

# C Federal GIS . Connections

ESRI • Winter 2009/2010

GIS for Federal Government

## An Enterprise Approach to Data Management

### USACE eCoastal Program Supports GIS across Divisions

From the beaches of Hawaii to the harbors of Maine, the United States Army Corps of Engineers (USACE) protects and restores the shoreline many call home and even more call the perfect vacation spot. Though images of peaceful waters and pristine sand may be fixed in our minds, the more than 12,000 miles of U.S. coastline are fragile and ever changing.

As they address issues such as coastal flooding, navigation, regional sediment management, erosion, and hurricane damage, Corps districts like the Mobile district in Alabama collect unique data to support engineering, environmental, and economic

decisions. District projects require much information such as regional coastal mapping data, the date and time shoreline imagery is collected, and detailed designs of coastal structures.

Historically, after the Corps districts in these areas collected data for coastal projects, it remained siloed in the confines of the project. “An engineer might not ever know the data she needs already exists even if she sits five cubicles away from the person who has it,” says Rose Dopsovic, eCoastal program manager, U.S. Army Corps of Engineers, Mobile district, Spatial Data Branch.

To improve data sharing and acquisition,

the Mobile district developed the eCoastal program—the letter *e* stands for enterprise. The program focuses on optimizing data access in each district, preferably in a geodatabase. The program utilizes Corps spatial data standards and implements national policy to provide a customized framework for spatial data standards, geodatabase structure, and geographic information system (GIS) applications that supports the development of enterprise GIS in and across coastal divisions.

“Now, regardless of which project data was collected for, if it’s indexed and archived properly, anybody who’s interested in the data can

find it and apply it to his own project,” says Dopsovic. “We tried to put together a standardized architecture to allow people to find the data they need—even if they didn’t pay for it themselves.”

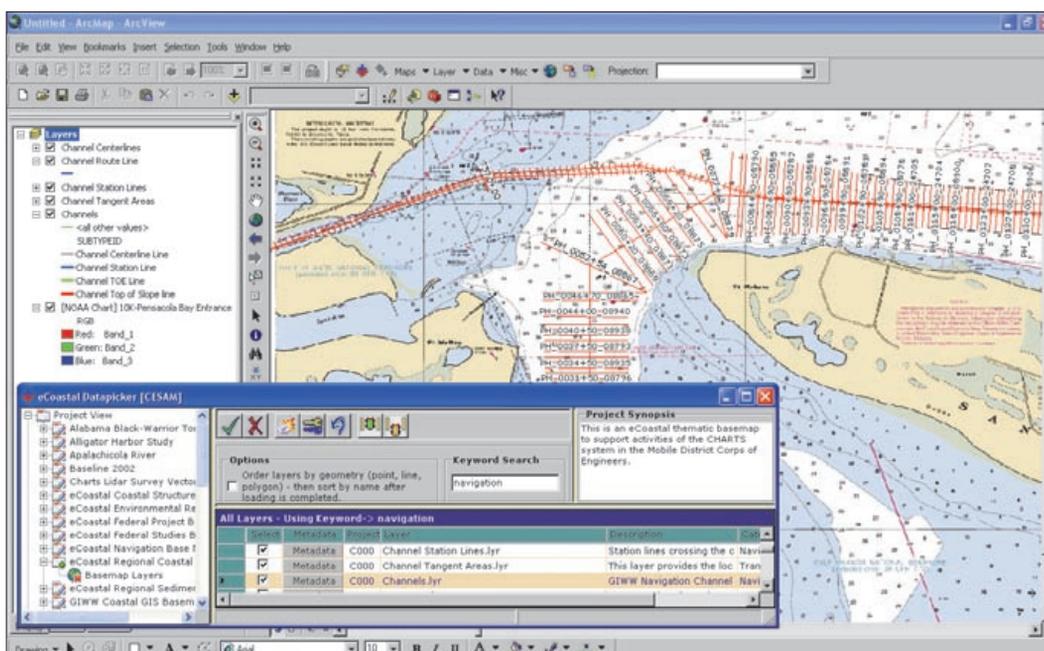
The program also addresses the requirements of districts that don’t have in-house GIS experts. It gives districts the analytic tools, lessons learned, and data structure they need to effectively use their geospatial information.

#### Coastal Customization

Generally, Corps engineers use the Department of Defense’s Spatial Data Standard for Facilities,

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The eCoastal Data Picker tool shows a search using the keyword *navigation*. The tool allows users to easily search a Corps district for the data they need. Users also have access to related metadata.

## Bureau Chief Tim Trainor Says Geography Is Core of Census

As a keynote speaker at the ESRI International User Conference this year, Tim Trainor, chief of the Geography Division at the United States Census Bureau, addressed a crowd of thousands at the Plenary Session and delivered a clear message: “Geography is the core of the census.”

Trainor focused his talk on activities for the 2010 decennial census, some of which are already under way. Since geography is a key component of census activities, the bureau uses GIS throughout the process, from the first activities of address canvassing to final data delivery.

Initially, the bureau divides the country into almost seven million census blocks with ArcGIS software. Those blocks are then aggregated into approximately 800,000 larger assignment areas for individual enumerators. Data from approximately 8,000 assignment areas is processed each day during address validation activities, which can exceed three million addresses per day.

“The census is the largest peacetime mobilization in the United States,” said Trainor. “It’s a snapshot of the population. It tells us who we are within our borders, and it tells us where we live. The goal of the census is to count everyone once and only once in the right location.”

Using handheld computers, enumerators recently verified each address in the United States, which will supply the mailing list for the census questionnaires to be sent on April 1, 2010. Trainor described it as “by far, the largest deployment of mobile GIS in the world.” One hundred forty thousand temporary work-

ers canvassed 145 million addresses and had 11 weeks to complete the task.

