

**Biennial Report of the Secretary of the Interior
on the
U.S. Geological Survey
National Cooperative Geologic Mapping Program's
Progress toward the
National Geologic Mapping Act**

**Presented to the
Committee on Energy and Natural Resources of the
United States Senate
and to the
Committee on Natural Resources of the
United States House of Representatives
2008**

INTRODUCTION

The Secretary of the Department of the Interior, acting through the Director of the U.S. Geological Survey (USGS), is required by the National Geologic Mapping Act (NGMA) (P.L. 102-285, 105-36, and 106-148) to submit a biennial report to the Senate Committee on Energy and Natural Resources and to the House Committee on Natural Resources. As required by the Act, this report addresses how the USGS and the Association of American State Geologists (AASG) (1) coordinate the development and implementation of the National Cooperative Geologic Mapping Program (NCGMP), (2) establish joint goals, mapping priorities, target dates for implementation of the NCGMP, and (3) identify how long-term staffing affects successful implementation of the NCGMP.

This report also responds to the findings and recommendations of the Annual Reports of the Federal Advisory Committee (FAC) of the NCGMP for the years 2006 and 2007. All recommendations of the FAC and future activities discussed in this report are subject to availability of funds and nothing in this report commits to activities inconsistent with Department of the Interior and USGS annual budget requests.

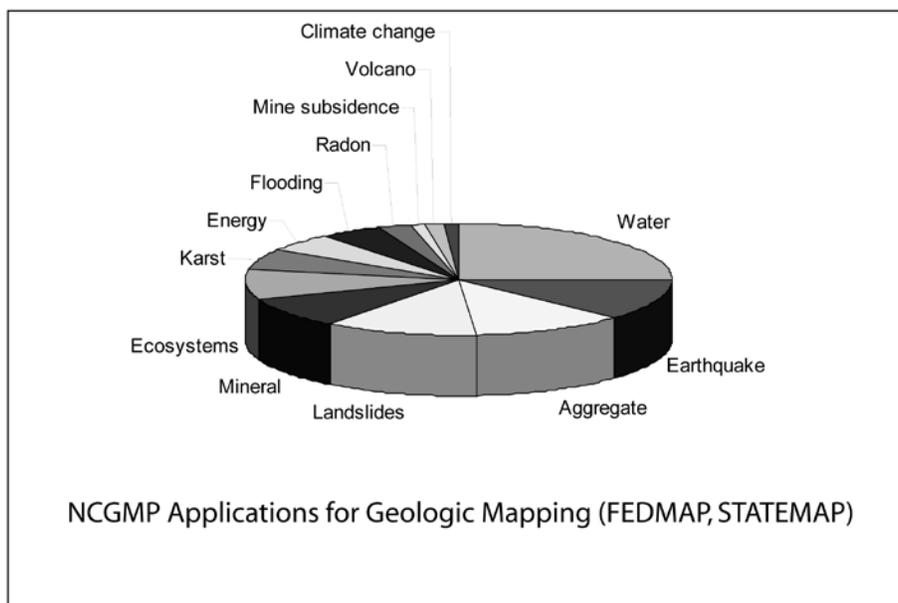
COORDINATION OF THE NCGMP

The Director of the USGS has been responsible for ongoing development of the NCGMP through cooperation with the USGS Associate Director for Geology, who serves as Chair of the Program's FAC, and the NCGMP Coordinator and Executive Secretary of the Committee. These USGS officials coordinate program development with the President and the Executive Committee of the AASG and with other Federal, State, and academic partners. This cooperation has led to the successful development of the NCGMP under the provisions of the NGMA. In addition, the Chief of the USGS National Geologic Map Database (NGMDB) Project and the Chair of the AASG Database Committee have continued to work together to coordinate the NGMDB. All of these individuals have worked with the Program's FAC to improve the operation of the NCGMP.

