General Statement

Science for a Changing World…embodies the character and role of the U.S. Geological Survey (USGS) as the provider of natural science for the Nation and the world. The USGS is the Nation's largest water, earth, and biological science and civilian mapping agency, working in cooperation with more than 2,000 organizations across the country and numerous international communities to provide reliable, impartial scientific information to resource managers, planners, and other customers.

This information, gathered in every State, is relevant to the Nation's well being and future ability to minimize the loss of life and property from natural disasters including volcanoes, earthquakes, geomagnetic storms, floods, hurricanes, landslides, wildfires and wildlife disease. USGS science programs help to avert the human and economic costs of natural disasters that kill hundreds of people and cost over $50 billion annually in the United States.

USGS biological, geological, hydrological, and mapping programs are essential to the effective stewardship of the Nation's cultural and natural resources, including the Department's management of about 450 million acres of Federal lands (about one-fifth of the total U.S. landmass) contained in national parks and preserves, national wildlife refuges, wilderness areas, wild and scenic rivers, and range lands, and about three billion acres of the Outer Continental Shelf.

Data collection and analytic capabilities of the USGS directly contribute to the conservation as well as economic and physical development of the Nation's natural resources. Other Federal agencies and State and local governments use USGS water, biological, energy and mineral resources information and capabilities to guide planning, management and regulatory programs.

The Strategic Plan…of the USGS has been refocused to be **customer driven**. Our commitment follows through in our budget and accompanying annual plan with increased emphasis on providing natural science data and research that meet the highest priority needs of our customers in fulfilling their missions. This focus strengthens our contribution to the resolution of complex issues and our tie to the outcomes achieved by our customers through science-based decisionmaking.

The USGS mission goals are directly linked to the Department of the Interior's (DOI) goal of "*Providing science for a changing world*," while also contributing to all of the other Departmental goals. The USGS mission is now clearly communicated through two bureau goals:

> **Environment and Natural Resources**…Provide science for a changing world in response to present and anticipated needs to expand our understanding of environmental and natural resource issues on regional, national, and global scales and enhance predictive/forecast modeling capabilities.

Hazards…Provide science for a changing world in response to present and anticipated needs, focusing efforts to predict and monitor hazardous events in near real time and real time and to conduct risk assessments to mitigate loss.

The contributions of each programmatic budget activity to achieving these mission goals are identified in each Activity Summary and discussed further in the FY 2000 Annual Plan.

Priorities — Environment and Natural Resources

Integrated Science

Integrated Science

$M	Budget Activity
15.0	DOI Science Priorities
2.4	Place-based Studies
17.4	Total FY 2000 Increase — Integrated Science

The House Science Committee of the 105th Congress, held a series of hearings and dialogues with scientists and citizens, and produced recommendations for a new national science policy. The study identified

> "New roles and responsibilities for science — While acknowledging the continuing need for science and engineering in national security, health, and the economy, the challenges we face today cause us to propose that the scientific and engineering enterprise ought to move towards center stage in a fourth role: that of helping society make good decisions. We believe this role for science will take on increasing importance, particularly as we face difficult decisions related to the environment. Accomplishing this goal will require, among other things, the development of research agendas aimed at analyzing and resolving contentious issues, and will demand closer coordination among scientists, engineers, and policymakers."

Similarly, House Report language accompanying the FY 1999 Appropriations states

> "The Committee supports the team approach that integrates all of the Survey's programs into one interdisciplinary science program designed to address major societal problems."

As the science bureau for DOI, and the only integrated natural resources research bureau in the Federal Government, the USGS has the capability to work hand-in-hand with land managers at the local, State and national level. The USGS staff of biologists, geographers, geologists, hydrologists, and other professionals bring multidisciplinary expertise to bear on solving today's problems and provide the knowledge to land managers to ensure that decisions that are made today will not have unintended consequences tomorrow.

The USGS has engaged the public, private, and academic sectors in dialogue to guide our efforts at integrating science and to develop our research agenda. In November 1998, the USGS, Ecological Society of America (ESA), and Geological Society of America (GSA) held a workshop on enhancing integrated science. The participants discussed the social, scientific, and administrative environments that lead to successful collaboration and integration,

produced an initial set of principles for integrating scientific efforts, and made recommendations for both the USGS and the larger scientific community to facilitate interdisciplinary work. Two previous workshops held by USGS, ESA, GSA, and the Keystone Center (a non-profit science and public policy and educational organization), identified new interdisciplinary research opportunities relevant to USGS mission.

The USGS is proposing an "Integrated Science" budget activity that will result in more efficient planning and operations for projects that benefit from the multidisciplinary science talents of the bureau. This new budget activity has two program components. "DOI Science Priorities" will focus on the high priority science needs of the Department's land management bureaus. "Place-based Studies" will focus on improving scientific understanding of complex, longstanding problems and providing scientific information in new, more comprehensive ways. This new budget activity will both facilitate the integration of activities, and provide the flexibility to shift emphasis and geographic location as customers' needs change.

DOI Science Priorities (+$15.0 million) — House Report language on the FY 1999 Appropriations states that

> "The Committee recognizes the growing need for high priority on-the-ground research for the National Park Service, Fish and Wildlife Service, and Bureau of Land Management. The Committee has provided additional resources to meet the growing demand for sound science on which to base resource management decisions. The Committee is concerned that the Bureaus in the Department have not been working with the Biological Resources Division to address their scientific needs. The Committee strongly encourages all of the bureaus to use the Biological Resources Division in carrying out the scientific responsibilities within their jurisdiction."

In *providing science for a changing world*, the Department has a planned outcome that resource managers will make decisions based on accurate, reliable, and impartial scientific information. One of the strategies to achieve this outcome is to ensure that the scientific research program focuses on understanding, assessing, and monitoring ecosystems to provide scientific understanding and technologies needed to support sound land and resource management.