“We’re using GIS in the field to make things easier and faster,” Trainor explained. He then announced, “Because of this technology, I’m pleased to tell you that on Friday, July 10, at 10:00 in the morning, the last assignment area was checked and verified. That ended our address-canvassing field operations seven days ahead of schedule.”

After the census is taken next year, the bureau will limit the amount of material it disseminates with paper and will opt instead to deliver the majority electronically. Many users will access the data through American FactFinder, which is being redesigned to take advantage of Web 2.0 technology. Cached maps will load faster, and users will be able to make thematic maps with any data instead of predetermined sets of data.

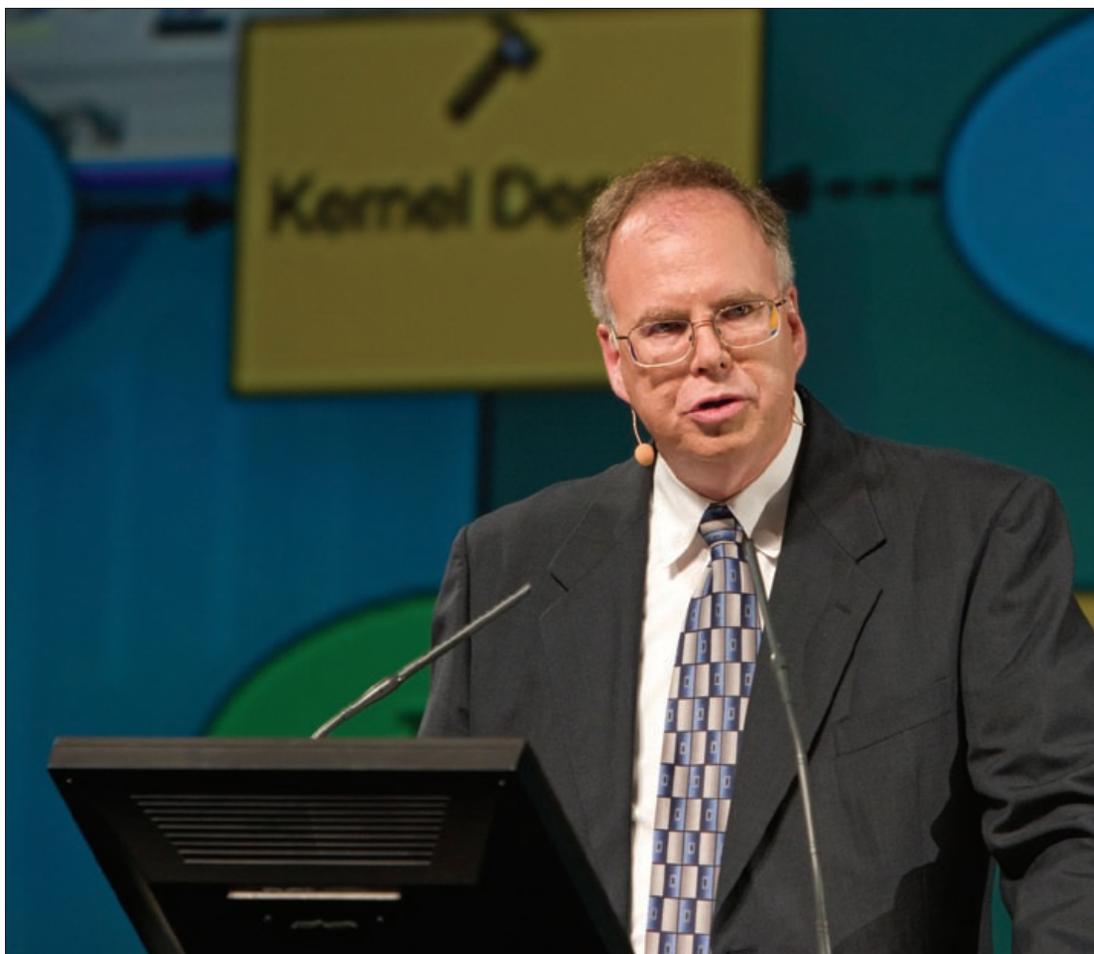
Census data will support general GIS appli-

cations, including planning efforts and determining where to locate schools, hospitals, and other public institutions. Trainor also noted it will help people answer questions about affordable housing, plan roads and bridges, enhance businesses and other economic infrastructure, develop social programs, and improve community projects. Population totals will determine how many seats each state receives in the House of Representatives, and states will use the information to redraw congressional district boundaries.

“The census,” Trainor concluded, “is basic to our democracy.” Then he strongly encouraged everyone to fill out their census forms.

### More Information

For more information, contact Tim Trainor (e-mail: [Timothy.F.Trainor@census.gov](mailto:Timothy.F.Trainor@census.gov)).



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# ESRI Online

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- **Migrating from Single-User Geodatabases to Multiuser Geodatabases**

- This podcast identifies reasons to migrate from Microsoft Access personal or file geodatabases to multiuser geodatabases. It also highlights some key concepts to keep in mind before migrating as well as GIS data migration methods.

- **Speaker Series—Interviews with ESRI Staff**

- **Managing Federal Government Civilian Campuses Using GIS**

- Thomas Gibbs, federal government account manager, talks about how federal agencies use GIS to manage federal government campuses. Gibbs explains how GIS can be integrated into existing systems to maximize available office space.

- **Managing Federal Real Property Using GIS**

- Dennis Smith, federal team member, talks about the need to precisely manage federal real property. In 2004, an executive order was issued to enforce the efficient and economical use of government real property assets. Smith explains why GIS is the ideal platform for the task.

- **GIS for Federal Office Building Management**

- John Young, business lead for federal civilian facilities management, details how GIS helps real estate portfolio managers determine the location of office space by giving them a geographic perspective.

