Esri News
for Federal Government

Winter 2011/2012

Federal GIS Moves to the Cloud

Beyond Individual Cloud Services, USDA Launches a Cloud GIS Portal

Right now, agencies are working to meet the goals of the White House's Policy to Reform Federal IT, including the Cloud-First initiative, which entails migrating at least three applications to cloud computing services by mid-2012. GIS cloud services can help achieve compliance while reducing costs and increasing productivity and collaboration within and between agencies. They can also help unlock federal agencies' vast stores of location-related data by allowing authorized users to perform GIS tasks online at any time.

Agencies that aren't ready for public cloud computing or are restricted from it are instead investigating private or hybrid cloud services. These types of cloud services keep classified or sensitive information safely behind agency firewalls, either on the premises or hosted by an external organization. Many believe the "sweet spot" in the federal government's migration to cloud computing will be found in balancing public and private cloud scenarios in a hybrid environment.

Federal organizations paving the way include the Recovery Accountability and Transparency Board, whose Recovery.gov site was the first government-wide system →

↑ This USDA soil survey is overlaid with a hydro reference layer. With an agency-wide, cloud-based GIS, more USDA staff will be able to share, layer, and analyze geospatial information to support their specific projects.

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Federal GIS Moves to the Cloud

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→ to move to the cloud. Its interactive online map helps citizens see how the government is spending funding from the American Recovery and Reinvestment Act of 2009 in their neighborhoods and across the United States. The USDA's Food and Nutrition Service was able to move its Supplemental Nutrition Assistance Program (SNAP) online retail locator to the cloud in about two months on a limited budget. SNAP, which replaced the former food stamps program, now handles about seven million electronic transactions at retailers across the United States every day. Further, Esri is working with the US Department of Energy on a $1.2 million project that aims to improve US fuel efficiency standards by evaluating technologies like cloud-based services that provide feedback to drivers so they can cut harmful emissions and reduce fuel consumption.

While these cloud-based services signal a sea change for federal GIS, agencies like USDA are taking things a step further by moving significant portions of their geospatial operations to a secure cloud platform. USDA anticipates that by making its geospatial data and services more prevalent, it can foster innovation, increase service to citizens, improve workflows, eliminate redundancy, and resolve scalability issues that can threaten network or server resources. The portal will allow a wider range of staff members to create detailed, accurate, updated maps to support their specific objectives.

USDA's cloud effort was largely initiated by its involvement in the Department of Homeland Security's New Madrid emergency response exercise, a national effort to prepare and coordinate an integrated response in the event of a catastrophic earthquake along the New Madrid fault.

"We looked around at the different GIS solutions we had in the department and couldn't find anything appropriate for the exercise," says Stephen Lowe, USDA geospatial information officer and director for the agency's Enterprise Geospatial Management Office (EGMO). "We agreed to test the beta version of Esri's ArcGIS Portal, and they helped us deploy it."

USDA's prototype portal, called the Enterprise Spatial Mapping Service (ESMS), is hosted in an Amazon cloud environment. During the New Madrid exercise in May 2011, USDA officials from the Animal and Plant Health Inspection Service, Farm Service Agency, Natural Resources Conservation Service, and other departments leveraged the portal to share and analyze geospatial content related to disaster response. ESMS maps also helped inform decisions in briefings with other participating agencies and local governments. By coordinating geographic information from various USDA agencies, exercise participants could better determine how livestock, farmers, and land would be impacted in the aftermath of a crisis.

"We can present a much more comprehensive picture of what's going on across the entire enterprise and very rapidly draw accurate conclusions that help us make meaningful business decisions," says USDA chief information officer Christopher Smith.

USDA's ESMS portal is currently used internally and is expected to be deployed enterprise-wide this year. When that happens, more USDA staff will be able to quickly create maps and apps using templates and web mapping APIs, form groups to collaborate on projects, share maps and apps with private groups or the entire organization, and embed maps and apps in custom web pages or blogs. USDA officials expect even greater benefits in the future. When the department is able to join other federal entities in a community cloud, "that's when government will be able to do more for the greater good," Lowe says.

Lowe also says agency CIOs understand the value of a national platform on which agencies can work together. "This will allow us to paint pictures we've never been able to paint before," he notes. "Maps are visual tools for constructing or rediscovering ideas. They enable us to think differently about public policy."

