094**	**$985,094**	**$1,970,188**

* - Geologic mapping of Coastal Plain units only. Bedrock geology previously mapped.

The North Carolina Geological Survey (NCGS) receives federal funding for conducting detailed geologic mapping from the STATEMAP program, a component of the National Cooperative Geologic Mapping Program (NCGMP). The 102nd Congress created the program in 1992 by passing the National Geologic Mapping Act (Public Law 102-285). This law has been reauthorized twice since then, most recently by the 106th Congress in 1999. The NCGMP distributes funding through three programs: 1) FEDMAP for the U.S. Geological Survey; 2) STATEMAP for participating state geological surveys; and 3) EDMAP for training future geologic mappers at universities and colleges. The NCGS has received STATEMAP funding through a competitive grant process since the program's inception in 1992 and has ranked as one of the top ten states for funding almost every year since then. To date the NCGS has received over $985,000 during the past nine years. Because the STATEMAP program requires that every federal dollar be matched by a state dollar, almost $2 million have been allocated to the NCGS for geologic mapping in this program. The NCGS has concentrated its 1:24,000-scale detailed mapping in three areas: the Raleigh, Asheville, and Henderson 30 x 60-minute quadrangles. These areas are some of the most populous and rapidly growing regions of the state. This rapid growth has accentuated many geologic-related problems including land-use and infrastructure planning; mineral resource identification — particularly construction aggregates; and environmental assessment and planning related to highway construction, waste disposal siting, and ground-water conservation and development. An adequate understanding of the geology and mineral resources of these regions is needed to help resolve these problems.

May 2001

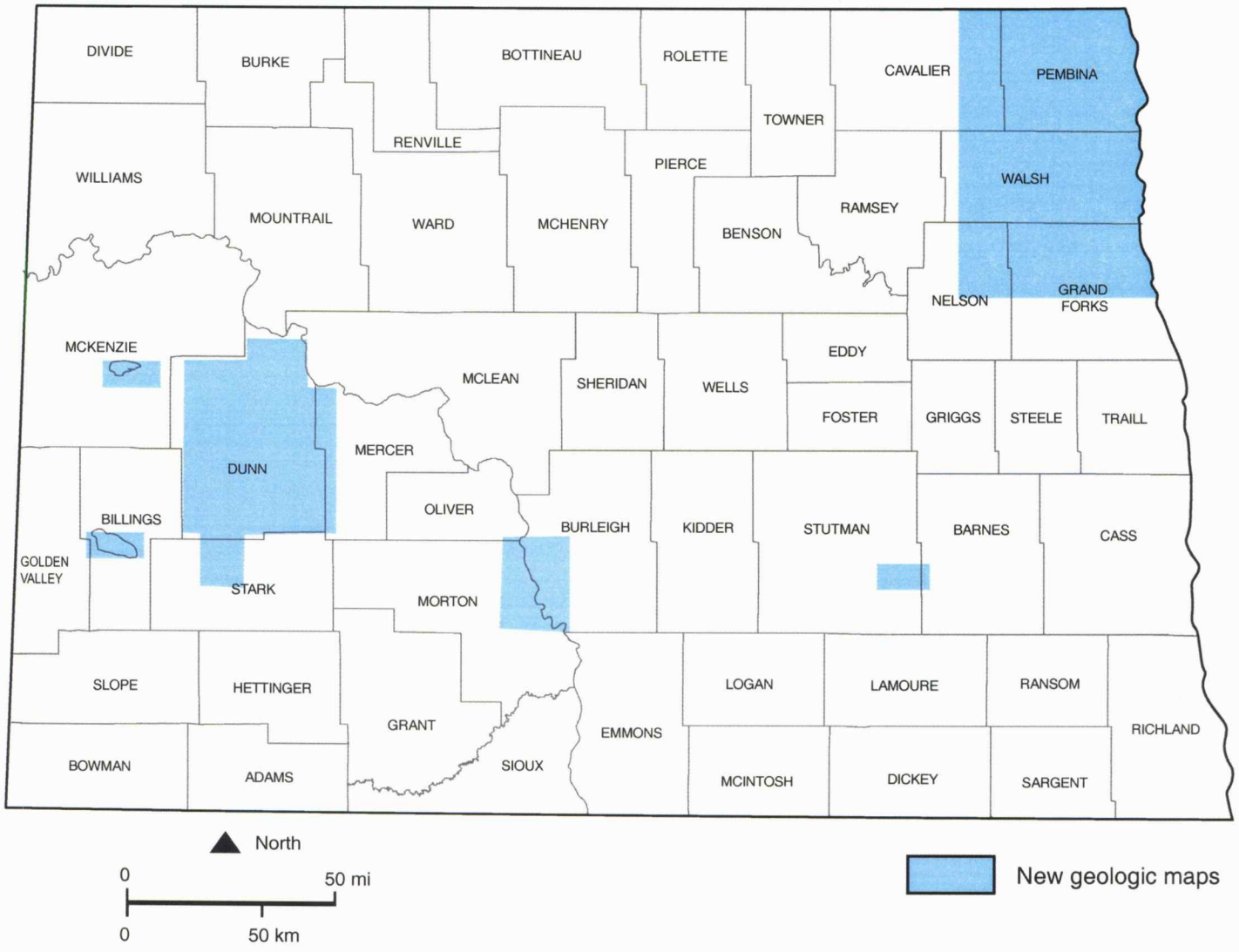
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

NORTH DAKOTA



Contact information

North Dakota Geological Survey
State Geologist: John P. Bluemle (701/328-8000)
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http://www.state.nd.us/ndgs/

U.S.G.S. Geologic Mapping Program Office
Program Coordinators: Peter T. Lyttle (703/648-6943)
Martha Garcia (703/648-6978)
http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN NORTH DAKOTA

Federal Fiscal Year	Project Title	Federal Dollars	State Dollars	Total Project Dollars
93	Jamestown Area	$18,049	$18,049	$36,098
94	Dickinson Area	23,040	23,517	46,557
95	Theodore Roosevelt Nat'l Park	9,000	10,296	19,296
96	1) Bismarck/Mandan, 2) Grafton	29,584	32,685	62,269
97	Bismarck/Mandan Area	18,820	18,820	37,640
98	No Project	0	0	0
99	Grafton Area	7,185	7,185	14,370
00	Walsh, Pembina, Cavalier counties	11,500*	11,500*	23,000*
01	Dunn, McKenzie, Billings counties	52,444*	53,000*	105,444*
	TOTALS	$169,622*	$175,052*	$344,674*

* Estimated

In recent years, the North Dakota Geological Survey has been able to complete a number of geologic mapping projects with funding from the National Cooperative Geologic Mapping Program (STATEMAP). It would not have been possible to complete these projects in a timely manner without STATEMAP funding. The majority of the projects under this program have generated detailed geologic maps at a scale of 1:24,000. Geologic maps have been created for three urban areas in the state, Dickinson, Jamestown, and Bismarck. Geologic hazards, such as landslides, and avoidance features, such as abandoned garbage dumps and sand and gravel resources, were noted on these maps. Geologic maps of urban areas contain vital information for developers, geotechnical consultants, sand and gravel companies, city engineers, etc. A mapping project in the Theodore Roosevelt National Park will result later this year in a geologic report and map which will be utilized by Park personnel for management purposes and by Park visitors including hikers, bicyclists, etc. Several geologic mapping projects have taken place in the northeast corner of North Dakota. The resulting maps will complete our 1:100,000 scale mapping program in the flood prone corridor of the Red River valley. Geologic mapping in 2001 and 2002 will focus on landslide prone areas within badlands topography in western North Dakota.

March 2001

Association of American State Geologists

DIVISION OF GEOLOGICAL SURVEY
OHIO DEPARTMENT OF NATURAL RESOURCES

United States Geological Survey

USGS
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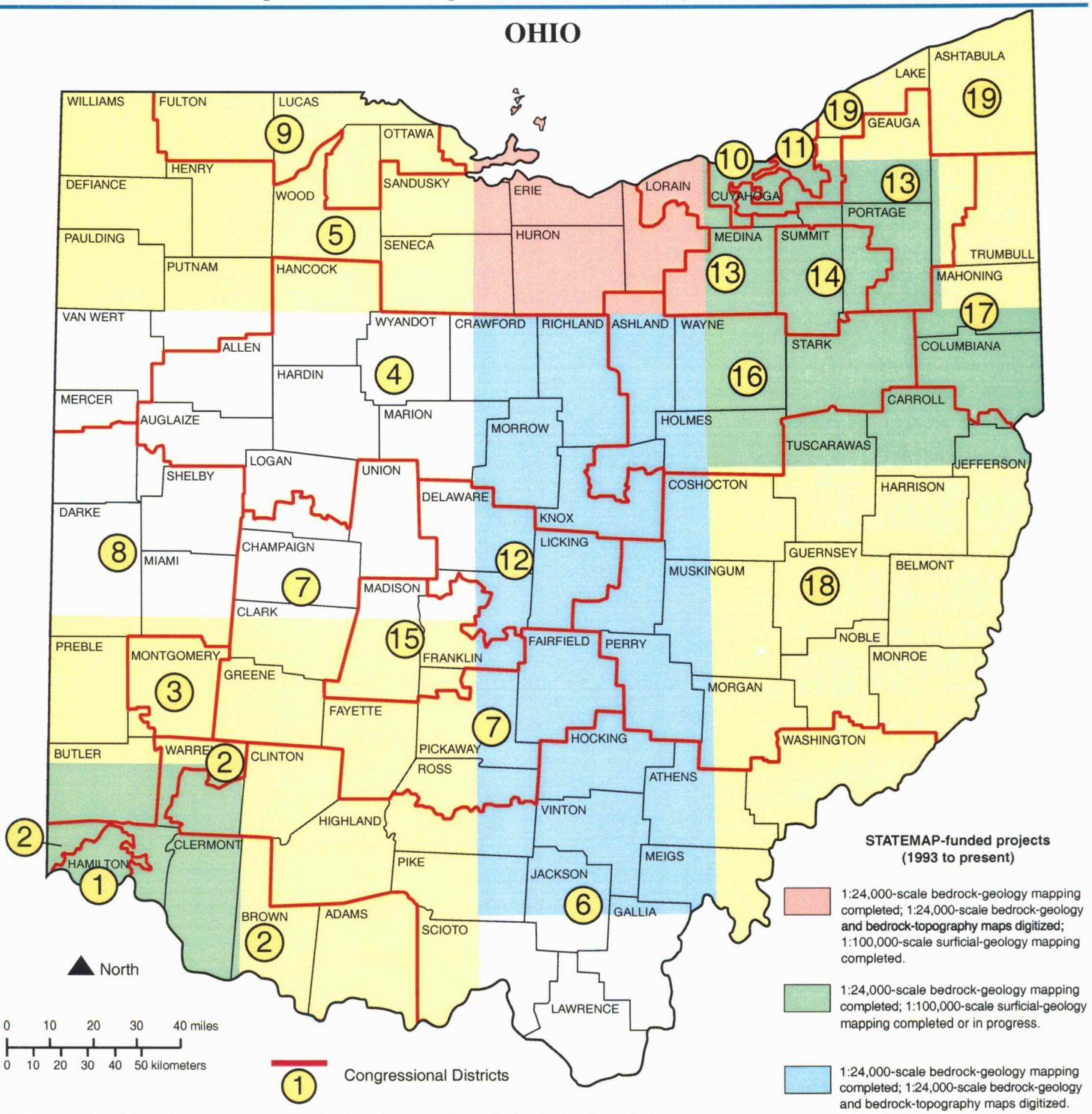
National Cooperative Geologic Mapping Program

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

OHIO



Note: 1:24,000-scale bedrock-geology mapping completed in white areas with non-STATEMAP funds; 1:24,000-scale bedrock-geology map digitized outside blue and red areas completed with non-STATEMAP funds.