In FY 2000, a DOI-wide process is being piloted with NPS, FWS, and BLM to assess the status of current science support, identify gaps and cross-bureau applications, formulate priorities for USGS research in support of land management needs and obtain land management bureau input for defining GPRA metrics and science outcomes. Current cooperative activities with DOI provide a $15 million base program ($9.5 million from Biological Research, $3.5 million from Water Resources Investigations, and $2.0 million from Geologic Hazards, Resources, and Processes) for which an augmentation of $15 million is being requested in the FY 2000 budget to fund the science needs that the land management bureaus prioritize through this process.

The request provides the first step in establishing a broad partnership with these Federal managers to enhance scientifically sound management of the lands and resources under their stewardship. The Directors of NPS, FWS, and BLM have identified their highest

priority needs for the integrated scientific capabilities of the USGS including: (1) formulation of strategies for ecosystem restoration; (2) establishment of ecosystem monitoring protocols; (3) assessment of rangeland and riparian health; (4) investigation and restoration of declining species and species at risk; (5) prediction and effects of invasive alien species; (6) Natural Resources Preservation Program tactical studies; and (7) assistance for making scientific data understandable to the public.

Place-Based Studies (+$2.4 million) — A General Accounting Office report released in January 1999, GAO/OCG-99-1 *Major Management Challenges and Program Risks — A Governmentwide Perspective*, cites the need for improved coordination in managing Federal lands. GAO states that the key challenge is reconciling administrative boundaries with natural system boundaries in planning how best to manage land use and assessing the cumulative impact of Federal and non-Federal activities on the environment. The report cites as an example

> "a widely recognized boundary of the Greater Yellowstone ecosystem encompasses all or part of seven national forests, two national parks, and three national wildlife refuges — most of which are covered by different plans."

This is precisely the type of challenge that USGS' integrated place-based science is poised to address, fostering collaborative decisionmaking among land management agencies. For the needs of Greater Yellowstone area, for example, USGS is conducting a pilot study to bring information into a common spatial framework (geographic information systems). By developing and sharing data resources with Federal and State agencies, information will be consistent and useful across ownership and management unit boundaries, and in a form that can be applied to management decisions concerning wildlife and its habitat, local zoning, geothermal and mineral resources, and natural hazards. Current integrated place-based studies in South Florida, San Francisco Bay, Chesapeake Bay, Greater Yellowstone, California Desert/Mojave, Platte River, Salton Sea provide a $15.3 million base for this program ($3.8 million from Biological Research, $5.6 million from Water Resources Investigations, and $3.2 million from Geologic Hazards, Resources, and Processes and $2.7 million from the National Mapping Program) for which an augmentation of $2.4 million is being requested in the FY 2000 budget. Scientific information provided by place-based studies can be used to guide land acquisition proposed in these areas under the Administration's Land Legacy initiative.

Of the $2.4 million increase requested, $1.3 million will augment current efforts in Yellowstone ($400,000), California Desert/Mojave ($500,000), and Platte River ($400,000). The remaining $1.1 million will support initiation of integrated place-based studies for the Great Lakes Region which includes nearly one-third of the Nation's population, about 50 percent of the Nation's heavy industry, and the bulk of one of the Nation's most important agricultural resource areas — the corn belt. Economically, the region accounts for about 56 percent, $180-200 billion, in trade between the United States and Canada. The Great Lakes Basin supplies the drinking water of 37 million people, and is responsible for a significant portion of $70 billion recreation and tourism industry of the Great Lakes States.

The EPA, FWS, NPS, the International Joint Commission, the Great Lakes Protection Fund, and Great Lake States have identified the need for integrated surficial geologic

maps, ground water source and availability data, and terrestrial and aquatic resource information to provide decision tools to resource managers. These tools are necessary to help managers determine water supply availability, protect groundwater resources, and restore coastal habitats in this highly populated and increasingly developed region. Partnerships with stakeholders, such as our geologic mapping partnerships with State Geologic Surveys, are central to the success of this integrated science program.

Community/Federal Information Partnership (C/FIP)

Community/Federal Information Partnerships

$M	Budget Activity
5.25	National Mapping Program
1.5	Geologic Hazards, Resources, & Processes
0.25	Water Resources Investigations
3.0	Biological Research
10.0	Total FY 2000 Increase — C/FIP

America's communities need spatially referenced environmental and natural resources data to make informed decisions that will ensure a high quality of life and a strong, sustainable economic growth. Through the Community/Federal Information Partnership effort, the USGS will work with State, local, and Tribal governments, the private sector, academia, and others to advance the abilities of communities to create and use spatially referenced data, and to improve the USGS's ability to provide spatially referenced earth science information through the National Spatial Data Infrastructure (NSDI). Additional information about the interagency C/FIP effort is available at **http://www.fgdc.gov/nsdi/docs/comfedip.html**; for more information on the NSDI, visit **http://www.fgdc.gov/nsdi/nsdi.html**.

A 1998 report by a panel of the National Academy of Public Administration, "*Geographic Information for the 21st Century: Building a Strategy for the Nation,"* endorses vigorous development of the NSDI to meet the Nation's needs for geospatial information. The House Appropriations Committee's report on the FY 1999 Appropriations Bill acknowledged the panel's report and its recommendations for development of NSDI. Regarding the entire range of services that have evolved in the geospatial arena, the Committee report states that

> "USGS is clearly the lead agency both within the Department, and among Federal, State, and local agencies and the private sector. The Committee endorses the idea of the National Spatial Data Infrastructure and expects the Survey to expand the partnerships and cooperation with State and local governments and the private sector to create an NSDI. "

The C/FIP program improves the USGS's ability to respond to the Committee's challenges. The FY 2000 budget includes an increase of $10.0 million for C/FIP. Of this amount, $6.7 million will be channeled through matching grants and other cooperative mechanisms to work with communities to develop spatially referenced earth and biological science data that benefit both communities and USGS programs, and to integrate these data into communities' decisionmaking processes. Such information is becoming an increasingly important tool in the effective resolution of growth debates in communities across the country.

