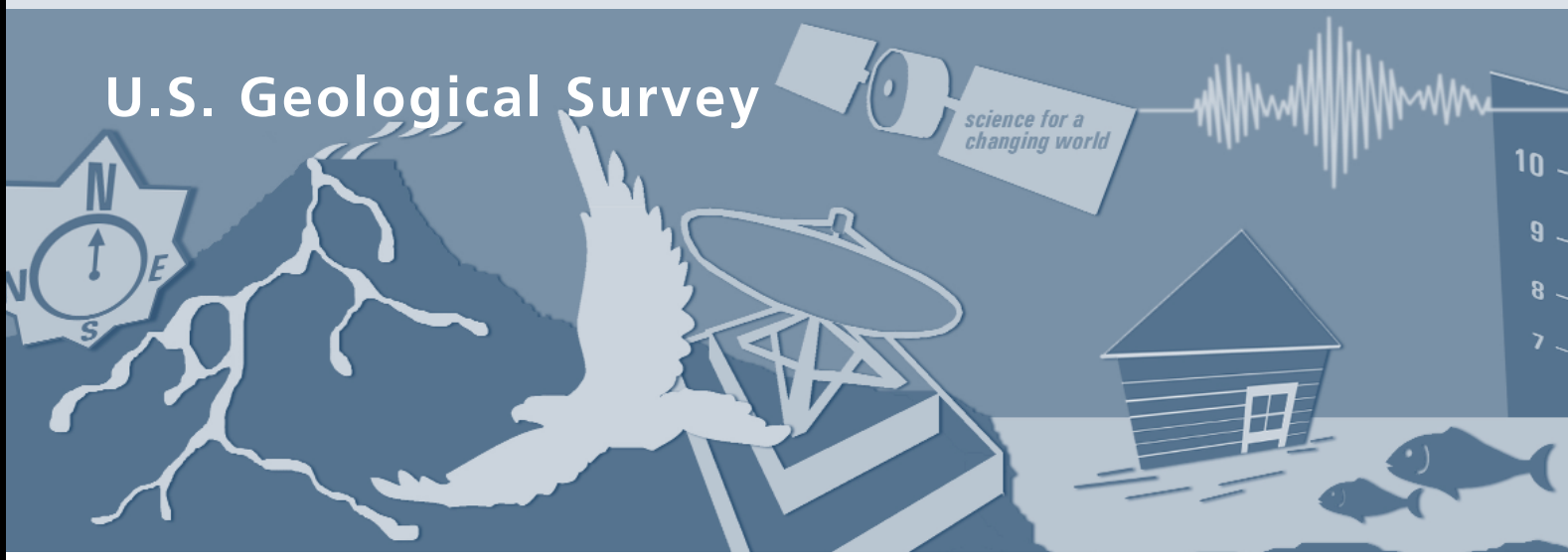
FY 2000 FY 2005

Strategic Plan

U.S. Geological Survey



DEPARTMENT OF THE INTERIOR

USGS
science for a changing world

U.S. Geological Survey Strategic Plan

2000 – 2005

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

I am pleased to present the USGS FY 2000 – 2005 Strategic Plan. This revised plan reflects an agency in transition, building on its proud 120-year history of impartial scientific excellence, to become more flexible and responsive in addressing challenges and opportunities of the 21st Century. Our plan reflects a renewed commitment to meeting the needs of our partners and customers and to cultivating an atmosphere of innovation and creativity that will foster and reward the broad-scale, integrated science I believe is needed by decision makers and the public.

To bring about these changes, we are streamlining our organization and emphasizing performance and accountability. I am committed to ensuring timely delivery of information to those who need our products by using all the applicable tools of the emerging information technology. Finally, we will ensure the relevance and usefulness of our science by better listening to our customers and integrating our strong capabilities in geology, biology, hydrology, and geography.

With this plan, we are embarking on an exciting future, by developing and implementing new operational practices, a more efficient structure, and creative new ways of accomplishing our mission and goals. We are pleased to be the science agency for the Department of the Interior and for a large number of other Federal, State, and local agencies. We look forward to expanding this role in the next century.

Charles Groat
Director

U.S. Geological Survey

Senior Management Commitment

The management of the U.S. Geological Survey (USGS) supports the goals and objectives of the Government Performance and Results Act (GPRA) and is committed to transforming USGS into a more responsive and performance oriented agency. In accordance with GPRA guidance, this Strategic Plan has been prepared to show our mission goals, long-term goals, and how we will measure progress in achieving these goals. The USGS Executive Leadership Team is responsible for successful implementation of our Strategic Plan:

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Executive Summary

The revised U.S. Geological Survey Strategic Plan (2000 – 2005) reflects a renewed commitment to the USGS's role as the National's principal natural sciences and information agency. USGS conducts research, monitoring, and assessments to contribute to our understanding of the natural world — our lands, water, and biological resources. USGS data and information are used daily by managers, planners, and citizens to understand, respond to, and plan for changes in our environment. This Strategic Plan now more concisely discusses the USGS's goals and the strategies that will be used to achieve them. It reflects the high priority the USGS places on meeting customers' needs for reliable and impartial information.

The USGS's two mission goals, **Hazards** and **Environment and Natural Resources,** were derived from organizing USGS activities in a way useful for natural sciences customers. The goals are the framework for marshalling the bureau's expertise in geology, biology, hydrology, and geography to meet societal issues.