In addition, the USGS and the AASG hold meetings and workshops during each year where they discuss and coordinate pertinent geologic mapping activities of the States and the USGS. Recent issues include: further implementation of the National Geological and Geophysical Data Preservation Program (NGGDPP); reauthorization of the NGMA; implementation of FAC recommendations; implementation of the Federal Geographic Data Committee geologic map standard, a product of the NGMDB; and collaboration with other organizations such as the American Geological Institute, National Science Foundation, and representatives from private industry and academia, on geoscience workforce issues.

The USGS and the AASG also hold biennial liaison meetings every fall and spring in which members of the AASG Executive and Liaison Committees meet with USGS managers to discuss issues of mutual interest. Also, USGS-AASG collaboration goals were furthered during the 100th anniversary meeting of the AASG in June 2008 and a coordination committee between the two organizations was formed.

This degree of coordination and shared participation under the NGMA has resulted in an unusually strong and productive Federal-State-university partnership in geologic mapping. Since the authorization of the program in 1992, over 900,000 square miles of new geologic maps in high-priority areas were produced to address customer needs. More than \$74 million in State matching funds have been leveraged with Federal dollars for the STATEMAP component. The program responds to changing national needs: in 1987 geologic maps were primarily applied to energy and mineral resources, however by 2005 the emphasis had shifted significantly to meet customer needs related to water resources and urban development. See the following figure for the myriad current geologic mapping applications today.



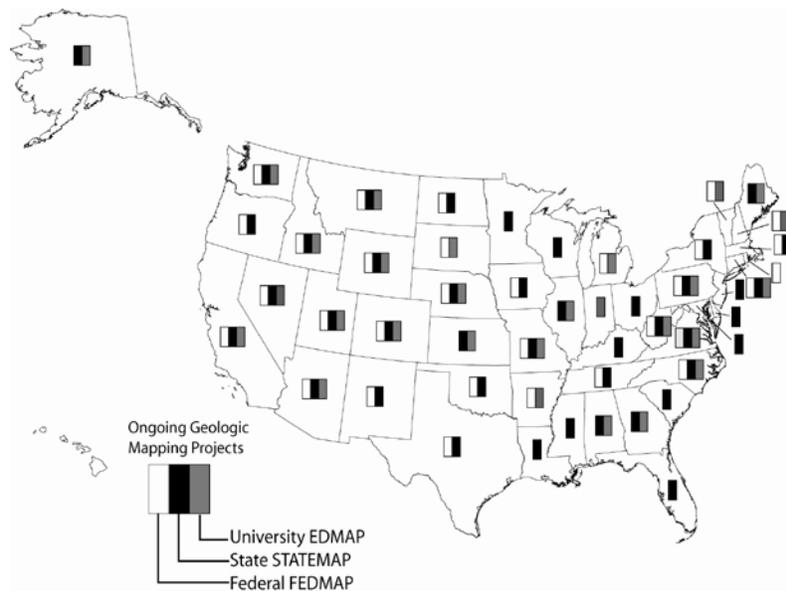
GOALS, PRIORITY SETTING, AND TARGET DATES FOR IMPLEMENTATION

Since its establishment in 1992, the NCGMP has experienced over a decade of successful cooperation among Federal, State, and university partners that strives to deliver modern digital geologic maps to the communities that need them. Each of these three partners has a distinctive role, yet all work cooperatively to produce new geologic maps.

In fiscal year (FY) 2008,

- Approximately 30 multi-year, Federal, geologic mapping projects are addressing issues that cross jurisdictional boundaries or involve Federal lands, developing new applications for geologic mapping, and continuing construction of the Internet-based NGMDB.
- Over 120 matching-fund STATEMAP geologic mapping projects are funded in 44 States.
- 55 university students at 35 schools in 23 States and the District of Columbia are being trained in geologic mapping through the matching-fund EDMAP component. These students join an increasing pool of trained geologic mappers to serve the geologic mapping needs of the future.

All geologic mapping projects must respond to customer needs, and priorities for these are determined through several mechanisms: the NCGMP FAC, State mapping advisory committees, and FEDMAP, STATEMAP, and EDMAP evaluation panels.