## Watch Engaging Videos

Visit [www.esri.com/geogov](http://www.esri.com/geogov) to see how GIS is supporting open, transparent, and effective government. Included here are videos of ESRI president Jack Dangermond discussing geoenabling Gov 2.0, tracking stimulus money with GIS, and more.

## Join the Online Community

Follow conversations with ESRI government staff on Twitter.



**Christopher Thomas**, Government Industry Solutions Manager

Twitter ID: [gis\\_advocate](https://twitter.com/gis_advocate)

**John Steffenson**, Federal Civilian and Global Affairs

Twitter ID: [jsteffenson](https://twitter.com/jsteffenson)

## Learn about GIS for GOV 2.0

See how GIS is supporting GOV 2.0 initiatives and find resources including videos, APIs, and success stories. Visit [www.esri.com/gov20](http://www.esri.com/gov20).

# DOI Demonstrates Climate Change with ArcGIS Explorer Visualizing Environmental Impacts Shows Need for New Strategy

Secretary of the Interior Ken Salazar recently signed an order to establish a coordinated strategy within the United States Department of the Interior (DOI) to improve response to climate change. During the press conference announcing the order, DOI staff used ESRI GIS technology to demonstrate the current and future impacts of global climate change.

“I’m issuing the order because the Department of Interior must continue to change how it does business and to respond to the energy and climate change challenges that I consider to be the signature issues of the twenty-first century,” said Salazar.

Science adviser Kit Batten and enterprise geographic information management lead Robert R. Pierce, Ph.D., used ArcGIS Explorer to show where on the globe climate change is taking place and what that change looks like.

“This is a live demonstration,” said Batten. “It demonstrates how DOI’s scientific expertise, data resources, and geospatial analysis and visualization capabilities help us understand, anticipate, and deal with the impacts of climate change.”

Batten used ArcGIS Explorer to show a 3D globe indicating increases in surface temperatures around the world and where warming negatively impacts the United States. Map points indicated incidents of extreme weather, such as large hail and strong tornadoes, and lines showed the paths of intense hurricanes.

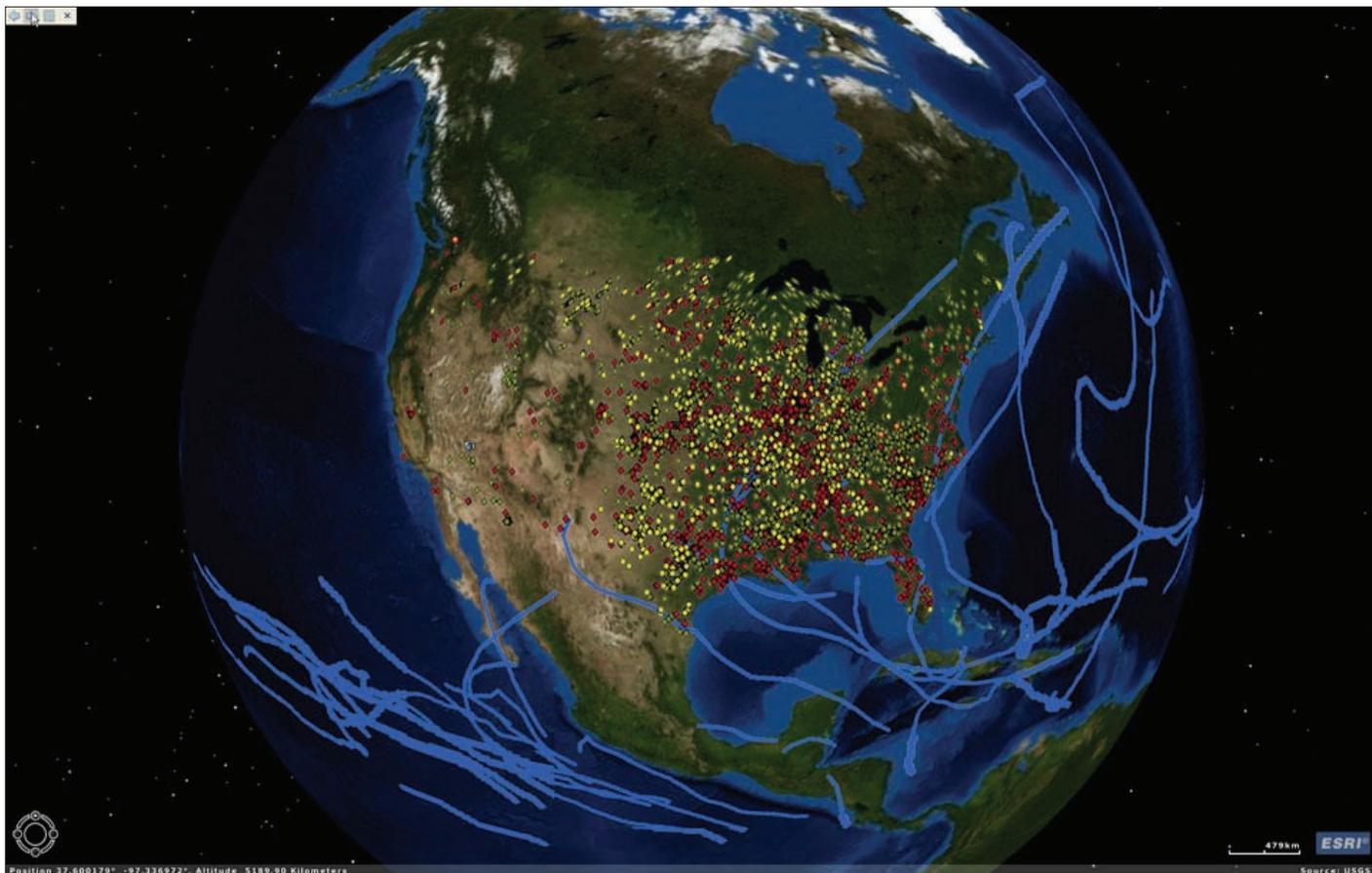
Batten also explained that as greenhouse gases continue to warm the environment and cause glaciers and permafrost to melt, scientists anticipate sea-level rises of up to one meter by the end of the century. The ArcGIS Explorer globe showed potential impacts to

coastal communities. “This information is imperative for designing strategies to protect our low-lying coastal communities,” she said.

