

# FGD newsletter

A Publication of the Federal Geographic Data Committee

## FGD Newsletter Information

### Purpose

The purpose of this newsletter is to establish a forum for the exchange of information of Federal geographic data activities for people who work with, use, or are simply interested in geographic data. It is your newsletter. Brief articles about the collection, storage, exchange, or application of geographic data are welcome. Please send typed, double-spaced material to the contact listed.

### Subscriptions

The newsletter is published several times a year. Copies and free subscriptions are available upon request. Simply fill out the form on the back of the newsletter and mail to the address given.

### Suggestions/Reprints

Material in this newsletter may be reprinted without permission; credit to the source, however, would be appreciated.

Suggestions for articles for future issues are welcome, and may be forwarded by using the Comments of the subscription form or by telephone.

Any use of trade names and trademarks in this newsletter is for identification purposes only and does not constitute endorsement by the Federal Government.

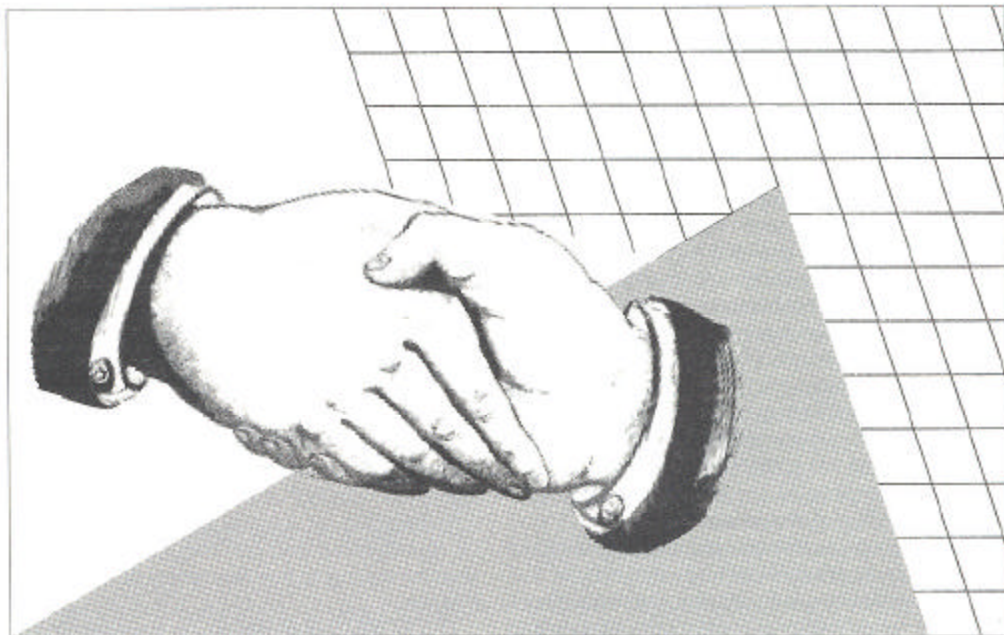
### Thanks for the Comments

Many excellent suggestions for future articles have been received.

Thanks for the suggestions. It's your newsletter, so write to us again.

Michael Domaratz  
590 National Center  
U.S. Geological Survey  
Reston, VA 22092  
703-648-4533; FTS 959-4533

## OMB Revises Circular A-16; Federal Geographic Data Committee Organized



On October 19, 1990, the Office of Management and Budget (OMB) issued the revised OMB Circular A-16, titled "Coordination of Surveying, Mapping, and Related Spatial Data Activities." The revised Circular establishes a new interagency coordinating committee, the Federal Geographic Data Committee (FGDC), which supersedes the Federal Interagency Coordinating Committee on Digital Cartography (FIC-CDC). The objective of the FGDC is to promote the coordinated development, use, sharing, and dissemination of surveying, mapping, and related spatial data.

The revised Circular also expands the breadth of coordination of spatial data and assigns governmentwide leadership roles to Federal departments for coordinating activities related to these data. The revised Circular was developed by the FICCDC in

response to an OMB request. The revised Circular defines spatial data as "geographically referenced features that are described by geographic positions and attributes in an analog and/or computer-readable (digital) form." For example, spatial data representing a building would identify a feature (the building) having a geographic position (longitude-latitude coordinates) and attributes (such as the name and the use of the building).

