Goal 4: Provide Science for a Changing World

"Honesty and integrity in all aspects of scientific enterprise, maintaining impartiality, and ensuring that information and products are used to benefit the public as a whole are the hallmarks of USGS science."

As a Nation, we face serious questions concerning the environment: How can we ensure an adequate supply of critical water, energy, mineral, and biological resources in the future? Are we irreversibly altering our natural environment when we use these resources? How has the global environment changed over time? What can the past tell us about the future? How can we predict, prevent, and mitigate the effects of natural hazards? Collecting, analyzing, and disseminating the scientific information needed to answer these questions, as well as providing the other critical scientific support for resource management decisions, are major responsibilities of the Department.

The U.S. Geological Survey (USGS) is the Nation's primary provider of natural science information related to natural hazards, certain aspects of the environment, and mineral, energy, water, and biological resources. USGS scientific research contributes to improving the health and welfare of the American people, as well as helping to resolve the Nation's environmental issues and formulate sound federal land management and natural resource policies. USGS is also the federal government's principal domestic map-making agency.

Since 1879, the USGS has been responsible for classifying the public lands and examining the geological structure, mineral resources, and products of the national domain. With the incorporation of the former National Biological Service in 1996, the USGS has also become a major partner in enhancing the Nation's understanding of the conditions and trends of biological resources and the ecological factors affecting them.

The Department employs the following strategies to achieve the goal of providing science for a changing world:

- Participate in interagency and intergovernmental programs to assess, document, and monitor ecological and socioeconomic conditions and trends, including developing and implementing information-needs assessment procedures.

- Ensure that its scientific research program focuses on understanding, assessing, and monitoring ecosystems to provide the scientific understanding and technologies needed to support sound land and resource management decisions.

- Help society to understand the ecological, geologic, chemical, and hydrologic processes that govern the environment's responses to management actions.

- Provide scientific information and technical assistance to understand the interaction of natural and human systems, protect the environment, understand the effects and risks of natural hazards, control wildlife diseases, assess energy and mineral resources, and ensure the preservation, conservation, and sustainable use of natural resources and restoration of habitats.

- Develop technology to increase efficiency and expand the collection and management of natural science data; establish and maintain national earth and biological science databases for use by federal, state, and local land management and regulatory agencies, as well as the public.

The major departmental activities to achieve the goal of providing science for a changing world are summarized in *Figure 8.*

Figure 8

Goal 4 – Provide Science for a Changing World		
GPRA Program Activity	**2001 Expenses ($ in millions)**	**2000 Expenses ($ in millions)**
1. Improve Environmental and Natural Resource Information	$1,095	$1,067
2. Increase Hazard Knowledge and Warning	188	159
3. Improve Land, Resources, and Title Information	120	119
Total – Goal 4	**$1,403**	**$1,345**

GPRA Program Activity 4.1: Improve Environmental and Natural Resource Information *(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)*

Background: The environment is constantly changing as natural processes and human actions affect it. Changes in demographics also affect the competition for and use of renewable and nonrenewable natural resources—land, water, minerals, and energy—needed to sustain life and to maintain and enhance America's economic strength. As land and resource management issues become increasingly complex, both environmental and natural resources sciences are needed to guide decisions, predict outcomes, and monitor results.


Tidal mangrove wetland in Florida (photo by Virginia Carter).

Performance Measure - Number of Decision Support Systems or Predictive Models Developed or Improved. USGS's environment and natural resource programs focus on understanding, modeling, and predicting how multiple forces affect natural systems. This knowledge enables land managers, decisionmakers, and citizens to make sound decisions about how to live on and manage the land. The USGS provides these customers with a better 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.

