ILLINOIS GIS NOTES

2005 Statewide Digital Orthophotography for Illinois

The tradition of systematic collection of federal aerial photography has been maintained in Illinois for nearly seventy years. The purpose of this article is to provide an overview of past programs as well as describe the current collection of 2005 statewide digital orthophotography for the State of Illinois.

By Don Luman, Illinois State Geological Survey
Dick Vraga, United States Geological Survey

Introduction

First-time statewide coverage of vertical aerial photography was achieved in Illinois between 1936 and 1939. Collected on a county-by-county basis, acquisition of the photography was in response to President Franklin Roosevelt signing into law the Agriculture Adjustment Act on May 12, 1933. The law was originally administered by the United States Department of Agriculture, Agricultural Adjustment Administration, which is now known as the USDA Farm Service Agency.

With the exception of the period from 1942 to 1945 when collection was suspended because of World War II, the USDA had primary responsibility for acquisition of statewide black-and-white aerial photography on a recurring basis in Illinois until 1980. For aerial photography acquired between 1936 and 1971, the contact scale is 1:20,000 (1 inch equals about .3 miles). In 1972 the contact scale was changed to 1:40,000 (1 inch equals about .6 miles).

Statewide aerial photography has been collected for Illinois by federal agencies at least once each decade. A state listing of the photography is available online at the USDA Aerial Photography Field Office (APF) (**http://www.archives.gov/**). Original film for Illinois' statewide aerial photography extending back to 1955 is archived at the USDA-APF.

The U.S. National Archives and Records Administration (**http://www.archives.gov/**) and the USGS EROS Data Center (**http://edc.usgs.gov/**) also are primary sources and archives of Illinois aerial photography. Unfortunately, the original silver nitrate film negatives for Illinois' USDA-AAA 1936-1939 aerial photography were destroyed by the National Archives in the 1980s, and only photographic paper print collections, mostly incomplete, remain at several Illinois libraries (**http://www.isgs.uiuc.edu/nsdihome/webdocs/ilhap/**).

NHAP and NAPP

An examination of federal aerial photography acquired for Illinois' 102 counties during the past fifty years reveals that the revisit interval ranges from one year to ten years for any particular county. The overall county average is approximately 4½ years between successive acquisitions.

In order to eliminate duplication of effort among federal agencies in collection of aerial photography, the National High Altitude Photography program (NHAP) was initiated in 1980 and coordinated by the U.S. Geological Survey (USGS). Two separate film formats were acquired, including black-and-white aerial photography at a scale of 1:80,000 (1 inch equals about 1.26 miles) and color-infrared aerial photography at a scale of 1:58,000 (1 inch equals about .9 miles), centered over USGS 7.5-minute quadrangles.

The Editor's Corner

By Keith Caldwell

At the last fall conference ILGISA celebrated its tenth anniversary. Thanks to all of you who attended the workshops and session presentations. Many of you also took advantage of the opportunity to catch up with colleagues and meet new ones. There were a record number of attendees—more than 410 for both days! The workshops on the first day afforded attendees an opportunity to develop their GIS skills in a variety of new technologies and applications. And for the sixth time, ILGISA offered a workshop on GPS and GIS specifically geared for K-12 educators.

Michael Domaratz from the U.S. Geological Survey got the second day of the conference off to a very informative start with a keynote presentation on The National Map program. All past presidents and Mrs. Dahlberg were in attendance at the business lunch to celebrate ILGISA's tenth anniversary. The service awards and the Dahlberg Distinguished Achievement award were also presented.

Special thanks to the planning committee, presenters, moderators, vendors and the staff at the Center for Governmental Studies at Northern Illinois University for making the Fall 2004 conference a success. ILGISA seeks to provide high quality, cost-effective programs.

In this issue of *GIS Notes* you can read about the awards and learn about the statewide aerial photography project to be completed later this year. It is a valuable resource that will serve many Illinois GIS applications. Particular thanks go to Dr. Donald Luman, Illinois State Geological Survey, and Richard Vraga, U.S. Geological Survey, for making this a reality.

It's gratifying to see ILGISA grow and still retain its core principles—mainly that it serves as an opportunity for professional GIS practitioners to meet and learn from sharing their experiences.

Your participation is key to making this organization grow. Members are encouraged to serve on committees, submit articles for this publication, share experiences and knowledge through presentations or help with moderating sessions.

You can also share your work with the world by submitting a map or poster for inclusion in the Members Showcase portion of ILGISA's website at **www. ilgisa.com**. (Have you visited the website lately? Sign in and learn about about Northern Illinois University's new GIS certification program, plus much more.) So please make a commitment to the Illinois GIS Association. If you would like to volunteer, it's as easy as contacting a Board Member.

Keith Caldwell is GIS Applications Supervisor with Lake County GIS.