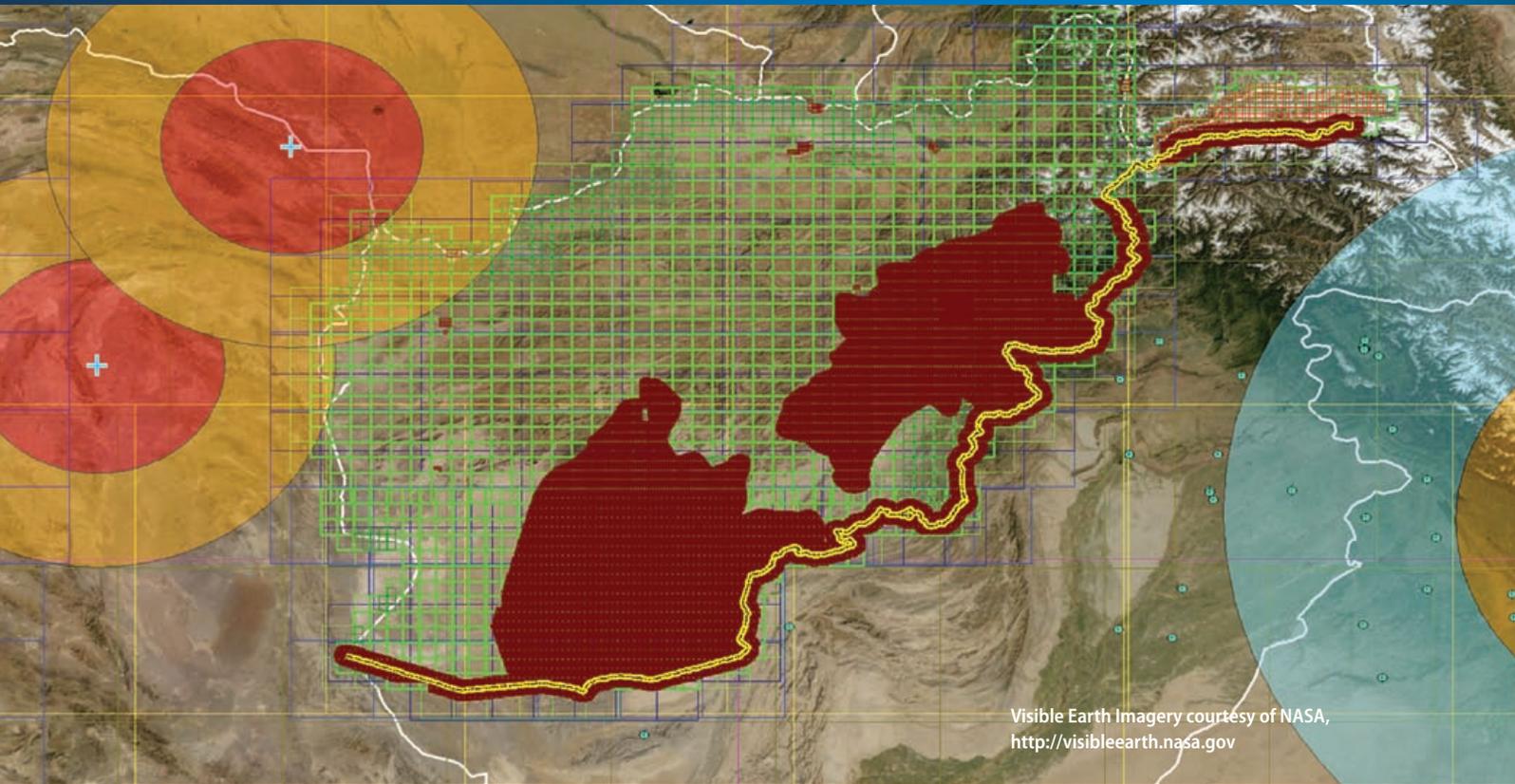
To better manage these and many other environmental impacts, Secretary Salazar’s order includes establishing a Climate Change Response Council and Regional Climate Change Response Centers, creating a network of Landscape Conservation Cooperatives, overseeing the DOI Carbon Storage Project, and lowering the department’s carbon footprint.

DOI will continue to leverage its investment in GIS technology for complex data analysis, data sharing, and collaboration with government agencies to address the vast nature of climate change challenges.

To see the demonstration, visit [www.doi.gov/climatechange](http://www.doi.gov/climatechange). To learn more about ArcGIS Explorer, visit [www.esri.com/arcgisexplorer](http://www.esri.com/arcgisexplorer).



ArcGIS Explorer shows extreme hail (yellow), tornadoes (red), windstorms (green), and hurricanes paths (blue).



Visible Earth Imagery courtesy of NASA,  
<http://visibleearth.nasa.gov>

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# ESRI ArcGIS Powers New Recovery.gov Map

## Interactive Web Map Shows Detailed Account of Where Stimulus Funds Are Going

The United States Recovery Accountability and Transparency Board recently launched the redesigned Recovery.gov Web site with a new interactive Web map based on ESRI GIS software. The dynamic map shows where American Recovery and Reinvestment Act funds have been awarded as well as recipient information.