USGS hazards activities are describing, documenting, and understanding natural hazards and their risks. The USGS studies earthquakes, volcanoes, landslides, geomagnetic field changes, flood, droughts, coastal erosion, tsunamis, wildland fire, and wildlife disease. The Hazard Long-Term Goal is to: "Ensure the continued transfer of hazards related data, risk assessments, and disaster scenarios needed by our customers before, during, and after natural disasters, and by 2005 increase the delivery of real-time hazards information by increasing the average number of streamgages reporting real-time data on the Internet during each quarter to 5,500 and installing 500 improved earthquake sensors to minimize loss of life and property."

Hazard Goal achievement strategies include adding telemetered streamgages and earthquake sensors to existing networks, measuring the reliability, delivery times, and accuracy of real-time hazards information, and making key scientific datasets, such as maps and geospatial information (or the underlying information used to develop them), easier to interpret and integrate.

USGS environmental and natural resources activities deal with physical, chemical, biological, and geological processes in nature and with the impact of human actions on natural systems. Studies include data collection, long-term assessments, ecosystems analysis, and forecasting future changes. The Environment and Natural Resources Long-Term Goal is to: "Ensure the continued availability of long-term environmental and natural resource information; and systematic analysis and investigations needed by customers, and, by 2005, develop 20 new decision support systems and predictive tools for informed decision making about natural systems."

Environment and Natural Resources Goal achievement strategies include continuing to improve the quality and use of long-term datasets and interpretive products including water quantity and quality assessments, mineral and energy information, biological data and information, water use information, and high-quality digital maps depicting the character of the Earth's surface. Emphasis will be placed on delivery information in ways to provide decision-makers a better understanding of current and future conditions, and provide options for adopting a course of action or response to these conditions (decision support systems).

The USGS conducts an extensive, ongoing program of internal and external proposal, project, and program reviews with a goal of conducting independent external peer program reviews approximately every five years in addition to frequent independent internal management reviews. The National Research Council and the National

Academy of Public Administration conduct a number of the bureau's external reviews.

A number of program evaluations contributed to the formulation of the 2000-2005 Strategic Plan. Many of them stressed the need for more integrated and coordinated science at the USGS, improved applications and science delivery, and expanded partnerships and collaboration by the USGS with its partners and customers.

Development of the U.S. Geological Survey Strategic Plan (2000-2005) included public and employee involvement through approximately 200 regular stakeholder meetings. Written review comments were solicited and received from other bureaus in the Department of the Interior, other Federal agencies, USGS employees, private corporations, the university community, environmental and other non-governmental organizations, and private individuals. Within the USGS, the Bureau Executive Leadership Team and other managers conducted an extensive review.

The U.S. Geological Survey's Strategic Plan (2000-2005) is a concise guidebook for achieving full integration of our science activities and developing high-quality, easy-to-use and understand information products, data, and assessments for the Department of the Interior and our many cooperative partners and customers.

Finally, in this new Strategic Plan, the USGS's original vision and mission statements are rewritten to more clearly state the bureau's core values and mission, and a Strategic Direction statement was developed. The eight business activities from the first USGS Strategic Plan are combined into two mission goals with clear strategies for achieving each goal. In addition, key factors that influence achievement and crosscutting relationships to other bureaus and agencies are discussed.

Glacial and polar ice can be excellent archives of past climatic and environmental conditions when atmospheric conditions are "frozen" into the snow and ice. Here scientists retrieve an ice core from the Upper Fremont Glacier Wyoming for analysis. Study of this archived ice core in combination with lake-sediment records adjacent to the site may provide a unique record of ecosystem response(s) to a rapid climate shift in a high-altitude, mid-continent ecosystem.

Section I

The USGS: Who We Are And How We Serve You

The U.S. Geological Survey (USGS), established in 1879, is the Nation's principal natural science and information agency. USGS conducts research, monitoring, and assessments to contribute to understanding the natural world — America's lands, water, and biological resources. The USGS provides reliable, impartial information to the citizens of this country and the global community in the form of maps, data, and reports containing analyses and interpretations of water, energy, mineral and biological resources, land surfaces, marine environments, geologic structures, natural hazards, and dynamic processes of the Earth. USGS data and information are used daily by managers, planners, and citizens to understand, respond to, and plan for changes in our environment. For example, the USGS is:

- Developing a real-time monitoring capability for earthquakes to provide information needed to save lives and reduce the skyrocketing economic costs of natural disasters;
- Assessing erosion, wetland loss, and environmental changes on our coasts and bays, such as the Chesapeake Bay, Gulf Coast, and Great Lakes, to assist in evaluation, protection, and restoration efforts;
- Providing vital information on flow in the Nation's rivers that is used for flood forecasting, resource management, and environmental protection through a nationwide streamgaging program;
- Synthesizing existing and new information about birds, mammals, fishes, plants, and other species. A recently-released report, *The Status and Trends of the Nation's Biological Resources,* compiled by USGS, will inform decision-makers about the health of the Nation's biological resources.
- Analyzing population growth, urban spread, and other land use changes, relating these to other natural science trends, and displaying the results in narrative maps and other products.
- Working with State and Federal agencies to assess the existing and potential environmental impacts, such as nutrient loading and release of pharmaceuticals/antibiotics, from intensive animal feeding operations, and developing state-of-the-art technology needed to identify sources of contaminants;
- Enlisting the public to provide information, through a web-based survey of volunteers reporting earthquake tremors, that will improve our understanding of how earthquake energy propagates through the earth, and will enable USGS to produce hazards maps and educate the general public about earthquakes;
- Working with the Centers for Disease Control and Prevention (CDC), U.S. Department of Agriculture (USDA), State public health departments, and natural resource agencies to track the West Nile virus, and setting up a surveillance network along the Atlantic and Gulf coasts.
- Serving as a repository for remotely sensed data and global land surface information.