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>
> Christopher Smith,
> USDA Chief Information Officer

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← Observed Flooding and Flood Warnings in the Midwest

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JAPAN EARTHQUAKE AND TSUNAMI March 11, 2011

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Get Easy Access to Census 2010 Data

Downloading and formatting Census 2010 data can be time-consuming and cumbersome. Esri has eliminated the need for clients to perform this task themselves by releasing the second portion of its Census 2010 data in easy-to-use formats and geographies. This release combines the PL94-171 file and variables from Summary File 1 (SF-1) into a single database. Demographic categories include population, age, and race and ethnicity; household type and size; and family, housing, and mortgage status.

Esri delivers the data in standard census geographies as well as ZIP Codes and user-defined areas such as rings, drive times, and hand-drawn shapes.

Esri's Census 2010 data is available through the Esri Business Analyst product suite and Community Analyst or can be used as a stand-alone database.

To learn more, visit esri.com/census2010data.

Prototype Solutions in Esri's Studio

The new Innovation and Collaboration Studio at Esri's office in Vienna, Virginia, provides an ideal setting for brainstorming and prototyping cloud, web, and mobile mapping solutions with Esri's technology and subject matter experts. It's also a great place to build applications that improve and modernize GIS workflows, learn about best practices from power users, showcase your business's solutions to your customers, and take part in user group meetings and social events.

Esri partners, customers, and those new to mapping are welcome to contact us at dcstudio@esri.com to schedule a session.

To learn more, visit esri.com/studio.

Are You Realizing the Full Power of Your Imagery Data?

Christopher Thomas
Director, Government Markets
Federal, State, and Local

Hopefully, you see imagery as more than just a backdrop for your maps. Your imagery data can bring much deeper insight to your GIS projects. Imagery data is not just for scientists and specially trained technicians anymore. Today it's an essential part of GIS.

The US federal government is uniquely equipped to use and share its valuable imagery resources. Besides managing, visualizing, analyzing, and disseminating all your geospatial information from one comprehensive platform, incorporating your imagery data into your GIS helps

- **Enhance visualization** by bringing an essential, organized awareness to static imagery. Relying on imagery without access to a population density map, for example, would misallocate services after a disaster.
- **Perform richer analyses** by incorporating imagery as another layer of intelligence within your GIS. It exposes patterns and relationships, helps confirm or correct data, directs attention to factors that would otherwise be missed, and allows you to monitor change over time.
- **Collaborate and share** rich geospatial information from the desktop or server, in the field, or in the cloud. From interactive online maps that provide citizens with public information to mobile apps that enable situational awareness during an emergency, imagery and GIS are central to effective place-based communication.

I encourage you to learn more about how you can start making the most of your imagery data at esri.com/imagery.

GIS, GPS, and Lasers: Field Crews Assess the State of Northwestern Watersheds

"Integrating the laser with everything else creates streamlined workflows."

Mark Isley, AREMP Data Manager

↓ Field crews use a laser and prism setup from Laser Technology, Inc. to capture precise measurements of river and stream morphology, which are fed directly into a GIS.

Human activity such as logging and road building inevitably transform our environment, but federal agencies are collaborating to evaluate, protect, and restore some of the most vital and sensitive areas. Riparian zones – from the Latin word "ripa" meaning river bank – refer to rivers, streams, and surrounding land. They serve as habitats for diverse flora and fauna and have far-reaching influence on soil and groundwater conditions. When outside influences turn a lush, shaded, slow-moving stream into a barren bedrock chute, for example, the entire watershed can be impacted and invasive species can take over.

The Northwest Forest Plan helps ensure that scenarios like that are avoided – and even reversed. The plan's policies and guidelines empower federal agencies to work together toward more sustainable management of federally owned lands that span from Northern California to the Canadian border, and from the Cascade Mountains west to the Pacific Ocean. In the crucial area of watershed conservation, their efforts are informed by comprehensive reports prepared by the Aquatic and Riparian Effectiveness Monitoring Program (AREMP).