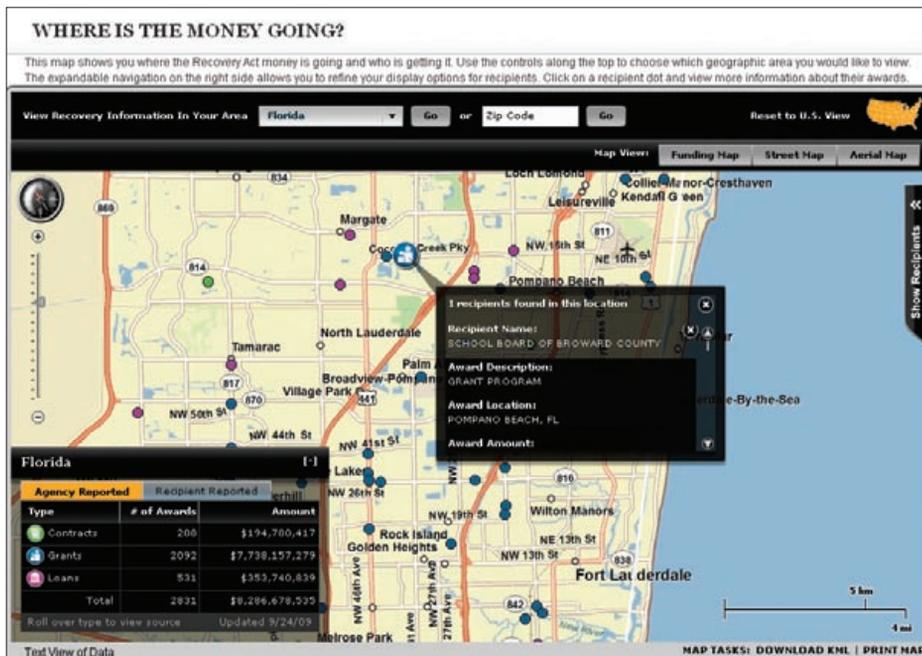
Smartronix, the professional solutions provider heading up the redesign, uses ESRI's ArcGIS Server to manage recovery data from federal agencies and display it on the map. ArcGIS Online services provide the basemap, and the ArcGIS API for Flex delivers easy navigation. In just a few clicks, visitors can see where stimulus funds have been invested

in neighborhoods across the nation. Selecting a point on the map reveals information about each award such as amount, description, and award number.

During October, recovery fund recipients began reporting their use of funds to the government, and this information is now available in the interactive Recovery.gov map. Moving forward, the map will continue to show updated spending information to facilitate the transparency and accountability the legislation requires.

"The map on Recovery.gov makes it easy to understand vast amounts of information on investments around the country," said Jack Dangermond, president, ESRI. "We are so pleased that the Recovery Board and Smartronix used GIS to integrate this important information and present it in a way that supports better analysis."

The Recovery.gov map is a customized version of sample templates ESRI provides for stimulus reporting. Visit [www.esri.com/recovery](http://www.esri.com/recovery) for more information.

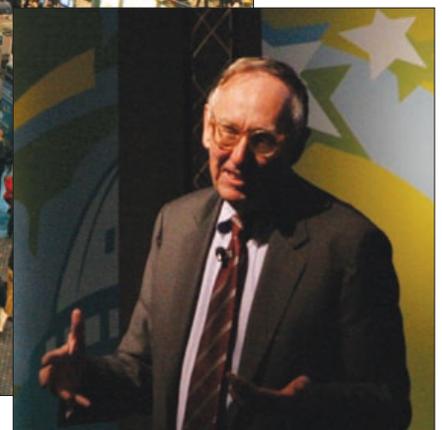


ESRI GIS drives the dynamic new map on Recovery.gov.

## Attend FedUC

Join us in Washington, D.C., February 17–19 for the 2010 ESRI Federal User Conference (FedUC). Whatever your GIS experience, FedUC will give you the knowledge and resources you need to fully leverage the geographic approach.

To learn more, visit [www.esri.com/feduc](http://www.esri.com/feduc).



# EPA Maps Recovery Obligations and Outlays

## Online GIS Application Shows Where EPA Is Investing and How Much It Has Spent to Date

The United States Environmental Protection Agency (EPA) is using GIS technology to show how it is administering its \$7.22 billion allotment from the American Recovery and Reinvestment Act of 2009 (ARRA). The ESRI ArcGIS Server software-based Web mapping application (see [www.epa.gov/recovery/map.html](http://www.epa.gov/recovery/map.html)) shows total financial obligations and outlays by state. Once a state is selected, visitors can see how much money is going to State and Tribal Assistance Grants, Environmental Program and Management, the Leaking Underground Storage Tank Trust Fund, and Hazardous Substance Superfund.