Contact information

ODNR, Division of Geological Survey
State Geologist: Thoman M. Berg (614/265-6988)
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http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP GEOLOGIC MAPPING PROGRAM IN OHIO

Federal Fiscal Year	Project Title, Scale	State Dollars	Federal Dollars	Total Project Dollars
93	Bedrock geology of 247 7.5-min quadrangles in northwestern and southwestern Ohio, 1:24,000	$239,071	$109,874	$348,945
94	Bedrock geology of 168 7.5-min quadrangles in north- and south-central Ohio, 1:24,000	298,577	105,000	403,577
95	Bedrock geology of 124 7.5-min quadrangles in northeastern Ohio, 1:24,000	99,910	40,000	139,910
96	Bedrock geology of 112 7.5-min quadrangles in southeastern Ohio, 1:24,000	86,155	86,155	172,310
	Digitization of bedrock-geology and bedrock-topography maps for north- and south-central Ohio	47,026	47,026	94,052
97	Surficial geology of the Cincinnati and Falmouth 30 × 60-min quadrangles (Ohio portion), 1:100,000	118,316	112,249	230,565
98	Surficial geology of the Lorain and Put-in-Bay 30 × 60-min quadrangles, 1:100,000	84,815	84,815	169,630
99	Surficial geology of the Cleveland South 30 × 60-min quadrangle, 1:100,000	103,803	103,802	207,605
00	Surficial geology of the Canton and East Liverpool 30 × 60-min quadrangles (Ohio portion), 1:100,000	99,877	99,877	199,754
	TOTALS	**$1,177,550**	**$788,798**	**$1,966,348**

The STATEMAP component of the National Cooperative Geologic Mapping Program (NCGMP) has enabled the Ohio Department of Natural Resources (ODNR), Division of Geological Survey (DGS) to rapidly and efficiently produce new bedrock and surficial geologic-map information for Ohio. With STATEMAP support, the DGS has, over the past eight years, produced more than 2,500 1:24,000-scale maps depicting bedrock geology, bedrock structure, and buried bedrock topography. STATEMAP funding also has been used to develop a statewide digital-map database of geologic information, and to support production of 1:100,000-scale surficial-geology maps for the Ohio portions of seven 30 x 60 minute quadrangle areas. This new geologic-map information is being used by public- and private-sector entities to address a wide range of critical issues that include: (1) identification and protection of ground-water resources, (2) identification of geologic hazards, (3) seismic risk assessment, (4) site selection for waste-disposal facilities, (5) highway planning, (6) mineral resource exploration and production, and (7) land-use planning.

In 1999, the combined sale of crushed stone and sand and gravel in Ohio reached an all-time high of 139,304,467 tons. Most of this aggregate was sold for transportation-infrastructure repair and expansion. Maintaining the state's highway system into the 21st century and sustaining a healthy and growing state economy are dependent on an adequate supply of high-quality, competitively priced construction aggregate. Ohio's crushed stone and sand and gravel producers are using maps produced through the STATEMAP program to identify target areas for detailed aggregate-resource exploration and assessment investigations. The Ohio Department of Transportation (ODOT) and the DGS have entered into an agreement for building a statewide geographic information system (GIS) of bedrock-geology and bedrock-topography maps produced under the STATEMAP program. When completed, this GIS will be used by ODOT to more effectively and efficiently consider geologic conditions in highway planning and design processes. The ODNR, Division of Water is using STATEMAP products to develop maps of the state's primary bedrock and glacial-drift aquifers. These derivative maps are providing critical information for water-supply management issues, including wellhead-protection, contaminant flow-path modeling, contaminant remediation, and ground-water exploration.

March 2001

Association of American State Geologists

United States Geological Survey

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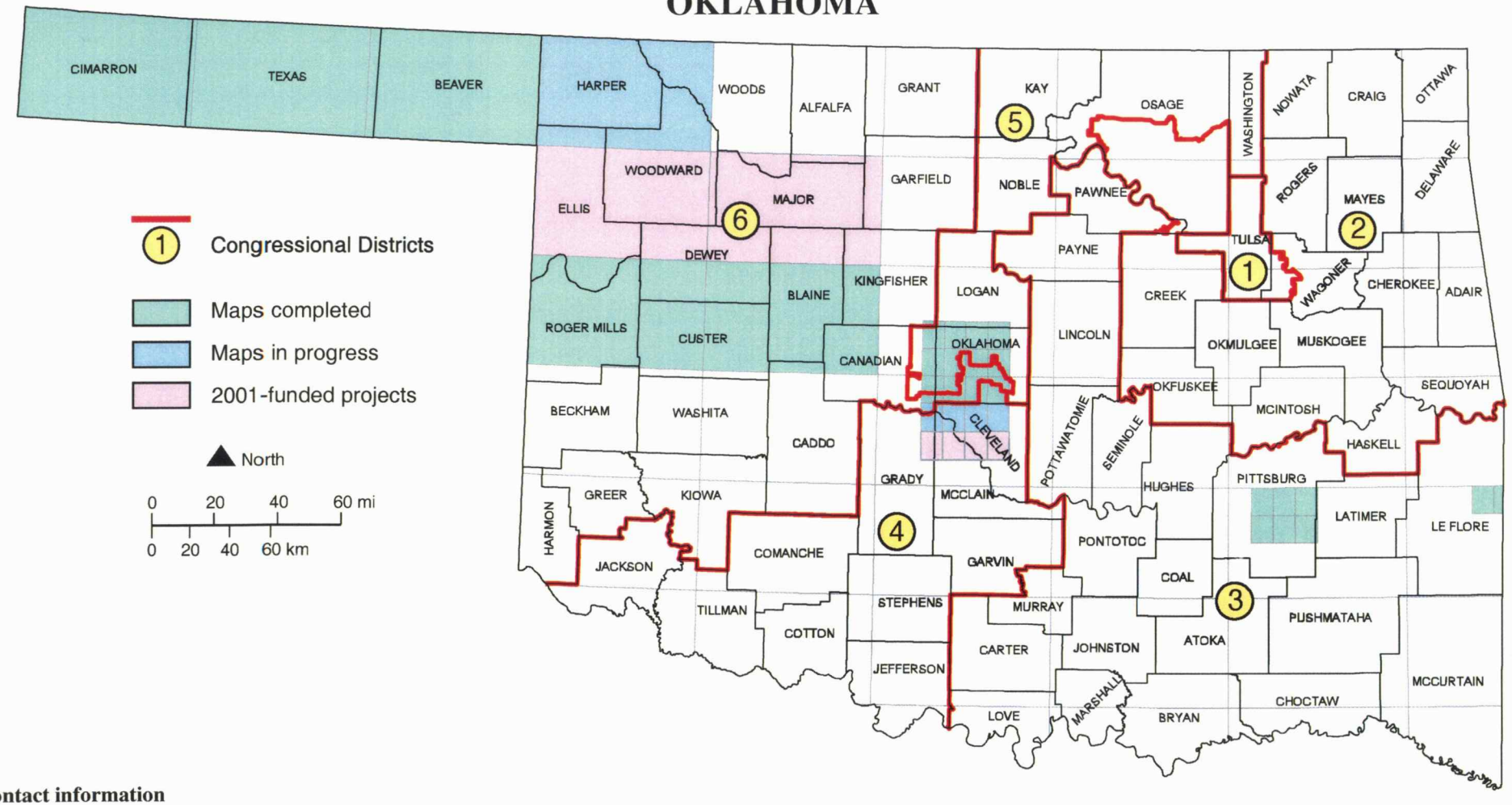
National Cooperative Geologic Mapping Program

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

OKLAHOMA



Contact information

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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN OKLAHOMA

Federal Fiscal Year	Project Map(s), Scale	State Dollars	Federal Dollars	Total Project Dollars
1993	Heavener and Bates Quadrangles; Le Flore County. 1:24,000	$23,732	$20,000	$43,732
1994	Adamson and Hartshorne Quadrangles; Pittsburg County. 1:24,000	61,844	50,000	111,844
1995	Krebs and Hartshorne SW Quadrangles; Pittsburg County. 1:24,000	80,659	30,000	110,659
1996	McAlester and Savanna Quadrangles; Pittsburg County. 1:24,000 Watonga and Foss Reservoir sheets; Ellis, Roger Mills, Beckham, Dewey, Custer, Blaine, Kingfisher, Caddo, and Canadian Counties. 1:100,000 digital	69,104	68,967	138,071
1997	Piedmont, Bethany NE, Edmond, and Arcadia Quadrangles; Kingfisher, Logan, Canadian, and Oklahoma Counties. 1:24,000 Boise City sheet; Cimarron and Texas Counties. 1:100,000 digital	95,482	86,433	181,915
1998	Bethany, Britton, Spencer, and Jones Quadrangles; Canadian and Oklahoma Counties. 1:24,000 Guymon and Beaver sheets; Texas and Beaver Counties. 1:100,000 digital	113,587	95,158	208,745
1999	Mustang, Oklahoma City, Midwest City, and Choctaw Quadrangles, Canadian and Oklahoma Counties. 1:24,000 Buffalo sheet; Harper, Woods, Ellis, and Woodward Counties. 1:100,000 digital	70,642	79,644	150,286
2000	Oklahoma City Metro Area	47,028	45,966	92,994
2001	Oklahoma City Metro Area Northwest Oklahoma	167,804	121,422	289,226
	TOTAL	**$738,884**	**$588,588**	**$1,327,472**

March 2001

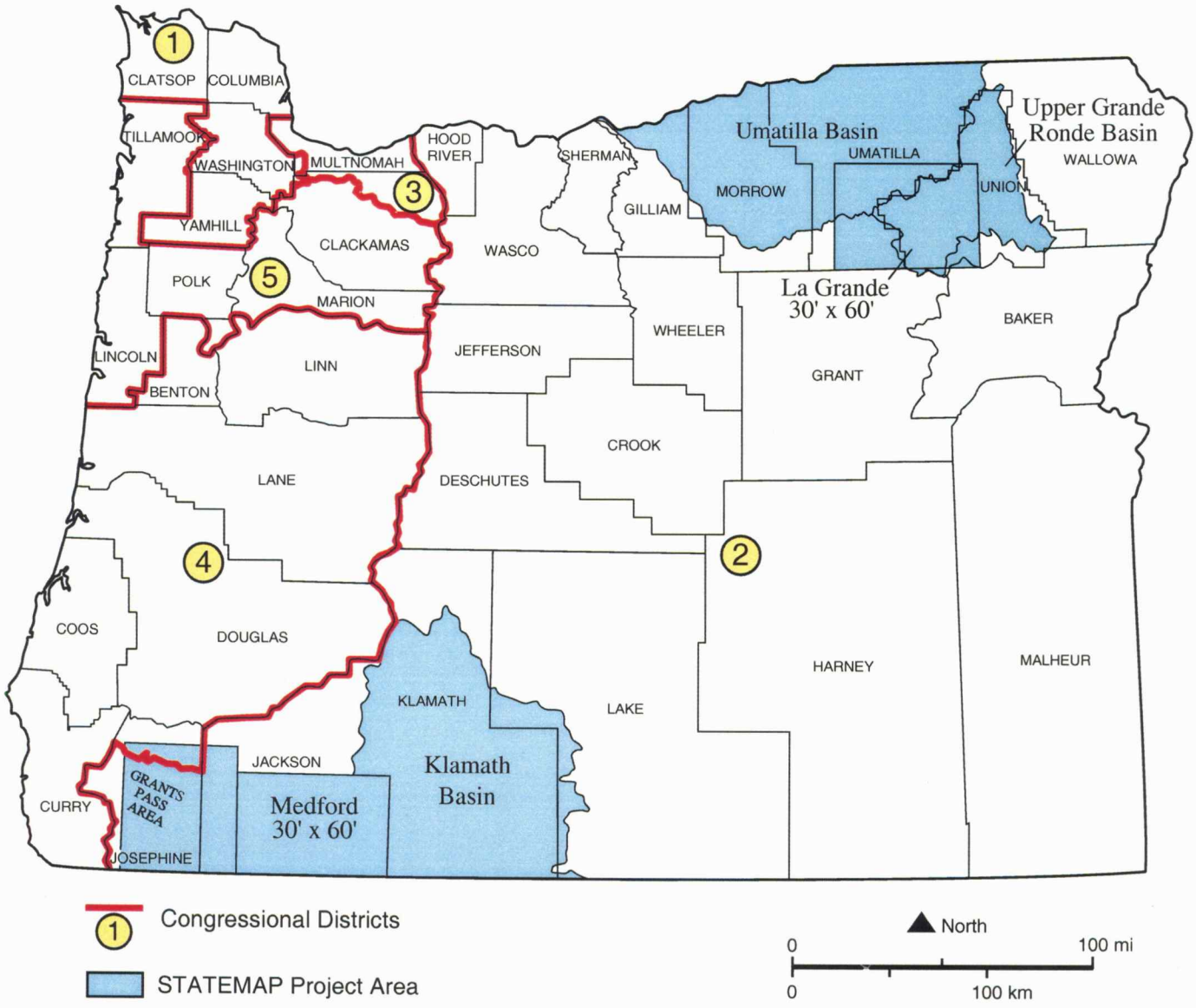
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

OREGON



Contact information

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STATEMAP Contact: Ian Madin (503/731–4100 x 241)
http://sarvis.dogami.state.or.us

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http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP GEOLOGIC MAPPING PROGRAM IN OREGON

Federal Fiscal Year	Project Title	State Dollars	Federal Dollars	Total Project Dollars
1993	Medford, Roseburg 30′ × 60′ sheets	$110,000	$39,000	$149,000
1994	Medford, Roseburg 30′ × 60′ sheets	110,000	45,000	155,000
1995	Medford, Bend 30′ × 60′ sheets	110,000	39,000	149,000
1996	La Grande 30′ × 60′ Sheet	65,000	56,000	121,000
	Medford 30′ × 60′ Sheet	62,000	56,000	118,000
1997	La Grande 30′ × 60′ Sheet	81,000	56,000	137,000
	Medford 30′ × 60′ Sheet	58,000	56,000	114,000
1998	La Grande 30′ × 60′ Sheet	60,000	56,000	116,000
	Klamath Basin	78,000	72,000	150,000
1999	Klamath Basin	129,000	92,000	221,000
	Upper Grande Ronde Basin	83,000	53,000	136,000
2000	Grants Pass Urban Area	32,000	15,000	47,000
	Klamath Basin	101,000	65,000	166,000
	Upper Grande Ronde Basin	82,000	62,000	144,000
2001	Umatilla Basin	91,000	90,000	181,000
	Grants Pass Urban Area	20,000	20,000	40,000
	Upper Grande Ronde Basin	76,000	76,000	152,000
	TOTAL FUNDING	**$1,348,000**	**$948,000**	**$2,296,000**

Funding from the STATEMAP portion of the National Cooperative Geologic Mapping Program (NCGMP) has been at the core of the Oregon Department of Geology and Mineral Industries' (DOGAMI) geologic-mapping program for many years. The program has allowed DOGAMI to significantly increase the production of new maps and has, through the State Geologic Mapping Advisory Committee, helped focus mapping on areas where resource- and hazard-management issues require good geologic data. Because so much of Oregon is a frontier state in terms of geologic mapping, DOGAMI's STATEMAP projects typically begin with a year or two of detailed mapping to understand the area's geology, followed by more regional mapping and compilation to provide the kind of coverage that users need.

