

2006 NSDI Cooperative Agreements Program
Category 5: Geographic Information Integration and Analysis
Final Report - March 2008
Cooperative Agreement # 06HQAG0102

Project Title: *Putting New Jersey on The National Map*

Project Start and End Dates: March 16, 2006 – December 31, 2007

Project Lead Organization: New Jersey Office of Information Technology, Office of GIS

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Data Themes:

Aerial Photography – 1930

Orthophotography – 2002

Boundaries

Hydrological Features

Land Use/Landcover

Topography

Transportation (Roads)

Project Summary

In March 2006, the State of New Jersey Office of Information Technology (OIT), Office of GIS (OGIS) was awarded \$46,560 by USGS to implement Cooperative Agreement #06HQAG0102, *Putting New Jersey on The National Map*. With this funding, New Jersey was able to purchase SAN storage hardware to support the infrastructure required for OGC-compliant Web Map Services (WMSs) and Web Feature Services (WFSs), and the data used in the map services.

The procurement and installation of SAN hardware was completed in 2006. The SAN hardware was purchased for \$39,360. OIT purchased a Dell Workstation in 2007 with separate funding to store and process LiDAR data being flown by various consortia of federal and state agencies. To process the LiDAR data, OIT purchased a license of Quick Terrain Modeler software for \$3,565.75. To transfer the data between OIT and other agencies, OIT purchased a SimpleTech 1 TB external hard drive for \$313.07. The Office of GIS (OGIS) had hoped to collect LiDAR data for the entire state by 2007, but funding issues have held up collection of the entire state until 2009. This impacted the ability of OGIS to develop map services for elevation data.

The remaining funds were used by OGIS staff for travel to national and regional conferences to disseminate information about the project, and promote knowledge of the National Spatial Data Infrastructure. Abstracts were submitted by OGIS and accepted in 2007 for the Towson University GIS (TUGIS) Conference at Towson University in Maryland in March, ESRI International Users Conference in San Diego, CA in June, and Northeast Arc (NEARC) Users Group Conference in Burlington, VT in November. OGIS staff received positive responses to the presentations at all three conferences. Slides from one of the powerpoint presentations are in the Appendix (small changes were made with each successive presentation).

The State's cost share included the following:

- Development and/or collection of statewide datasets
- Development of OGC-compliant WMSs and WFSs
- Development of OGC-compliant metadata records for WMSs
- Hosting, maintenance and distribution of data and map services in the public domain

A breakdown of all costs assumed by the USGS funding is provided below:

Hardware

Hitachi SAN Storage	\$ 39,360.00
SimpleTech External Hard Drive	\$ 313.07

Software

Quick Terrain Modeler	\$ 3,565.75
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Conference Travel

TUGIS (Doug Schleifer)	\$ 310.96
ESRI Intl UC (Andy Rowan)	\$ 1,407.90
NEARC (Doug Schleifer, John Macready)	\$ 1,602.32

Total \$ 43,560.00

The development and/or collection of statewide datasets had mixed results regarding the ability of federal and state agencies to develop data within the active time period of the project. As previously mentioned, the delay of LiDAR projects impacted the ability of OGIS to create map services for elevation data. OGIS will begin collection of LiDAR data in 2008 from recent and active projects for processing into a three meter Digital Elevation Model. The state's current elevation data is not fit for map services.

As a substitute for a WMS of elevation data, OGIS developed a WMS of aerial photography from the 1930s. The New Jersey Department of Environmental Protection (NJDEP) began a project in 2006 to scan and georeference historic aerial photography from their Photo and Map Library. By enabling the ESRI WMS connector, OGIS is able to serve out a WMS based on an ArcIMS Image Service of a statewide mosaic of the 1930s aerial photography. NJDEP will be continuing with their project to create mosaics of historic aerial photography for each decade up to the 1980s.

OGIS took over modern aerial photography projects from NJDEP in 2002. A WMS of OGIS's 2002 statewide orthophotography was enabled using the ESRI WMS connector based on an ArcIMS Image Service. OGIS flew the state again in 2007 and will provide map services of that aerial imagery when available in Fall 2008.

NJDEP's municipal, county and state boundaries were used in a WMS of government boundaries. OGIS had anticipated the completion of an update to these datasets in late 2007, but the project will not be completed until April 2008. Once the updates are complete, they will be used in an update of the map service.

Hydrography is included in a WMS of several hydrological features. In 2007, NJDEP completed an update to their Land Use/Landcover dataset derived from the OGIS 2002 orthophotography. Water bodies and wetlands from the LULC dataset are used in the map service. As part of the LULC update, NJDEP also updated their hydrography (stream centerlines) dataset. However, the release date for the hydrography dataset is Earth Day 2008. Once the dataset is released, they will be used in an update of the hydrological features map service.

The Land Use/Landcover WMS uses the NJDEP 2002 LULC dataset. Attributes include LULC codes from the 1995 LULC dataset and impervious coverage estimates.

The Roads WMS uses NJ Department of Transportation (NJDOT) roadway network data last updated in April 2007. This dataset was also originally derived from the OGIS 2002 orthophotography. It is updated on an annual basis. All future updates will be incorporated into the map service.