The world is rapidly changing; revolutionary technological advances, demographic growth, competing demands for resources, and increased awareness of the interconnectedness and global scale of many natural science issues are shaping tomorrow's science needs. Managers, planners, and citizens are demanding more and better scientific information, delivered more rapidly, that will help them make decisions about the world around them. To meet the critical science needs of the 21st Century, USGS must build on its traditional strengths while becoming more flexible and responsive. Using this Strategic Plan, USGS is working to integrate our scientific disciplines

while building on its world leadership and scientific excellence; streamline operations to become as efficient as possible; use the rapid advances in information technology to better deliver information to support the needs of decision-makers; and do a better job of understanding our many customers and partners.

This plan corresponds to the period 2000-2005 and is an update on the first Strategic Plan (1997-2005) and the "refocused" plan released in 1998. The plan has been modified to represent more clearly USGS goals and our strategies for achieving these goals, and to reflect stakeholder feedback received through the consultation process.

MANAGEMENT ISSUES

The USGS is serious about resolving management issues that affect achievement of its goals. Because these issues tend to be tactical or operational in nature, they are not addressed here. USGS Annual Performance Plans include a section on management issues and addresses how they are being resolved and whether these areas have related performance goals and measures for each issue.

ORGANIZATION OF THE PLAN

This plan lays out USGS long-term goals for meeting the challenges of the 21st Century. Measures for science and customer satisfaction build upon, and are supported by, internal goals and performance targets for employees and operations.

Following this introduction are statements of our Vision, Mission, and Strategic Direction, and a section that shows the links between the Department of the Interior and USGS goals. Next, the USGS's mission and long-term goals are set forth, with strategies for achieving each goal, key factors affecting goal achievement, and relationships to other bureaus and agencies. Following goal descriptions is discussion of applicable general program evaluations, and a section describing the consultation process that was used in updating the plan and that will be used to assess future performance. For each long-term goal, there is a corresponding annual goal and performance indicators that are outlined in the Annual Performance Plans. They will be used to assess the results of USGS program activities and will help determine whether USGS has achieved the desired outcomes.

A USGS scientist inspects an air disposition station at Rowan College, New Jersey.

Section II

Why We're Here: Vision, Mission, and Strategic Direction

The USGS vision, mission, and strategic direction focus on responsiveness and customer service, underscoring the application of science to customer, partner, and other stakeholder needs. They direct the combined expertise of our many scientific disciplines and define our commitment to pursuing an integrated approach to providing science for a changing world.

USGS scientists have long recognized the significance of change in the history of our planet. While this recognition has focused primarily on natural phenomena, the role that people — and our interactions in natural systems and on the landscape — play as forceful and pervasive agents of change is becoming an increasingly important piece of the scientific puzzle. Insufficient scientific understanding of human impacts on the Earth has produced uncertainty about the condition of our environment. This uncertainty has led to concern about increasing competition for water, energy, and mineral resources; economic, environmental, and social sustainability; the impacts of natural hazards; the state of our rivers and coastal areas; and biological and geologic impacts resulting from human-induced landscape change. We have learned from the past century that understanding the way our Earth works is essential to the well-being of our society. And the decisions made today will shape the world we inhabit tomorrow. Our experiences with natural disasters, with issues of resource scarcity, and with unexpected environmental effects of well-intentioned decisions, have taught us that scientific knowledge is the critical tool that both informs decisions and permits the early detection and response to emerging problems. The USGS provides scientific knowledge that prevents crises, creates opportunities, and supports enduring solutions.

The USGS, through its scientific activities that involve insightful monitoring and data collection, innovative research and process understanding, and informative assessment and interpretive studies, is well poised to provide the integrated natural science that society demands to address such issues as:

Vision: USGS is a world leader in the natural sciences through our scientific excellence and responsiveness to society's needs.

Mission: The USGS serves the Nation by providing reliable scientific information to
- describe and understand the Earth;
- minimize loss of life and property from natural disasters;
- manage water, biological, energy and mineral resources; and
- enhance and protect our quality of life.

Strategic Direction: The USGS will combine and enhance our diverse programs, capabilities, and talents and increase customer involvement to strengthen our scientific leadership and our contribution to the resolution of complex issues.

- Mitigating the impacts of earthquakes through better maps and information concerning potential ground shaking and through rapid notification of the onset of earthquakes;
- Resolving conflicts over the management of rivers for multiple purposes such as water supply, water quality, habitat, hydropower, flood control, and recreation;
- Developing strategies for the detection and control of deleterious invasive species;
- Guiding protection and development of our Nation's coastlines consistent with growing coastal populations and vulnerable estuary and wetland environments;
- Developing a better knowledge base for the sustained development of our Nation's ground-water supplies;
- Guiding land-use decisions to ensure the availability of natural resources and the safety of growing communities;
- Providing information on the availability, quality, and development impacts of energy resources;
- Understanding ecological functions and assessing predicted change at varying temporal and spatial scales.