### The Federal Geographic Data Committee

The FGDC, according to Circular A-16, "supports surveying and mapping activities, aids geographic information systems use, and assists land managers, technical support organizations, and other users in meeting their program objectives through:

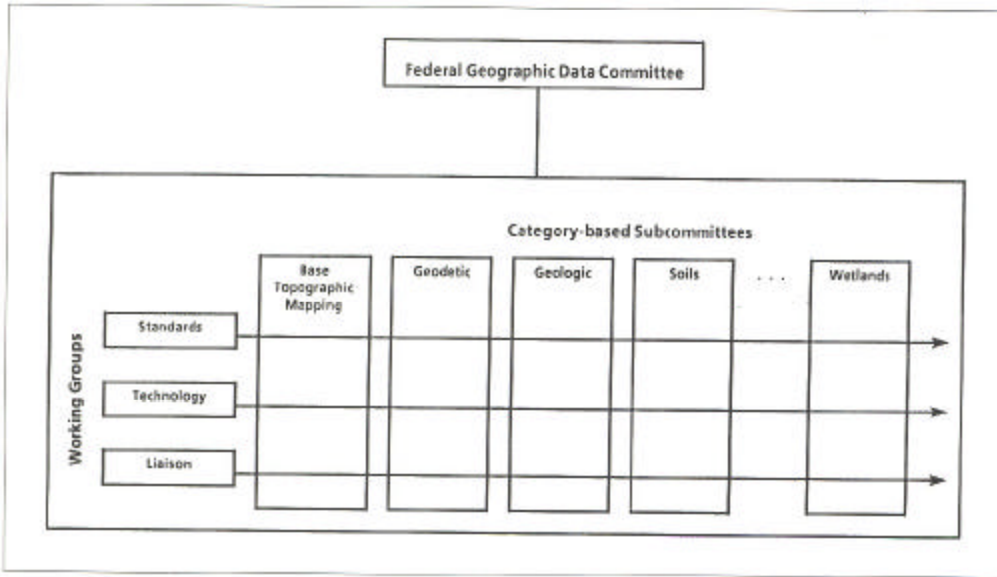


Figure 1. The structure of the Federal Geographic Data Committee. The Steering Committee guides and oversees the activities of the subcommittees and working groups. The subcommittees coordinate activities related to each spatial data category. The working groups deal with issues common to all spatial data categories and promote consistency among the subcommittees.

- Promoting the development, maintenance, and management of distributed data base systems that are national in scope for surveying, mapping, and related spatial data;
- Encouraging the development and implementation of standards, exchange formats, specifications, procedures, and guidelines;
- Promoting technology development, transfer, and exchange;
- Promoting interaction with other existing Federal coordinating activities that have interest in the generation, collection, use, and transfer of spatial data;
- Publishing periodic technical and management articles and reports;
- Performing special studies and providing special reports and briefings to OMB on major initiatives to facilitate understanding of the relationship of spatial data technologies with agency programs; and
- Ensuring that activities related to Circular A-16 support national security, national defense, and emergency preparedness programs."

Examples of FICCDC activities that will be continued and enhanced by the FGDC include: (1) developing a National Geographic Data System (a system of independently held and maintained Federal digital spatial data bases, linked by standards and criteria); (2) updating the FICCDC technical report, "A Process for Evaluating Geographic Information Systems;" and (3) continuing the inventory and producing a "Summary of GIS Use in the Federal Government."

The Circular names the Departments of Agriculture, Commerce, Defense, Energy, Housing and Urban Development, Interior, State, and Transportation; the Federal Emergency Management Agency; the Environmental Protection Agency; the National Aeronautics and Space Administration; and the National Archives and Records Administration as members of the FGDC. The Tennessee Valley Authority was admitted to the committee in April. The Department of the Interior chairs the FGDC. Other Federal departments and independent agencies with activities or interest in surveying, mapping, or related spatial data should be represented and can request membership by writing to the Secretary of the Interior.

The FGDC will establish, in consultation with other Federal agencies and appropriate organizations, the standards, procedures, interagency agreements, and other mechanisms to carry out its coordinating responsibilities. It may recommend to OMB additions to, revisions of, or deletions from Circular A-16 and supporting documents. Subcommittees, working groups, and advisory committees may be convened. The new subcommittees and working groups will build on coordinating mechanisms established under the previous version of the Circular and the FICCDC working groups (fig. 1).

The FGDC plans to establish subcommittees to coordinate activities and develop standards for the categories of data to be coordinated under the Circular. Each subcommittee will be chaired by a lead agency identified for the category. Membership will include at least all agencies that have program needs involving that category. There may be further subdivisions of these groups

to handle specific issues. As additional spatial data categories are identified, lead agencies will be designated and subcommittees will be established to develop standards and coordinate activities.

In addition, the FGDC will establish working groups to deal with issues common to all spatial data categories. Working groups have been established for three issues: standards, technology, and liaison with State and local governments, academia, and the private sector.

### Spatial Data Categories and Lead Agencies

Surveying, mapping, and related spatial data categories are characterized by spatial data that are a part of, or frequently analyzed with a reference to, the base topographic data and geodetic network of the Nation. These national spatial data categories are of interest to many agencies and will represent a substantial part of the national spatial geographic information resource.