The New Jersey Geological Survey (NJGS) scanned and georeferenced USGS 1:24,000 topographic quadrangle map sheets. A statewide mosaic of these monochromatic scanned images (scale range less than 1:24,000) are used in a WMS along with color Digital Raster Graphic images (scale range 24,000 – 100,000).

Working with staff at The National Map (TNM), the WMSs developed for this project are currently being consumed by TNM and accessible to the public by use of the TNM Viewer. All WMSs (and the ArcIMS Image Services they are derived from) have fully (OGC) compliant metadata records. These records are posted on the NJ Geographic Information Network (www.njgin.gov) and are harvested by Geospatial One-Stop.

List of WMSs with connection URL:

- Aerial Photography from the 1930s
 - http://njgin.state.nj.us/NJ_OGC/wms/NJ_AirPhotos_1930_IS?
- Aerial Orthophotography from 2002
 - http://njgin.state.nj.us/NJ_OGC/wms/NJ_AirPhotos_2002_IS?
- Municipal, County and State Boundaries
 - http://njgin.state.nj.us/NJ_OGC/wms/NJ_GovtBounds_IS?
- Hydrological Features including watershed management areas, subwatersheds, streams, water bodies, wetlands and floodplains
 - http://njgin.state.nj.us/NJ_OGC/wms/NJ_Hydrology_IS?
- Land Use/Landcover
 - http://njgin.state.nj.us/NJ_OGC/wms/NJ_LULC_2002_IS?
- Roads
 - http://njgin.state.nj.us/NJ_OGC/wms/NJ_Roads_IS?
- USGS Topographic Map images
 - http://njgin.state.nj.us/NJ_OGC/wms/NJ_TopoMaps_IS?

By enabling the ESRI Interoperability Connection Tool, OGIS is able to serve out WFSs based on ArcIMS Feature Services. However, working with TNM staff to consume WFSs into TNM, it became apparent that use of the ESRI Interoperability Connection Tool was much less than ideal. The tool does not provide a way to implement scale dependencies to limit the amount of data throughput. For WFSs, this resulted in the crashing of the ArcIMS servers because they were timing out trying to retrieve very large statewide datasets. The only way to limit the amount of data throughput is to limit the amount of features served, which defeats the purpose of WFSs as a means to export data. A partial, spatially unspecified dataset is of little utility to users.

Working with staff at The National Map, the WFSs developed for this project are currently being consumed by TNM, but metadata have not been developed for these WFSs. In 2008, OGIS will switch to an open source tool, such as GeoServer (used by TNM), to serve out WFSs. Better results are expected.

The WFSs listed below are the similar to their corresponding WMSs.

WFSs include statewide datasets of:

- Municipal, County and State Boundaries
 - http://njgin.state.nj.us/NJ_OGC/wfs/NJ_GovtBounds_FS?
- Hydrological Features including watershed management areas, subwatersheds, streams, water bodies, wetlands and floodplains

- http://njgin.state.nj.us/NJ_OGC/wfs/ NJ_Hydrology_FS?
- Land Use/Landcover
 - http://njgin.state.nj.us/NJ_OGC/wfs/ NJ_LULC_2002_FS?
- Roads
 - http://njgin.state.nj.us/NJ_OGC/wfs/NJ_Roads_FS?

Participants

New Jersey Office of Information Technology, Office of Geographic Information Systems

New Jersey Department of Environmental Protection

New Jersey Geological Survey

New Jersey Department of Transportation

Feedback on the NSDI Cooperative Agreements Program

What are the program strengths and weaknesses?

The main program strength for our project was the availability of expertise from staff at The National Map. Specifically, we received an immense amount of help and guidance from Marshall Creighton, Rick Brown and Calvin Meyer.

Another program strength that served us well was the flexibility to make changes to our project (within its scope) as necessary. The ability to extend the timeline and modify the themes of our map services from the original intent allowed us to finish the project.

From the grantee perspective, the major weakness of the program is the relatively low level of project funding. Also, unless the grantee has a project that syncs up well with a specific funding category, there is little incentive to pursue a CAP grant.

Where does the program make a difference?

The technical knowledge we gained from The National Map staff made a significant difference and will be of great utility to us in the future.

Was the assistance you received sufficient or effective?

In addition to the effective help we received from staff at The National Map, the help received regarding project administration was excellent.

What would you recommend doing differently?

Higher levels of funding per project and a category that allows the grantee to define the project to a greater degree.

Are there factors that are missing or need to be considered that were missed?

Can't think of any.

Are there program management concerns that need to be addressed? Time frame?

Perhaps a bit more flexibility in the timeframe. Of the two CAP grants we received (2004 and 2006), both needed extensions.

If you were to do this again, what would you do differently?

Dependence on the completion of large data development efforts within the timeframe of the project should be avoided. Only datasets that are complete or near completion should be used. Depending on technologies that are not well developed, such as the ESRI Interoperability Tool, should also be avoided. We plan to adopt open source solutions for our WMSs and WFSs later this year.