C/FIP was developed with other Federal agencies, and was reviewed by State and local government organizations and others, through the Federal Geographic Data Committee (FGDC). The program will expand these activities:

- **Data**: The USGS will increase collaborative efforts with the public and private sectors to develop spatially referenced earth and biological science data. Explosive interest in these data provides opportunities to leverage Federal data investments, resulting in increased

and more current data coverage for both communities and Federal agencies. Cooperative development of common geographic data also aids collaborative decisionmaking for issues of interest to both communities and Federal agencies, and helps to bring Federal scientific data and expertise to bear on issues faced by communities. The Community/Federal Information Partnership provides resources needed to spur these cooperative efforts to develop these data and to improve the compatibility of data. The emphasis will be on geographic orthoimage, elevation, and hydrography data, and biological data needed for land management and surficial geologic data. In addition, USGS will work with others to develop and test standards for spatially referenced geologic and water data. These standards will increase the benefits of future investments by ensuring that data can be combined and reused by many organizations and for many applications.

- **Access**: Spatially referenced data held by the USGS can aid decisions regarding economic, social, and environmental issues facing the Nation. The FY 2000 budget increase will improve access to these data through the use of advanced Internet-based technologies and participation in the National Geospatial Data Clearinghouse. Communities, government, industry, and the public will be able to conduct Internet-based search, retrieval, and display of spatially referenced biologic, geographic, geologic, and remotely sensed data.

This program is part of the Administration's $39.5 million interagency Community/ Federal Information Partnership within the comprehensive Livable Communities Initiative. This FGDC-coordinated interagency effort is designed to make new information and tools readily available to communities. This effort also responds to the House Appropriations Committee FY 1999 report language which states

> "USGS should also continue to work within the Federal Geographic Data Committee (FGDC) to define better Federal agency roles and responsibilities for NSDI, including coordinated goals, performance measures, strategies, and budgets."

National Biological Information Infrastructure (NBII)

National Biological Information Infrastructure

$M	Budget Activity
1.0	Biological Research
1.0	Total FY 2000 Increase — NBII

The President's Committee of Advisors for Science and Technology (PCAST) is the highest level private sector science and technology advisory group for the President and National Science and Technology Council (NSTC). In their March, 1998, report entitled *"Teaming with Life: Investing in Science to Understand and Use America's Living Capital,"* PCAST acknowledges that

> "we are not able to formulate a strategy for the 21st Century that couples environmental well being with economic growth, in part because our knowledge of the environment and our skills at using data are not sufficiently developed."

Yet, the report goes on to say,

> "we have the technology to harness information theories and large capacity computational systems to develop a clear vision of the biological world and we have a wide array of tools that can help us explore environmental questions at variable scales, simultaneously."

In order to achieve the Nation's goals of enhancing human health and wealth and protecting natural resources, the PCAST panel recommends targeted investments including the application of leading-edge information science and technologies to electronically organize, interlink, and deliver information for use by all sectors of society.

The USGS FY 2000 budget requests a modest increase of $1.0 million to accelerate a broad cooperative effort to develop the National Biological Information Infrastructure. The increase will enlarge the amount of biological resource information that is available and accelerate efforts for the nationwide development and implementation of consistent data and standards that are necessary for the sharing and integration of information from these various sources. Funding will also be used to establish a set of interconnected regional nodes at major research institutions in order to connect to the public and private institutions that house this biological resources data. This targeted investment in improving the availability and accessibility of biological resources information complements the biological component of the NSDI C/FIP initiative which focuses on increasing availability and standardization of spatially referenced biological data, such as the distribution of a particular species. For more information on NBII, visit the web site at **http://www.nbii.gov/**.

Research and Monitoring of Amphibians as an Indicator Species

Amphibian Research & Monitoring

$M	Budget Activity
0.6	National Mapping Program
1.0	Water Resources Investigations
4.0	Biological Research
5.6	Total FY 2000 Increase — Amphibian Research

Amphibian declines world-wide remain unexplained. This was the conclusion of an international meeting of experts convened by the National Science Foundation in May 1998. Because amphibians may be good indicators of stress affecting ecosystems, the scope and severity of their decline is in urgent need of evaluation so that research can be focused on understanding the causes and proposing actions to correct them.

USGS scientists and their cooperators have been engaged in research on amphibian declines for more than a decade. USGS is uniquely qualified to lead a national amphibian monitoring program because its scientists have been in the forefront of tracking amphibian populations, developing sampling and monitoring protocols now used throughout the world, and conducting research designed to understand amphibian life history and potential causes of decline.

The FY 2000 budget request proposes a $5.6 million increase for amphibian research and monitoring. Current efforts will be expanded to create a coordinated, nation-wide monitoring program that will conduct statistically valid amphibian surveys on DOI lands. Activities will include compiling existing data and information on the distribution and abundance of amphibians and their habitats and conducting additional sampling to document status and to

forecast trends. Research will include the individual and combined impacts of various stressors such as contaminants, disease, global climate change, and the introduction of non-native species. The research program will complement the monitoring plan and will target those areas where declines are documented or suspected. Database management will be coordinated with the National Biological Information Infrastructure and the National Spatial Data Infrastructure using both a traditional printed format and electronic media.

DOI Environmental Crosscuts

Everglades Restoration — The DOI is leading an effort to protect and restore the South Florida ecosystem. Restoration and protection require scientific information on the history of changes to the environment, scientific understanding of how the ecosystem operates, and an ability to forecast what will happen under different management scenarios. USGS has worked closely with its scientific and management partners through the South Florida Ecosystem Restoration Task Force and associated groups to identify scientific needs, coordinate activities, and deliver relevant science for decisionmaking. Highly accurate elevation data are needed in hydrologic models to determine the direction of water flow under different management actions. South Florida bathymetry is among the systematic analyses and investigations that USGS is targeting for completion in FY 1999. Ecological and hydrologic models form the basis for decisions concerning the consequences of management modifications. USGS will continue development of these models in FY 1999, and the Florida ecosystem website (**http://sflwww.er.usgs.gov/**) will be improved. These improvements will include additional information on ecosystem history which will also provide a yardstick for determining the success of the restoration and a better understanding of the backdrop of natural variability, against which anthropogenic changes must be judged.