The revised Circular expands the coordination to 10 categories of spatial data: base mapping and digital cartographic; cadastral; cultural and demographic; geodetic; geologic; ground transportation; certain international boundaries; soils; vegetation; and wetlands data. Most of these spatial data categories are collected, maintained, and disseminated under national programs established by law. The Circular also initiates coordination for other national spatial data categories for which there are broad interest and resources spent by FGDC-member departments and independent agencies.

The Circular assigns to the Departments of Agriculture, Commerce, Interior, State, and Transportation the responsibility to lead the coordination of these national spatial data categories. This responsibility includes facilitating the exchange of information and transferring of data; establishing and implementing standards of quality, content, and transfer capability; and coordinating the collection of spatial data to minimize duplication of effort. Each department has authority described in its mission or implied as part of its program responsibilities. The departments delegated this responsibility to the organizations listed in table 1.

This leadership will be carried out under the policy guidance and oversight of the new FGDC. Additional categories and lead agencies may be added by recommendation of the FGDC and concurrence of OMB.

**Table 1. Spatial data categories and lead agencies under the revised OMB Circular A-16.**

Category	Responsible Organization
Base Mapping and Digital Cartographic Data	National Mapping Division U.S. Geological Survey
Cadastral	Support Services Bureau of Land Management
Cultural and Demographic	Geography Division Bureau of the Census
Geodetic	Office of Charting and Geodetic Services National Oceanic and Atmospheric Administration
Geologic	Geologic Division U.S. Geological Survey
Ground Transportation	Highway Performance Analysis Branch Federal Highway Administration
International Boundaries	Cartographic Division Office of the Geographer
Soils	Soil Geography Program Soil Conservation Service
Vegetation	Forest Inventory, Economics, and Recreation Research Staff U.S. Forest Service
Wetlands	Fish and Wildlife Enhancement Directorate U.S. Fish and Wildlife Service

#### **Interaction with State and Local Governments and the Private Sector**

Another important focus of the FGDC will be to provide guidance and promote cooperation among Federal, State, and local government agencies and between the public and private sectors in the collecting, producing, and sharing of spatial data. Initially, a liaison working group will assess opportunities for coordination with non-Federal spatial data users. The objective is a partnership among the Federal, State, and local government agencies and the private sector in the development of a national spatial geographic data infrastructure.

#### **Interaction with Other Coordinating Mechanisms**

The revised Circular builds on the FICCDC and earlier versions of Circular A-16. The authors of the revised Circular recognized the existence of other coordination activities related to spatial data and avoided duplicating these efforts. The FGDC's coordination with these complementary coordinating mechanisms will ensure the compatibility of activities. Discussions with representatives of other coordinating groups have resulted in suggestions of joint technical meetings, close coordination among the committees' secretariats, and involvement of representatives of the coordinating groups at meetings.

*Source: Michael A. Domaratz  
FGDC Executive Secretary  
U.S. Geological Survey  
590 National Center  
Reston, VA 22092  
703-648-4533; FTS 959-4533*

## **Federal Geodetic Control Committee Coordinates Federal Geodetic Surveying**

The Department of Commerce's National Geodetic Survey (NGS) establishes and maintains the National Geodetic Reference System (NGRS), a network of monuments which resist movement and have known positions. The network, which incorporates highly accurate geodetic surveys, is used by engineers, surveyors, cartographers, planners, and others. The published positions of latitude, longitude, and height enable users to accurately locate their positions in reference to a specific point on the surface of the Earth. For example, the positions of these monuments on a map provide the base reference for the entire map. The absolute location of features on a map would be meaningless without reference to known positions of sufficient accuracy and density.

Guidelines for coordination of surveying, mapping, and related spatial data activities in the Federal Government have been established by the Office of Management and Budget (OMB) under Circular A-16. The Circular assigns to the Department of Commerce the responsibility to ensure that Federal surveys, as well as other geodetic surveys that may be of acceptable quality for inclusion in NGRS, are properly coordinated, planned, and executed. To assist the Federal Government in its surveying role, OMB organized the Federal Geodetic Control Committee (FGCC) in 1967. This committee provides leadership, coordination, and management of the national geodetic networks and dissemination of geodetic data to Federal, State, and local agencies, and the general surveying community.

#### **FGCC Activities**

The FGCC develops and publishes standards, specifications, and technical reports for producers and users of geodetic and related surveys. In addition, FGCC technical reports assess new geodetic instruments, procedures, and other technical information. Reports published by the FGCC include "Standards and Specifications for Geodetic Control Networks," "Geometric Geodetic Accuracy Standards and Specifications for Using GPS [Global Positioning Systems] Relative Positioning Techniques," and "Input Formats and Specifications of the National Geodetic Survey Data Base."