Our projects focus on the geology of rapidly developing urban areas (Medford 30′ × 60′ and Grants Pass Area projects), areas where good regional mapping is needed to understand critical ground-water problems (Klamath Basin, Upper Grande Ronde Basin), or areas where general ecosystem- and watershed-health management requires regional data concerning rock chemistry, soils, mineral deposits and slope stability (La Grande 30′ × 60′). In fact most of these areas include some of all these issues, and geologic hazards in the form of earthquakes and landslides are shared by all.

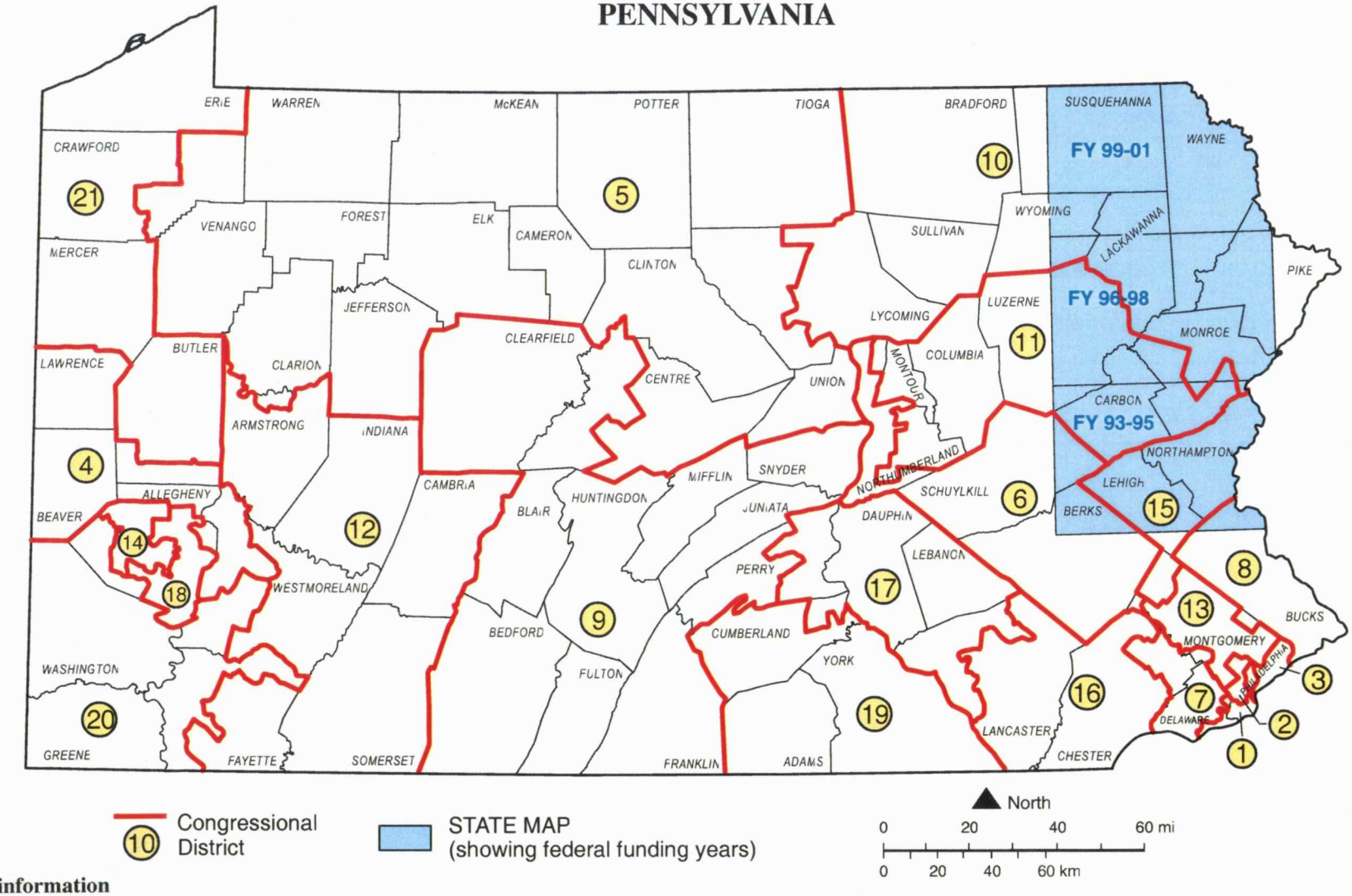
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

PENNSYLVANIA



Contact information

Bureau of Topographic and Geologic Survey
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U.S.G.S. Geologic Mapping Program Office
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Martha Garcia (703/648-6978)
http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN PENNSYLVANIA

Federal Fiscal Year	Project Title	State Dollars	Federal Dollars	Total Project Dollars
93	Surficial Geology of the Allentown 30 × 60 quadrangle	$40,182	$40,000	$80,182
94	Surficial Geology of the Allentown 30 × 60 quadrangle	48,556	40,000	88,556
95	Surficial Geology of the Allentown 30 × 60 quadrangle	56,974	34,423	91,397
96	Bedrock and Surficial Geology of the Scranton 30 × 60 quadrangle	80,581	75,489	156,070
97	Bedrock and Surficial Geology of the Scranton 30 × 60 quadrangle	132,616	132,616	265,232
98	Bedrock and Surficial Geology of the Scranton 30 × 60 quadrangle	127,728	122,458	250,186
99	Bedrock and Surficial Geology of the Honesdale 30 × 60 quadrangle	77,094	75,000	152,094
00	Bedrock and Surficial Geology of the Honesdale 30 × 60 quadrangle	108,644	108,415	217,059
01	Bedrock and Surficial Geology of the Honesdale 30 × 60 quadrangle	131,717	131,444	263,161
	TOTALS	**$804,092**	**$759,845**	**$1,563,937**

Pennsylvania has benefited from the National Cooperative Geologic Mapping Program (NCGMP). It has enabled Pennsylvania to provide new geologic information in its northeast, an area lacking adequate geologic data and maps. Here glaciers deposited abundant sands and gravels. Over large areas these unconsolidated sediments deeply bury the layered sandstone bedrock. Northeast Pennsylvania is an area undergoing development requiring ground water and economic mineral resource, and land-use planning information that the NCGMP maps provide.

Produced to date are nearly seventy (70) geologic reconnaissance quadrangle maps (scale 1:24,000) of the sands and gravels, a construction resource. The maps also provide detailed basic information for local engineering studies, ground-water resource investigations, and for effective land-use planning. Each is accompanied by depth-to-bedrock data that are particularly useful in resource assessments and engineering studies. The maps are being digitized for use as "layers" in a regional Geographic Information System (GIS) of the Wyoming–Lackawanna valley being developed for local planners at Wilkes University.

During this same time period, State-matching funds produced reconnaissance bedrock and surficial materials geologic maps of nearly twenty (20) additional quadrangles, mostly in the former anthracite-mining areas of the Wyoming–Lackawanna valley. The bedrock maps are particularly important to a wide range of users who are dealing with issues resulting from anthracite coal mining, including subsidence, environmental degradation, and engineering solutions needed for future development. Mapped former waste bedrock resulting from anthracite production is now viewed as useful sources of aggregate and dimension stone. Through partnerships with local area universities, faculty and students are contracted to prepare surficial and bedrock quadrangle maps. Working in adjoining areas, field geologists of the Pennsylvania Geologic Survey prepare similar maps. Both analog and digital map products from the mapping are made quickly available to all potential users through an open-file-type report.

Future geologic-mapping efforts are anticipated in the geologically complex sedimentary, metamorphic and igneous terranes of southeastern Pennsylvania and in the southwestern portion of the state where critical geologic-mapping needs include mapping for effective land-use and geologic-hazard-avoidance planning.

March 2001

Association of American State Geologists

DNR

United States Geological Survey

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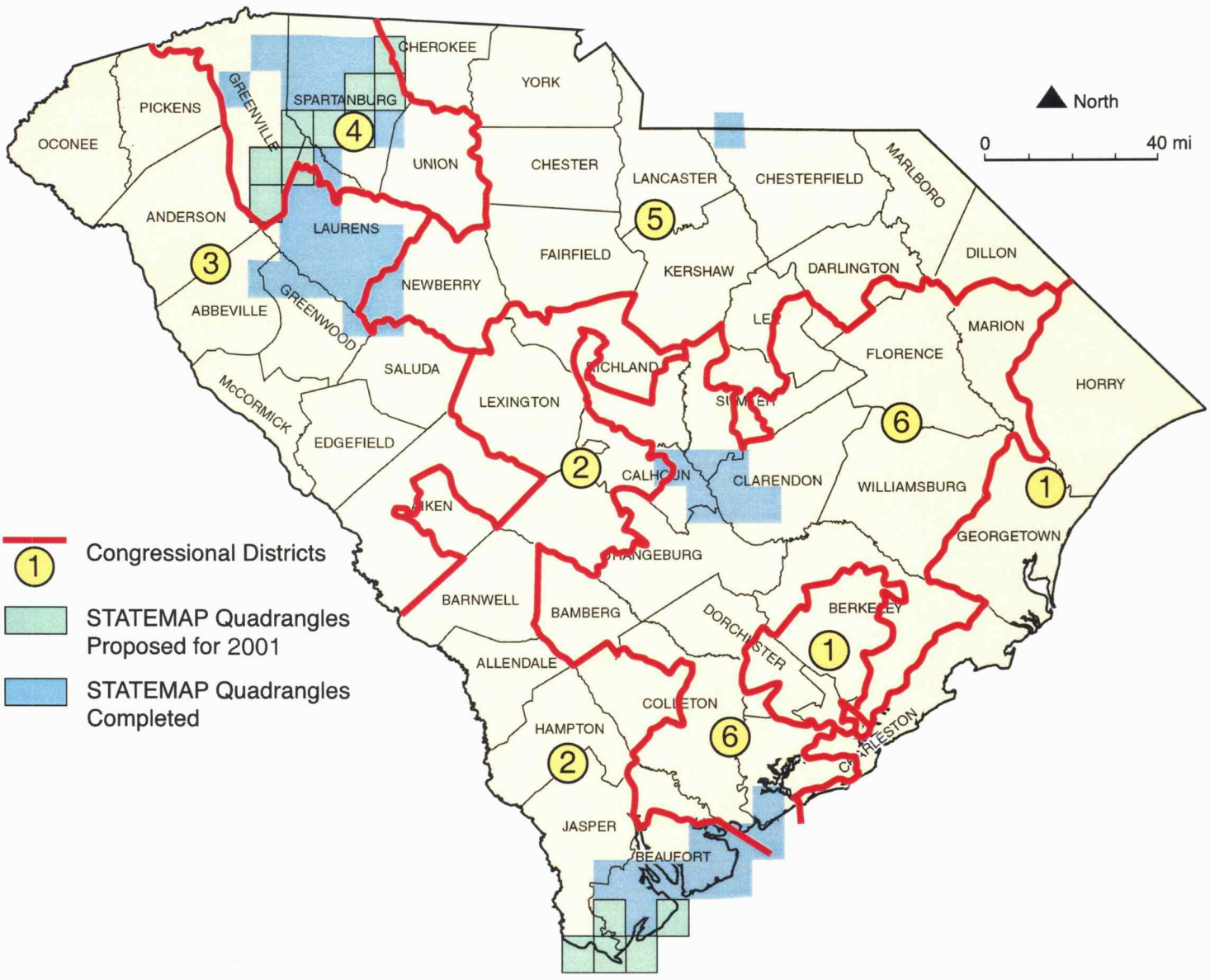
National Cooperative Geologic Mapping Program

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

SOUTH CAROLINA



Contact information

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STATEMAP Contact: C. W. Clendenin, Jr. (803/896-7708)
http://water.dnr.state.sc.us/geology/geohome.htm

U.S.G.S. Geologic Mapping Program Office
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Martha Garcia (703/648-6978)
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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN SOUTH CAROLINA

Funds Matched by SCGS since 1993	$741,881.00

The STATEMAP component of the National Cooperative Geologic Mapping Program has allowed the South Carolina Geological Survey (SCGS) to fulfill its duties mandated by State legislation. These duties include geologic reconnaissance, mapping, and gathering of surface and subsurface data, as well as involvement in environmental protection, conservation of natural resources, economic development, regional planning, and effective land use. Once the geologic information is assembled, dissemination of this information in a timely manner, which is another goal of STATEMAP, fulfills other legislative mandates.