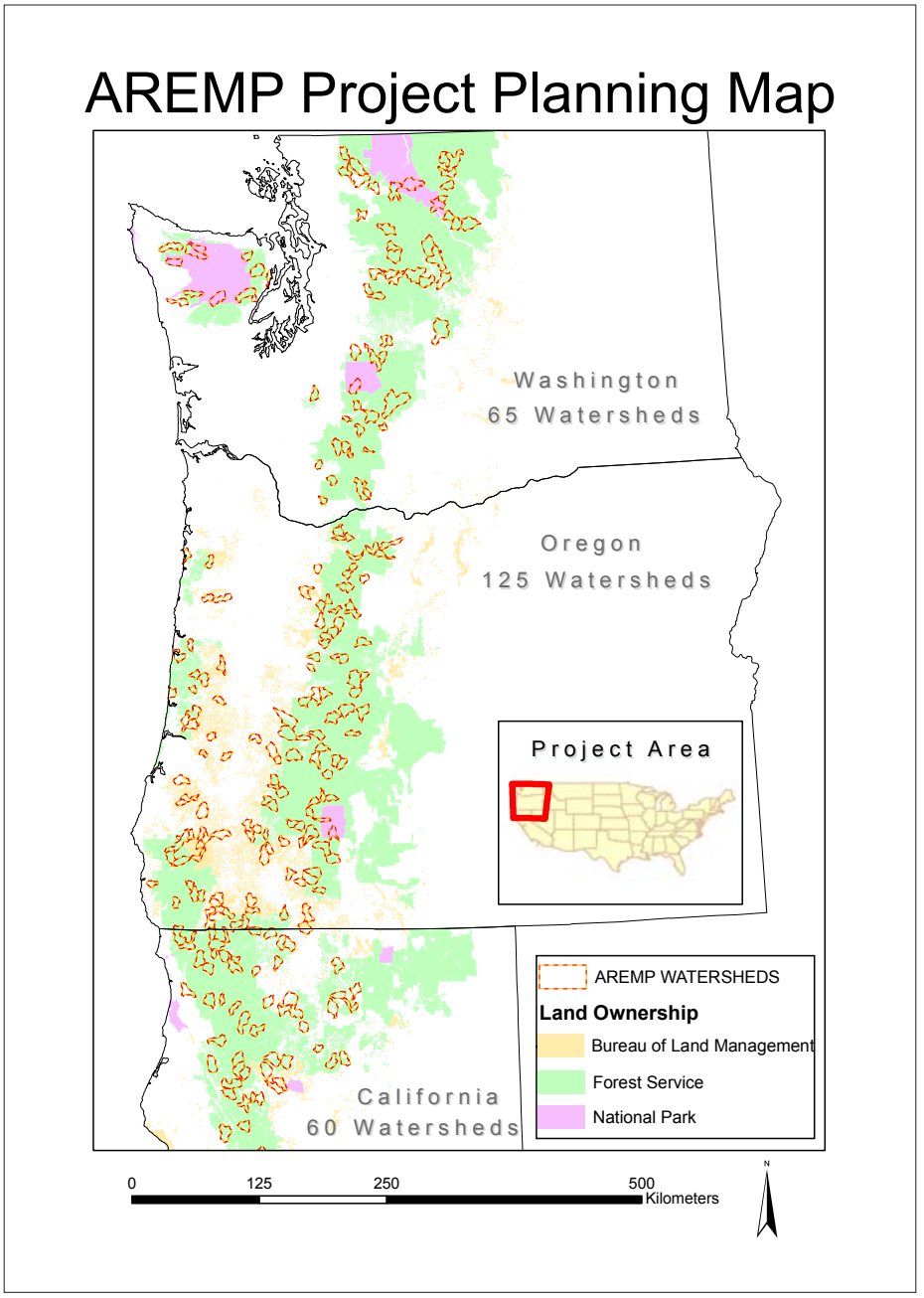
Each summer, adventurous AREMP field crews employed by the US Forest Service (USFS) and US Bureau of Land Management (BLM) set out to sample 28 watersheds, resulting in 250 watersheds sampled on a 9-year rotation. To determine monitoring site locations, the AREMP GIS team first identified watersheds with at least 25 percent of their stream channels lying within federal land. Of these watersheds, 250 were selected for stream sampling using a process that ensured a random, uniform distribution of watersheds throughout the Northwest Forest Plan area. Within each selected watershed, a similar process was used to select a random, uniform sample of stream survey sites. Because many other agencies and organizations also use this method to select study sites, AREMP findings contribute to richer overall knowledge about the sample areas and can help inform other environmental efforts.

AREMP stream crews measure a variety of attributes including the shapes and sizes of streams and rivers, the location and position of large woody debris in the stream channel, and biological factors such as the types of aquatic insects and amphibians that are present. The result is an overall stream score for each watershed that reveals its health and enables comparisons with previous conditions.

The AREMP team's findings help inform a variety of National Forest Plan efforts. Near Roseburg, Oregon, for example, before riparian zones were protected, logging activity resulted in decreased amounts of woody debris, altering the streams and making them less hospitable to the salmon which once thrived there. Federal and state governments and local non-profit organizations placed trees and boulders in riparian zones to help build up substrate levels to create better fish habitats. Upon returning to the sites like the ones in Roseburg, field crews found that the restoration work did in fact result in increased stream condition scores.

The AREMP team also helps look for the presence of invasive species. When they come across aquatic invasive species during their

→ Every nine years, 250 sites are surveyed between Northern California and the Canadian border. The data collected is combined with other spatial datasets and remotely sensed imagery and analyzed in a GIS to better understand the conditions of northwestern



stream surveys, the appropriate government organizations are informed so they can take immediate action before the problem worsens.