San Francisco Bay-Delta — As part of DOI's focus on San Francisco Bay-Delta and the CALFED process, the USGS has increased understanding and communicated scientific knowledge to our partners within the CALFED community and to the general public. CALFED is a consortium of Federal and State agencies with management and regulatory responsibilities in the Bay-Delta. A World Wide Web presentation (**http://sfbay.wr.usgs.gov/access/wqdata/**) which synthesizes decades of water quality data is now readily available for Bay modeling and forecast development. In FY 1999, a model based on river flow and simulating changes in the salt content of water in ecologically sensitive regions of the estuary (the X2 salinity standard) will be improved. The X2 standard was developed as part of a 1994 agreement between the EPA and California water agencies, water contractors, and environmental groups. The model can be used by CALFED partners to develop management strategies to meet this standard. A determination of bathymetric changes (since 1850) in San Pablo Bay is among the systematic analyses and investigations that USGS is targeting for completion in FY 1999. This information will provide a record of sedimentation and contamination from mining debris and industrial sources in Bay bottom sediments, needed for planning dredging and wetland restoration activities.

Forest Plan for the Pacific Northwest — USGS continues to play an important role in the development of research and monitoring programs associated with the Northwest Forest Plan. For example, the status and trends of northern spotted owls and Pacific salmon are being monitored through several demographic studies on BLM, USFS, and NPS lands in Washington, Oregon, and northern California. Information from forestry research is helping

BLM and other managers understand how to restore and maintain these complex forest ecosystems.

Wildland Fire — The challenge of managing wildland fire in the United States is increasing in complexity and magnitude. Catastrophic wildfire now threatens millions of wildland acres, after a century of suppression. The need to reintroduce wildland fire on an ecologically significant scale is the focus of the new Federal Wildland Fire Policy, established in 1995. At the direction of Congress, DOI and the USFS have prepared a joint Fire Sciences Plan to address: (1) comprehensive fire fuels mapping and inventory, (2) evaluation of treatment techniques (including ecological consequences), (3) long-term schedules that describe sequencing of pre- and post-burn treatments, and (4) establishing protocols to monitor and evaluate fuel treatment techniques. USGS collaborative fire research contributes strongly to the areas the Congress has identified as being of concern. Areas of emphasis are:

- Fire Behavior Modeling carried out in collaboration with the USFS, has improved existing fire behavior and fuel models to determine the most appropriate application of fire treatments and provide better predictive capability at larger spatial scales.
- Fire Effect/Fire Rehabilitation studies, carried out in collaboration with DOI land management agencies, have led to improved understanding of direct fire effects on ecosystems. Post-fire treatments can influence ecosystem response, particularly with regard to species at risk and increased vulnerability to invasive exotic species.
- Remote Sensing studies, carried out in collaboration with the USFS, are being used to assess vegetative conditions over large areas and may be used to assess fuel loading or to detect wildland fires and provide early warning of fire danger.

Other areas in which USGS has projects and capabilities include data management skills needed to set up comprehensive databases including fuels inventory, climate patterns, fire histories, species at risk, fire effects on resident wildlife species, habitat fragmentation and topographic features at a landscape scale. USGS conducts post-burn monitoring studies to evaluate the effectiveness of fire fuel/vegetation treatment techniques for habitat restoration and erosion control. Partners in these research activities include the USFS, and the academic community, in addition to the BLM, FWS, and the NPS.

Exotic Species — The cumulative number of intentional and unintentional introductions of exotic species has increased since European settlement, slowly at first, and rapidly during the past century. More than 6,000 species of non-native plants, animals, and microorganisms of foreign origin have established free-living populations in the United States. Some, like the kudzu, zebra mussel, and the chestnut blight, have become invasive and caused severe harm to native species and the economic productivity of natural resources. Many species (e.g., most trees and shrubs) have long lag times, and some species that initially escaped many decades ago are only now becoming widely invasive in natural ecosystems. Pathways for introduction and spread are diversifying along with increasing travel and global commerce. Most U.S. ecosystems contain many exotic species. The impacts of invasions are especially severe in western rangelands, tropical islands (e.g., Hawaii, Guam), in Florida and California, and many wetlands, riparian areas, and aquatic ecosystems, including the Great Lakes. Because information on exotic species is often anecdotal and not readily available to potential users, there is an urgent need to develop Internet-based capabilities to locate sources of information and to integrate information from many sources in ways that support management action.

In 1998, the President's Council of Advisors on Science and Technology (PCAST) identified invasive species for priority attention in an expanded national effort to understand and manage America's living capital. In February 1999, President Clinton signed an Executive Order that underscores the urgency of the threat, sets forth Federal agency responsibilities, establishes a national invasive species council, and calls for a national plan to address the problem. To support an effective response, increased research is needed to understand factors that determine species invasiveness and factors that influence the vulnerability of habitats to invasions. Research is also needed to develop integrated, cost-effective approaches for reducing the impacts of invasive species and restoring native species and ecosystem functions.

Most previous Federal research has focused on a few dozen highly invasive species that cause significant economic impacts. Research has often been initiated after the invader is so widespread that developing cost-effective controls is problematic. To help address invasions at an early stage when effective control or eradication is often possible, improved methods are needed for early detection, coordinated reporting, and reliable monitoring of invasions in U.S. ecosystems, as well as for predicting future risks of invasions in particular habitats. The Committee on Environment and Natural Resources has recognized these research needs in a broad interagency proposal for integrating the scientific and technological capabilities of USGS and other agencies in addressing the effects of interacting stresses on U.S. ecosystems.