The SCGS has participated in STATEMAP over the past seven years, and involvement in STATEMAP reflects the changing emphases and priorities for assembling geologic information in South Carolina. From 1993 to 1995, STATEMAP efforts were in the Piedmont region and were placed on establishing the geologic controls influencing the location of the Enoree Vermiculite District in Laurens County. As with many other state Geological Surveys, identification and economic development of mineral resources were the driving elements behind the work. In 1995 the priorities of the SCGS began to be re-evaluated and more emphasis was placed on effective land-use planning, environmental protection, and geo-hazards. At this same time, the SCGS was completing the first set of geological maps of the Savannah River Nuclear Site and expanding the STATEMAP component into the Coastal Plain region was part of that change of emphasis. STATEMAP-funded mapping in 1996 and 1997 in the Coastal Plain produced the first 1:24,000-scale maps of the area around the Pinewood toxic waste dump on the northern shore of Lake Marion. At this same time, mapping in Piedmont was redirected to emphasize application of geologic information for land-use planning adjacent to the I–85 growth corridor in Greenville and Spartanburg counties.

At the 1997 planning meeting, an advisory committee member pointed out that land-use and environmental concerns along the coast required additional attention and recommended a shift in mapping priorities. STATEMAP priorities for 1998 were modified to accommodate that recommendation, and a five-year plan to focus mapping on the area between Edisto Beach and the Savannah River was initiated. The "priority on the coast" continues today and has been expanded into a 10-year plan to map the entire coastal region.

From 1998 to present, mapping in the Piedmont region continues to address the need for geologic information adjacent to the I-85 growth corridor. Recognizing that basic geologic information is multipurpose, emphasis of Piedmont mapping on fracture systems and the structural framework for geo-hazard purposes is being shifted to emphasize ground-water availability and protection. Following a recent Blue Ribbon Committee review of applications of science within the Department of Natural Resources, the SCGS was commended for these different initiatives in effective land-use and environmental protection, which are and have been STATEMAP funded.

March 2001

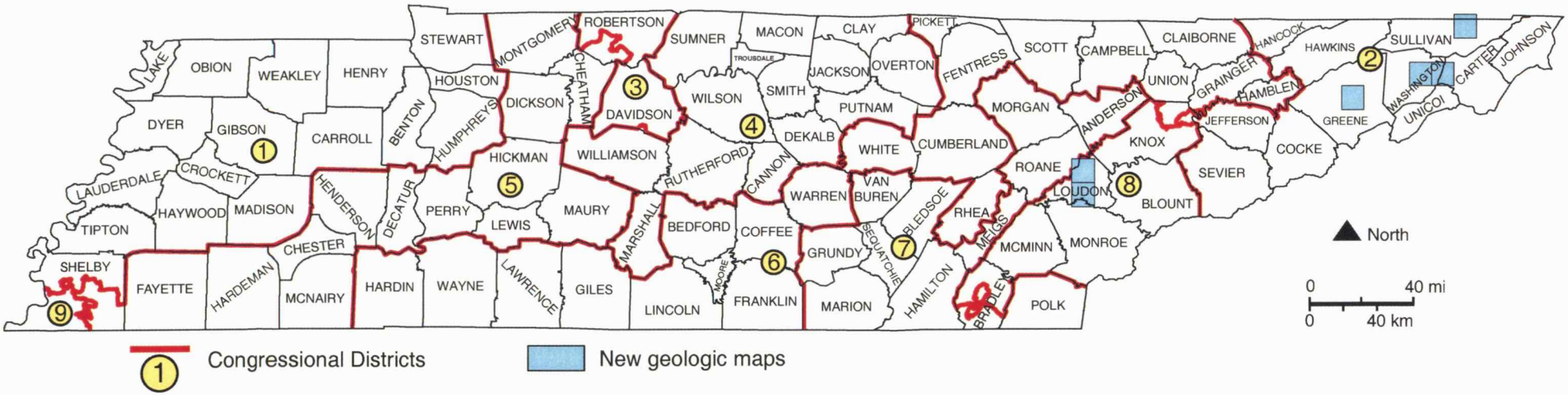
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

TENNESSEE



Contact information

Tennessee Geological Survey
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STATEMAP Contact: Ronald P. Zurawski (615/532-1502)
http://www.state.tn.us/environment/tdg

U.S.G.S. Geologic Mapping Program Office
Program Coordinators: Peter T. Lyttle (703/648-6943)
Martha Garcia (703/648-6978)
http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN TENNESSEE

Federal Fiscal Year	Project Title / Scale	State Dollars	Federal Dollars	Total Project Dollars
94	**Greeneville** Geologic Map, 1:24,000	$15,000	$15,000	$30,000
95	**Johnson City** and **Bristol** Geologic Maps, 1:24,000	12,468	12,468	24,936
96	**Lenoir City** Geologic Map, 1:24,000	11,688	11,688	23,376
98	**Jonesborough** Geologic Map, 1:24,000	16,000	16,000	32,000
99	**Loudon** Geologic Map, 1:24,000	16,864	16,864	33,728
00	**Sweetwater, Philadelphia,** and **Cave Creek** Geologic Maps, 1:24,000	60,027	60,027	120,054
01	**Jackson North, Sullivan Gardens,** and **Leesburg** Geologic Maps, 1:24:000	60,000	60,000	120,000
	TOTALS	**$192,047**	**$192,047**	**$384,094**

Detailed geologic mapping began in Tennessee in 1964, when a new series of 1:24,000-scale geologic quadrangle maps was started that includes a mineral-resources summary to accompany each map. In addition to delineating geologic formations, these maps show all known information on occurrence, mining, reserves, and exploration of mineral deposits and construction materials found in each quadrangle area. This series was recently expanded to include a section on environmental geology. When the number and severity of environmental hazards such as landslides or sinkholes is significant, a separate environmental map showing the location of these hazards is also included in the geologic map package. Although 487 of Tennessee's 804 quadrangles (60 percent) have already been mapped and published, limited funding for mapping personnel has hampered this effort in recent years.

The STATEMAP part of the National Cooperative Geologic Mapping Program has enabled the Tennessee Division of Geology to increase production of these 1:24,000-scale geologic maps by at least one additional map per year. Over the past six years, STATEMAP has helped support geologic mapping of bedrock materials and identification of geologic hazards and potential mineral resources in six quadrangles in East Tennessee (Bristol, Greeneville, Johnson City, Jonesborough, Lenoir City, and Loudon). These quadrangles were prioritized by the Tennessee Geologic Mapping Priority Advisory Committee on the basis of a high degree of urbanization, significant numbers of environmentally sensitive sites and facilities, potential geologic hazards, and a notable lack of available geologic data. This effort has also addressed concerns raised during recent studies by the U.S. Geological Survey indicating that active cave development and solution openings may extend to depths of 180 meters or deeper in this part of Tennessee. Availability and potential contamination of ground water is therefore of prime concern in this rapidly developing region. These geologic maps are also the basic source of information for people engaged in environmental regulatory work, mineral and/or oil and gas exploration, geologic hazard assessment and mitigation, building-site evaluation, and many other practical as well as scientific uses.

May 2001

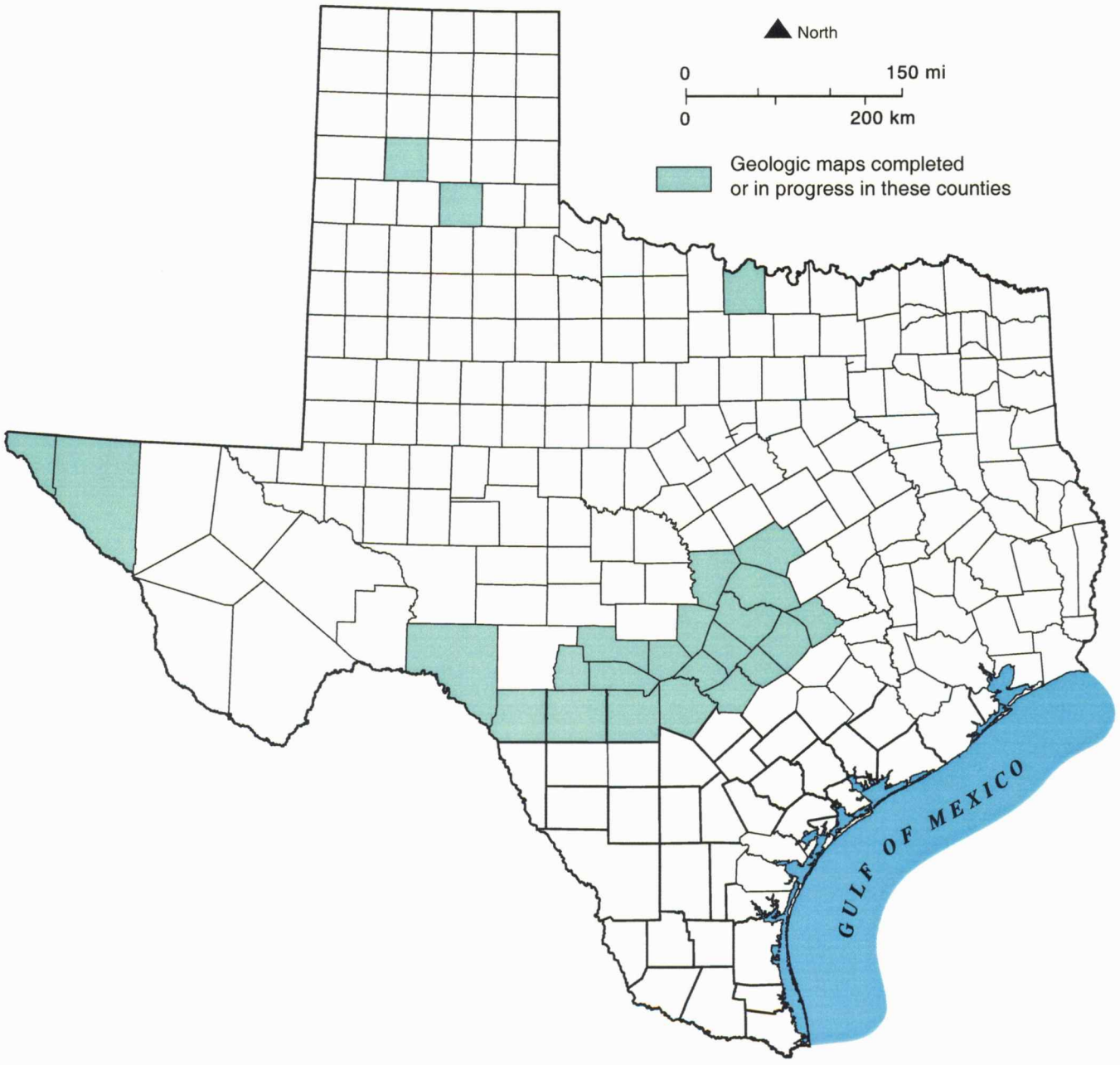
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

TEXAS



Contact information

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U.S.G.S. Geologic Mapping Program Office
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http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP GEOLOGIC MAPPING PROGRAM IN TEXAS

Federal Fiscal Year	Project Title	State Dollars	Federal Dollars	Total Project Dollars
93	El Paso STATEMAP Project	$43,769	$24,821	$68,590
	New Braunfels STATEMAP Project	52,297	31,412	83,709
94	El Paso STATEMAP Project	52,152	44,164	96,316
	New Braunfels STATEMAP Project	50,287	35,000	85,287
95	El Paso STATEMAP Project	60,636	51,000	111,636
96	Digital Geologic Map of New Braunfels	25,910	20,974	46,884
	Geologic mapping of karst aquifer areas, south-central Texas	85,849	79,421	165,270
97	Geological mapping of critical aquifers	122, 785	96,169	218,954
98	Geological mapping of critical aquifers	220,714	120,874	341,588
99	Geologic mapping of urban corridors and critical aquifers	119,915	106,049	225,964
00	Geologic mapping of urban corridors and critical aquifers	96,278	93,194	189,472
01*	Geologic mapping of urban corridors and critical aquifers	147,088	147,088	294,176
	TOTALS	**$1,077,680**	**$850,166**	**$1,927,846**

** Project to begin April 1, 2001, therefore matching figures are estimated.*

The Texas STATEMAP program, part of the National Cooperative Geologic Mapping Program (NCGMP), has benefited Texas greatly. Funding provided by this program, with matching money from the State, has enabled the Bureau of Economic Geology (Bureau) to produce new geologic maps of many areas of the State that are undergoing rapid urban development. High-quality geologic maps provide important data that support responsible decision-making regarding the utilization of land and natural resources. Management of water resources, identification of sources of aggregate and other earth resources, land-use planning, and recognition of areas prone to foundation problems are a few examples of the many uses of geologic maps. Geologic maps are made available to the public at a scale of 1 inch to 2,000 feet (1:24,000), and are digitized and compiled into regional maps. Mapping priorities are set by the Texas STATEMAP Advisory Panel whose membership is made up of staff from many State agencies.