After visiting four to ten sites within a watershed, the crew moves on to the next watershed. To get to remote sites in places like Olympic National Park in Washington, which has some of the highest watershed scores due to limited human activity, crews must hike 10 or more miles. In some cases, horses are used to help transport survey gear to especially rugged sites. Crews work from May through September, with some special monitoring projects extending into October.

A key piece of the field data collection that lays the groundwork for the surveys involves measuring river or stream morphology. This creates a map of the channel based on the width, depth, and path of the water and how it changes over time. To take accurate measurements, two crew members work together using a laser with an electronic compass and prism setup from Laser Technology, Inc. called the MapStar® Impulse System, which is waterproof and can be mounted for extra stability on rough terrain. Measurements are immediately displayed on a backlit LCD display to ensure accurate readings in shady environments like riparian zones.

A built-in serial port brings the compass and laser data directly into surveying software running on Esri's ArcPad® platform on rugged hand-held devices. Customized data input forms specific to AREMP's work automatically appear when a laser measurement is taken, and the devices also record the location via a GPS sensor. These measurements are used to create a map using a toolbar extension for ArcPad® called LaserGIS®, providing context for each study site. Other crew members measure shade levels; sample for amphibians, invasive species, and small invertebrates like insects, snails, worms, and crayfish; and collect additional data. Those data are inputted through custom ArcPad applets and forms, and are automatically related to the site map.

"Integrating the laser with everything else creates streamlined workflows," says AREMP data manager Mark Isley. "Sometimes we'll be measuring channel widths that are a meter or meter and a half wide with a depth of 10 to 15 centimeters, so highly accurate laser offsets are important to us."

Along with the data collected in the field, the GIS team brings in additional datasets, including vegetation from remotely sensed imagery and GIS road layers from the BLM and Forest Service. These data enable them to analyze key riparian factors across full watersheds, such as miles of road within riparian areas and the frequency of roads crossing streams. All of this information together results in a comprehensive picture of the health of Northwestern watersheds.

The AREMP team's hard work has not gone unnoticed. They've received a Riparian Challenge Award from the Western Division of the American Fisheries Society and a National Interagency Service First Award for their collaborative, multi-agency monitoring program that supports the success of the Northwest Forest Plan.

Safer Law Enforcement through Spatial Data Sharing

Map-Based System Reveals Conflicting Operations before It's Too Late

"Having a secure environment for our operational law enforcement data is essential."

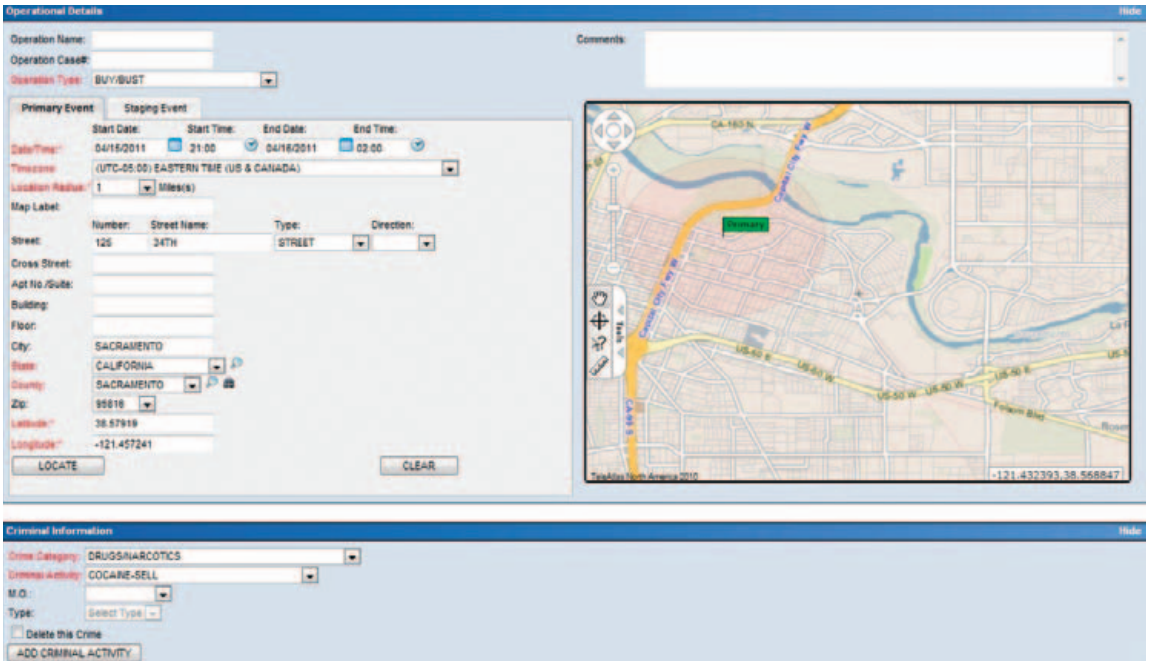
Hank Oleyniczak
Deputy Chief Technology Officer
RISS Office of Information Technology