2004 Dahlberg Distinguished Achievement Award to Jim Westervelt

Jim Westervelt of the US Army Corp of Engineers Research Laboratory at Champaign, Illinois received the 2004 Dahlberg Award for his pioneering work in creating Illinois' first GIS software, Geographic Resources Analysis Support System (GRASS). Jim was the visionary lead of an initial three-person team including William Goran and Michael Shappiro. Together they worked designing and developing the first prototype used for military installations from 1979 through 1984.

Jim was the key architect for GRASS and pioneered many of the innovative approaches that made GRASS attractive and were later emulated by commercial vendors. These include a seamless linkage between GIS and image analysis, a robust suite of raster analysis tools, a library with procedures for building and contributing new capabilities, and an integrated visualization environment. The unique nature of GRASS as a free, open-source GIS environment is still important as evidenced by its resurgence with the creation of an international GRASS-GIS user organization.

Beyond GRASS, Jim has added his vision to various spatial modeling projects and is an avid publisher of his findings. He helped establish the combined GIS laboratory with the Departments of Geography, Landscape Architecture, Urban and Regional Planning, and Anthropology at the University of Illinois. There he taught workshops and graduate courses and also sponsored a scholarship program to recognize and encourage students pursuing geospatial challenges.

Later, while leading a technology committee for the Illinois Council on Food and Agricultural Research, Jim was able to promote GIS, including providing funding to the Illinois Natural Resources Geospatial Data Clearinghouse maintained at the Illinois State Geological Survey. His current work is landscape simulation modeling titled Fort Future, which is a combination of tools and data that will help the Department of Defense address the planning requirements of lands, seas and airspace to maintain mission readiness. His standing in the profession, his passion for his work, and his dedication to education make Jim an ideal recipient of this award.

Notes from the desk of **Ruth**
Anne Tobias, ILGISA President, 2004-2005

It is truly a pleasure to be seated as President of ILGISA, having watched this fine organization grow and change over the last ten years. We have carefully shepherded GIS practitioners from a dedicated group of 300 or so early innovators into a formal, cohesive, fully functioning organization of more than 600 GIS professionals who continue the innovation process, stretching GIS applications wherever they can. I am very pleased with the growth and development as an organization that you have all fostered and worked so hard to accomplish. Just like a proud parent!

Now that we've arrived, we need to continue growing in several different ways. We'd like to increase the membership. It would be great to add 50 members this year. We need everyone's help in identifying directions to search. Southern Illinois would seem to be ripe for membership development. If you have any contacts who might be interested in joining, please let us know, or let them know about ILGISA.

We would also like to consider opening up our 'Sustaining Member' category to corporations who support ILGISA and other state GIS organizations at conferences, meetings and training seminars with the results of their cutting-edge work with clients. We have a 'Sustaining Member' category in our by-laws, but it has never been activated. The ILGISA organization has always worked to be the voice of federal, state and local government agencies, but we can't do it without the help of vendors. Let us hear what you think.

We need to continue growing as an organization. How can we improve our services, the newsletter, the website? What can we add to the 'Members Only' portion of the website to make this organization better for you, the members? How can we add to the website in general to make it more informative and more functional?

And while we're at it, more fun, too. We'd like people to come back again and again. Are there any interesting links you know of that people would enjoy? We'll put them on our webpage.

And we need to continue growing as practitioners. I have often said that the power of GIS is limited only by one's imagination—and of course, the data! Over the last ten years the data problem has become easier and easier—even GIS has become easier while becoming more integrated into the work we do every day.

I consider GIS to be part of the infrastructure of any local government, much as we consider highways and hardware to be. These tools allow us to provide better services to the citizens. Since I became Chair of the DeKalb County Board, I have seen a direct impact from the use of GIS as applied to departmental needs and uses—and how difficult it can be to vote for higher GIS fees to cover the costs of further GIS development. Taxes, you know.

Now that GIS is so much a part of what we all do, we need to stretch the boundaries, push the envelope, expand our horizons to see what more we can do with it and how we can make it work for us.

Poster Award

The People's Choice Award for best poster at the fall *GIS in Illinois* conference went to "Development of the Bicycle Level of Service Map," by Leonard Waltham, Staff Cartographer at Northern Illinois University.
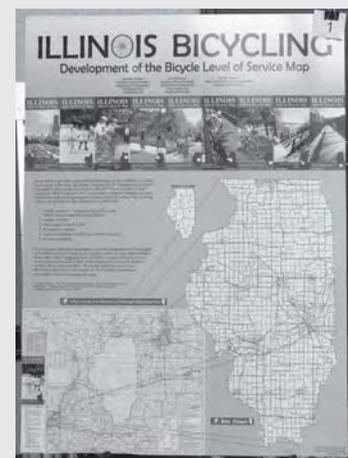
(continued from page 1)

Statewide collection of NHAP in Illinois began in 1981 and was completed in 1986. In the most widespread in-state application of NHAP, the color-infrared aerial photography served as the primary imagery source for interpretation of the Illinois portion of the National Wetlands Inventory.