In far West Texas, the Bureau has mapped the surficial and bedrock geology of a large area of the border region that includes El Paso, the Hueco bolson, and the valley of the Rio Grande. Geologic mapping has emphasized the subdivision of geologic units that impact development decisions and has improved understanding of sediments that host the major ground-water resources for El Paso, Ciudad Juarez, and other communities. Geologic mapping in Central Texas, a major focus of the program, reflects the needs of this area of rapid urbanization. A crucial geologic resource in this region is the Edwards aquifer, and the geologic data produced by STATEMAP have greatly improved the accuracy of numerical models that are used to manage the aquifer. Other geologic maps have been produced for special purposes such as environmental protection and remediation, public education, and improved management plans for State parks.

March 2001

Association of American State Geologists

UTAH GEOLOGICAL SURVEY
a division of
UTAH DEPARTMENT OF NATURAL RESOURCES
STATE OF UTAH

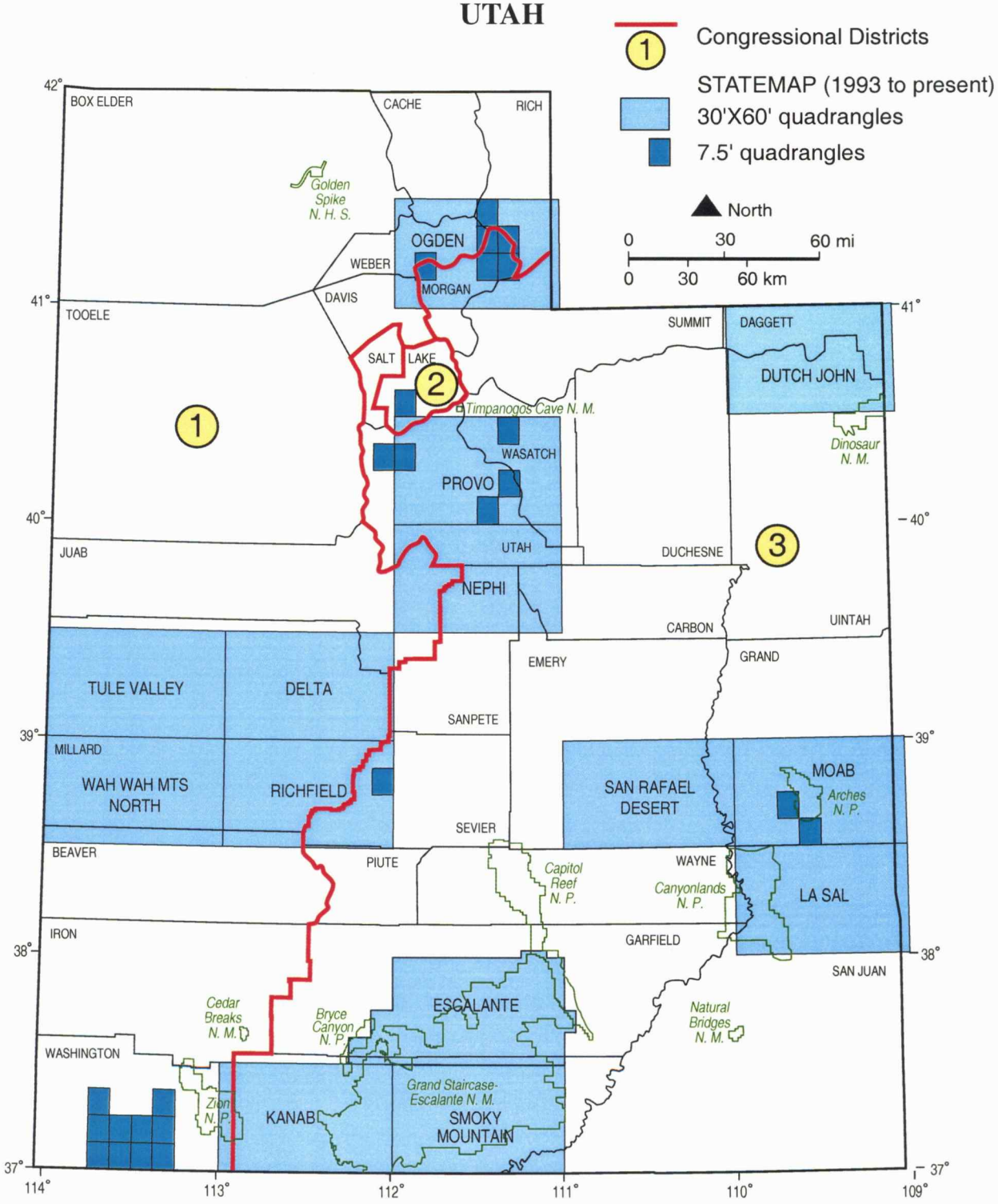
United States Geological Survey

USGS science for a changing world

National Cooperative Geologic Mapping Program

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

UTAH



Contact information

Utah Geological Survey
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U.S.G.S. Geologic Mapping Program Office
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http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN UTAH

Federal Fiscal Year	Project Title Scale: 7.5' quadrangles = 1:24,000 30' × 60' quadrangles = 1:100,000	State Dollars	Federal Dollars	Total Project Dollars
93	7.5' - Richfield (Sevier Valley), Midvale (Salt Lake Valley)	$30,000	$30,000	$60,000
94	7.5' - St. George and Washington (St. George area), Moab	38,000	38,000	76,000
95	7.5' - Santa Clara (St. George area), Merrimac Butte (Moab area)	30,000	30,000	60,000
96	30' × 60' - Ogden (part 1 of 3), Smoky Mountain 7.5' - White Hills and Harrisburg Junction (St. George area)	125,000	125,000	250,000
97	30' × 60' - Ogden (part 2 of 3), Escalante, Kanab, SE Panguitch 7.5' - Hurricane and Washington Dome (St. George area)	130,102	130,102	260,204
98	30' × 60' - Ogden (part 3 of 3), Delta, Moab, La Sal 7.5' - Horse Ridge, Dairy Ridge, Lost Creek Dam, Francis Canyon, and Peck Canyon (from Ogden area); The Divide (St. George area); Center Creek (Heber Valley area)	149,044	149,044	298,088
99	30' × 60' - Dutch John (part 1 of 3), Provo (part 1 of 3), Wah Wah Mountains North 7.5' - Pintura (St. George area)	130,000	130,000	260,000
00	30' x 60' - Dutch John (part 2 of 3), Nephi, Tule Valley, Richfield, San Rafael Desert (part 1 of 2) 7.5' - Snow Basin (Ogden Valley area)	124,590	124,590	249,180
01	30' × 60' - Dutch John (part 3 of 3), San Rafael Desert (part 2 of 2) 7.5' - Billies Mountain and Two Tom Hill (Wasatch Mountains), Cedar Fort and Saratoga Springs (Utah Valley area), Veyo (St. George area)	146,763	146,763	293,526
TOTALS		**$903,499**	**$903,499**	**$1,806,998**

Cooperative funding through the STATEMAP component of the National Cooperative Geologic Mapping Program has enabled the Utah Geological Survey to produce thirteen 30'x60' and twenty-five 7.5' quadrangle geologic maps since 1993. This work has entailed original geologic mapping and digital compilation of previous mapping. Local, state, and federal land management agencies have used this new map information to address a variety of issues, including ground-water location and protection, geologic hazards evaluation, resource protection and development, education, and tourism.

For example, geologic maps of the St. George basin provide the foundation for a detailed study of the abundant geologic hazards that cause problems for construction in the rapidly growing area. The 30'x60' quadrangles in southern Utah formed the basis for evaluating geologic issues in the management plan of recently designated Grand Staircase-Escalante National Monument. New mapping in the Ogden 30'x60' quadrangle produced a major revision in the interpretation of the subsurface geology in the oil and gas fields area of northeastern Utah, resulting in more accurate exploration strategies. Mapping in several national and state recreation areas has led to new geologic interpretations and tourist information.

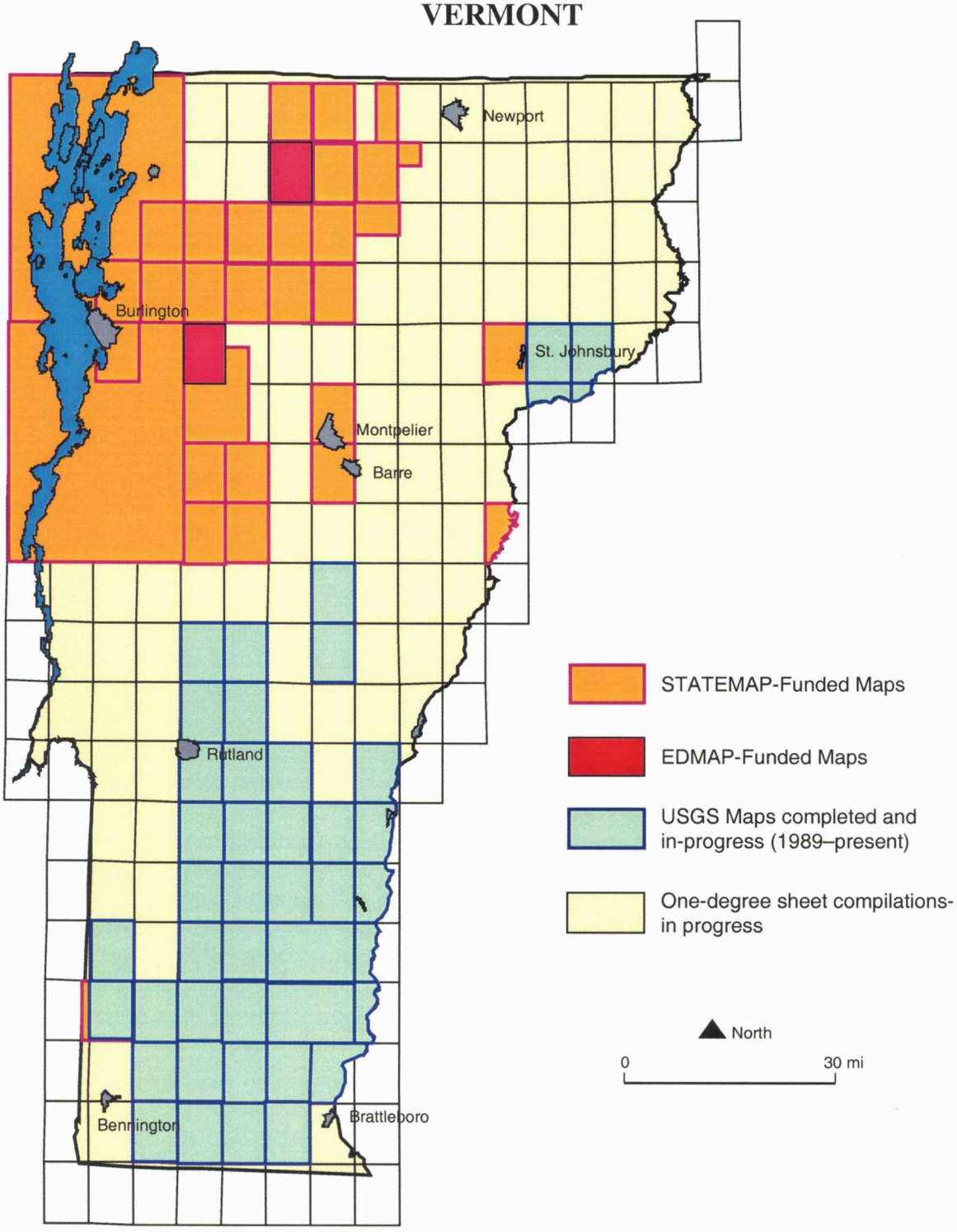
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

VERMONT



Contact information

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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN VERMONT

Federal Fiscal Year	Vermont Project Title - Scale	State Dollars	Federal Dollars	Total Project Dollars
94-96	First Compilation of all Northern Vermont Bedrock Geology; Digitization of Lake Champlain North and South - 1:100,000; Digitization of USGS Mapped Quadrangles - 1:24,000	$187,372	$92,566	$279,938
97	Mt Mansfield, Eden, Jay Peak, Hazen's Notch, Johnson, Morrisville: Bedrock Mapping and Digitization - 1:24,000	54,694	45,553	100,247
98	Montpelier-Barre and St. Johnsbury: Surficial Geology and Digitization - 1:24,000	49,522	40,592	90,114
99	Newbury: Surficial Geology and Digitization - 1;24,000	22,262	20,768	43,030
00 In Progress	Jeffersonville, Arlington, Great Brook Watershed, and Plainfield: Surficial Geology and Digitization - 1:24,000 Hazard and Aquifer Maps	70,820	70,210	141,030
01 Starts June 01	Third Branch of the White River Surficial Geology - 1:24,000; Hazard Maps; Colchester/Milton Bedrock Geology - 1:24,000; Digitization - Pownal, North Pownal, and Underhill - 1:24,000	132,034	117,790	249,824
TOTALS Bedrock, Surficial, Hazard, and Aquifer Maps (Years 94-01)		**$516,704**	**$387,479**	**$904,183**