The Congress continues to work on a reauthorization of the NGMA that would prioritize funding for the STATEMAP and EDMAP components of the NCGMP, add a second representative from private industry and a representative from a Department of the Interior land management bureau to the Program's FAC, maintain the program's authorization level at \$64 million for 2009-2018, and extend the length of the reauthorization from 5 to 10 years.

LONG-TERM STAFFING

One of the most important issues in the future will be for the Nation to maintain adequate expertise to meet an increasing demand for geologic mapping. Commensurate with an increase in specialization and laboratory science, geology departments at most universities in the United States have decreased their field geology programs and training in geologic mapping. In addition, the National Science Foundation terminated funding for geologic mapping. To ensure that training in geologic mapping continues, the NGMA created a matching-fund grants program

with the Nation's universities. This program provides support to undergraduate and graduate students to conduct well-mentored geologic mapping. Since this program component was put in place in 1996, it has supported more than 700 students at 138 universities.

PROGRESS OF THE NCGMP

The NCGMP has continued to fund the production of geologic maps across the United States through its three components: FEDMAP, STATEMAP, and EDMAP. The program continually monitors and guides these components in an effective and efficient manner. Actions taken include:

FEDMAP Component

- The NCGMP has devised an effective method for using product information listed in USGS Budget and Science Information System Plus (BASIS+) to evaluate the ability of NCGMP-funded projects to meet their product delivery goals. Productivity is one of the most important criteria the program uses to evaluate and determine project funding.
- Each NCGMP-funded FEDMAP project must enter into its BASIS+ proposal a statement of how its research, publications, or maps have been used in the past year by customers, such as other Federal agencies, State or local governments, private industry, etc. Relevant product/publication citations are also listed.
- Each of the three regional USGS Earth Surface Processes Teams now provides annual lists of their published products to the NCGMP. This information is part of the Program's Government Performance and Results Act results and may be found in each year's USGS Budget Justifications and Performance Information (green book).

STATEMAP Component

- The NCGMP maintains up-to-date databases that track STATEMAP projects from initial application for funding to final submittal of products.
- NCGMP personnel continue field visits to ongoing STATEMAP projects to ensure consistency with program goals and quality of efforts.
- The STATEMAP panel ensures that the information in the NGMDB is up to date by including evaluation criteria requiring grants recipients to report on metadata.
- All STATEMAP proposals are required to include a statement of how their geologic maps have been used in the past year by customers.

EDMAP Component

- The NCGMP maintains up-to-date databases that track EDMAP projects from initial application for funding to final submittal of products.
- NCGMP personnel continue field visits to ongoing EDMAP projects to ensure consistency with program goals and quality of efforts.
- NCGMP tracks EDMAP students on an annual basis to gather information on the students' education, satisfaction with the EDMAP program, and how the experience has helped with their employment and career. It is clear from the responses that students who participate in EDMAP are well above the national average for continuing in the geoscience field.
- NCGMP personnel have taken a leadership role in increasing minority participation in field studies.

RESPONSE TO RECOMMENDATIONS OF THE FAC FROM THE 2006 AND 2007 MEETINGS

Progress on Recommendations from 2006 FAC report

Continuing progress was made by the program on several of the recommendations made by the FAC in its report for 2006:

1. Reauthorization and Funding for the NCGMP. The FAC recommends that reauthorization of the NCGMP be a high priority for the Department of the Interior, not only because the program products contribute to the public good but also because they are in great demand by other bureaus within the Department. Funding for the program should be increased from its current level of \$25.113 million to at least \$35 million per year.

Status: As of the date of this report, Congress has not reauthorized the NCGMP.

2. Legacy Products. For the purposes of this program, legacy work includes geologic maps that are incomplete but where most or all of the data have been collected and assembled. The FAC recommends that the USGS develop guidelines for inclusion of unpublished geologic maps as items in the NGMDB. In some cases, this may mean release of draft copies of maps (for public review); in other cases this may mean providing funding to complete USGS maps that are almost finished.