The NHAP program continued until 1987, at which point the program name was changed to the National Aerial Photography Program (NAPP) to reflect the changes in requirements and specifications for nationwide aerial photography.

> *First-time, statewide digital orthophotoquad coverage was completed in 2001.*

NAPP is acquired statewide during the leaf-off period using either black-and-white or color-infrared film. The contact scale is 1:40,000, and the flight lines are flown in a north-to-south direction along the west and east halves of 7.5-minute quadrangles, with film exposures centered on quarter quadrangles. NAPP is coordinated by the USGS and maintains strict specifications regarding sun angle, cloud cover, haze, stereoscopic coverage and image inspection.

Three NAPP cycles have been completed in Illinois. NAPP 1 was principally acquired in late March to mid-April 1988. USGS specified color-infrared as the primary film format. The contractor used a dual camera system to also collect high definition black-and-white photography with NAPP specifications. Years later, the Illinois Department of Transportation (IDOT) had the opportunity to acquire the original black-and-white film negatives from the contractor, and as a result, this NAPP-like aerial photography became widely distributed and recognized in Illinois.

By the early 1990s USGS required cost-sharing from participating states to ensure NAPP collection. IDOT stepped forward and contributed the entire state cost share for the NAPP 2 and NAPP 3 cycles. Black-and-white film was selected as the single format in accordance with IDOT's program needs and requirements.

NAPP 2 collection took three years for completion, from 1993 to 1995, due in part to dismal weather conditions associated with the Flood of 1993. In addition, the contractors used lower resolution aerial film, resulting in aerial photography of poorer quality compared to NAPP 1.

In accordance with the five- to seven-year cycle, NAPP 3 was scheduled for 1998. Approximately 80 percent of the state was acquired during that year, with most of the remainder collected in 1999. USGS

and IDOT stipulated higher resolution aerial film in the NAPP 3 requirements, and the resulting photography is of high quality.

As a consequence of an ambitious effort led by the USGS and the Illinois Mapping Advisory Committee (IMAC), a joint funding agreement cosigned in 1999 between four federal and three Illinois state agencies made it possible for the NAPP 3 aerial photographs to be converted to USGS Digital Orthophoto Quadrangle (DOQ) imagery.

In addition, Lake County, Illinois and the USGS had already concluded a joint funding agreement to produce the NAPP 3 based DOQs for that portion of the state. The partnership federal agencies included the USGS, the USDA Natural Resources Conservation Service (NRCS), the USDA Farm Service Agency and the U.S. Environmental Protection Agency. The partnership state agencies included the Illinois Department of Transportation, the Illinois Environmental Protection Agency and the Illinois Department of Natural Resources.

First-time, statewide DOQ coverage was completed in 2001. External grants and contracts awarded to the Illinois State Geological Survey (ISGS) enabled online access of the statewide DOQ database through the ISGS Illinois Natural Resources Geospatial Data Clearinghouse (Illinois Clearinghouse) for free download, as well as fee-based copies on compact disc (**http://isgs.uiuc.edu/nsdihome**). Nearly 620,000 DOQ files have been downloaded as of March 2005, and their popularity continues as a framework layer for GIS and a variety of other applications.

> *...current orthophotography [is] the most critical and broadly based geospatial need for Illinois.*

2005 Statewide Orthophotography

In November 2003 IDOT and USGS initiated discussions regarding an interagency agreement to provide geographic and photogrammetric products for Illinois. The agreement, signed in May 2004, is an extension of the long-standing relationship between the two agencies.

Discussions between these agencies and ISGS determined that current orthophotography was the most critical and broadly based geospatial need for Illinois. This was verified in several IMAC meetings and other discussions held during 2004. During

these discussions, the Northeastern Illinois Planning Commission expressed a desire to coordinate the acquisition of higher resolution imagery in the Chicago urban area, which aligned with USGS goals for Department of Homeland Security needs.

Following a significant commitment by USDA-NRCS, a concerted effort was made through IMAC to gather funding partners for the statewide project. As a result, fifteen agencies (listed below) are contributing funds to ensure the completion of the Illinois 2005 Statewide Orthophotography project. By mid-February 2005 all of the necessary funds for aerial photography acquisition and production of the digital orthophotography had been identified.

Contributors to the Illinois 2005 Statewide Orthophotography Project Fund

Federal

- U.S. Geological Survey
- USDA Natural Resources Conservation Service
- Federal Emergency Management Agency

State

- Illinois Department of Transportation
- Illinois Emergency Management Agency
- Illinois Environmental Protection Agency
- Illinois Department of Revenue
- Illinois Historical Preservation Agency

Regional and Local

- Northeastern Illinois Planning Commission
- Cook County
- DuPage County
- Kane County
- Lake County
- McHenry County
- Will County

The Illinois 2005 Statewide Orthophotography project is being conducted in two parts because specifications for aerial photography acquisition and the associated digital orthophotography are different for the Chicago urban area and the rest of the state.