The Vermont Geological Survey (VGS - a Division of the Vermont Department of Environmental Conservation) conducts surveys and research of the geology, mineral resources, and topography of the state. For a variety of topics important to society, VGS provides aid and advice to Vermonters. Geologic maps provide the framework for addressing many environmental and resource issues. To match State resources, STATEMAP is an extremely valuable cooperative program that expands the effectiveness of the VGS. Current emphasis is on: Mapping the surficial geology on a watershed basis and application of this information to determine the potential for geologic hazards, ground-water resources, infrastructure project siting, ecosystem analysis, highway materials, etc.; Development and preparation of a new state bedrock geologic map as a cooperative venture with USGS and University of Vermont; and the integration of the bedrock, surficial, and fluvial geomorphological data to produce maps and reports that display the nature of physical and chemical geologic hazards (landslides, erosion, earthquakes, and radionuclides) in Vermont. The VGS provides advice concerning the development and working of rock and mineral deposits suitable for building, road making, and economic purposes, and review of projects as they relate to Act 250, Vermont's Land Use and Development Law. Vermonters in the past year have become aware of risks to drinking-water safety associated with naturally occurring geologic sources of radionuclides (uranium, thorium, radium, and radon) that occur in certain bedrock formations. To help Vermonters understand health risks associated with the consumption of certain ground water, the Survey is working to delineate areas prone to having radioactive ground water through field-based geologic surveys, radiometric water analyses from wells, and the production of GIS-based radioactive ground-water hazard maps. Landslides and rockfalls do occur in Vermont. The April 1999 landslide at Deer Run Heights in Jeffersonville, VT, and the rockfall and debris slide at Smugglers Notch in 1983 are examples of local natural hazards. Stream bank erosion is also an example of slope instability. Geologists study the conditions at these sites and use the data to understand and predict future risk to Vermonters.

March 2001

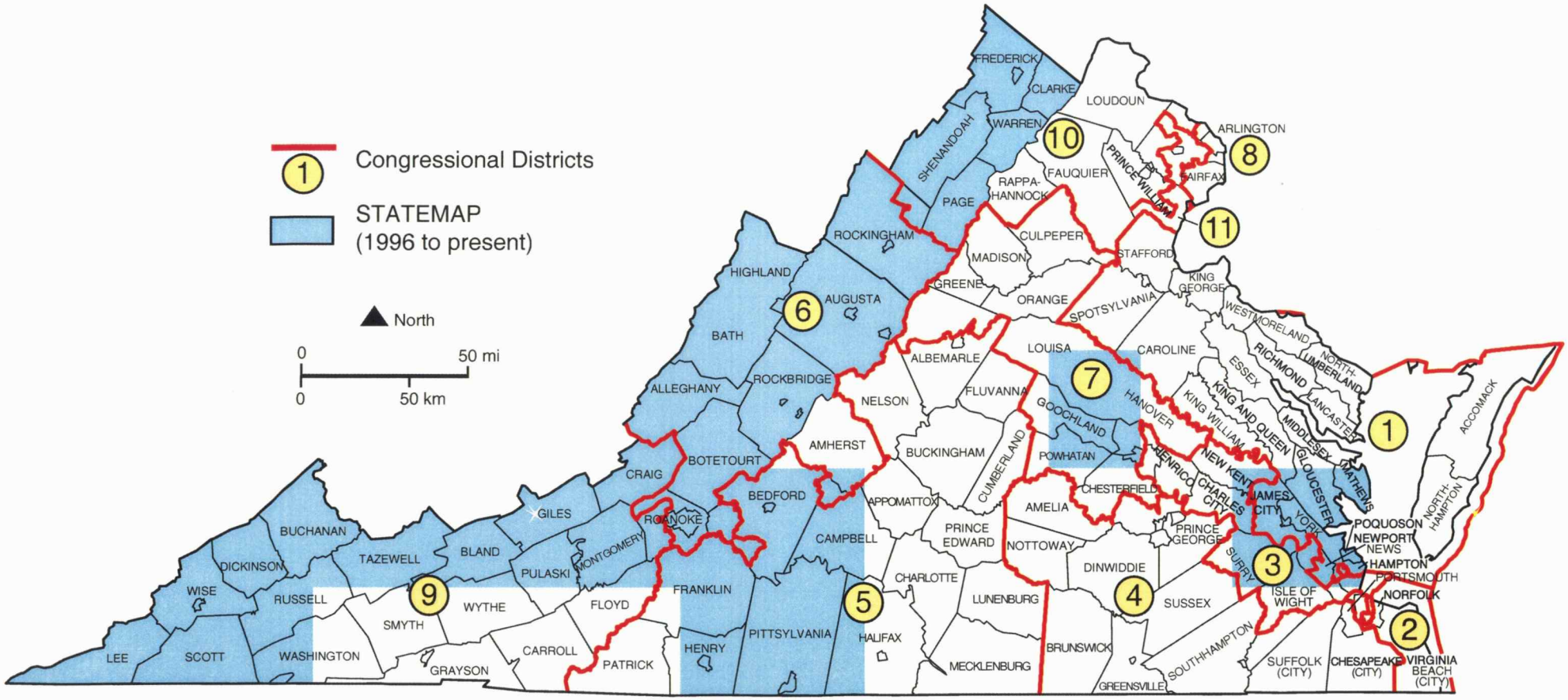
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

VIRGINIA



Contact information

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U.S.G.S. Geologic Mapping Program Office
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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN VIRGINIA

Federal Fiscal Year	State Dollars	Federal Dollars	Total Project Dollars
96	$20,702	$20,702	$41,404
97	49,345	49,345	98,690
98	50,000	50,000	100,000
99	45,728	45,728	91,456
00	48,258	48,258	96,516
01	22,899	22,899	45,798
TOTALS	**$236,932**	**$236,932**	**$473,864**

Virginia Geology

Virginia is characterized by perhaps the most varied terrains and complex geology of any state in the United States. Five physiographic provinces in Virginia are, from east to west, the Atlantic Coastal Plain, the Piedmont, the Blue Ridge, the Valley and Ridge, and the Appalachian Plateaus.

The Coastal Plain Province. The Coastal Plain is composed of unconsolidated sediments that extend inland for more than 100 miles. Economic materials mined in the province are sand, gravel, and clay. Recently, mining was started for heavy mineral sands (ilmenite, leucoxene, and zircon).

The Piedmont Province. The Piedmont extends from the Fall Line westward to the Blue Ridge Mountains. Structurally, it is composed of a complex of metamorphic and igneous rocks. The rocks are schists, gneisses, basalts, slates, phyllites, marble, and quartzites. These metamorphic rocks have been further altered by intrusions of granite, gabbro, diabase, pegmatite and other igneous rocks. Rocks and minerals mined from the Piedmont are kyanite, slate, vermiculite, granite, gabbro, diabase, and feldspar. Some gem "mining" occurs in pegmatite. Former mining activity includes gold, lead, zinc, copper, soapstone, manganese, iron, and pyrite.

The Blue Ridge Province. The rocks that form the Blue Ridge Province include a basement complex of Precambrian granite and granulites along with late Precambrian metamorphosed sedimentary rocks. Blue Ridge rocks are quarried for quartzite for aggregate, and past mining has occurred for copper, iron, manganese, and a limited amount of tin.

The Valley and Ridge Province. This is the most varied region of the state, both topographically and geologically. Strata composed of shale, dolostone, and limestone dominate on the east, and grade westward into strata comprising generally sandstone, siltstone, and shale. Karst features, such as sinkholes and sinking creeks, are common throughout the province. Resources currently utilized from this province are limestone, dolostone, sandstone, iron oxides, clay, oil, natural gas, and shale. Past resources included salt, manganese, iron, lead, zinc, barite, gypsum, and coal.

The Appalachian Plateaus Province. The Appalachian Plateaus fringe the Valley and Ridge on the west in the southwestern part of the state. The sedimentary units are coal, shales, siltstones, and sandstones. The Southwest Virginia coal field is totally contained within this province. In addition to coal, this province contains valuable resources of coalbed methane, natural gas, some oil, and crushed stone.

Virginia Mineral Resources

The most important current mineral resources of Virginia are coal, aggregate, sand and gravel, lime (limestone and dolostone), and natural gas. The only deposit of kyanite being mined in the United States is in Buckingham County. Virginia is the only producer of "Virginia Aplite" and is the second leading producer of vermiculite.

A wide variety of nonmetallic industrial minerals are of great importance to Virginia. These include aggregate and dimension stone, sand and gravel, limestone for cement and lime production, kyanite, soapstone, feldspar, iron-oxide pigments, vermiculite, gemstones, and clay materials.

The nonfuel minerals industry is an important aspect of Virginia's economy. In 1999, there were 512 industrial-mineral mining operations permitted throughout the Commonwealth. In 1999, at least 85 million tons of nonfuel minerals, with a value of 654 million dollars, were produced.

The importance of the fuel-minerals industry to Virginia's economy is best exemplified by the coal industry. In 1999, there were 106 active surface coal mines and 255 underground coal mines. Approximately 32.2 million tons of coal was mined in 1999 with a value of 1.08 billion dollars.

A grand total of 11.87 billion dollars of mineral commodities can be attributed to our Commonwealth for 1998. This includes the indirect impacts that occur in the "expenditures" of salaries and wages in local communities; in equipment, services, and goods purchased from suppliers; in the rail transportation industry; and in our export facilities.

March 2001

Association of American State Geologists

WASHINGTON STATE DEPARTMENT OF Natural Resources

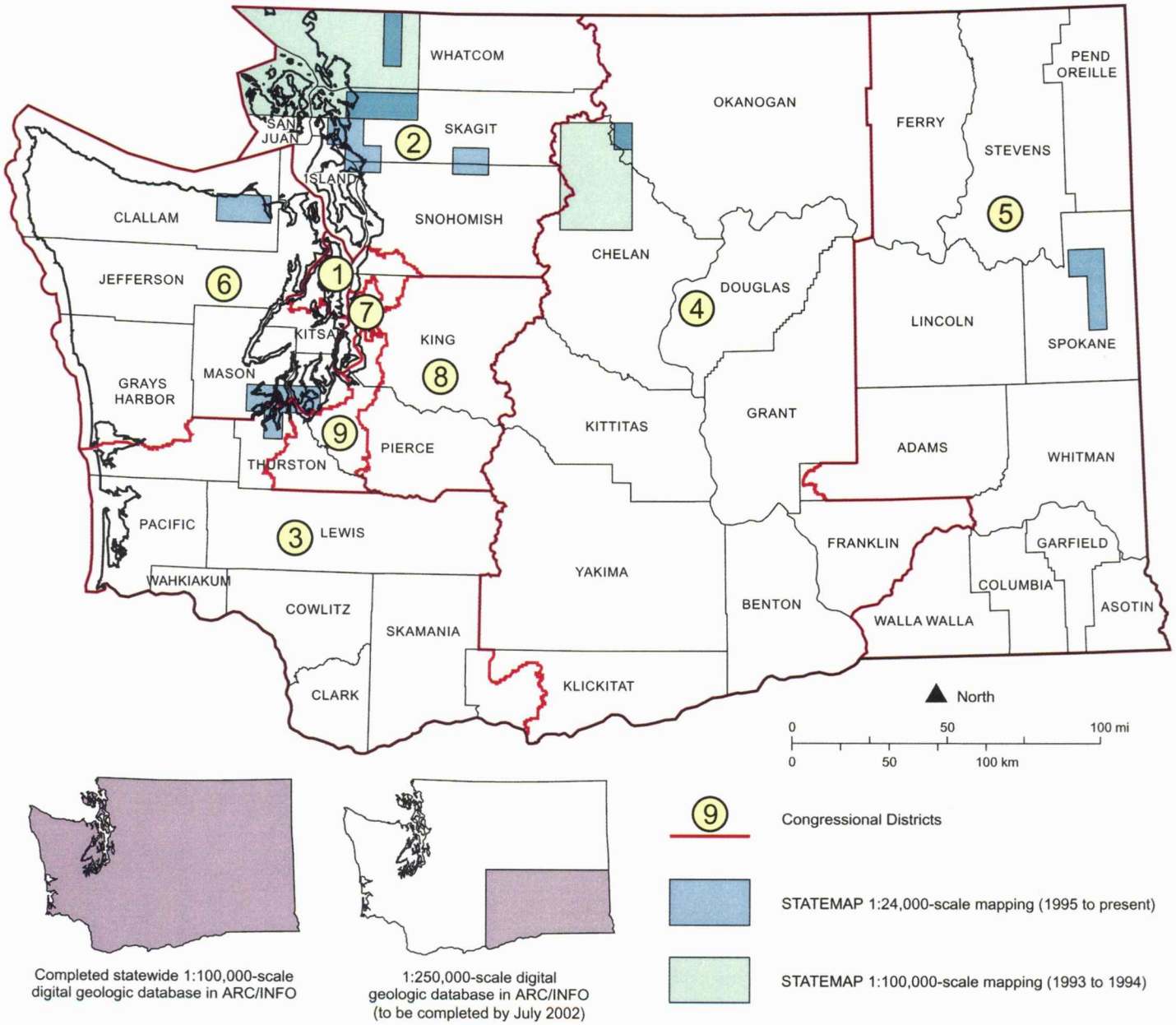
United States Geological Survey

USGS science for a changing world

National Cooperative Geologic Mapping Program

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

WASHINGTON



Completed statewide 1:100,000-scale digital geologic database in ARC/INFO

1:250,000-scale digital geologic database in ARC/INFO (to be completed by July 2002)