Section III

What We Expect to Accomplish

The USGS has organized its strategic planning into two comprehensive, integrated mission goals that group our scientific activities in a way that is meaningful to those who use our data and information: (1) Hazards and (2) Environment and Natural Resources. Each of these mission goals has an associated long-term goal with performance targets. They are the framework within which we bring to bear our world leadership and excellence in geology, biology, hydrology, and geography to address societal issues. As these societal issues become increasingly complex, addressing them will require broader scale, integrated approaches in the future. For example:

- Issues such as habitat fragmentation, coastal erosion, and climate change must be examined on a broad, even global, scale if we are to understand how systems are affected by change.
- Pollution issues increasingly require consideration of multiple sources and complex interactive effects. Solutions are becoming more costly and involve multiple parties.
- Water resources issues are growing more complicated. Effective management requires consideration of surface water-groundwater interactions, the impact of land use on water quality and quantity, and vulnerability of people and infrastructure to hazards. These problems arise in the context of scarcity and competition for the resource.
- Managers are increasingly seeking detailed understanding of species' habitat requirements as they face difficult decisions about how to accommodate economic growth while preserving key species.
- Population growth is leading to complex changes in our landscapes that will have dramatic impacts on land, water, and living resources.

Planners and decision-makers need sophisticated new tools that allow them to ask "what if" questions and to explore alternative future scenarios. Such decision support tools will build upon a strong foundation of USGS research findings in the natural sciences. Moreover, many solutions will require active partnership with universities and other public and private agencies.

RELATION TO DEPARTMENTAL GOALS

As the science bureau of the Department of the Interior, USGS provides information and technologies that are critical to the mission achievement of Department land and resource management agencies. USGS and the resource management bureaus of the Department of the Interior have formalized a process to provide USGS science support to the DOI bureaus that will eventually provide input to USGS for defining GPRA metrics and outcomes.

USGS mission and long-term goals support all five of the Department of the Interior's strategic goals, but are most directly relevant to Goal 4, "Provide Science for a Changing World."

The Department has defined the following outcomes for its Goal 4:

- Resource managers make decisions based on accurate, reliable, and impartial scientific information.
- The loss of life and property from natural disasters is minimized through access and availability of timely scientific information.
- Federal, State, and local governments and the private sector have access to shared national databases of natural resources information.
- The public has easy access to earth science information.

USGS goals and performance measures link directly to achievement of these outcomes.

SCIENCE AND PERFORMANCE MEASUREMENT

Most quantitative measures of scientific productivity address outputs (for example the number of journal articles published) rather than outcomes and convey little sense of the true public benefits that science provides. We believe the USGS obligation is to do important work on relevant topics and to communicate the results to decision makers. Nonetheless, we are striving to move to more outcome-oriented performance measurement in future years, improved ability to capture and quantify how customers and partners are using USGS information, and improve the usefulness and accessibility of USGS data and information.

A USGS scientist inspects a radio-reporting flood warning gage at the East branch of the Rahway River, at Millburn, New Jersey.

Section IV

Mission Goals

A. HAZARDS

Hazards are natural events that expose people to the risk of death or injury and property damage and destruction. The Nation's vulnerability to hazards has increased dramatically during this century: populations have grown; people have moved into hazardous regions such as the coasts and mountains; and the U.S. economy has become dependent on complex infrastructure — telecommunication networks, highways, and pipelines — whose disruptions affects many people. To reduce an increasing vulnerability to natural hazards, the USGS studies earthquakes, volcanoes, landslides, geomagnetic field changes, floods, droughts, coastal erosion, tsunamis, wildland fires, and wildlife diseases.

USGS hazards activities deal with describing, documenting, and understanding natural hazards and their risks. This information is delivered to public officials to help them make decisions about land use and hazard-resistant design requirements and to businesses and citizens to help them make long-term decisions about the use of and improvements on their land. USGS information is also used to help emergency officials, businesses, and citizens make crucial short-term decisions related to evacuations, movement of property, and rescue and recovery in response to current or impending natural disasters. USGS activities include long-term monitoring and forecasting, short-term prediction, and real-time crisis monitoring and communication with civil authorities and others. The USGS has the primary Federal responsibility for monitoring and notifying civil authorities about earthquakes, volcanoes, landslides, geomagnetic field changes, and wildlife disease outbreaks. The USGS streamgage network provides most of the flow data used by the National Weather Service (NWS) in carrying out its mission of forecasting floods and droughts. USGS also prepares risk assessments for regions vulnerable to natural hazards and conducts studies following disasters to help develop strategies to mitigate future hazards.

The information provided by the USGS is essential to support saving lives and reducing the skyrocketing costs of natural disasters. The USGS focus for the beginning of the 21st Century is on delivering information in real time so that lives can be saved and further damage avoided by the quick actions of emergency managers, businesses, and citizens. Future efforts will concentrate on more extensive monitoring, advanced technology, and better and faster synthesis of information to detect hazardous events and convey the information to decision-makers and the public. USGS will also conduct risk assessments of natural hazards and intensive studies after an event to provide a solid scientific basis for land use planners and the public so that they can minimize losses from future hazardous events.

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

Long-Term Goal: Ensure the continued transfer of hazards-related data, risk assessments, and disaster scenarios before, during, and after natural disasters, by 2005 increase the delivery of real-time hazards information by increasing the average number of steamgages reporting real-time data on the Internet during each quarter to 5,500, and install 500 improved earthquake sensors to minimize loss of life and property.

Customer Satisfaction Measurement: USGS customers will be surveyed to determine their satisfaction with key USGS hazards information products. Product

usefulness will be evaluated on the basis of customer requirements such as content, media, format, and timeliness. A baseline will be established in FY 2000, and targets will be set for the revised final FY 2001 plan to ensure continual improvement.