The "Chicago Urban Area" is defined by the six-county area including Cook, DuPage, Kane, Lake, McHenry and Will Counties. This part uses USGS Urban Areas high-resolution orthophotography specifications to meet Homeland Security needs for the Chicago urbanized area.

The second part is referred to as the "Illinois NAPP," and it includes the remaining 96 Illinois counties. Although NAPP has been discontinued due to lack of funding, the specification used for the program is being used as the foundation for this part. A significant change from the NAPP 3-based DOQs for the 2005 Illinois NAPP is that the ground spatial resolution for the DOQ data will be increased from the standard 1 x 1 meter to 0.5 x 0.5 meters per pixel. Following is a summary of the two parts.

Chicago Urban Area

Area of Coverage: Entirety of Cook, DuPage, Kane, Lake, McHenry and Will counties.

Imagery Source: True (natural) color film. Scheduled to be acquired during the leaf-off period from March 1-April 30, 2005.

Projections & Datum: Illinois State Plane Coordinate System, East and West zones; and Transverse Mercator, UTM grid zones 15 and 16; NAD 83 datum.

Spatial Resolution: 1 x 1 foot ground sample distance per pixel for the SPCS orthoimagery, and 0.3 x 0.3 meter ground sample distance per pixel for the UTM orthoimagery.

Data Format: Uncompressed GeoTIFF with accompanying FGDC-compliant metadata.

Data Files: Each orthorectified image tile will represent a 1,500 x 1,500 meter ground area produced at even 1,500 meter grid lines, with no overlap between image tiles. Corner coordinates will be based on the UTM grid and shall be evenly divisible by 1,500 meters. Estimated number of image tiles is 2,612 and file size is approximately 73 Mb for each image tile.

Illinois NAPP

Area of Coverage: Entire 96-county Illinois area exclusive of Cook, DuPage, Kane, Lake, McHenry and Will counties.

Imagery Source: Black-and-white film. Scheduled to be acquired during the leaf-off period from February 15-April 30, 2005.

Projections & Datum: Illinois State Plane Coordinate System, East and West zones; and Transverse Mercator, UTM grid zones 15 and 16; NAD 83 datum.

Spatial Resolution: 1.5 x 1.5 foot ground sample distance per pixel for the SPCS orthoimagery, and 0.5 x 0.5 meter ground sample distance per pixel for the UTM orthoimagery.

Data Format: Uncompressed GeoTIFF with accompanying FGDC-compliant metadata.

Data Files: Each image file will conform to the USGS 3.75' x 3.75' Digital Orthophoto Quarter Quadrangle (DOQQ) standard. Estimated number of DOQQ image files is 3,262 and file size is approximately 175 Mb for each DOQQ.

Lake County Internet GIS Applications

By Richard Hilton, Lake County
*   Peter Schoenfield, Lake County*

*Lake County introduced the first phase of a new family of Internet GIS applications for the public this past February at **http://www.co.lake.il.us/maps**. According to Richard Hilton, they've been working to build GIS data for many years, and now the ability to create applications on the Internet can put that information to work for many people and many purposes—far more than they could ever touch through traditional paper maps.*

The initial applications that the Lake County GIS program offers are Environment and Property Tax; a number of other applications are under development. Users can move from one application to another while maintaining their geographic area of interest. The same look and feel is used consistently.

Visitors can search, navigate, locate, report and print a variety of information including aerial photography, parcel boundaries, floodplain, wetlands, district boundaries, roads, extensive assessment, property sales and tax bill history, among other things.

Coordinated by the GIS Division of the Lake County Department of Information Technology, this is a cooperative project involving many county departments and other agency partners at the federal and state level. It's intended to serve the public but also to satisfy internal staff needs for viewing and printing map related information.

Benefits of the Public GIS Applications

The motivation to develop public GIS applications is based on highly successful prior experience with making all of our 7,000 published tax maps available to the public on the Internet four years ago. (See **http://www.co. lake.il.us/gis/MapGallery**)

Since then the staff time required to handle phone calls and walk-ins from the public has dropped substantially, freeing up badly needed time to keep up with increasing workload. Our lobby area now resembles a dentist's waiting room, with a small counter, often empty.

Since we price map products at the cost of reproduction there was no change in net revenue. We've had much positive feedback from the public.