9 Congressional Districts

STATEMAP 1:24,000-scale mapping (1995 to present)

STATEMAP 1:100,000-scale mapping (1993 to 1994)

Contact information

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U.S.G.S. Geologic Mapping Program Office
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http://ncgmp.usgs.gov/

SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN WASHINGTON

Federal Fiscal Year	Project Title	State Dollars	Federal Dollars	Total Project Dollars
1993	Geologic Maps of the Roche Harbor and Bellingham quadrangles, 1:100,000	$25,000	$25,000	$50,000
1994	Geologic Map of the western half of the Twisp quadrangle, 1:100,000	30,000	30,000	60,000
1995	Geologic Map of the Gilbert 7.5'quadrangle, 1:24,000	30,000	30,000	60,000
1996	Geologic Maps of the Deming, Kendall, and Mead 7.5' quadrangles, 1:24,000, and Digitization of the geology of eighteen quadrangles, 1:100,000	120,492	120,492	240,984
1997	Geologic Maps of the Bow, Alger, Dartford, and Sequim 7.5' quadrangles, 1:24,000, and Digitization of the geology of eleven quadrangles, 1:100,000	144,350	144,350	288,700
1998	Geologic Maps of the Lyman, Sedro Woolley North, and Spokane NE/SE 7.5' quadrangles, 1:24,000, and Compilation, digitization, and partial mapping of nine quadrangles, 1:100,000	143,848	143,848	287,696
1999	Geologic Maps of the Carlsborg, Longbranch, McNeil Island, Anacortes South, and La Conner 7.5' quadrangles, 1:24,000, and Digitization of the geology of twelve quadrangles, 1:100,000	140,892	140,892	281,784
2000	Geologic Maps of the Morse Creek, Utsalady, Conway, and Squaxin Island 7.5' quadrangles, 1:24,000	137,328	126,045	263,373
2001	Geologic Maps of the Fortson, Darrington, Shelton, and Tumwater 7.5' quadrangles, 1:24,000, and NGMDB-Data Entry Project and Digitization of the geology of the SE quadrant of WA, 1:250,000	129,811	129,811	259,622
Totals		**$901,721**	**$890,438**	**$1,792,159**

Skyrocketing population growth throughout Washington State is depleting natural resources and multiplying risks associated with the state's many geologic hazards. Geologic maps are essential tools for mitigating the resulting negative effects of this rapid growth through their use in growth management planning; infrastructure building and maintenance; dam safety; earthquake, volcano, and landslide risk assessment; water-resource appraisals; mineral resource exploitation and protection; education; recreation; and scientific research. Since its inception in 1992 when authorized by the National Cooperative Geologic Mapping Act, the STATEMAP Program has enabled the Washington Division of Geology and Earth Resources to improve map quality and coverage throughout the state.

The Division has completed a statewide 1:100,000-scale digital geologic GIS database. This ARC/INFO database is now part of the National Digital Geologic Map Database. It is also the basis for a regional sand and gravel resource inventory program that is embraced by producers, users, and regulatory agencies. Information from this map database has also been used for watershed-basin analysis, forest fertilization planning, wildlife habitat research, and aquifer protection projects, among other things.

Geologic maps of twenty-five 1:24,000-scale quadrangles (maps of smaller areas that show more detail than the 1:100,000-scale maps) have also been completed under the STATEMAP program. These maps are being incorporated into a Puget Lowland digital geologic database that is a regional cooperative program between the Division, the U.S. Geological Survey, and the University of Washington. The database maps are used to identify areas that are susceptible to landslides, earthquake shaking, earthquake liquefaction, and volcano-induced hazards. For example, mapping has provided evidence that a portion of the Interstate 5 corridor was once and could again be inundated by volcanic debris flows (lahars) from Glacier Peak, and that large areas in the Skagit Valley may be susceptible to earthquake-induced liquefaction. STATEMAP products have also been used in eastern Washington, where mapping in the Spokane area has delineated the volume of the region's only water resource—the Spokane–Rathdrum aquifer—and exposed its vulnerability to contamination and depletion. As public awareness of the need for information about the natural environment has grown, the demand for good geologic maps has increased dramatically. The STATEMAP Program is an integral part of Washington State's ability to meet that demand.

April 2001

Association of American State Geologists

wvges
West Virginia Geological & Economic Survey

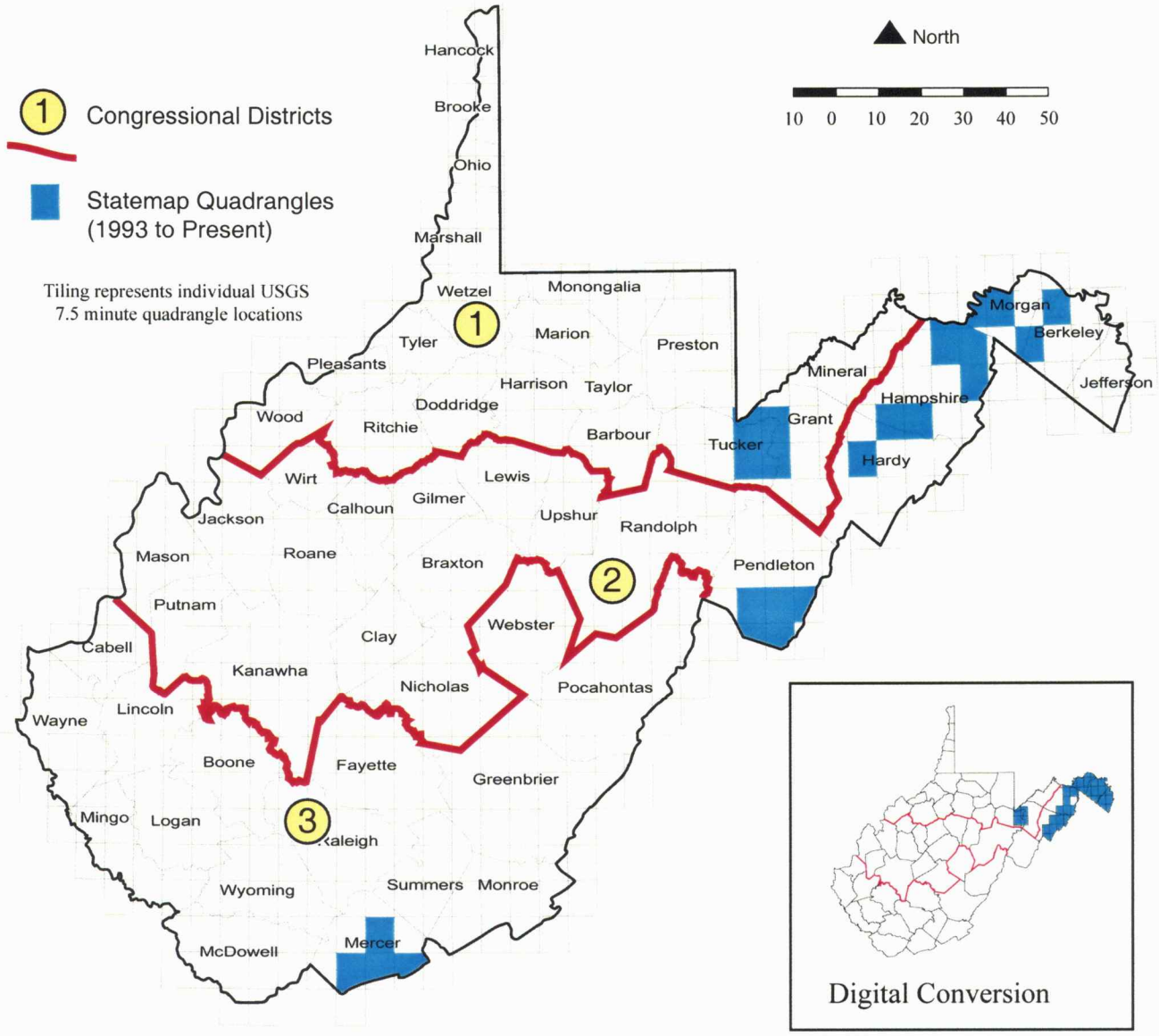
United States Geological Survey

USGS science for a changing world

National Cooperative Geologic Mapping Program

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

WEST VIRGINIA



Contact information

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U.S.G.S. Geologic Mapping Program Office
Program Coordinators: Peter T. Lyttle (703/648-6943)
Martha Garcia (703/648-6978)
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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN WEST VIRGINIA

Federal Fiscal Year	Project Title	Federal Dollars	State Dollars	Total Project Dollars
1993	Canaan Valley	$26,545	$23,167	$49,712
1994	Canaan Valley - Davis	40,987	23,000	63,987
1994	Big Pool/Glengary	40,836	30,000	70,836
1995	Canaan Valley - Mt. Storm	39,251	22,000	61,251
1996	Hagerstown/Frederick	12,435	10,210	22,645
1996	Great Cacapon/Paw Paw	70,394	50,000	120,394
1997	Blackbird Knob	33,529	24,675	58,204
1997	Largent/Levels	69,166	63,568	132,734
1997	Palo Alto	37,910	30,400	68,310
1997	Cumberland/Winchester	16,876	16,201	33,077
1998	Doe Hill/Sugar Grove	50,764	43,241	94,005
1998	Winchester/Front Royal	28,809	24,568	53,377
1999	Bluefield/Princeton	39,391	28,676	68,067
1999	Moatstown	32,618	26,996	59,614
1999	Capon Bridge/Rio	33,089	30,449	63,538
2000	Oakvale/Athens	25,603	25,603	51,206
2000	Sector/Moorefield	28,775	28,775	57,550
2000	Brandywine	15,622	15,622	31,244
	Totals	$642,600	$517,151	$1,159,751

The STATEMAP component of the National Cooperative Geologic Mapping Program has increased the availability of accurate and up-to-date geologic maps for the state of West Virginia. Using STATEMAP funds, the West Virginia Geological and Economic Survey has conducted geologic mapping in areas prioritized by the following criteria: infrastructure and economic development; high population growth; tourism and natural beauty; recreational use; environmental concerns; and significant water resources. Areas of significant coal resources are not ignored; they are mapped under the state-funded Mineral Lands Mapping Program. Users of our maps include planning commissions, state and Federal agencies, schools, companies, and private individuals.

Areas to be mapped in 2001/2002 have significant water resources. The areas of the Petersburg East/Rig and the Larona/Matoka mapping projects are ones of highway-building and economic development. The Petersburg East/Rig and Snowy Mountain/Spruce Knob/Monterey projects lie in areas of significant environmental concern, including geologic hazards.