Relationship Between Long-Term Goal and Annual Performance Goal

The annual performance goal for hazards follows directly from the long-term goal, which supports the mission goal.

Strategy for Achieving the Goal

Programs: USGS will enhance its ability to characterize and monitor hazardous events in near-real and real time by adding telemetered streamgages and earthquake sensors capable of delivering information almost instantaneously. In addition, long-term data vital both to emergency response and to analysis of flood, earthquake, and other hazard risk will continue to be collected and maintained through current monitoring networks. The USGS will upgrade its earthquake sensors and streamgage networks. We will measure the reliability, delivery times, and accuracy of our real-time hazards information in order to evaluate improvements. USGS will improve the utility of its information by identifying areas vulnerable to damage by particular hazards. Scientific datasets integral to the delivery of hazards information — key maps and geospatial information, for example — will be made easier to interpret and integrate in order to assist in rescue, recovery, and reconstruction efforts. We are also continuing to develop better ways to measure outcomes linked to the outcomes of key partners like the Federal Emergency Management Agency, State partners, and National Weather Service.

Customers: USGS will focus on understanding the needs of hazards information users, such as emergency managers, community planners, industry, and citizens. The USGS will increase development and delivery of products and services tailored to the current and future needs of these customers.

Operations: USGS will maximize the efficiency of its administrative, science support, and programmatic activities by streamlining and enhancing the reliability of our systems for hazards data delivery. The USGS will continue to upgrade our information infrastructure (computers, telemetry systems, and networks) to improve our ability to integrate hazards-related data and assessments.

People: USGS employees are at the core of a long-term strategy for achieving the Hazards Goal. They are in the field before, during, and after events installing instruments, making measurements, and analyzing and interpreting the data and information. They use a wide range of analysis and modeling methods to turn these measurements into improved hazard assessment products. The USGS will evaluate its current capabilities and skills and actively invest in training employees in the skills needed to keep pace with technology, and to understand and model natural systems. USGS is aligning its rewards systems to encourage integration of its capabilities and support increased responsiveness to customers' needs, such as better prediction of and response to hazards and the development of tools tailored to the needs of emergency managers. Finally, the USGS will increase its flexibility to respond quickly and effectively to natural hazards by developing response plans, using new contractual mechanisms for obtaining new skills, removing barriers to resource sharing, and increasing use of cooperative agreements with other emergency response entities.

Key Factors Affecting Goal Achievement

Several key factors external to the U.S. Geological Survey and beyond its control could significantly affect the achievement of this goal:

- **Monitoring and Communications:** The USGS does not work alone. Comprehensive networks of instruments and other observation systems are supported or maintained jointly by the USGS and its partners in many areas. The USGS also relies on other entities, public and private, to communicate needed information to the people affected and to the response community. Effective reduction of loss of life and property will occur only when all of these components are working together.

- **Cooperation with Local Decision Makers:** Land use regulation and planning generally are controlled at the local level in the United States. Most emergency response plans also are developed at the State and county levels. To reduce loss of life and property, the USGS needs to be able to engage individuals and their communities in both mitigation and preparedness plans. This requires that the USGS partner with organizations that represent States and localities like the National Emergency Managers Association and the National Association of Counties.

- **New Technologies:** Advances in scientific understanding, monitoring systems, and communications systems will make it possible to detect, analyze, interpret, and communicate natural hazards information faster, more completely, and more effectively to the appropriate audiences. The USGS must be able to adopt new technologies as they emerge, so that we can reduce the cost, and increase the effectiveness, of our hazards-related science.

- **New Vulnerabilities:** America's population is growing, and at the same time society is becoming more urbanized and dependent on complex and vulnerable infrastructure. Population growth, urbanization, and technological advance are combining to produce more interdependent infrastructures for power supply (national power grids), communications, transportation networks, health services, water supply, and sewerage control systems. In addition, population growth is occurring rapidly in the coastal, floodplain, and mountain regions of the Nation, which are prone to natural hazards, thus increasing the Nation's vulnerability.

Cross-cutting Relationships to Other Bureaus and Agencies

The USGS partners with many Federal, State, and local agencies and the university community in addressing our hazards-related mission and long-term goals.

Real-time monitoring of snowmelt-induced landslides near Aspen, Colorado.

Warnings and Notifications: The USGS provides hazards-related information to other agencies and organizations that are responsible for protecting public safety. For example:

- The USGS provides the streamgage and related hydrologic information needed by the National Weather Service in forecasting floods and droughts, and works closely with the National Oceanic and Atmospheric Administration in monitoring coastal erosion and tsunamis.
- The USGS works with the National Interagency Fire Center and many other agencies in monitoring wildfire potential.
- The USGS cooperates with the Federal Aviation Administration on warnings to the airline industry and aircraft related to the hazards of volcanic ash.
- The USGS, partnering with the national defense and intelligence communities in a "dual-use" access to National Technical Means satellite data during natural disasters, provides derived products to assist in responding to disasters.

In all of these programs, USGS hazards experts work closely with other Federal emergency managers and with State and local partners, in pursuit of the national goal of reducing the toll of natural disasters.

Mitigation: The USGS cooperates and coordinates closely with local, State, and Federal agencies, the university community, and the private sector to meet their needs for earth science information critical for developing mitigation strategies. For example:

- The USGS is an important partner of the National Earthquake Hazards Reduction Program, cooperating closely with the Federal Emergency Management Agency, the National Science Foundation, and the National Institute of Standards and Technology.
- The USGS provides information on the discharge, height, and velocity of potential floods that is used by utility companies, transportation agencies, and engineering firms to help design dams, bridges and roadways.