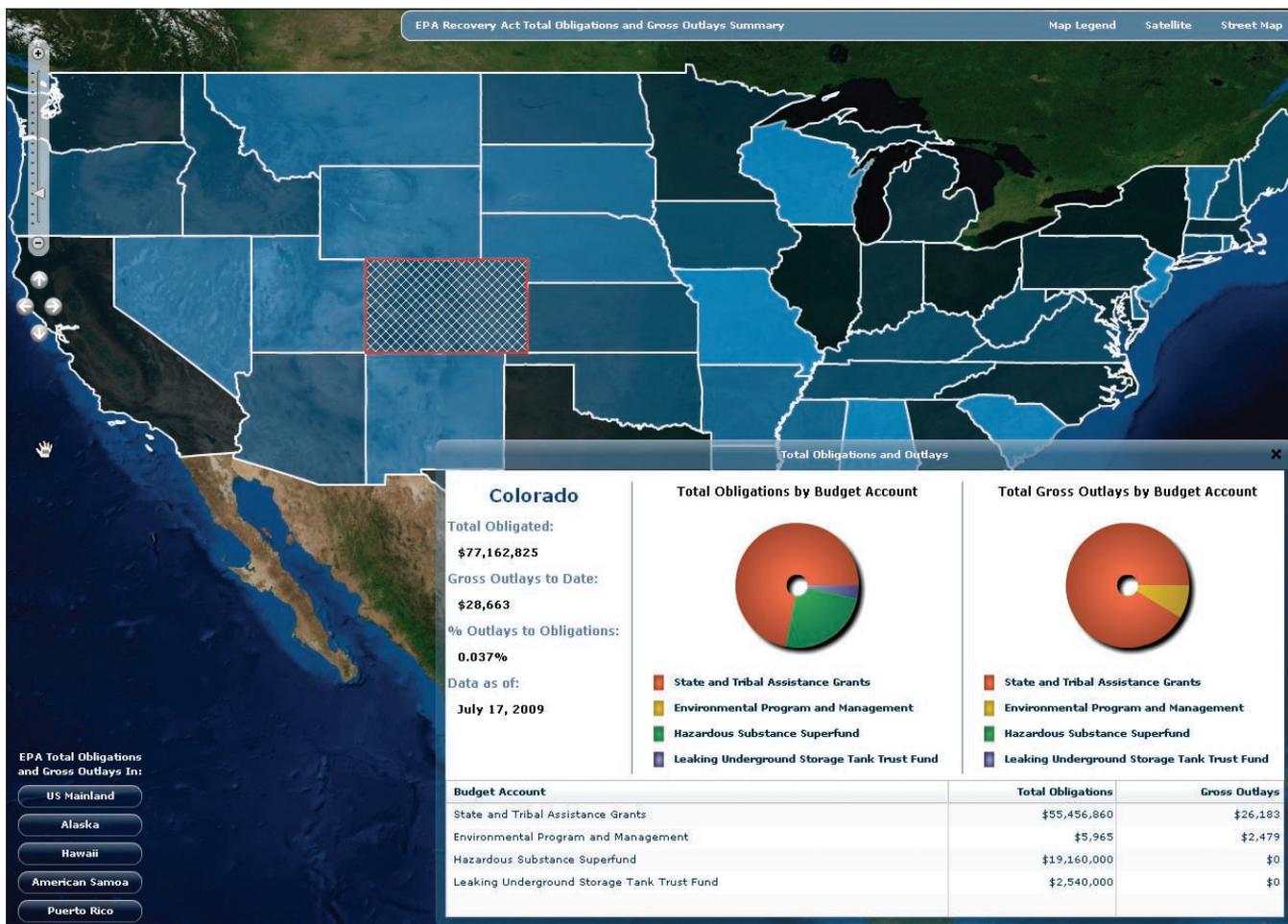
“Providing this rich set of information to the public in an easy-to-use mapping application is one important way that we are operat-

ing in an open and transparent way,” says Jerry Johnston, geospatial information officer, EPA. “By allowing the public to see exactly how EPA’s ARRA funds are being disbursed in their states and, ultimately, in their neighborhoods, this application and the ones that will follow will help ensure an unprecedented level of accountability and transparency in the execution of these programs.”

EPA has used ESRI GIS technology for years to manage its geographic data and deliver information to the public. The EnviroMapper portal, for example, provides access to GIS-based applications that map data related to air, water, and land issues across the United States including EnviroMapper for Environmental Justice and EnviroMapper for the Toxics

Release Inventory Program. Most recently, EPA added MyEnvironment to its home page, which allows visitors to input a location and discover detailed information in a specified area such as air quality, cancer risk estimates, and water conditions. MyEnvironment is powered by ArcGIS Server and uses Microsoft Bing Maps.

“GIS supports EPA’s mission to safeguard human health and the environment,” says ESRI president Jack Dangermond. “Using GIS for research, reporting, and decision making has allowed the agency to quickly respond to environmental events and keep the public informed and protected.”



EPA’s GIS-based Web map shows ARRA investments in the United States, American Samoa, and Puerto Rico.

## FEMA Cuts Production Time in Half ArcGIS and Wacom Pen Display Integration Improves Workflow for Map Modernization Program

By Mike Dana, Wacom Technology Corp.

The objective of FEMA's National Flood Insurance Program (NFIP) Map Modernization (Map Mod) Program is to capture updated flood hazard data and reduce the reliance on paper products. To do that, the agency is transitioning to digital processes for distributing and reading flood maps and has contracted with AMEC, the international engineering and project management company, to develop NFIP Map Mod deliverables.

AMEC evaluated the existing workflow for developing digital geospatial datasets and identified bottlenecks it could eliminate to optimize staff productivity and produce a superior product. AMEC designed an innovative solution to streamline the GIS data production process that integrates ArcGIS software with the Wacom DTZ-2100 interactive pen display.

The pen display is a workstation solution that uses a high-quality LCD viewing environment with pen-based digital input. The ease of use, custom configuration, and seamless integration with ArcGIS made it an ideal solution for the Map Mod digital conversion workflow. The pen display allows users to draw directly on the surface of the 21" LCD screen to emulate a pen-on-paper experience while creating rich geospatial datasets. The

DTZ-2100 also contains multiple input buttons that can be programmed as shortcuts to repetitive tasks within a workflow by using Wacom's point-and-click customizable driver interface.

Justin Graham of AMEC's Nashville, Tennessee, office managed the digitization of Flood Insurance Rate Maps (FIRMs) for 30 to 40 counties annually. "The ability for each staff member to customize their favorite shortcuts to the DTZ-2100 keys allowed us to enhance our existing methods and workflow through greater speed and comfort," he said.

The integration also allowed greater speed and accuracy in the production of digital geospatial data. "We noticed improved precision of our digitized features when we compared data collected with pen input to data collected with mouse input," Graham remarked. "The mouse-based digitizing led to inaccurate line segments that required manual cleanup and had the potential for topology errors. Drawing our GIS features right on the screen surface using the Wacom pen was a natural tool for digitizing features, and it provided us with cleaner, more precise data."

When AMEC measured the productivity gains, the results were dramatic. Staff members completed their project work in half the

time compared with using a traditional heads-up mouse digitizing workflow. The return on investment was measurable from both cost of production and data quality perspectives.