These publications discuss the national geodetic standards and specifications and explain how to meet the national geodetic accuracies established by the FGCC. The Input Formats document discusses the digital data formats for horizontal, vertical, and gravimetric data required for incorporation in the National Geodetic Survey integrated data base. A complete bibliography appears in table 2. Other publications listed in the bibliography cover tests and reports of instruments tested by the FGCC to assure compliance with manufacturers' accuracy statements.

Since 1981, the FGCC has published an annual Federal Survey Plan. This plan is the responsibility of the Geodetic Control Requirements and Plans Subcommittee of the FGCC. The plan describes both the major geodetic survey projects completed in the previous fiscal year and those planned for the current year by member agencies. Survey requirements, plans, and other information in this report allow for coordinated planning by Federal, State, and local agencies. This coordination reduces the potential for duplication of effort and enhances the opportunity for development of multipurpose surveying projects that contribute to the NGRS.

Tests of survey equipment are performed by the Instrument Subcommittee of the FGCC and made available to all member departments, eliminating the need for each agency to conduct individual tests. Tests have been completed on the following Global Positioning System equipment: Ashtech L-XII and LD-XII; IstaC 2002; Macrometer™ V1000; Mini-Mac™ 2816; Motorola Eagle; Norstar 1000; Sercel NR 52; Texas Instruments TI 4100; Trimble 4000S, 4000SX, 4000ST, and 4000SST; and Wild-Magnavox WM 101.

The Methodology Subcommittee is responsible for national geodetic standards and specifications. The Vertical Subcommittee has met extensively during the past year to discuss and define the North American Vertical Datum of 1988. A general adjustment has been completed. There are also two ad hoc subcommittees: the Multipurpose Cadastre Task Force and the Alaska Coordinating Subcommittee.

The FGCC recently published "Multipurpose Land Information Systems: The Guidebook." Section I has been released. It contains seven chapters; the first three contain introductory material on cartography, geographic information systems, and geodesy. The other four discuss land interests and boundaries, the Public Land Survey System, and why a multipurpose land information system should be established. Subsequent sections will focus on local government, how to implement a multipurpose land information system, and data automation. The Guidebook will contain detailed

---

**Table 2. FGCC bibliography.**

---

General

---

Office of Management and Budget, 1990: "Coordination of Surveying, Mapping, and Related Spatial Data," Circular A-16, Executive Office of the President, Washington, D.C.

Geodetical Info Magazine, March 1989, vol. 3, no. 3: Federal Geodetic Control Committee, p. 23.

Information Flyers of the National Geodetic Survey, April 1990.

National Research Council, 1980: Need For a Multipurpose Cadastre, National Academy Press, Washington, D.C.

---

FGCC Publications

---

Federal Survey Plan FY 1991, October 1990.

Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques, August 1, 1989.

Input Formats and Specifications of the National Geodetic Survey Data Base, Volume I, Horizontal Control Data, 1980, revised 1989.

Input Formats and Specifications of the National Geodetic Survey Data Base, Volume II, Vertical Control Data, 1980, reprinted 1982.

Input Formats and Specifications of the National Geodetic Survey Data Base, Volume III, Gravity Control Data, 1983, revised 1985.

Multipurpose Land Information Systems: The Guidebook, Chapters 1-3, 1989, Chapters 4-7, 1990.

Report on Test and Demonstration of Macrometer™, Model V-1000 Interferometric Surveyor, FGCC Report: FGCC-IS-83-2, May 1983.

Report on Test and Demonstration of Motorola Mini-Ranger Doppler Satellite Survey System, FGCC Report: FGCC-IS-83-1, December 1982.

Report on Test and Demonstration of GPS Satellite Survey Systems, FGCC Report: FGCC-IS-90-1, June 1990.

Specifications to Support Classification, Standards of Accuracy, and General Specifications of Geodetic Control Surveys, 1975, revised 1980.

Standards and Specifications for Geodetic Control Networks, 1985.

Test and Demonstration of Three Dual-Frequency (L1/L2) GPS Satellite Survey Systems, FGCC Report: FGCC-IS-90-2, June 1990.

Test and Evaluation of Total Station Instruments, FGCC Report: FGCC-IS-87-1, 1987.

The Use and Value of a Geodetic Reference System, 1984.

---

information for those planning, evaluating, and implementing land information systems at the county, State, or Federal levels. Principal contributors are from the Bureau of Land Management, the U. S. Geological Survey, the National Geodetic Survey, and the University of Wisconsin.