2001 Results: The USGS met its performance target by developing or improving seven decision support systems. These decision support tools and predictive models are broad in scope, are robust, yield quantitative predictions about natural resources or the environment or quantitative options for land and resource management, and are used by managers for informed decisionmaking. The seven new or improved systems are:

1. GEODE (Geo-Data Explorer)
2. MODFLOW 2000 (Ground-Water Flow Model)
3. PHREEQCI (Low Temperature Geochemical Analysis)
4. Evaluating Threats of Potentially Invasive Birds
5. SPARROW (Spatially Referenced Regression on Watershed Attributes)
6. ATLSS (Across Trophic Level System Simulation)
7. Snow Water Equivalence Model

Number of Decision Support Systems or
Predictive Models Developed or Improved
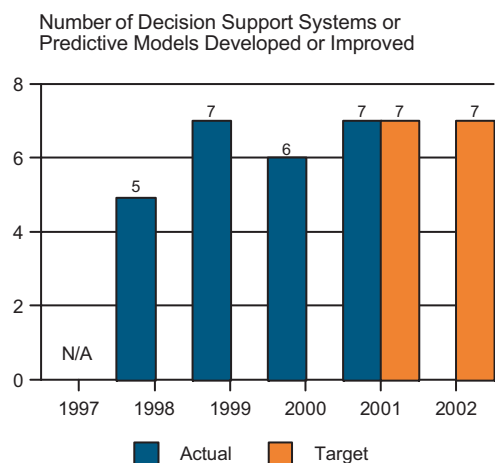
GPRA Program Activity 4.2: Increase Hazard Knowledge and Warning
(Provide science for a changing world in response to present and anticipated needs, focusing efforts to predict and monitor hazardous events in near-real and real time and to conduct risk assessments to mitigate loss)

Background: Hazards are uncontrollable natural events that may expose America's population to the risk of death or injury and may damage or destroy private property, societal infrastructure, and agricultural or other developed land. The USGS is responsible for describing, documenting, and understanding natural hazards and their risks.

Performance Measures - *Real-Time Streamgages on the Internet and Real-Time Earthquake Sensors.* The USGS enhances its ability to characterize and monitor hazardous events in near-real and real time by using telemetered streamgages and earthquake sensors that are capable of delivering information almost instantaneously.

2001 Results: The USGS maintained a quarterly average of 5,280 real-time streamgages on the Internet (98 percent of target) and improved 128 real-time earthquake sensors for a cumulative total of 329 (100 percent of target). Telemetry is added to existing streamgages to provide real-time flow information to National Weather Service forecasters and emergency management and response officials. During 2001, USGS made a transition from the old decentralized computer systems that served real-time data to the public and to other government agencies via the Internet to a new centralized NWIS-Web (National Water Information System) system. Delays in getting some real-time streamgaging sites included in the NWIS-Web database caused the shortfall in meeting the performance target. Ground motion detectors are the initial instrument installed to capture and transmit real-time earthquake information. In 2001, 128 targeted sensors were installed.

Performance Measures	1997	1998	1999	2000	Plan 2001	2001	Plan 2002
Real-time streamgages on the Internet (quarterly average)	Replacement		4,500	4,872	5,374	5,280	5,574
Real-time earthquake sensors (cumulative)	70	100	120	201	329	329	449

GPRA Program Activity 4.3: Improve Land, Resources, and Title Information
(Provide the public with improved information about the land, its resources, and land records)

Background: The Bureau of Land Management (BLM) has extensive historical and current information on land ownership, use, and condition in the United States. The agency maintains cadastral survey and historical data on patented lands, along with information on the mineral estate, resource conditions, and permits or leases on federal lands. Historical records are critical to resolving many ownership disputes and are increasingly recognized as an important source of both genealogical information and data about historic resource conditions in the United States. As the complexities of managing ecosystems increase, data collection and analysis become even more vital to managing the land.

BLM surveyor talking to a neighboring landowner (photo by BLM).

Performance Measure - *Number of Public Land Title Records Posted on the Internet.* The public is performing online Internet searches for information and subsequently downloading digital data or filing requests for historical information directly with BLM offices. One example is BLM's General Land Office Records Web site (*http://www.glorecords.blm.gov*).

2001 Results: The BLM achieved its performance target by posting 200,500 public land records to the Internet. Additionally, the BLM provided customers with online query capability, image viewing, and ordering of certified documents. Since going online in May 1998, this Web site has recorded almost 3.8 million visits from individuals who have accessed over 122 million pages of information and ordered more than 55 million copies of patents contained on the site.

Number of Public Land Title Records Posted on the Internet

Year	Value
1997	N/A
1998	2,000,000
1999	250,000
2000	335,000
2001	200,500 (Actual) / 200,000 (Target)
2002	200,000 (Target)

■ Actual   ■ Target