Graham summed up the impact of this GIS solution. "We wanted to ensure that we were as efficient as possible with our use of staff time and production resources utilized on the Map Mod FIRM digital conversion process. By using the Wacom pen and streaming digitizing within ArcGIS, you can just sit there and draw a nice smooth line to build rich geospatial data. The DTZ-2100 paid for itself after doing just one county map, and we're doing up to 40 counties a year. Every hour that we cut from our production workflow represented real dollars saved that justified the investment in the DTZ-2100."

Graham also reports that production was approached with increased enthusiasm because of the comfort of using a pen-based workflow. This meant less physical and mental fatigue for the production team. "Employees are valuable," Graham noted. "You don't want them to run out the door because their hand hurts from clicking a mouse for hours on end. We found that our team continued to improve almost exponentially as they spent more time working with the pen in hand."

Integrating the DTZ-2100 and ArcGIS workflow delivered easily measured productivity gains and return on investment for the work completed under the FEMA Map Mod project. The ease of use of pen input and the seamless integration of ArcGIS shortcuts with Wacom's hardware driver led to the development of superior data that was produced with speed and comfort. Deliverables were completed twice as fast as on previous projects by staff members that were enthusiastic to embrace this innovative technology.

For more information, contact Mike Dana, Wacom business development manager, at [Mike.Dana@wacom.com](mailto:Mike.Dana@wacom.com).



# The Role of GIS in National Health Reform

## Making Better Decisions through Place-Based Intelligence

Bill Davenhall, Global Marketing Manager, Health and Human Services, ESRI

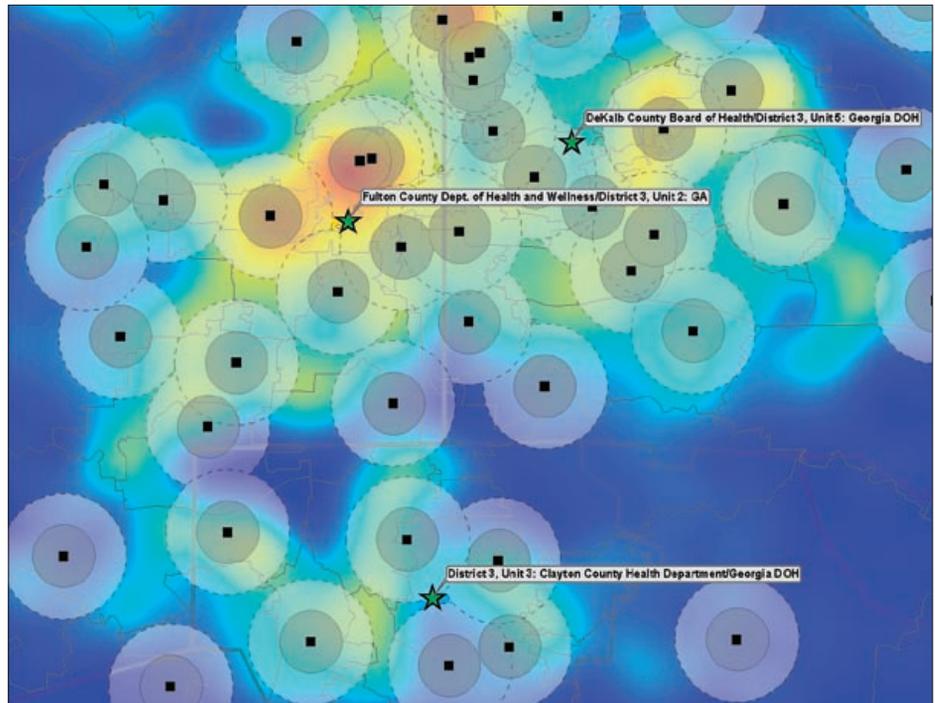
A health-focused geographic information infrastructure, adequately resourced and managed at the national level, can go a long way toward ensuring attainment of the health outcomes that national health policies seek to achieve.

Evidence is growing that, in the United States, the health of many Americans does not directly reflect investments made by either the public or private sector. According to leading health experts, the failure of America's health "system" to deliver medically acceptable outcomes at affordable prices has become a powerful driver for change.

Most Americans remain hopeful that changes in the national health policy, combined with recent health information technology (IT) commitments, will result in a more effective system that will help them live healthier lives as well as lessen the threat of financial ruin caused by medical bills. Moving the United States toward a highly effective health system will require increased health intelligence to support greater access to care, improved service coordination, and affordable and timely care.

An important component of health intelligence is the inclusion of place-based information in health, such as the locations of disease outbreaks, accessibility to social services, or proximity of communities to potentially hazardous environmental contamination. Inclusion of place-based information and the use of place-based information systems that use software based on geographic information system (GIS) technology add greater value to health intelligence, whether it is used to think about fund allocation, service accessibility, cost and qualitative disparities, or ways to help seeking consumers achieve desirable health outcomes.

To further build on the value and benefit afforded by place-based intelligence, the Department of Health and Human Services (DHHS) should adopt an aggressive agenda for improving the agency's capacities to undertake place-based research, provide greater



Place-based information adds greater value to health intelligence, as illustrated in this view of vaccine distribution center locations compared with the concentration of populations they serve.

accessibility to many different types of health information, and accelerate the availability of government-sponsored research results to the public. A geospatial infrastructure, adequately resourced and managed, will go a long way toward ensuring attainment of the health outcomes that national health policies seek to achieve.

These three strategic initiatives should be considered by DHHS leadership in the coming years:

- Appoint a geographic information officer (GIO) reporting to the proposed assistant secretary of health information, a position that can leverage the vast geographically relevant data holdings of the DHHS. This data helps states and local communities measure access, identify disparities, and ensure service delivery. Purposeful use of geographically relevant health and human service data will not only strengthen the department's place-based decision-making functions but also support strategic research, grant making, and community support linked to national recovery

investments and any future health care reform initiatives.