### FGCC Membership and Meetings

The members of the FGCC include the Federal Departments of Agriculture, Commerce, Defense (the Army Corps of Engineers and Defense Mapping Agency), Housing and Urban Development, Interior (the Bureau of Land Management and the U.S. Geological Survey), and Transportation (the U.S. Coast Guard and Federal Highway Administration); the International Boundary Commission; the National Aeronautics and Space Administration; and the Tennessee Valley Authority. The FGCC is chaired by the Director of the Office of Charting and Geodetic Services, National Ocean Service, National Oceanic and Atmospheric Administration. The position of FGCC Secretariat is filled by the Chief of the National Geodetic Survey's (NGS) Planning and Requirements Staff (NGS is a division within Charting and Geodetic Services). For information pertaining to FGCC membership, meetings, etc., call or write the FGCC Secretariat, N/CG1x5, Rockwall Building, Room 209, National Geodetic Survey, NOAA, Rockville, MD 20852; telephone: 301-443-8143.

The FGCC meets three or four times a year. A typical meeting may cover progress of projects and developments in technology, products, and services. Items discussed at the October 1990 FGCC meeting included the status of "Multipurpose Land Information Systems: The Guidebook," an update of new geodetic vertical datum activities; test results

of a new digital leveling instrument; pending legislation that could affect mapping, charting, and geodesy; and Global Positioning System activities by FGCC members.

### The Revised OMB Circular A-16

The revised Circular A-16 was issued October 19, 1990, in anticipation of a national digital spatial information resource involving Federal, State, and local governments and the private sector. The Circular was revised to enhance cooperation and efficient transfer of spatial data between producers and users. The FGCC's objective will continue to be to coordinate geodetic and related surveys among Federal agencies in order to facilitate cooperation and eliminate duplication in the collection of geodetic data.

### Additional Information

For further information on FGCC and available products and services, call or write the National Geodetic Information Center, N/CG174, Rockwall Building, Room 24, National Geodetic Survey, NOAA, Rockville, MD 20852; telephone: 301-443-8631.

The National Geodetic Information Center distributes information fliers listing FGCC products and services, as well as those pertaining to NGS activities. The Center's automatic mailing service ensures that updated and new product information is sent to interested users.

*Source: Pamela J. Fromhertz  
National Geodetic Survey Charting and  
Geodetic Services  
National Ocean Service  
National Oceanic and Atmospheric  
Administration  
Rockville, MD 20852  
301-443-8749*

## FICCDC Publishes Updated Summary of GIS Use in the Federal Government

In December 1990, the Federal Interagency Coordinating Committee on Digital Cartography (FICCDC) published an updated "Summary of GIS Use in the Federal Government." The summary, expanded from the 1988 edition, includes responses from 110 Federal organizations about their use of geographic information systems (GIS's). Of the 110 organizations responding to the survey, 95 reported that they now use GIS's or planned to use GIS's next year.

The summary contains information about the organizations' GIS activities, including primary applications of GIS's, GIS policies and guidelines, data categories used in GIS applications, data sources, data dissemination activities, cooperative activities, hardware and software used in GIS activities,

and GIS funding and expenditures. For the purposes of the summary, a GIS was defined as a computer hardware and software system designed to collect, manage, analyze, and display spatially referenced data. Automated map and chart production systems were excluded from the summary.

In addition to the survey results, the summary contains a list of individuals who may be contacted for further information about GIS activities in their agencies. To obtain a free copy of the summary, please complete the form on the last page of this newsletter and mail it to the address indicated.

*Source: Michael A. Domaratz  
FGDC Executive Secretary  
703-648-4533; FTS 959-4533*

## GIS's Assist Bureau of Reclamation Efforts

The U.S. Bureau of Reclamation's Mid-Pacific Region uses geographic information systems (GIS's) in a number of activities. The Bureau used viewsheds to predict the visual effects of development near California's New Melones Reservoir Recreation Area. The Bureau is also developing ways to transfer GIS data to Macintosh computers.

### Viewshed Analysis

Private property owners considered developing their land in the vicinity of the New Melones Reservoir Recreation Area near Modesto, California. The Sacramento District office of the Army Corps of Engineers (Corps) and the district U.S. Attorney were concerned that the proposed development would not be aesthetically compatible with the recreational uses of the reservoir area. They asked the Bureau's Mid-Pacific Region to develop a series of viewsheds showing some private property near the recreation area.

A viewshed illustrates a portion of the landscape that can be seen from a particular point. Viewsheds are calculated using elevation and other information about features that obstruct the view.

Contour elevation data from 1:24,000-scale U.S. Geological Survey (USGS) topographic maps for the study area were scanned and converted to vector form. The elevation data were transformed to a Triangulated Irregular Network (TIN) surface model.

Property lines were digitized from Corps maps. The property lines were collected as precisely as possible. Using both the legal description and Corps maps, decisions were made about which source would accurately represent the land areas in court. Other features such as the Public Land Survey System and roads were digitized from USGS topographic maps.