Benefits of the Internal GIS Applications

Three years ago we introduced our first generation of interactive Intranet-based GIS applications in several specialized areas, later sharing access with a number of municipalities and other government agencies. As a result basic GIS capabilities have been extended to hundreds of users that would otherwise not have any.
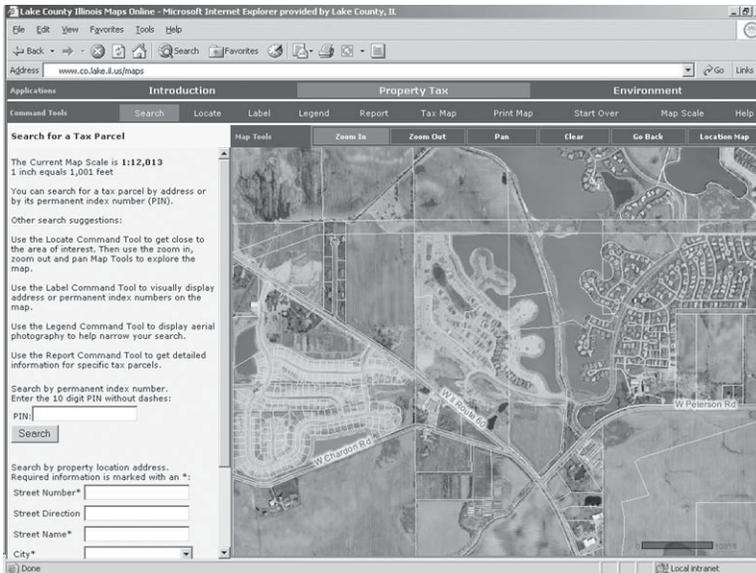
The growth in individual desktop GIS licenses has slowed dramatically, and some users have decided they no longer require desktop GIS software. The new applications greatly expand the topics and features and will provide GIS access to a much larger number of users.
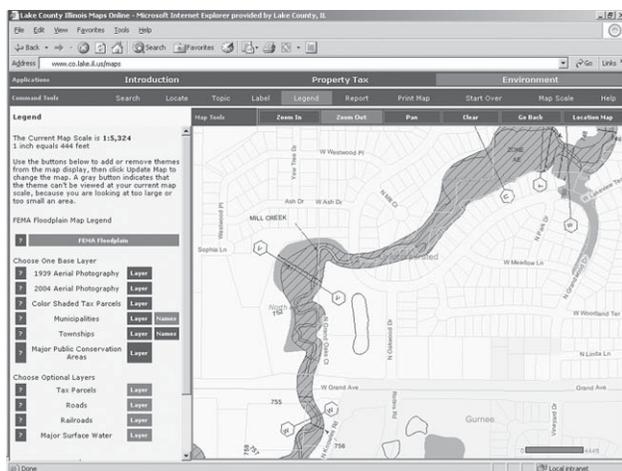
Viewing a floodplain
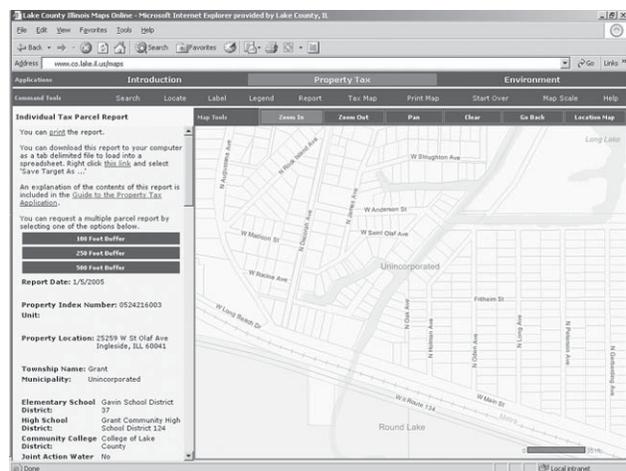
Exploring tax parcel information

Viewing aerial photography

Integrated Applications

Rather than develop separate standalone Internet GIS applications for each major topical area, we decided to design a single interface that would accommodate all of them, including both public applications and internal governmental applications.

Generic commands for functions such as map navigation are developed once and then available to all applications. Much of the program code is transferable from one application to another.

Applications and functions offered to the visitor depend upon the visitor's identity. There is a broad set of features provided to all users, but county staff and other partner agencies with logons have additional capabilities that are invisible to everyone except those who have access to them.

The emphasis is on anticipating the data and functions needed for

a particular topic and packaging those things into simple commands. We deliberately did not imitate the toolbox approach of desktop GIS, which requires a higher level of training and understanding of underlying processes. No icons are used, just English words.

Lake County is shown in its correct geographic setting, with neighboring counties and Lake Michigan. The visitor can zoom out to a multi-state area and see decreasing levels of detail. Certain internal GIS applications are being developed in partnership with neighboring jurisdictions to extend the detail across common borders for public safety and other purposes.

Technical Summary

The design process began with a capacity study performed with the assistance of our software vendor, ESRI. Estimates of Internet transaction volumes were made based on prior experience with the map gallery application and other

considerations. We included county Technical Support staff and the webmaster in these discussions so they could gauge the possible impact on network bandwidth and other infrastructure components.