Priorities — Hazards

In the United States, natural disasters kill hundreds of people and result in economic losses averaging in excess of $50 billion each year. Some of the largest recent events are Hurricane Andrew, which in 1992 killed 58 people and inflicted losses of $30 billion; the 1993 Midwest floods, which caused 48 deaths and $20 billion in damages; and the Northridge earthquake, which struck the Los Angeles area in January 1994, killing 57 and inflicting losses estimated at $40 billion. A steady stream of less costly but still devastating events makes headlines every month, reporting the enormous social and economic burden that will increase as the population of the United States continues to grow in hazard-prone areas such as coastal and mountainous regions. The toll of future disasters will accelerate as urbanization and technological advances produce more tightly integrated infrastructures to support society's needs for power supplies, communications, transportation, and drinking water.

The DOI, and USGS in particular, has a major role in the Federal response to natural disasters. The USGS has the primary Federal responsibility for monitoring and issuing warnings for earthquakes, volcanoes, landslides, and geomagnetic (solar) storms. The USGS works closely with the National Weather Service in providing hydrologic information that is used to forecast floods; the National Oceanic and Atmospheric Administration in monitoring coastal erosion and tsunamis; the Interagency Fire Center, in support of wildland fire management activities; and the FWS and others in monitoring and reporting on wildlife disease outbreaks. The USGS has unique capabilities for the integration of hazards information with a wealth of other geospatial data and imagery to rapidly assess the impact of natural hazards events.

Real-Time Hazards

The Administration's Natural Disaster Reduction Initiative is a $250 million priority being coordinated by the National Science and Technology Council (NSTC). With funding received in FY 1999, several agencies have begun to implement the initiative. USGS received encouragement from Congress to seek funding in FY 2000. The House Appropriations Committee stated that

> "The Committee believes that the Survey's highest hazards-related priority should be to continue to upgrade its various hazards monitoring networks to acquire quality hazards information."

Real-Time Hazards

$M	Budget Activity
0.45	National Mapping Program
2.0	Geologic Hazards, Resources, & Processes
3.0	Water Resources Investigations
5.45	Total FY 2000 Increase — Real Time Hazards Warning

The Committee encouraged USGS to refine our real-time hazards proposal which we have done in the intervening year. Our FY 2000 request is aligned with complementary budget requests from the National Oceanic and Atmospheric Administration and other Federal agencies under the leadership of NSTC and includes:

- **Center for the Integration of Natural Disaster Information (+$0.45 million)**— USGS will develop the analytical and data integration capabilities of the new Center for Integration of Natural Disaster Information, and will expand the hazards databases. The enhanced capabilities of the Center will enable the USGS to integrate a wide range of hazards-related information in near real-time, in support of all hazards response activities. These enhanced capabilities will also be used to construct predictive models in support of mitigation and planning to reduce future loss of life and property.

Hurricane Mitch, the most destructive hurricane in the history of the western hemisphere, battered the Caribbean coast and Central America from October 27 through November 1, 1998. USGS joined the humanitarian effort organized by the U.S. government to provide assistance and within days of the event had created a digital atlas communicating more than 60 different types of geospatial information in a form that can be manipulated for analysis. The new maps showed the locations of landslides and floods, damage to roads, bridges, and other infrastructure, precipitation information, and impacts on agricultural lands. The information was extracted from satellite images, existing geologic maps, aerial photographs, and dozens of other digital and paper sources. This integrated information will continue to be critical for allocating resources in the short-term relief effort, for understanding the disaster's long-term impact on ecosystems, and for planning the region's economic recovery and reconstruction.

- **Earthquake Hazards (+$1.6 million)** — In the minutes following a damaging earthquake, Federal, State and local emergency program managers need accurate maps showing the severity and geographic distribution of strong ground shaking. This information is also needed by the managers of transportation systems and utilities, public service providers and the public. This proposed increased funding will increase from 20 to 100 the number of earthquake sensors that can be purchased and installed in FY 2000.

> ***A Plan for Implementing a Real-Time Seismic Hazard Warning System,*** approved by the Department and OMB, identified the need for installing a total of 840 strong motion sensors to support early alerts that can help to minimize the loss of life and property in the event of an earthquake.

- **Flood Hazards (+$3.0 million)** — A new evaluation of the USGS streamgaging network was recently conducted. A report of the results was provided to Congress, as requested in the FY 1999 House Appropriations Committee report, and is available at **http://water.usgs.gov/streamgaging/** This evaluation provides the foundation for continued development of the network. With the requested increase, the USGS will purchase and install new and upgraded stream gaging telemetry for a total of 250 gaging stations (an increase of 150 from the annual rate of 100 new or upgraded gaging stations), in support of high-priority river forecasting locations selected in consultation with the National Weather Service. In addition, USGS will purchase new velocity sensing equipment for an additional 5 gaging locations on rivers where conventional techniques do not provide timely and reliable flood-flow information, and will enhance our ability to estimate streamflow from water levels at 50 gaging stations where existing ratings do not permit accurate forecasting of extreme floods. We will reactivate discontinued stations or strengthen existing stations at 10 vital locations.

> ***Customer Comment***
>
> "Your site has been the best source of river information we have ever been able to obtain to make rescue and evacuation decisions...Your work and site is much appreciated and invaluable to us!!! Thanks from the citizens in Hays County." (Emergency Management Official, Texas)

- **Geomagnetic (Solar) Storms (+$0.4 million)** — The USGS operates 13 magnetic observatories that monitor short and long-term variations in the Earth's magnetic field. The next maximum in the 11-year solar sunspot cycle will be in 2000-2001, and will produce strong short-term variations in the earth's magnetic field in the form of geomagnetic or solar storms. These storms induce strong, spurious electrical currents in power grids, disrupt communications and navigation systems, and can damage or destroy satellites. The USGS will modernize three observatories, expand telemetry links and increase data processing capability to provide real-time data to users, including the airlines industry and the U.S. Air Force.