The planimetric data were "draped" onto the surface model. Views were generated from different altitudes and azimuths to determine the visibility of the target property from the New Melones Lake level. Viewshed visibility maps were created to support the TIN surface model. Other properties in the area were compared to demonstrate that the target property had the highest visibility in the recreation area.

The Corps was prepared to initiate property condemnation proceedings to avoid private development near the recreation area. The viewshed visibility maps helped clarify the surface model maps and permitted the parties to identify areas within the

property that could be developed without being seen from the recreation area. The Bureau of Reclamation's GIS capabilities were influential in reaching an out-of-court settlement.

### Transfer of Data to Macintosh Computers

Over the past years a wealth of data has been collected on agricultural drainage problems by the San Joaquin Valley Drainage Program. In this joint program of the Bureau of Reclamation, U.S. Geological Survey, U.S. Fish and Wildlife Service, California Department of Fish and Game, and California Department of Water Resources, the participants used GIS technology to develop strategies for coping with the drainage problems in the valley.

To make this information, including the GIS data, publicly available, the Bureau of Reclamation is transporting some of this information to Macintosh computers. The information will be available for use in libraries and by researchers.

The data are in an ARC/INFO GIS on a PRIME computer. Initially, INFO data base management system data files describing reports, GIS overlays, and portions of the final report were transferred into Hypercard on the Macintosh. For display purposes, some GIS data were transferred using the Geomancer program developed by the National Oceanic and Atmospheric Administration. Hypercard permits quick query and display of this material.

The user can peruse descriptions of drainage problems, including map display of key features; switch to the glossary for definitions of key terms; or search by subject for materials in the program's library. The program library will be operational on a Macintosh in the San Joaquin Valley Drainage Office and in Bureau of Reclamation's Mid-Pacific Regional Office's library.

Students did some of the data transfer and developed most of the graphic materials. Further development of two modules of this program is planned to make it more usable. The first module will allow users to identify and map areas with ground water quality problems. This capability includes planning a ground water quality survey and identifying potential problems based on existing ground water quality data and regulations. The second module will examine agricultural effects of the plan for a portion of the valley. The user will select from a variety of options and see the projected outcome.

*Sources: Mike Sebat, Tom Heinzer, Chuck Johnson, and Dave Hansen  
U.S. Bureau of Reclamation (MP-430)  
2800 Cottage Way  
Sacramento, CA 95825-1898  
916-978-5063; FTS 460-5063*

## Interagency Steering Committee Coordinates Development of Public Domain GIS Software

The Geographic Resources Analysis Support System (GRASS) is a public-domain geographic information system (GIS). A unique aspect of the software is the interagency committee that oversees its development. The GRASS Interagency Steering Committee provides for cooperative enhancement of GRASS and protects the investment of agencies that have contributed to GRASS development.

### Creation and Adoption of GRASS

GRASS was developed by the U.S. Army Construction Engineering Research Laboratory (USACERL). Initially, the focus of USACERL developers was to integrate and analyze spatial data from various sources to improve the process and results of environmental impact assessments. GRASS was first released in 1985 to three environmental offices on military installations and to several universities involved in the development of GRASS.

The first version of GRASS had limited functions, but offered an interesting set of data integration and raster analytical tools and was relatively easy to learn and modify. The source code was available and documented reasonably well. GRASS was designed to run under the UNIX operating systems but was not dependent on a particular manufacturer's hardware. This characteristic became increasingly important with the rapid emergence of UNIX-based engineering workstations. Other early enhancements to GRASS included functions to integrate commonly available digital spatial data (for example, U.S. Geological Survey Digital Elevation Model and Digital Line Graph data, Landsat Multi-Spectral Scanner and Thematic Mapper data, and Defense Mapping Agency digital elevation data); distributing sample data with the software for training purposes; capabilities to encode new data via vector digitizing; and friendly, easy-to-learn graphic display and hardcopy map creation functions. Support structures such as training courses, user meetings, a newsletter, and distribution and telephone assistance centers became increasingly available.

These factors attracted interest from the Federal and non-Federal communities. These groups were interested in geographic information systems, had tentative support and minimal funding from other elements within their agencies, and needed low-cost ways to pursue this technology. Examples of these groups include the Department of

Agriculture's Soil Conservation Service, the Department of the Interior's National Park Service, the U.S. Army, and the American Farmland Trust.

### The GRASS Interagency Steering Committee

USACERL researchers were pleased to encounter such interest, and, in 1985, invited representatives of these groups to a GRASS user meeting. Issues concerning the development plans for GRASS; the method by which other agencies work with USACERL in obtaining and using GRASS; the Army's ability to sustain funding for GRASS development; and how multiple agencies could coordinate their GRASS development efforts were discussed. The group established a steering committee, with representatives from each Federal agency with an interest in the GRASS software. Universities and the American Farmland Trust expressed interest in participating on the committee.