Lake County operates two identical GIS hardware/software configurations: an Intranet version entirely inside the firewall, and a completely separate Internet version outside the firewall. Each configuration has a dedicated data server running ESRI SDE with Microsoft SQL Server software, and a dual-CPU application server running ESRI ArcIMS software in addition to our custom application code.

The SDE servers are updated on a weekly basis with any images or data that have changed during the week. All data on these application servers is only a copy of completed production work, so there is no danger to county data from potential hacking. Production desktop GIS work is done on completely separate Intranet servers. A separate development platform is used to test and modify ArcIMS applications before they are moved into production.

Digital orthophotos are stored in uncompressed .tif format tiles. As users zoom in progressively with these applications, they eventually will view uncompressed original images, the highest viewing quality possible.

If you have questions or comments about this article or the Lake County GIS program, send them to **maps@co.lake.il.us.**

Richard Hilton is Manager for the Lake County GIS and Peter Schoenfield is Principal GIS Analyst for Lake County.

The National Map and National Geospatial Programs Office

As a contribution toward the development of the National Spatial Data Infrastructure (NSDI), USGS is developing The National Map (TNM) as a seamless, continuously maintained and nationally consistent set of online, public domain, geographic base information.

The National Map is designed as a network of digital databases that will provide a consistent geographic data framework for the country and high-resolution data where available. This base geographic information, which includes orthophotography, will be the foundation for integrating, sharing and using geospatial data for many purposes including planning, development and emergency response.

The results of the 2005 Statewide Orthophotography project will be a significant contribution to The National Map, and the data will be available for access and down-loading via TNM web mapping service and viewer.

The 2005 orthophotography project also reflects the goals of the newly formed USGS National Geospatial Programs Office (NGPO). The emphasis of the NGPO is to engage partners throughout the geospatial community in its planning and in ensuring that its geospatial activities meet the needs of those on the landscape.

According to the National Geospatial Programs Office, "By connecting the components of The National Map (integrated base data), Federal Geographic Data Committee (coordination, policy, and standards), and Geospatial One-Stop (information discovery and access), and by embracing and communicating the message of the importance of the NSDI, the geospatial community and the Nation will realize the vision of "current and accurate geospatial data [that] will be available to contribute locally, nationally, and globally to economic growth, environmental quality and stability, and social progress."

Data Distribution

In addition to public access through The National Map, each of the partner agencies listed above will receive one complete set of the digital ortho-photography. The original film from both areas will be delivered to the Illinois Department of Transportation Aerial Surveys Section for archival purposes and reproduction services.

Based upon the very successful experience with providing online access to the statewide NAPP 3-based DOQs for the past four years, it is anticipated that the ISGS Clearinghouse will have responsibility for in-state distribution of the 2005 statewide orthophotography.

Online since 1997, the Illinois Clearinghouse is maintained and managed by the Illinois State Geological Survey. It is part of a network of more than 300 NSDI nodes worldwide, a program managed by the FGDC. Part of the benefit of being affiliated with the National Spatial Data Infrastructure is that all nodes use a common suite of technology tools that allow users to easily search, locate and download geospatial data hosted on one or more of the NSDI servers.

> *The results of the 2005 Statewide Orthophotography project will be a significant contribution to The National Map, and the data will be available for access and downloading.*

The effort to establish in-state distribution of the NAPP 3 based DOQs required approximately $280,000. These funds were needed for personnel, computer hardware and software, processing and databasing of the DOQ files, development of customized text-based download web pages and ArcIMS Map Service, compact disc media services, continuing maintenance and other tasks.

Primarily because of the substantial increase in both the file size and number of files for the 2005 digital orthophotography data, the estimated cost of providing online access, download services and continuing maintenance for a 2½ year project period is $440,000. This map service would also be used by The National Map for orthoimagery theme layer data for Illinois.

The Illinois Environmental Protection Agency has pledged $100,000 for Year 1 of the data distribution project. However, to date no additional funding has been secured as a result of numerous meetings, grant submissions to the USGS and NSDI, and other efforts. Achieving consortium funding for in-state data distribution is the remaining challenge of the Illinois 2005 Statewide Orthophotography project.

Don Luman is with the Illinois State Geological Survey Geologic Mapping Program. Dick Vraga is with the Wisconsin/ Illinois Mapping Partnership Office of the USGS.

Recipients of the 2004 Illinois GIS Association Service Awards

Tom Nicoski has been involved with GIS/Mapping and computers since the early 1970s. He spent 18 years with a local GIS/Mapping company working in positions that ranged from drafter to programmer to network administrator. The last 12 years have been at Kane County, Illinois, where he is the county GIS Director.

Tom has a degree in MIS from Judson College and certificates in GIS and Visual Basic Programming. Tom also holds an intermediate-level Certified Illinois Assessing Official professional designation and is currently finishing a second major at Judson College in Management Technology Systems.