Disaster Information Network (DIN)

Disaster Information Network

$M	Budget Activity
8.0	National Mapping Program
8.0	Total FY 2000 Increase — Disaster Information Network

The FY 1999 House Appropriations Committee report, in response to our request for funding this effort, stated

> "The Committee believes that the Administration's proposed Disaster Information Network (DIN) shows some merit in that it would help create a single source of disaster information readily available to a wide range of users. The Survey has a critical role in providing disaster related information for specific hazards, such as earthquakes, landslides, and floods. However, the government-wide integration of disaster information is not the Survey's primary role. The Federal Emergency Management Agency, with direct responsibility over disaster response, is the more appropriate umbrella agency for this proposal, not the Survey."

A National Research Council review of the DIN program, *Reducing Disaster Losses through Better Information*, published in 1999 strongly endorses the advancement of the concept for an improved information system to save lives and reduce losses related to natural disasters. Among their findings, they state that

> "At present several federal agencies and other organizations perform a variety of functions relevant to development and communication of information about natural disasters....
>
> The inability to access information and the lack of standardization, coordination, and communication are all obstacles that need to be overcome...
>
> in developing the information there is a need to integrate data across many disciplines, organizations, and geographical regions."

The USGS believes that we do have a significant, appropriate, demonstrated contribution to offer in the resolution of these issues and in support of the multiagency effort to establish a robust, integrated disaster information network by virtue of

- our Hazards mission goal as stated on page 1,
- our critical role in providing disaster related information for specific hazards, such as earthquakes, volcanoes, landslides, and floods,
- our expertise and lead responsibility for geospatial information services among Federal, State, and local agencies and the private sector,
- our multidisciplinary expertise and strength in integration of scientific data for problem solving,
- our customer-driven focus, and
- our presence in every State, U.S. territory, and Puerto Rico.

A preview of what could be achieved more efficiently and expeditiously with this initiative in place was demonstrated by our Center for Integration of Natural Disaster Information (CINDI) in response to Hurricane Mitch. CINDI is a research facility to develop advanced methods for

disaster data gathering, integration, and dissemination. CINDI was pressed into operational activities during the emergency that accompanied Hurricane Mitch. While the results of our efforts were well received by the other Federal agencies and the governments of the countries affected, the effort showed the critical need to have common data format standards, various protocols, and a more streamlined system in place for gathering, processing, and distributing critical hazards data to the disaster managers. The disaster environment is inherently chaotic and lines of communication are stressed beyond normal limits, and often broken, at a time when efficient effective communication is essential to saving lives and property. DIN would be the operational network with standards and protocols in place for all phases of disaster management.

Therefore, the FY 2000 budget requests $8.0 million for the Disaster Information Network (DIN). The DIN request and Real Time Hazards request, taken in tandem, represent a comprehensive strategy for improved disaster mitigation and recovery. It incorporates both a state-of-the-art disaster monitoring and detection component and an advanced, integrated, and coordinated communications link among the sources of disaster information and the users of that information to ensure access during all phases of disaster management.

Administrative Priorities

Maintenance/Capital Improvement (+$1.5 million)

The Conference Report on the FY 1999 Omnibus Appropriation states

> "The Committees understand that the maintenance needs of the Survey are being included as part of the Department's 5-year maintenance planning effort and encourage the Survey to reflect these needs in future budget requests."

The USGS has developed a Five-Year Deferred Maintenance and Capital Improvement Plan as part of the Department of the Interior's efforts to improve its infrastructure. We conducted a detailed inventory of our facilities and equipment needs based on the Department of the Interior's standards and criteria. These projects have been ranked with critical health and safety and critical resource protection as the highest priorities. The FY 2000 Budget requests a $1.5 million increase as the first step in correcting the USGS' highest priority deferred maintenance and capital improvement projects included in the Plan as well as beginning a cycle of condition assessments and development of a maintenance management system that has elements in common with those of the land management bureaus and BIA.

Y2K

The FY 1999 House Appropriations Committee report states

> "The Committee directs the agencies to ensure that the Year 2000 conversion efforts include the full inventory of both information technology and non-information systems in day-to-day agency operations. The non-information systems include mechanical

systems in buildings, telephones, radios and scientific instruments. Non-information systems should be treated with as much urgency as the information systems."

The FY 1999 Senate Appropriations Committee report states

"The Committee is hopeful that agencies in this bill will continue to work aggressively to resolve outstanding year 2000 issues within available funds, but will also work with the Office of Management and Budget to access any emergency funds that may be appropriated to the President for information technology systems and related expenses."

In FY 1999, the U.S. Geological Survey received from DOI a total of $15,087,000 from the FY 1999 Emergency Supplemental Appropriation for replacement, upgrade, installation, testing of scientific instruments, communications equipment and scientific applications software allocated as follows: seismic activities: $3.6 million; water research and analysis: $7.5 million; mapping: $1.9 million; biological research: $1.1 million; and administrative & technology: $0.9 million.

The General Accounting Office (GAO) has made over 100 recommendations in more than 70 reports addressing the urgent Year 2000 computing challenge. In their most recent release, *GAO High-Risk Series An Update* GAO/HR-99-1, January 1999, the focus of their recommendations is summarized in five categories. USGS progress toward accomplishing each is discussed in the following table.