The FAC recommends that such legacy products be given high priority, as the cost for completing such maps is likely to be considerably less than the cost to create an entirely new map. The USGS should set priorities for which maps to complete first based on national needs that include priorities of other agencies within the Department of the Interior. The FAC is encouraged by the newly reestablished Bradley Scholar Program for USGS Scientists Emeriti, which is providing some funding for completion of legacy geologic maps.

The FAC recognizes that USGS geologic mappers work not only for the Earth Surface Processes Teams, whose funding comes primarily from the NCGMP, but also for USGS programs in Minerals, Energy, and Hazards (volcanoes, earthquakes, landslides), and other programs. The FAC recommends that the geologists in these other programs be included in the effort to dramatically increase the rate of publication of legacy maps.

Status: The NCGMP has developed a strategy for program-funded projects to complete legacy products. The FAC is pleased to note that the Program included a "Follow-up Action" in its PART (Program Assessment Rating Tool) Improvement Plan that states: "Develop plans for publishing NCGMP-funded legacy data." Two associated milestones were completed: (1) This goal has been met through discussions with the Team Chief Scientists of Earth Surface Processes Teams in all three regions of the USGS. A requirement was added to the Geologic Discipline Science Plan in the fiscal year (FY) 2008 cycle that asked each project to submit plans with appropriate budget identified to publish the highest priority legacy products. (2) In a memorandum dated June 27, 2008, to Project Chiefs and Project Scientists, the Program Coordinator issued the following

requirement: "The program continues to emphasize the publishing of legacy products. In the work plan, list high-priority legacy products as task products(s). If you are doing a legacy map, it must be an integral part of your project's plan and should be treated as any other product that takes time and money; this applies only to those products in which field work is complete."

3. Release of EDMAP Products. The FAC recommends that the USGS continue to move forward in the process to allow unpublished EDMAP products to be released through the NGMDB. The USGS has agreed to do this and will design a web-based form for use by professors and their graduate students in submitting a PDF or similar printable and viewable versions of their maps.

Status: The NCGMP has now instituted an annual process for choosing the best EDMAP products to put on the NGMDB Web site. Through time the majority of student mapping will be available in this manner.

4. Additional EDMAP Recommendations. On the basis of dialogue between the USGS and the academic community, the FAC recommends that the cap for EDMAP funding be kept at \$15,000 until funding for the NCGMP is raised significantly. The short-term goal is to raise the cap to \$20,000 per student and to increase the number of students funded through EDMAP. The FAC reiterates its 2005 recommendation that the USGS undertake a survey of employers of geologists to assess the need for geologic mappers. This information will be useful in setting goals for EDMAP funding in future authorizations of the program. The survey should include employers who produce geologic maps for the public, as well as those who create geologic maps for internal use.

Status: EDMAP funds will continue to have a \$15,000 cap until additional funds can be obtained. The NCGMP has met with the American Geological Institute on the issue of statistics on the future need for geologic mapping skills. As a follow up to this recommendation, the NCGMP met in March 2008 with representatives from private industry and academia. The NCGMP also participated in an international workshop on workforce issues led by the American Geological Institute as part of the 33rd International Geological Congress in Oslo, Norway, in August 2008. This workshop included private industry, geological surveys, and academia representatives from around the world.

5. Populating the NGMDB. The FAC recommends that the USGS encourage non-governmental organizations, including private companies and scientific societies that have geologic maps for sale, to submit information on their maps to the USGS NGMDB.

Status: Staff from the USGS NGMDB Program have been actively involved in obtaining this type of geologic map information and adding it to the NGMDB.

6. Prioritization of Funding for the NCGDPP. The FAC recommends that the USGS seek its advice in setting annual priorities for the data-preservation program. The USGS should engage geologists in the user community, perhaps at annual meetings of the leading societies whose members use geologic maps (Geological Society of America, American Association of Petroleum Geologists, American Institute of Professional Geologists, Society of Economic

Geologists, Association of Environmental and Engineering Geologists). The FAC further recommends that a peer-review process be used for the selection of specific projects in both the internal and external components of the data-preservation program.