Tom has promoted the use of GIS in Kane County government while updating the cadastral base for the Kane County Tax Maps. He has written programs to support such offices as Township Assessor, Development, Transportation, Water Resources, Environmental Management, States Attorney, County Clerk, Forest Preserve, Sheriff, Public Safety and Public Health. He has a reputation for being a mentor, teacher, project manager, problem solver and an energetic leader in the development and distribution of the Kane County GIS. It is for his enthusiasm and dedication to bringing Kane County to the forefront in the use of GIS that Tom deserves this recognition.

Bob Lindquist and **Tim Johnson** have advanced the implementation and application of geospatial technologies in Illinois for almost twenty years. They were instrumental in the development of a multidepartmental GIS at the Illinois Department of Energy and Natural Resources (ENR, now DNR). They supported the development of several statewide GIS databases that formed the basemap foundation for many early organizational GIS programs in Illinois. With the assistance of many individuals, these early efforts led to the development of a larger, distributed, multi-agency GIS in Illinois that was considered one of the leading GIS installations in the country.

In 1991 Bob and Tim left ENR to launch GIS Solutions, Inc., a GIS consulting firm that is now recognized as a leading GIS vendor. Bob and Tim have demonstrated a commitment to the Illinois GIS community by extending themselves to meet GIS installations challenges and helping countless organizations apply geospatial technology. GIS applications developed by GIS Solutions are recognized nationally, and many of their techniques are being applied in other states and in federal programs.

Tim and Bob have invested considerable energy and financial resources supporting GIS coordination organizations such as ILGISA, the Midwest/Great Lakes Arc Users Group and the National States Geographic Information Council. GIS Solutions regularly participates at ILGISA. In recognition of their many years of dedicated service to support the GIS user community in Illinois and the region through tireless networking and sponsorship support, their efforts to educate decision-makers and policy-makers about the value and application of the technology, and their sustained efforts to support ILGISA, Tim Johnson and Bob Lindquist are truly deserving of an ILGISA Service Award.

Dr. Michael Sublett of Illinois State University is one of the 2004 ILGISA Service award recipients for his work and dedication as the coordinator of internships for students in the Geography program at Illinois State University. The first intern Dr. Sublett placed was in the late 1980s.

Over the years Dr. Sublett has reached out to firms and agencies to set up internships for seniors in the Geography program. He has been very successful placing students and in monitoring their progress during the time they are in the on the job.

Beyond placing and monitoring students in internships, Dr. Sublett also teaches the Seminar in Geography course, where students are able to fully prepare themselves for life after college. They are prepped for interviews, prepare a professional resume, and spend a great deal of time writing. These and the other skills and knowledge obtained during the Seminar in Geography class allow Illinois State Geography students to more fully and quickly integrate into the workforce. There are a number of GIS employees in the State of Illinois who got their first practical experience as an intern under the direction of Dr. Michael Sublett because of his hard work and dedication.

An Update on Geographic Information Technology as part of the State of Illinois Information Technology Initiative

By Sheryl Oliver

In the Summer 2004 issue of "Illinois GIS NOTES" we addressed the Illinois Technology (IT) initiative for the State of Illinois and the role of Geographic Information Technology as it relates to the overall IT organizational structure. The following article describes the IT Enterprise Architecture, which is patterned after the Federal Enterprise Architecture Program.

Enterprise Architecture

Four Reference models comprise the Enterprise Architecture (Logical Model): the End User Reference Model, Business Reference Model, Data Reference Model and Technical Reference Model.

The **End User Reference Model** is focused on the IT needs of constituents and end users and the access mechanisms or channels used to deliver IT services. GIS is an integral component of this reference model, which incorporates GIS interfaces and web-mapping services.

The **Business Reference Model** concentrates on applications enabling common shared services. GIS and its applications intersect many business areas, their functions and application implementation.

The **Data Reference Model** is composed of subject area information that is related to common applications identified in the Business Reference Model. Information within certain subject areas will include geographic information.

The **Technical Reference Model** is the first to be implemented and is much further along than the rest. It is organized by domains and consists of technology building blocks that enable the IT services that the State provides to its constituents. The reference model defines standards and technologies that enable applications, information, end user access and systems management.

Sheryl Oliver, the GIS Domain Leader, together with Curt Reynolds (IDOT) and Dan Wilcox

(Agriculture), both technical subject matter experts, drafted the GIS building blocks for the Technical Reference Model Taxonomy Tool. Presently there are nine building blocks defined:

- The *GIS Application Server* is an enterprise-level GIS processing environment.
- The *GIS Database Server* is used to access very large multi-user geographic databases stored in relational database management systems.
- The *GIS Desktop* provides a Graphical User Interface to GIS software.
- The *GIS Internet Application* delivers interactive maps and GIS data services via the Internet.
- The *GIS Mobile* feature enables map-based data collection for portable and handheld computing platforms.
- The *GIS Cartographic Labeling* component addresses map annotation.
- The *GIS Geocoding* building block generates spatial reference from address information.
- The *GIS Image Analysis* facilitates geographic analysis of aerial photos and satellite imagery.
- The *GIS Image Compression* component is used for compresssing imagery.