B. ENVIRONMENT AND NATURAL RESOURCES

Our Nation's renewable and nonrenewable natural resources — biota, land, water, minerals, and energy — are critical to sustain life and to maintain and enhance our economic strength. Looking back, environment and natural resource science has been at the heart of the country's development since frontier days, as the USGS discovered and mapped the Nation's natural resource base. To manage these resources while protecting the environment society must understand the complex and interconnected processes involving air, water, land, and plant and animal life. Traditional boundaries between environment and natural resource science have blurred as land and resource management decisions deal with increasingly complex issues. The need for the cross-disciplinary integrated science that the USGS provides has never been greater.

USGS environment and natural resources activities deal with physical, chemical, and biological processes in nature and with the interactions of human activities with natural systems; in short, understanding change and its consequences. These studies include data collection, long-term research assessments, ecosystem analysis, and forecasting changes, and implications of changes, that may be expected in the future.

USGS provides this essential data and information to managers and the public to assist in land and resource management decisions. Our focus is on developing predictive models and decision support systems that can provide resource managers and the public with an ability to understand and predict the consequences of decisions. These predictive models and support systems require an understanding of social and economic factors that are in turn affected by the decisions on land and resource use. Future efforts will focus on major societal issues and will emphasize integration of our scientific disciplines with social economic factors to understand and model key systems and to develop better tools for managers' and the public's use.

Mission Goal: Provide science for a changing world in response to present and anticipated needs to expand our understanding of environment and natural resource issues on regional, national, and global scales and enhance predictive/forecast modeling capabilities.

Long-Term Goal: Ensure the continued availability of long-term environmental and natural resource information and systematic analysis and investigations needed by customers, and, by 2005, develop 20 new decision support systems and predictive tools for informed decision making about natural systems.

Customer Satisfaction Measurement: USGS customers will be surveyed to determine their satisfaction with key USGS environment and natural resource information products. Product usefulness will be evaluated on the basis of customer requirements such as media, content, format, and timeliness. A baseline will be established in FY 2000, and targets will be set for the revised final FY 2001 plan to ensure continual improvement.

Relationship Between Long-Term Goal and Annual Performance Goal

The annual goal for environment and natural resources flows directly from the strategic goal, which supports the mission goal.

Strategy for Achieving the Goal

Programs: Environment and Natural Resource programs will focus on understanding, modeling, and predicting in an integrated manner how multiple forces affect natural systems. This knowledge will enable land managers, decision-makers, and citizens to make sound decisions about how to live on and manage the land. The USGS will provide these customers with an integrated understanding of natural systems at all scales, with more and better predictive tools and decision support systems, and with easier access to natural science data. USGS will continue to improve the quality and usefulness of its long term datasets and accompanying interpretive products, including water quantity and quality assessments, mineral and energy information, biological data and information, water use information, and high-quality digital maps depicting the character of the earth's surface. In particular, the USGS will develop forecast and predictive models

and decision support systems that allow managers and decision-makers to evaluate the resource and environmental consequences of management choices under various scenarios. This information can be used to inform management decisions.

Customers: The USGS will focus on key users of environment and natural resources information, such as Federal, State and local managers, to ensure that their needs are understood and are being met. USGS will increase development and delivery of products and services tailored to the current and future needs of these customers.

Operations: USGS will improve the efficiency of its administrative, science support, and programmatic activities to streamline systems for delivery of environment and natural resources data and information. USGS will implement its Information Infrastructure Plan to ensure that data comply with common standards and protocols.

People: As with the Hazards Strategic Goal, USGS employees are at the core of our long-term strategy for achieving the Environment and Natural Resources Goal. USGS will assess its current capabilities and skills and actively invest in training its employees in the skills needed to improve our ability to understand natural systems, develop improved forecast and predictive models, and better communicate with customers. USGS is aligning its rewards systems to reinforce the need for better integration of its capabilities and for more responsiveness to customer needs. Finally, USGS will take steps to increase its flexibility to respond quickly and effectively to the needs of our customers by putting in place new contractual vehicles for obtaining new skills, removing barriers to resource sharing, and increasing use of cooperative agreements and partnerships with other entities who use our data and information on natural resources and the environment.

Key Factors Affecting Goal Achievement

There are several key factors external to the U.S. Geological Survey and beyond its control that could significantly affect the achievement of this goal:

- **Cooperative Monitoring and Data Collection**: Long-term data-collection, monitoring, and assessment programs are costly. The USGS will continue to maintain the data-collection activities that are part of its core mission but with increasing reliance on its partners for key sources of complementary data.

- **Access:** The USGS depends on the willingness of private landowners, regulatory and management agencies, and private industry for access and permission to collect and use cartographic, geographic, geologic, biologic, and hydrologic data.

- **New Technologies:** Advances in scientific understanding, monitoring systems, and analytical techniques have revolutionized the natural sciences and are likely to dramatically improve our ability to understand change and how it affects natural systems. For example, we can characterize land use and land cover through remote sensing; map the coastal ocean floor and coastlines using advanced laser techniques; detect and analyze chemical compounds at minute levels in the environment; use genetic and molecular tools for wildlife population and community monitoring and ecological risk assessments for wildlife; create geographic information system maps, predictive models, and visualizations of model results using advanced computer technology; conduct resource assessments using ground-penetrating radar; and monitor changes to the Earth's surface using satellite radar techniques. The USGS must continue to use new technologies to reduce the cost and increase the effectiveness of our science in the environment and natural resources sciences.