The committee might have seemed premature. The user community was minuscule, the software was limited, and no agency, including the Army, had adopted GRASS as prototype or standard. But interest in GIS was growing, GRASS was accessible, and USACERL developers were willing to enter a process through which many agencies could "own and grow with" this software. The first steering committee meeting, with USACERL as host, was convened in 1986.

The focus of the GRASS Interagency Steering Committee has remained simple: information sharing and coordination. Major committee goals include (1) maintaining GRASS as a single system, with a common version in use by all agencies; (2) developing and sustaining high standards for software performance and documentation; (3) leveraging resources of all agencies, whenever possible, to benefit all users; (4) developing user support services to ensure that GRASS, and related software systems, are fully supported; and (5) making GRASS accessible, both within participating agencies and to other potential users.

Federal agencies attending steering committee meetings have included the Soil Conservation Service; the Department of Commerce's National Oceanic and Atmospheric Administration and Bureau of the Census; the Department of the Interior's National Park Service and U.S. Geological Survey; the U.S. Army; the U.S. Navy; the Environmental Protection Agency; and the National Aeronautics and Space Administration. The number of participating universities and value-added vendors (now 15) has grown steadily, and representatives of these organizations also attend committee forums in advisory and information-sharing roles.

Initially, USACERL researchers continued to undertake all GRASS enhancements, and changes to the core of the software remain the responsibility of USACERL. GRASS programming expertise has developed in several agencies. These agencies concentrate on creating new tools using standard GRASS libraries, integrating GRASS with other software packages, developing and testing new user interfaces, and modifying the software for hardware or other requirements of the agencies. Except for modifications specific to agencies, these efforts are gathered into new releases and become available to the user community. There are many shared-funding arrangements for GRASS enhancements and support, but these have been accomplished largely through separate cooperative agreements, usually involving only two agencies.

Is the committee succeeding? In 1985 there were only a few GIS software packages, users, or successful applications. Most available GIS software packages required substantial hardware and software investments. To help develop GIS expertise in government agencies, academic institutions, and the private sector, efforts were needed to help make GIS technology more accessible.

USACERL and the GRASS Interagency Steering Committee have played an important part in this process. GRASS was an important resource for many Federal, academic, and private organizations to learn the basics of emerging GIS technology. Many early groups that tested GRASS are now centers of GIS expertise, offering years of experience that novices now seek.

Few early GRASS user sites have abandoned this software because GRASS has continued to improve and the steering committee has continued to establish a network of support services for GRASS users. The steering committee's and USACERL's willingness to make GRASS widely accessible and to continually invest in software improvements created an atmosphere of trust in a public-domain software system. Without the steering committee, organizations adopting GRASS would have gone along their own paths, modifying GRASS to meet their specific needs. Soon GRASS would have splintered into many incompatible versions with varying levels of (mostly insufficient) support and documentation.

This has not happened with GRASS. By now, there are hundreds of organizations that have GRASS source code. These organizations have not chosen to develop their own versions of GRASS, even though they could.

### Providing User and Developer Support

Initially, the GRASS Interagency Steering Committee was simply a forum for coordinat-

ing GRASS enhancements, avoiding costly work duplication, and sharing GIS implementation experiences between Federal agencies. As the capabilities and use of GRASS increased, so did the demand for new services. Each year the steering committee added new user services and new forums to help users and developers communicate with a growing user community. User services include conferences, newsletters and other publications, and other activities. In 1985, organizations began to take turns as host of the Annual GRASS GIS Users Conference. The conference emphasizes GRASS users and applications. The "GRASSClippings Newsletter" and GRASS Information Center were established in 1987. The newsletter provides information about upcoming meetings and software releases, a place for hardware and value-added vendors to advertise, and highlights of users' applications. The GRASS Information Center maintains the mailing list for the newsletter, gathers and distributes publications about GRASS, and provides a clearinghouse of information about training workshops, user services, hardware configuration options, and other items. The "GRASS Story Video," with a focus on U.S. Army installation applications, is an important resource for many elements of the user community. The National Park Service contributed concepts and footage to the video.

USACERL and Central Washington University published the "Problem Solving Manual," a "how to" manual to help users enter the complex realm of GIS analysis. This manual has been distributed throughout the GRASS user community. A "Directory of GRASS Related Products and Services" lists more than 50 organizations.