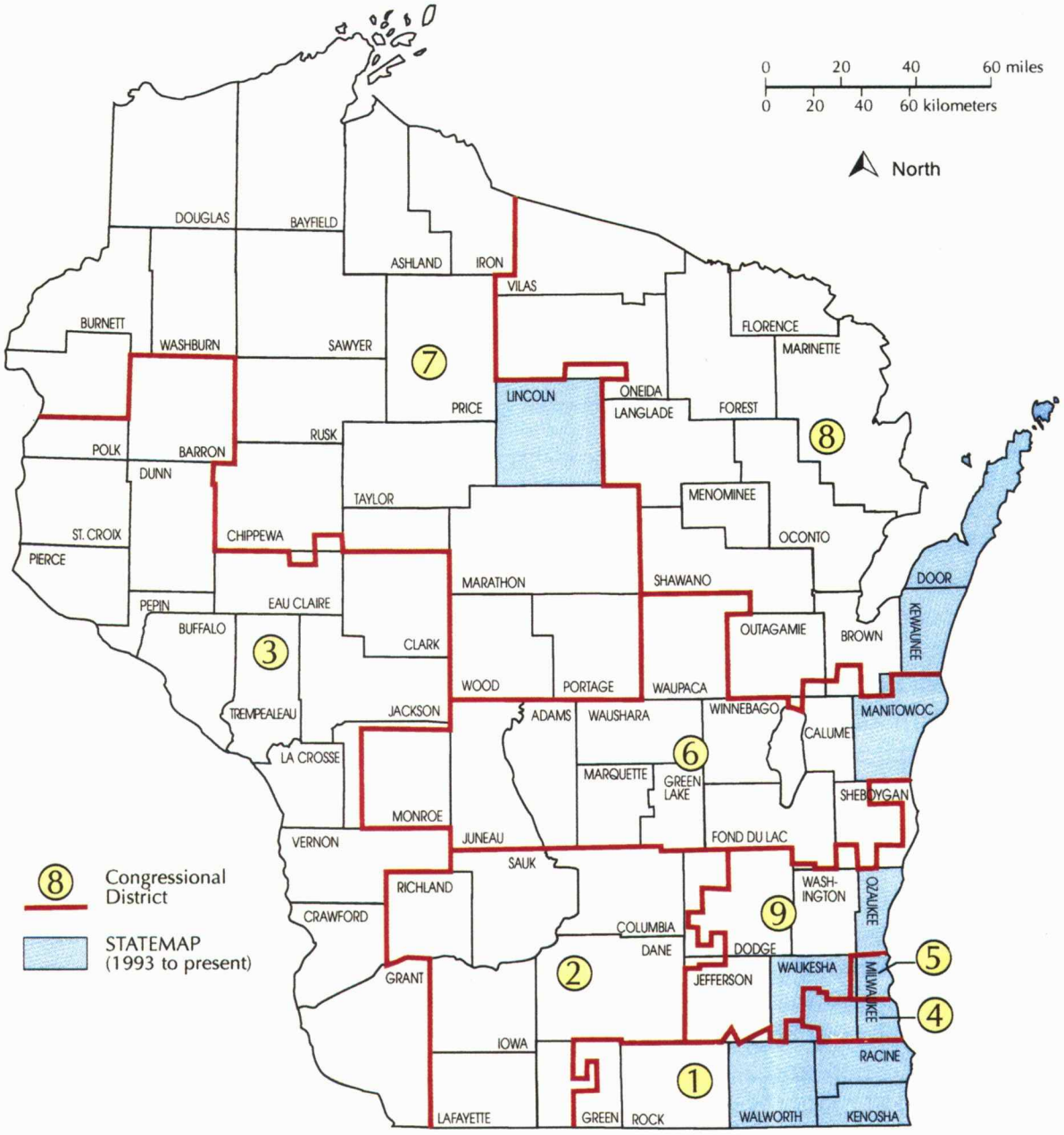
Association of American State Geologists

United States Geological Survey

National Cooperative Geologic Mapping Program

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

WISCONSIN



Contact information

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SUMMARY OF STATEMAP
GEOLOGIC MAPPING PROGRAM IN WISCONSIN

Federal Fiscal Year	Project Title Scale		State Dollars	Federal Dollars	Total Project Dollars
93	Pleistocene Geology of **Lincoln County**, 1:100,000		$ 54,786	$ 24,000	$ 78,786
94 95	Pleistocene Geology of **Walworth County**, 1:100,000	Year 1 Year 2	40,895 32,122	40,789 31,998	81,684 64,120
96 97	Quaternary Geology of **Manitowoc County**, 1:100,000	Year 1 Year 2	48,130 48,621	47,502 48,604	95,632 97,225
97 98	Quaternary Geology of **Kewaunee County**, 1:100,000	Year 1 Year 2	29,428 32,815	28,086 31,253	57,514 64,068
98 99 00	Paleozoic Geology of Part of the Eastern Wisconsin Urban Corridor, 1:100,000 **(Walworth, Racine, and Kenosha Counties)** **(Milwaukee, Waukesha Counties)** **(Ozaukee County)**	Year 1 Year 2 Year 3	52,889 65,360 30,352	51,877 59,574 32,581	104,766 124,934 62,933
99 00	Quaternary Geology of **Door County**, 1:100,000	Year 1 Year 2	56,199 53,554	54,445 46,848	110,644 100,402
		TOTALS	**$545,151**	**$497,557**	**$1,042,708**

The STATEMAP part of the National Cooperative Geologic Mapping Program (NCGMP) has significantly enhanced the Wisconsin Geological and Natural History Survey's (WGNHS) ability to produce new county geologic maps in Wisconsin. STATEMAP has, over the past seven years, helped support geologic mapping of glacial and/or bedrock materials in nine counties (Lincoln, Walworth, Racine, Kenosha, Manitowoc, Kewaunee, Waukesha, Milwaukee, and Door). This new geologic map information is regularly incorporated into decision making on a wide variety of local and county-wide issues that include protecting groundwater, locating new municipal wells, siting waste-disposal facilities, identifying potential aggregate resources, and addressing a broad spectrum of land-use concerns. The geologic maps are also used to develop educational materials on the state's glacial history and landscapes.

Recent geologic mapping of glacial materials and Paleozoic bedrock in the Southeastern Wisconsin Regional Planning Commission (SEWRPC) seven-county area is being used in a variety of ways in this rapidly urbanizing part of the state. For example, geologic mapping aids in the identification of supplies of non-metallic resources (sand, gravel, crushed stone, and dimension stone) that support urban and infrastructure construction. In addition, the geologic map information helps to constrain and calibrate a regional groundwater aquifer simulation model. This model, developed jointly by the WGNHS, U.S. Geological Survey–Water Resources Division, and the Wisconsin Department of Natural Resources, will simulate water levels and movement in shallow and deep aquifer systems in the region. Model results will support present and future regional groundwater and water-supply management planning efforts that directly address such issues as wellhead protection, the effect of land-use activities on groundwater, water conservation, groundwater recharge scenarios, the optimization of groundwater use, well interference, and the optimal location of new water-supply wells.

March 2001

Association of American State Geologists

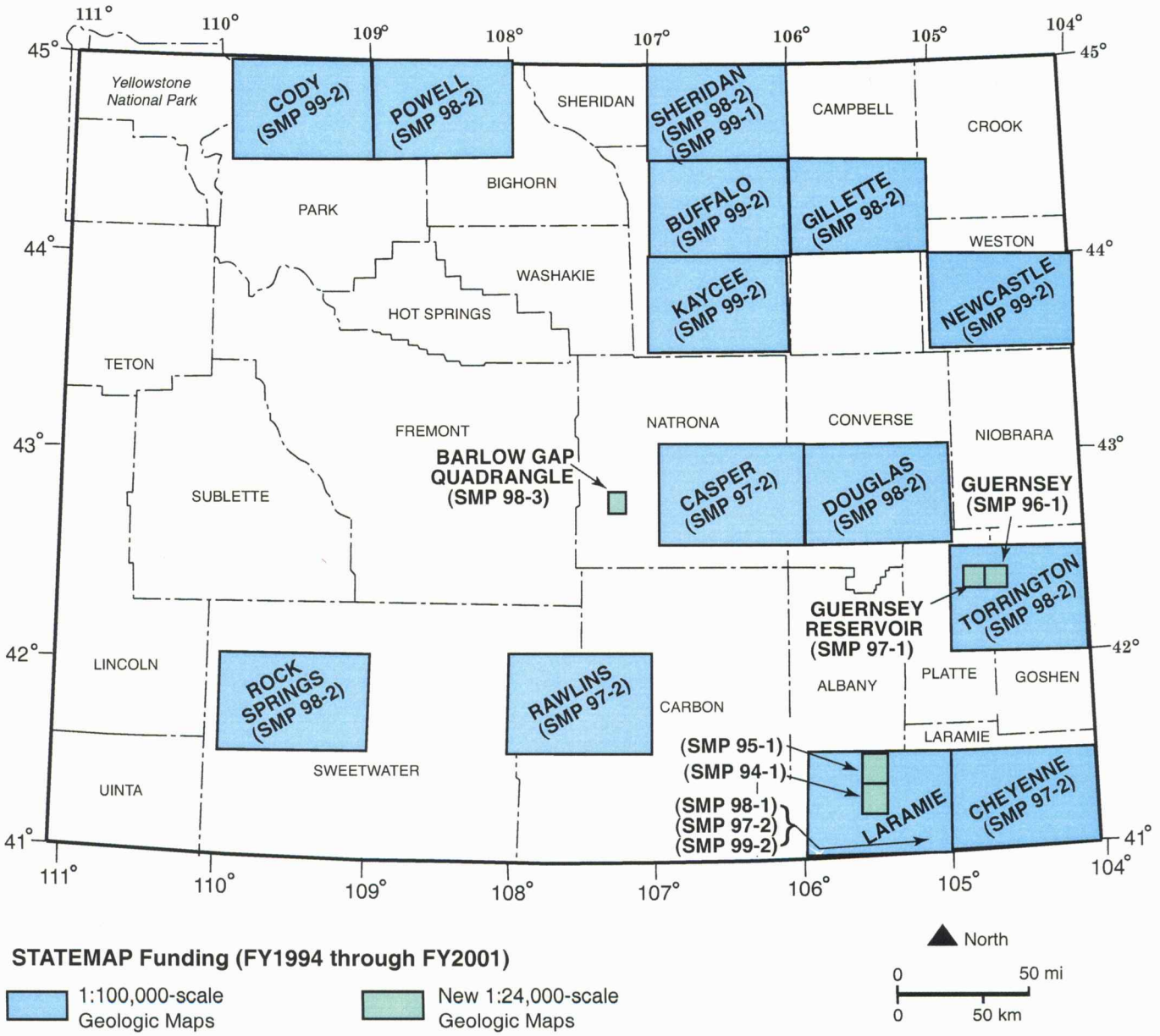
Wyoming State Geological Survey

United States Geological Survey

National Cooperative Geologic Mapping Program

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

WYOMING



Contact information

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SUMMARY OF STATEMAP GEOLOGIC MAPPING PROGRAM IN WYOMING

WY Fiscal Year	Project Description and Map Scale	State Dollars	Federal Dollars	Total Project Dollars
1995	Geologic map of the Laramie Quadrangle, 1:24,000-scale **STATEMAP94**	$12,000	$12,000	$24,000
1996	Geologic map of the Howell Quadrangle, 1:24,000-scale **STATEMAP95**	10,000	10,000	20,000
1997	Geologic map of the Guernsey Quadrangle, 1:24,000-scale **STATEMAP96**	8,499	8,499	16,998
1998	**1**-Geologic map of the Guernsey Reservoir Quadrangle, 1:24,000-scale **STATEMAP97**	14,000	14,000	28,000
	2-Digital geologic map of the Cheyenne Quadrangle and digital surficial geologic maps of the Casper, Cheyenne, Laramie, and Rawlins Quadrangles, 1:100,000-scale **STATEMAP97**	17,000	17,000	34,000
1999	**1**-Geologic map of the Laramie Quadrangle, 1:100,000-scale **STATEMAP98**	18,500	18,500	37,000
	2-Digital surficial geologic maps of the Douglas, Gillette, Powell, Rock Springs, Sheridan, and Torrington Quadrangles, 1:100,000-scale **STATEMAP98**	20,000	20,000	40,000
	3-Geologic map of the Barlow Gap Quadrangle, 1:24,000-scale **STATEMAP98**	18,650	18,650	37,300
2000	**1**-Geologic map of the Sheridan Quadrangle, 1:100,000-scale **STATEMAP99**	19,500	19,500	39,000
	2-Digital geologic map of the Laramie Quandrangle and digital surficial geologic maps of the Buffalo, Cody, Newcastle, Kaycee, and Worland Quadrangles, 1:100,000-scale **STATEMAP99**	20,000	20,000	40,000
2001	**1**-Geologic map of the Buffalo Quadrangle, 1:100,000-scale **STATEMAP00-in progress**	20,500	20,500	41,000
	2-Digital geologic map of the Sheridan Quandrangle and digital surficial geologic maps of the Basin, Lance, Lusk, and Sundance Quadrangles, 1:100,000-scale **STATEMAP00-in progress**	24,500	24,500	49,000
	TOTALS	**$203,149**	**$203,149**	**$406,298**

The STATEMAP Program, part of the National Cooperative Geologic Mapping Program (NCGMP), has significantly expanded and driven the mapping efforts of the Wyoming State Geological Survey (WSGS) over the past seven years. The WSGS completed 24 maps using funding from this program since it began involvement in 1994; an additional 11 maps were completed independent of the program's funding. Six additional maps are in progress with STATEMAP 2000 funding and STATEMAP 2001 will fund ($48,929) the mapping of one geologic map (Rattlesnake Hills Quadrangle) and the digitizing of four new geologic maps (Buffalo, Midwest, Casper, and Basin Quadrangles).

Current STATEMAP-supported mapping priorities established by the WSGS in cooperation with Wyoming Geologic Mapping Advisory Committee include: 1) producing geologic maps to support coalbed-methane exploration/production activities and associated ground- and surface-water protection needs in the Powder River Basin and 2) mapping the more populated areas of the state to provide assistance to city and county planners in siting and land-use planning, as well as providing information to support mineral- and water-resource development.

March 2001