Cross-cutting Relationships to Other Bureaus and Agencies

Partnerships, cooperation, and coordination are a critical component of USGS programs. In addition to our priority science agreements with DOI bureaus, the USGS actively seeks to partner with other Federal, State, and local agencies and the university community in addressing its Environment and Natural Resources mission and long-term goals. For example:

- USGS works with more than 1,200 state and local partners and about 30 Federal partners to develop a wide range of water resources information.

- USGS has approximately 40 cooperative research units at State universities that conduct graduate research on a wide range of biological issues.

- USGS scientists are working with multiple and diverse partners to understand, evaluate, and provide options for restoring fish and wildlife habitats and better guide resource management decisions in interagency ecosystem initiatives in South Florida, San Francisco Bay, Platte River, Mojave Desert, Chesapeake Bay, and Yellowstone.
- USGS provides government-wide leadership to ensure coordinated planning and execution of Federal geospatial mapping efforts through its chairmanship of the Federal Geographic Data Committee (FGDC) Subcommittee on Base Cartographic Data and its responsibility for the FGDC Secretariat.

These partnerships will become even more important as the USGS focuses on major societal issues and emphasizes the integration of its science activities with social and economic factors.

A USGS scientist weighs a polar bear cub on the Beaufort Sea.

V. Evaluations

Evaluations are a key part of USGS culture and are critical to maintaining our reputation for scientific excellence and credibility. The USGS conducts both peer and management reviews to evaluate our activities, consisting of both internal and external reviews by USGS and non-USGS scientists, technicians, or specialists who are not involved in the specific proposal, project, program, or product under review. The USGS goal is to seek an independent external peer review of ongoing programs about every five years, combined with more frequent independent internal management reviews. The evaluations are used for a number of purposes, including to: improve the accountability and quality of programs; identify and address gaps in programs; redirect or reaffirm program directions; identify and provide guidance for development of new programs; and reward and/or motivate managers and scientists.

A major partner in USGS external reviews is the National Research Council, which is conducting a study of the role of the USGS in the 21st Century, and has provided evaluations of USGS scientific activities in mineral and energy resources, volcanoes, and coastal and marine studies. The USGS also has a strong relationship with the National Academy of Public Administration (NAPA), which has conducted a review of our mapping programs; evaluated factors that may limit access to USGS disaster information; and conducted a functional review of USGS human resources roles and responsibilities as part of continuing efforts to streamline.

The program evaluations that contributed to the Strategic Plan are listed below.

These reviews and evaluations collectively shaped this plan. In particular, many evaluations stressed the need for more integrated and coordinated science at the USGS. For example:

- The National Research Council, in its review of the Coastal Marine Geology Program, recommended more centralized direction and management of the program.
- The Fisheries and Aquatic Resources Program Review recommended that the program's research projects be more closely coordinated.

Program Evaluation	Reviewer	Goal[1]	Completed
Coastal and Marine Program	External Review by National Research Council	HAZ ENR	1999
Energy Program	External Review by the National Research Council	ENR	1999
Earthquake Hazards: The Advanced National Seismic System	Internal Report prepared for Congress	HAZ	1999
Federal Advisory Committee on National Cooperative Geologic Mapping	Internal/External Panel	ENR	1999
Federal-State Cooperative Water Program	External Review by the National Research Council	ENR HAZ	1999

[1]HAZ = Hazards Mission Goal; ENR = Environment and Natural Resources Mission Goal

Program Evaluation	Reviewer	Goal[1]	Completed
Fisheries and Aquatic Resources Program Review	Internal/External Review	ENR	1999
Gateway to the Earth Workshop	Internal/External Review by technical specialists from USGS, university and State governments	HAZ ENR	1999
Global Change Wetlands Program Review	Internal/External Review	ENR	1998
Global Disaster Information Network	External Review by National Academy of Public Administration (NAPA)	HAZ	1999
Ground Water Resources Program	Internal Report prepared for Congress	ENR	1999
Human Resources Roles and Responsibilities	National Academy of Public Administration	HAZ ENR	1999
Hydrologic Hazards at USGS	External Review by the NRC	HAZ	1999
Landslide Hazards at USGS	Internal Report prepared for Congress	HAZ	1999
Meeting U.S. Energy Resource Needs-The Energy Resources Program of the U.S. Geological Survey	Committee on Earth Resources, Commission on Geosciences, Environment, and Resources	ENR	1999
Mineral Resources and Society	A Review of the U.S. Geological Survey Mineral Resource Surveys Program Plan. Natural Resource Council, Committee on Earth Resources, Commission on Geosciences, Environment, and Resources	ENR	1996
Mineral Resource Surveys	National Research Council	ENR	1996
Mineral Resources and Sustainability-Challenges for Earth Scientists	National Research Council. Committee on Earth Resources, Commission on Geosciences, Environment, and Resources	ENR	1996
National Digital Orthophoto Program (NDOP)	Internal/External Review with multiple Federal agencies and National States Geographic Information Council	HAZ ENR	1999
National Mapping Program Private Sector Relationships	Internal/External Review by senior management and private sector partners	ENR	1999
National Water Quality Assessment Program: the Challenge of National Synthesis	National Research Council, Committee on USGS, Water Resources Research, Water Science and Technology Board	ENR	1994
Preparing for the 21st Century: a Report to the USGS Water Resources Division	National Research Council, Committee on U.S. Geological Survey, Water Resources Research, Water Science and Technology Board	HAZ ENR	1992
Regional Hydrology and the USGS Stream Gaging Network	National Research Council, Committee on U.S. Geological Survey, Water Resources Research, Water Science and Technology Board	HAZ ENR	1992
Science for Decisionmaking-Coastal and Marine Geology at the U.S. Geological Survey	National Research Council, Ocean Studies Board, Commission on Geosciences, Environment, and Resources	ENR	1999
Status and Trends Program Review	Internal/External Review	ENR	1999
Strategic Directions for the USGS	Internal Review	HAZ, ENR	1999
Water Resources Division Streamgage Program	Internal Report prepared for Congress	HAZ ENR	1998
Activities of the USGS Upper Midwest Environmental Sciences Center	DOI Inspector General to support Corps of Engineers management requirements	ENR	1998