Status: Proposals submitted by the State geological surveys for FY 2008 funding were reviewed by a peer review panel as indicated in the NCGDPP Implementation Plan. The panel consisted of representatives of State geological surveys, USGS, Department of the Interior, and outside organizations. The panel met for 3 days to review proposals. About a half day was spent discussing lessons learned – how to make the process better next year. In FY 2009, the USGS will implement most of the suggestions in FY 2009.

7. Operation of the FAC. The FAC requests that the USGS fund at least two meetings of the FAC per year. Each meeting should contain components of both the NCGMP and the NCGDPP. A review of metrics for the programs should be included annually to assist the FAC in reporting on progress of the programs. The USGS should include dialogue between the FAC and USGS geologic mappers, STATEMAP geologic mappers, and EDMAP professors and students on the agendas of some of its meetings each year.

Status: The NCGMP will fund more than one FAC meeting per year when it is deemed the most appropriate use of the FAC representatives' time and when pressing issues demand.

The FAC recommends that the USGS activate the two task forces mentioned in the 2005 report. First, a Task Force on Education and Awareness Issues should be charged with drafting recommendations for better ways of communicating the benefits of geologic mapping and the NCGMP and for assisting non-geologist users of geologic maps. Second, a Task Force on Legacy Maps should be charged with drafting recommendations for ways to rapidly publish maps in which field work has been entirely or partially completed but have not been through the peer review process for formal publication. These task forces may need to be creative in avoiding problems of giving the impression that these products carry the seal of approval of the USGS or State geological surveys.

Status: Although task forces were not used, NCGMP is pursuing ways to deliver legacy geologic map information. See response to Recommendation 2 above.

8. Rotation of Membership on the FAC. The FAC recommends the following regarding future membership and terms of office.

1. In general, all members of the FAC, except for those USGS representatives whose positions on the FAC are defined as their administrative roles within the USGS, should be limited to 5-year terms.
2. To encourage independence and high-quality representatives, the industry and academic representatives should be recommended by non-governmental organizations:
 - a. The Executive Committee of the American Institute of Professional Geologists will be asked to recommend representatives from private industry.
 - b. The Council of the Geological Society of America (GSA) will be asked to recommend representatives from academia.

Status: An initial academic nomination by the GSA was declined by the Department of the Interior. GSA was contacted to provide additional candidates. The NCGMP selected and has submitted the name of a qualified individual to the Secretary of the Interior for consideration.

3. For all Federal agency members, the USGS Director will ask Directors/Chiefs of the agencies for recommendations.

Status: Maintaining consistency with the 5-year term limit for FAC representatives established in 2006, U.S. Department of Agriculture (USDA) representative Carla Kertis attended her last NCGMP FAC meeting on November 1-2, 2007. Ms. Kertis received an appreciation award at the meeting for her part in advancing the cause of geologic mapping through service on the FAC. The USDA has recommended a new representative from that agency with the appropriate knowledge of geologic mapping. The NCGMP has submitted the name of this qualified individual to the Secretary of the Interior for consideration.

4. The Act already calls for the AASG to choose two State representatives.

Status: Maintaining consistency with the 5-year term limit for FAC representatives established in 2006, James Robertson attended his last NCGMP FAC meeting on November 1-2, 2007. Mr. Robertson received an appreciation award at the meeting for his part in advancing the cause of geologic mapping through service on the FAC. As established in the NGMA, the AASG was contacted for a nomination to fill this vacancy, and they selected the State Geologist of Maine, Robert Marvinney.

The FAC voted to endorse the FY 2008 technical assistance committee recommendations. The Committee requested to see the recommendations for FY 2009. The Committee also discussed how to develop best practices for data preservation. No recommendations came out of this discussion. Discussion to continue at the next meeting.