- Adopt the Health Level-7 (HL7) geographic interoperability messaging standard for clinical and administrative data, which supports meaningful use of the electronic health record. A portable electronic health record, available anywhere and anytime, is one of the most effective information tools for maintaining a lifelong record of a patient's health care encounters.
- Establish educational programs in geomedicine (the use of GIS in health-related fields) within academic health science centers. These programs provide students with opportunities to pursue careers in the emerging disciplines of health geoinformatics, disaster medicine, public health preparedness, and geospatial medicine. Future generations of health and human service professionals trained in the use of geographic data and methods will be a critical contribution to improving the health of individuals and communities.

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### An Enterprise Approach to Data Management

Infrastructure, and Environment (SDSFIE). The standard includes hundreds of data models, but only a few are relevant to coastal engineers. To make it easier for coastal engineers to access the models they use, the eCoastal program isolates the pertinent portions.

The Mobile district also requested changes to the spatial data standards committee. For example, coastal engineers need to include the intricacies of CAD drawings in GIS. Historically, a coastal structure would look like a simple line in a GIS. The data model now supports integration of those drawings, giving engineers geometry that accurately represents coastal structures so they can analyze them effectively.

In addition to providing data models, eCoastal includes a suite of custom tools. For example, the Data Picker tool allows users to easily find and connect to the data they need. With the ArcGIS Desktop software-based tool, users can search by keyword or category, then load data directly from their own or other Corps districts.

The Coastal Structures Condition Assessment (CoSCA) tool, developed by the Mobile district and the Corps' Engineering Research and Development Center's Navigation Research and Development Program, allows users to make 3D models of structures such as jetties. A 3D CAD drawing is overlaid on survey data to calculate composition of and dam-



The eCoastal Online Map Viewer allows Corps engineers to select a navigation channel and view dredged channel information including historical data. Here, off the coast of Florida, black squares with white dots represent the Florida Department of Environmental Protection control points, purple lines are federal navigation channels, and the shaded region in the gulf is a USACE ocean disposal area for dredged material.

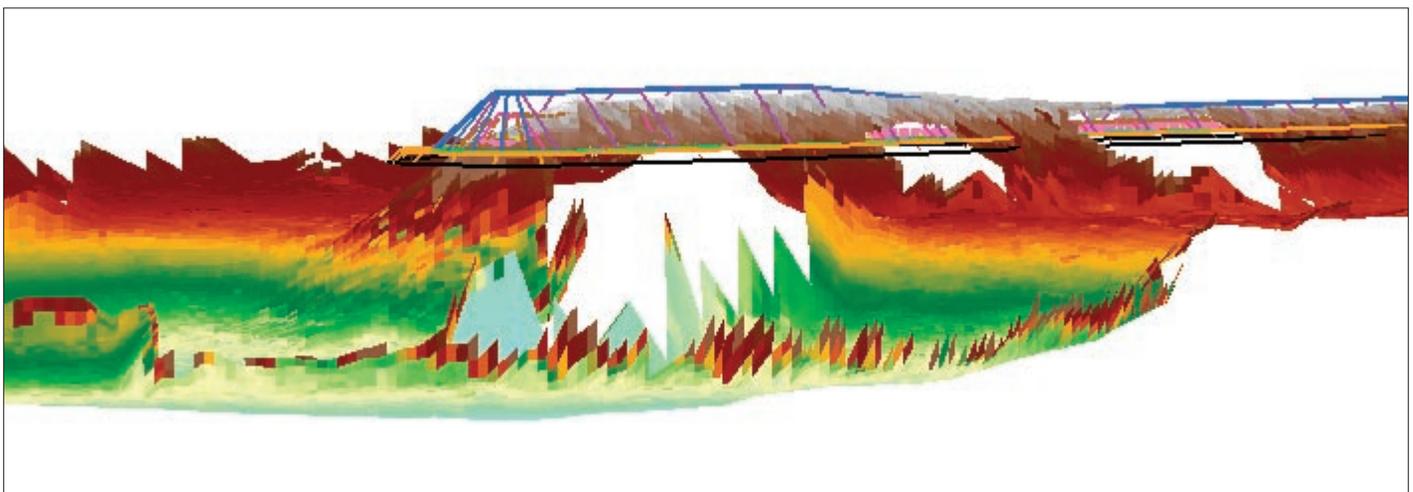
age to structures. Then engineers can calculate repair costs.

The Mobile district freely shares the eCoastal documentation and source code with other districts as well as entities outside the Corps such as the Florida Department of Environmental Protection, universities, and the public. Much of the complimentary material is available on the Corps Web site at [ecoastal.usace.army.mil](http://ecoastal.usace.army.mil). However, organizations that would like help setting up their GIS can access experts from the Mobile district.

Many districts are taking advantage of this

program, adopting all or part of the suggested framework. Buffalo, New York; San Francisco, California; New Orleans, Louisiana; and Charleston, South Carolina, have implemented the full eCoastal architecture. Those that have implemented some elements of the program include Honolulu, Hawaii; New York, New York; Los Angeles, California; Philadelphia, Pennsylvania; and Jacksonville, Florida.

For more information, contact Clint Padgett, chief, Spatial Data Branch, Operations Division, USACE, Mobile district, at [Clint.Padgett@usace.army.mil](mailto:Clint.Padgett@usace.army.mil).



A 3D wireframe representation of a jetty in East Pass, Florida, is combined with accurate survey data showing how the structure has degraded. GIS allows engineers to accurately calculate the amount of damage to the structure.

39°54'50.9206"N  
105°08'17.8710"W  
09:38:58 MDT

39°54'50.8894"N  
105°08'17.8650"W  
09:39:27 MDT

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