- The Global Change/Wetland Ecology Program Review recommended better integration of studies and disciplines.

Many evaluations also stressed the need for improved applications and delivery of our science:

- The Gateway to the Earth workshop recommended better integration and delivery of USGS' vast data holdings.
- The National Cooperative Geologic Mapping review recommended increased emphasis on interpretive geospatial science information.
- The National Digital Orthophoto Program (NDOP) Steering Committee recommended that USGS develop more applications to meet its mission requirements.
- The External Review of the Federal-State Cooperative Water Program recommended expansion of the streamflow monitoring network to deliver more comprehensive information to users of data.

The above bulleted recommendations contributed to the development of revised performance measures for real-time hazards information and support the plan's emphasis on predictive modeling and decision support systems development. In addition, the Bureau's internal review of its streamgaging network revealed that the previous long-term goal related to streamgaging, which counted the number of streamgages with telemetry, was not the best assessment of the utility of the network. As a result, a revised long-term target was developed based on the average number of gages reporting data on the World Wide Web.

Another important theme of these evaluations that was incorporated into the Strategic Plan is that of partnerships and collaboration. For example:

- The National Research Council recommended expanded partnerships with users of environmental data from the Energy Resources Program.
- Review of the National Cooperative Geologic Mapping Program recommended increased emphasis on multi-level partnerships.
- The NDOP Steering Committee recommended that USGS work more closely with States to coordinate Federal requirements with State programs.

This emphasis on partnerships and customers is reflected in our performance measures for stakeholder meetings and customer satisfaction and in the many listening sessions held by USGS program managers to enhance USGS partnerships.

The table on page 19 shows evaluations planned for 2000 and 2001:

Program Evaluation	Scope	Methodology	USGS Goal	Schedule
Alaska Programs and Projects	Explore ways to work with stakeholders to document Alaska's landscape and natural resources	Internal/External Reviews with partners and customers	HAZ ENR	Annual
Cooperative Programs	Annual review of data collection program strategies and plans by cooperators and partners	External Reviews Partnership Biennial Meetings • USGS/USFS Single-edition Steering Committee • National Digital Orthophoto Steering Committee • National Satellite Land Remote Sensing Data Archive Advisory Committee • DOI High-Priority Digital Base Data Program Steering Committee • DOI Science support	ENR HAZ	Annual
EPA Superfund Support	Maintenance of complete, accurate, and current site-specific cost records for Superfund projects; billing documentation; appropriate reimbursements.	DOI IG audit	ENR	Annual
Exotic and Invasive Species Program Review	Entire Program	Internal/External Review	ENR	2000
Gateway to the Earth	Help USGS identify needs, framework, scope, standards, linkages to partners	Internal Review and External Reviews by DOI, OMB, Congress, and technical specialists from university and private sectors	HAZ ENR	Annual
Ground-water Resources	Entire program--review of regional ground-water studies	External Review by the NRC, DOI, OMB, Congress	ENR	2001
South Florida Ecosystems Restoration	Government-wide	GAO Audit and Programmatic Evaluation	ENR	2000
Upper Mississippi River System Environmental Management Program	Activities of the USGS Environmental Management Technical Center	DOI Inspector General Survey Report	ENR	2000
USGS Strategic Directions	Help USGS identify: • and interpret changing society and political environments; • major societal needs that should be addressed by USGS; • emerging scientific & technical issues relevant to the USGS mission; • opportunities for partnerships	External Review by the National Research Council	HAZ ENR	2000
Volcano Hazards Program	Entire program	External Review by the National Research Council	HAZ	2000

CONSULTATIONS

The development of this Strategic Plan has been an interactive process involving public and employee involvement, stakeholder meetings, written comments, briefings, and discussions. A draft of the Strategic Plan was mailed to almost 300 key stakeholders. It was also made accessible on the USGS home page with a "hot button" allowing viewers to provide comments on-line, and notice was also placed in the Federal Register. We received written comments from other bureaus in the Department of the Interior, other Federal agencies, employees of the USGS, private corporations, the university community, environmental organizations and other non-governmental organizations, and private individuals. Comments on our programs were received during approximately 200 regular stakeholder meetings and were incorporated into the revised Plan. The Bureau Executive Leadership Team and other USGS managers also reviewed it extensively. These consultations for the most part supported the new simplified mission goals and the long-term goals. In response to comments and program evaluations, we added a customer satisfaction measurement to the mission goal performance measures and revised our performance measurement for real-time hazards.

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