Project planning	The USGS has developed a three-tier project plan with automatic aggregation from discreet systems, telecommunications and scientific instruments projects to the organization's division and bureau levels.
Priority-setting	The USGS has identified those facilities which house processes critical to its mission and where materials and organisms are used whose release into the environment could be hazardous.
Data exchanges	The USGS has completed its analysis of data exchange partners, remediated or bridged those which were not Year 2000-compliant and has completed its testing of those exchanges.
Testing	The USGS completed testing of its mission critical systems and, using emergency supplemental appropriations, is well on the way to testing and validating non-critical systems, telecommunication infrastructures and scientific instruments.
Business continuity and contingency planning	The USGS has business continuity and contingency plans for most of its facilities Using emergency supplemental appropriations, the USGS has initiated a project to review these plans to ensure that they adequately address the threat represented by the Year 2000 problem.

While all mission-critical and most mission essential computers, application systems, telecommunication infrastructure components and scientific instruments will be year-2000-compliant by the turn of the century, there is the growing realization that this problem is extraordinarily pervasive and that not everything can be fixed in time. Consequently, Y2K

remediation, testing and implementation activities will continue into FY 2000 for those items that, on the basis of business impact and acceptable risk analyses, may be deferred and for latent problems that are uncovered.

FY 2000 Budget Summary

The USGS 2000 budget request is $838.5 million, an increase of $40.6 million over 1999. The request reflects tradeoffs, redirections and offsets to achieve a final budget that addresses the Department's and Nation's most urgent science needs and fully covers our fixed cost increases.

The budget includes $19.6 million for uncontrollable cost increases in order to continue the current services level of program operations and prevent program erosion that would occur from absorbing these increased costs. This increase is consistent with Presidential policy for civil service pay, providing $18.5 million for the pay raise of 3.6 percent anticipated in January 1999, and the 4.4 percent pay raise anticipated in January 2000. The increase includes the anticipated costs of the conversion of agency personnel currently enrolled in the Civil Service Retirement System to the Federal Employees Retirement System ($0.8 million); Workers' and Unemployment Compensation adjustments (-$0.1 million); and contributions to the Department of the Interior Working Capital Fund ($0.3 million). There is a decrease of $1.3 million for technical adjustments to the Biological Research activity, eliminating the $1.0 million needed in FY 1999 for replacement of an incinerator at the National Wildlife Health Disease Center located in Madison, Wisconsin. Also eliminated is $300,000 pursuant to the transfer of the San Marcos Field Station from the USGS to the U.S. Fish and Wildlife Service (FWS). The facility is currently being operated by the the FWS.

The budget includes $53.6 million for programmatic increases, a number of which contribute to the Administration's Integrated Science for Ecosystem Challenges initiative, Livable Communities initiative, and Land Legacy initiative. In addition to the priorities previously described: Integrated Science (+$17.4 million), Community/Federal Information Partnership (+$10 million), National Biological Information Infrastructure (+$1.0 million), amphibian research and monitoring (+$5.6 million), real-time hazards warning (+$5.45 million), and Disaster Information Network (+$8.0 million), USGS is participating in several other interagency efforts for which additional funding is requested. Highlights of the changes follow.

National Satellite Land Remote Sensing Data Archive (+$2.5 million) — The Secretary of the Interior has delegated to the USGS the responsibility to manage the National Satellite Land Remote Sensing Data Archive, as mandated by the Land Remote Sensing Policy Act of 1992 and the National Space Policy (NSTC) of 1996. The USGS maintains this permanent, comprehensive, government archive of global remotely sensed data by providing proper storage, preservation, and timely access to data for long-term monitoring and global environmental studies. In 1999, new remote sensing instruments (Landsat 7, MODIS, and ASTER) will begin to provide unprecedented amounts of data that the USGS archive is currently unable to accept. The FY 1999 budget included an increase of $2.5 million of a total $5.0 million needed to develop the required systems and infrastructure capacity to ensure the availability and avoid permanent loss of these data. This budget includes a request for the remaining $2.5 million in the Earth Science Information Management and Delivery Subactivity

of the National Mapping Program to ensure that Federal and State agencies, academia, private companies, and general public expectations, as well as congressional intent under the Land Remote Sensing Policy Act, can be met.

Coral Reefs (+$1.0 million) — Recent evidence indicates that coral reefs are deteriorating worldwide. Symptoms include loss of corals, increasing abundance of benthic algae, declining populations of animals that feed on corals, increased coral disease, and increased erosion. The proposed $400,000 increase in the Biological Research activity will enable USGS to initiate studies to develop and test existing and emerging technologies to document coral reef health and develop management and policy options for coral reef conservation. The proposed $600,000 increase in the Geologic Hazards, Resources, and Processes activity would be used to map coral reefs and define the natural processes related to reef health and growth and the effects of man's activities and natural processes causing the wide spread decline in reef health.

Hawaii Archipelago (+$0.7 million) — Because of their geographic isolation, tropical islands have a higher proportion of native species than anywhere else on earth. These unique biological communities are threatened by habitat loss and a growing number of invasive alien species. The proposed increase in the Biological Research activity will expand USGS research to assess the effects of interacting stressors on island ecosystems, and to develop management strategies to improve the status of native species.

Hypoxia (+$0.4 million) — A persistent "dead zone" in the northern Gulf of Mexico develops seasonally near the outlet of the Mississippi River and westward along the Louisiana coast, causing fish and shrimp to leave or avoid the area and threatening nationally important fisheries. The dead zone is a result of hypoxia, a condition where water is very low in dissolved oxygen. This dead zone has been growing in the past decade. Scientists believe this condition is caused by the flow of large quantities of nutrient-rich freshwater into the Gulf of Mexico from the Mississippi River each year during spring and summer. Nutrients in the river water cause blooms of algae, which consume dissolved oxygen as they decay. With the $400,000 increase requested in Water Resources Investigations, the USGS will expand research on hypoxia, with high priority on: (1) improving the National Stream Quality Accounting Network (NASQAN) monitoring network to provide better spatial definition of nutrient production and response to management actions, and (2) improving scientific methods (which are needed by resource management agencies to focus remedial activities) for identifying nutrient sources and the associated land uses.