Progress on Recommendations from 2007 Annual Meeting

1. The Committee recommends that the NCGMP consider adding new types of representatives on the EDMAP panel to bring in new perspectives, particularly with regard to minority issues.

Status: The next EDMAP panel will be convened in January 2009. This recommendation will be considered when current representatives rotate off the panel.

2. The Committee recommends that the next FAC meeting focus on future workforce issues in the United States with regard to geologic mapping and Geographic Information Science skills. The format should be an open discussion about the issues. The NCGMP should invite knowledgeable individuals on this subject to attend the meeting.

Status: Complete. This recommendation was the focus of the March 2008 FAC meeting. In addition to FAC members, active participants included representatives from Federal (National Science Foundation, Forest Service, Department of Energy, Department of the

Interior), State, academia (schools specializing in geosciences, mining, natural sciences), private sector (Newmont Mining Corporation, ExxonMobile), and other organizations (American Geological Institute, American Institute of Professional Geologists).

3. The Committee recommends that the program, in cooperation with the American Geological Institute, write a paper about success of the EDMAP program.

Status: In progress: A related workshop, "The Future of the Geoscience Workforce--A Global Crisis?" was held at the 33rd International Geological Congress in Oslo, Norway, in August 2008. Results from the workshop will be included in the paper.

4. The Committee recommends that the NCGMP provide guidance in the next EDMAP request for a proposal to facilitate incorporation of EDMAP-produced geologic maps into the NGMDB.

Status: FY 2008 and FY 2009 EDMAP Requests for Proposals (RFP) contain guidance for incorporating EDMAP maps into the NGMDB and serving them via the Web.

5. The Committee recommends that there be additional emphasis on finding ways for EDMAP students to work together in the field for safety reasons. The GSA should be approached about the possibility of making a recommendation on this issue. At this time, the FAC limited its consideration to student safety.

Status: The GSA held an open forum at its national meeting to discuss this important issue and to raise awareness in the geoscience community. The EDMAP RFP encourages a "buddy system" by recommending that student assistants accompany the principal EDMAP student in the field.

6. The Committee recommends the NCGMP meet with the AASG Executive Committee to begin alignment of Federal initiatives, including research aimed at conducting a water census of the Nation. Following this, NCGMP should modify the STATEMAP-RFP to improve alignment between State and USGS geologic mapping projects in support of Federal initiatives that add funds to the NCGMP.

Status: Meetings held in March and June of 2008 addressed this recommendation. The 2009 RFP was modified to include water census guidance.

7. The Committee endorses the NCGDPP FY 2008 priorities for funding and requests that FY 2009 priorities also be presented to the FAC.

Status: FY 2009 priorities will be presented at the next FAC meeting/panel.

8. The Committee recommends that there be a FAC meeting to discuss future technologies for geologic mapping, including 3-D, 4-D, multiple dimensions, and framework studies done for broader applications. Both FEDMAP and STATEMAP should participate in this discussion.

9. The Committee recommends that there be more dialog on future ways to deliver and distribute geologic map data--add a day to Digital Mapping Techniques (DMT) meeting to discuss this. Perhaps have this presented at a GSA session.

10. The Committee recommends that its representatives be able to participate in the next DMT meeting in 2008.

Status: To address recommendations 8, 9, and 10, plans are in place for a joint DMT--FAC meeting to discuss future technologies. The meeting will be held in Morgantown, West Virginia, in May 2009.

11. The Committee recommends that program funding be boosted by at least \$10 million per year to keep pace with the demand for new geologic maps and digital, geographic information system versions of previously published geologic maps. Because geologic maps are used to understand and mitigate the effects of natural disasters (including floods, earthquakes, landslides, tsunamis, volcanoes, etc.), it would be appropriate that new funds provided for the USGS hazards initiative be shared with NCGMP.

Status: Progress on this recommendation is outside the direct control of the NCGMP. However, the FAC is pleased that the NCGMP continues to aggressively seek funding opportunities.

*****END*****