Law enforcement professionals execute a vast number of operations across the country every day, from security detail to criminal investigations to drug raids. Until recently, there was no simple way for officers to determine whether their actions might unknowingly interfere with those of another agency or even their own department.

"Speaking as a former police officer myself, I know at some time we've all gone to places where other local, state, or federal officers are working without our knowledge," says Angelo Fiumara, deputy chief technology officer for programs at the Regional Information Sharing Systems (RISS) Office of Information Technology. "The key is to share that information in advance so an officer doesn't impede an investigation or put another officer or a member of the public in physical danger."

That goal led to the development of the RISS Officer Safety Event Deconfliction System (RISSafe) that was deployed in 2008. RISSafe is one of several information sharing systems used by law enforcement through the RISS program. Through funding from the US Department of Justice, RISS links thousands of criminal justice agencies and provides them with the intelligence and information they need to address criminal activities between jurisdictions.

↓ From 19 regional RISSafe Watch Centers, staff monitor all activities and identify patterns in criminal activity that can help inform other law enforcement information sharing efforts.



← After entering the date, location, and radius of interest, officers are immediately informed of any conflicting law enforcement activities, which occur in about 30 percent of cases.

Today, in just a few minutes, officers can determine whether their operations overlap with other law enforcement efforts. They start by accessing the RISSafe system either by contacting a regional RISSafe Watch Center or entering an operation's date, time, and location through the RISS Secure Intranet (RISSNET). TomTom's MultiNet database generates a list of specific addresses to select from, making the process quicker and more precise for the officer. MultiNet then enables a detailed map view of the area for the critical step of confirming that the officer did indeed select his or her intended location and not a similar nearby address.

"Besides enabling the spatial view and address confirmation, another advantage of using MultiNet is that we can keep our information in-house instead of relying on geospatial providers that publicly share data," says Hank Oleyniczak, deputy chief technology officer for operations for the RISS Office of Information Technology. "Having a secure environment for our operational law enforcement data is essential."

On the map, the officer can adjust the location point as needed to indicate precisely where the activity will take place, which is important in environments such as large city parks or building complexes. He or she then enters a radius of interest in potential conflicting operations, which may vary depending on the situation and landscape. Officers working in the desert, for example, may have a visual range of vehicles for several miles, while those working in an urban area are more interested in potential conflicts in only the surrounding blocks and other floors of the building in which the operation will take place. If other operations have been planned in that area, the system provides contact details for the leader of the conflicting operation so the two officers can discuss their situations and adjust activities accordingly. The officers will also be contacted personally by one of 19 regional RISSafe Watch Centers to confirm that they are aware of the conflict.

"Before RISSafe, we recognized the need to identify conflicts, but we didn't realize that so many conflicts actually happened," says Oleyniczak. "We've consistently measured a 30 percent conflict identification rate since RISSafe's inception. That doesn't necessarily mean all those conflicts posed problems, but certainly some of them did."

To ensure that RISSafe is not misused, internal security features limit individual officers' access to the system to ensure they are provided only with contact information related to potential conflicts, not operational data. Individuals can't search the entire system or schedule ongoing events just to find out when other officers would be in an area. All entries are monitored from the RISSafe Watch Centers, whose staff members are trained to identify suspicious use of the system. While an officer may enter operation details such as suspect names and license plate numbers, only RISSafe Watch Center staff members have access to that information and can see the full picture of all events. That view often reveals patterns and trends in criminal activity that can be incorporated into other information sharing processes within the RISS program.

RISSafe has proved to be so valuable that today its use is mandatory in many law enforcement organizations, whether officers are serving arrest or search warrants, staking out a crime site, installing surveillance gear, or protecting a high-profile dignitary. It has been recognized as a visionary IT application in its field through awards from *Government Computer News* in 2009 and *Computer World* in 2011.

This year, the RISS program is planning to launch a mobile version of RISSafe that will bring the same event reporting and conflict notification processes to the field. Officers will soon be able to enter event locations and be aware of extenuating circumstances as new situations develop instead of delaying operations or continuing their mission despite the risk of nearby conflicts.

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