The steering committee encourages universities and private firms to offer GRASS training workshops and courses, and such other support services as software distribution and support. Initially, such services were limited, but dozens of organizations now offer GRASS support services. A documented sample data set is distributed with the GRASS software. These data, originally developed by the U.S. Geological Survey, are improved with each release of GRASS. These data are important in GRASS's role in making GIS technology more accessible because new sites are provided both software and data. This combination is particularly useful to academic institutions. The steering committee also offers technical support services for GRASS. In 1988, the committee developed standards for transporting and testing GRASS on new hardware platforms, and published documents describing both beta testing standards and benchmarks for comparing GRASS performance on different machines. The "Hardware Configuration Guide" identifies potential hardware platforms for GRASS and their "testing"

status. With the release of GRASS 3.0, USACERL fully documented the structure and functions of GRASS software. This "Programmer's Reference Manual" spawned GRASS development efforts at numerous new sites.

A section of "contributed" software was included as part of the GRASS 3.1 release. Authors and organizations contributing the software are acknowledged in both the code and documentation to encourage contributions and provide links between elements of the user community.

Finally, the steering committee resolves policy concerns. The "Policy and Procedures for GRASS Use and Distribution," formally adopted by the steering committee in 1989, broadened the opportunities for value-added resellers, and resulted in great growth in this community during 1990. The "GRASS Distribution Agreement," drafted and reviewed during 1990 and planned for implementation in 1991, provides a formal mechanism for organizations to enter into arrangements with the steering committee to distribute GRASS software.

### Future Challenges

The GRASS user community is growing rapidly, particularly outside the United States. Despite the new support structures, the rapid growth of the user community creates significant challenges to manage a publicly developed software product that has application in the public and private sectors. The most critical challenge is combining these pieces into a coherent whole. GRASS development is now occurring at so many sites that it is difficult to coordinate these efforts, integrate the contributed products, test the code on different machines, and generate new releases.

For example, the development of new capabilities to model hydrologic events is occurring at dozens of sites on several continents. Who keeps track of all these efforts, evaluates the various methods, ensures the code is compatible, reviews the documentation, finds and corrects errors, tests the code on different machines, and arranges for testing? This issue is now a major focus of the steering committee. A jointly funded Interagency GRASS Support Office has been proposed to handle coordination, testing, documentation, and software releases. Such an office, however, is several steps beyond an informal committee, sharing thoughts and needs. The initiation and operation of this office will raise the intensity of a very successful process of government agencies working together.

*Source: William D. Goran  
U.S. Army Construction Engineering  
Research Laboratory  
P.O. Box 4005  
Champaign, IL 61824-4005*

---

## FGDC Publications Request Form

If you are interested in subscribing to the newsletter or receiving other FGDC publications, please complete this form and return it to FGDC Publications, U.S. Geological Survey, 590 National Center, Reston, VA 22092.

Check all that apply:

- Add me to your mailing list
- Note my change of address
- Remove me from your mailing list
- Send me the publications checked below

### FDC Newsletters

- Newsletter #5
- Newsletter #6
- Newsletter #7
- Newsletter #8
- Newsletter #9
- Newsletter #10
- Newsletter #11
- Newsletter #12

### FICCDC Annual Reports to OMB

- 4th report—1986 Activities
- 6th report—1988 Activities
- 7th report—1989 Activities

### Other Reports

- 1988—A Process for Evaluating Geographic Information Systems
- 1989—Transcript of FICCDC Forum on Spatial Data Coordination
- 1990—A Summary of GIS Activities in the Federal Government

The Secretary of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department.

---

Name \_\_\_\_\_

---

Position \_\_\_\_\_ Organization \_\_\_\_\_

---

Street Address \_\_\_\_\_

---

City/State/Zip \_\_\_\_\_

---

Telephone \_\_\_\_\_

---

## Conferences

### July 29-August 2, 1991

International GPS/GIS Conference  
Big Sky, MT  
Contact: GPS/GIS Conference Coordinator  
GeoResearch, Inc.  
115 North Broadway  
Billings, MT 59101  
406-248-6711

### August 11-15, 1991

Urban and Regional Information Systems  
Association (URISA) Annual Conference  
San Francisco, CA  
Contact: Angela Ziesler  
URISA Secretariat  
900 Second Street, NE., Suite 304  
Washington, DC 20002  
202-289-1685

### September 15-18, 1991

First International Conference/Workshop on  
Integrating Geographic Information  
Systems and Environmental Modeling  
Boulder, CO  
Contact: GIS/Modeling Conference  
Secretariat  
NCGIA, University of California  
Santa Barbara, CA 93106  
805-893-8224

### September 22-25, 1991

National Computer Graphics Association  
GIS '91  
Denver, CO  
Contact: National Computer  
Graphics Association  
2722 Merrilee Drive, Suite 200  
Fairfax, VA 22031  
703-698-9600

---

U.S. Department of the Interior  
U.S. Geological Survey  
590 National Center  
Reston, VA 22092

Third Class Mail  
Postages & Fees  
PAID  
Geological Survey  
Permit No. G-23