Program Decreases — The increases are partially offset by reductions totaling $32.6 million
composed of $2.7 million in the National Mapping Program, $9.8 million in the Geologic Hazards, Resources and Processes Activity $6.7 million in Water Resources Investigations, and$12.1 million in Biological Research.

Budget Structure Changes

The 2000 budget submission proposes key changes to the USGS budget structure. It includes:

- consolidation of all facilities costs associated with appropriated work into an overall "Facilities" budget activity;
- consolidation of all bureau level general administration costs into a new "Science Support" budget activity;
- creation of a new "Integrated Science" budget activity as previously discussed; and
- separation of the geomagnetism program from the Earthquake Program to clarify the relationship of the earthquake line item to the authorized funding levels contained in the National Earthquake Hazards Reduction Act.

Consolidation of the appropriated facilities and general administration costs into bureau-wide accounts improves accountability for all aspects of the organization, and promotes common business practices throughout the bureau. A much clearer view of the funding available for science is the result. Because of the transition to the new budget structure, it may appear that programs throughout the bureau are decreasing significantly. However, both facilities and general administration expenses were always a part of these program lines, which gave the impression that more dollars for science existed than was really the case.

Facilities

In support of the Secretary's Five-Year Maintenance and Capital Improvement Plan, base funding for operations and maintenance of facilities and facilities related equipment, has been redirected to a new Operations and Maintenance subactivity under the Facilities Activity. This restructuring is in response to a need for better management of the bureau's assets as reflected in the following General Accounting Office statement: "In this time of reduced federal spending and increased competition for these limited dollars, it is more critical than ever to know what the agencies' [DOI] maintenance needs are and how to best address them."

The FY 2000 budget includes a Maintenance and Capital Improvement component of $1.5 million under the Facilities Activity to address the bureau's highest priority deferred maintenance and capital improvement projects. This component will be maintained at the bureau level to facilitate the bureau's efforts to allocate funding to the highest priority projects included in the five-year plan on an annual basis.

Customer Service

The USGS is committed to engaging customers in a dialog to identify their needs and satisfaction levels, and to deliver our products, information and services to customers in a timely and accurate manner. To this end, the USGS has

- adopted a Bureau-level Customer Service Policy to clearly and officially state our position on and support of customer service excellence, **http://www.usgs.gov/usgs-manual/500/500-15.html** and

- initiated a 3-year information collection program involving voluntary customer surveys to ascertain customer satisfaction with the products, information and services of the USGS. The surveys will involve individuals who interact directly with the USGS to use or to request our products, information and/or services. Over the 3-year period, we will focus on encouraging and obtaining satisfaction feedback from customers involved in three areas of effort: partnerships and cooperative agreements, technical assistance, and public inquiries and requests for publications, information, services, maps, and/or other products.

Customers Comment

"Nice web page! You provide a valuable service to local scientists here in southern California by distributing both historical and real-time streamflow data. Thank you for the service." (Scientist of the Southern California Water Resources Program)

"The virus isolates identified...helped determine a course of action for the State of Alaska in evaluating the impact of this virus on the wild herring populations in the Prince William Sound." (Alaska Department of Fish and Game)

"This is a great site (TerraServer developed through a partnership of the USGS and Microsoft Corporation). Such a huge amount of information, structured and presented really well. I'll be spending hours here! Especially in the digital backyard. Great job!" (Private citizen)

"Data obtained from this (USGS) study resulted in major changes in commercial fishing practices in Prince William Sound, Alaska." (University of Washington)

Consistent with our strategic direction, program performance targets are customer-driven. As such, stakeholder meetings are identified as a crucial performance measure for both annual goals. Although we are constantly meeting with partners and stakeholders, the Program Managers have identified several significant meetings and program evaluations that are and will be crucial to the planning process, yielding tangible assessments that will improve direction and management of the programs as well as identifying USGS output/outcome needed by stakeholders. Program managers refine target estimates for program performance on the basis of these meetings.

Five Customer Service pilots will be initiated in FY 1999 to continue customer service activities of the bureau and to test a measurement framework designed to characterize our customers, their needs, and how they interact with us. The framework will provide USGS program managers and customer service representatives with the tools that they need to effectively identify their customers and their customer needs and requirements; to design products/services/information to meet those needs and requirements; and to assess customer satisfaction. Our *FY 1999 Customer Service Plan* is available online at **http://www.usgs.gov/customer/1999_customer_service/1999service.html**

Additional Congressional Directives

The Conference Report on the FY 1999 Omnibus Appropriation directed the USGS to use the additional resources provided to the cooperative research units to fill as many personnel vacancies as possible. The Unit program consists of 39 Cooperative Fish and Wildlife Research Units located in 37 States, and two special minority projects at Historically Black Colleges and Universities. The Federal Government is responsible for staffing each Unit with two to four scientists. Over the past two fiscal years, with increased funding, the number of unfunded science vacancies in the Unit Program has dropped from 14 to 6. In FY 1998 and FY 1999, personnel actions were initiated for research positions in Alabama, Alaska, Arkansas, California, Georgia, Hawaii, Maine, Massachusetts, Minnesota, New Mexico, North Carolina, Oklahoma, Pennsylvania, South Carolina, South Dakota, Vermont, Washington, West Virginia, and Wisconsin.

The Conference Report on the FY 1999 Omnibus Appropriation encouraged the USGS to use the services of the private sector in the conduct of its activities wherever feasible, cost effective, and consistent with the principles pertaining to the effective performance of governmental functions and to share with the Committees information on efforts to pursue opportunities to use the capabilities of the private sector. During the past several years, the USGS has increased its use of the private sector. The USGS is also proceeding with an aggressive program of partnerships with the private sector under the provisions of technology transfer legislation that have been enacted over the years by Congress. To date, the USGS has negotiated over 40 Cooperative Research and Development Agreements (CRADA) and other agreements to work cooperatively with the private sector in areas of mutual interest. The USGS will provide additional information on this issue as requested by Congress.