This Taxonomy Tool is pending approval, which is expected in April of this year. More information will be released at that time.

Other GIS Activities

In January, 2005 the GIS Domain Leader was asked by the State's Chief Information Officer, Jim Matthews, to put in place a small group of GIS professionals who could devote time to drafting a Strategic Plan for Developing an Enterprise GIS for the State of Illinois. The team at the time of this writing is Sheryl Oliver (DNR), Rob Krumm (ISGS), Phil Pittman (IDPH), Curt Reynolds and Dan Wilcox.

Following is the "Project Objective," which is a small part of a Charter written to initiate the development of the GIS Plan. This will help the reader understand the direction we are taking.

Excerpt from a State of Illinois Charter to Initiate GIS Plan Development

The project objective is to design a strategy that will result in the implementation of an Enterprise Geographic Information System (GIS)-including other Geographic Information technology (GIT)-for the State of Illinois. The strategy will assess the components necessary to effectively create a strong, viable and consistent State Spatial Data Infrastructure (SDI). An SDI is part of a larger National Spatial Data Infrastructure (NSDI) that is in perpetual development, in cooperation with organizations from State, local and tribal governments, the academic community, and the private sector. The NSDI encompasses policies, standards, and procedures for organizations to cooperatively produce and share geographic data. An effective State SDI will be built on a multiple function/ specific function model which addresses two areas: a) the common requisites of multiple agency-shared services, and b) the varied programs and activities within agencies-distributed needs. An effective SDI will promote geospatial data access, integration and sharing throughout all levels of government, private and non-profit sectors, and academia. The question is not whether public investments in GIS and GIT will be made; the question is whether they will be made in a coordinated manner in order to maximize public return on investments.

The strategy will address key components of an SDI, as they relate to the NSDI, and as they further relate to the State's Enterprise Architecture Model:

Data-address the development and maintenance of 'Framework' data. The Framework forms the data backbone of any SDI. The Framework includes data, procedures, and technology for building and using data, and institutional relationships and business practices that support the environment. Seven themes have been adopted as the minimum Framework of the NSDI because they are produced and used by most organizations. Additional layers are designated as Framework on a state-by-state basis (i.e. critical facilities, landcover, etc.). The Framework provides a reliable, standardized source for commonly needed and used geographic data which minimally includes:

- *Digital Orthophoto Quadrangles (georeferenced image from aerial photography),*
- *Transportation (Street centerline network, addresses, and related features),*
- *Geodetic Control (basic reference framework for all geodata),*
- *Hydrography (surface water network and related features),*
- *Administrative boundaries (widely used districts, service, and government boundaries),*
- *Elevation (digital elevation model of georeferenced vertical positions),*
- *Cadastral information (property ownership).*
- *Additional critical datasets will be identified by State stakeholders.*

Access—address various levels, techniques, and procedures for distribution of geodata and information derived from it. This includes the development and sharing of enterprise-wide databases to address critical needs, assure ease of use, and web access to geospatial data. There is an active State Geospatial Data Clearinghouse which will be a component of the overall access and distribution strategy.

Standards—address the formulation of standards, guidelines, and protocol, and evaluate existing standards, guidelines and protocol for 1. the development and maintenance of the Framework; 2. its distribution; and 3. the technology that surrounds GIS (GIT).

Technology—define in specific terms how the envisioned Enterprise will function, including clear explanations of the GIS applications, data and network requirements. With this in mind and based on the findings of this report, a systems architecture design strategy will be outlined. This will include the identification, inventorying and assessment of the GIS physical infrastructure as it currently exists as well as the identification of the technology necessary to support the GIS functions envisioned for the State. Interoperability and addressing ADA recommendations will be addressed. Overlaps between other subdomains will be included.

People—Evaluate practical organizational structures for the creation of an efficient environment where coordination and integration will flourish. Stakeholder support is essential; therefore, the use of existing networks and communication structures (ILGIC, ILGISA, IMAC) will be maximized by the Project team.

Sheryl Oliver is the GIS Domain Leader for the State of Illinois and GIS Coordinator with the Illinois Department of Natural Resources, ILGIC.

Timing is Everything
Roles of Technology, Community, and Education in GIS Development

National Geospatial

Approaching Build Out

Lake in the Hills Sanitary District

ILGISA Images from the Fall 2005
GIS in Illinois Conference

Illinois GIS Association
Center for Governmental Studies
Northern Illinois University
DeKalb, Illinois 60115

CHANGE SERVICE REQUESTED