



Geographic Information Systems Technology News

The Newsletter of the New York State
GIS Coordination Program

George E. Pataki
Governor

James G. Natoli
Director of State Operations

A Service of the NYS Office For Technology
NYS GIS Clearinghouse: <http://www.nysgis.state.ny.us>

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New Digital Ortho Imagery Program Launched!

The New York State Office for Technology (OFT) is proceeding with the New York State GIS Coordination Program's Statewide Digital Orthoimagery Program. This Program is designed to provide complete statewide orthoimagery coverage on an annual phased cycle, with each phase covering approximately 25% of the State. The first phase of the program will provide new orthoimagery for Long Island and the Hudson Valley area in 2001.

For more information on this program, please see insert.



Sample of Natural Color Digital Orthoimage at .5 ft. Resolution

How do I Become a Cooperative Member?

To learn more about benefits of participating in the NYS GIS Data Sharing Cooperative, visit <http://www.nysgis/gis/datacoop.htm>

You may also contact Bruce Oswald at the NYS Office for Technology at 518-486-3580 or by e-mail at bruce.oswald@oft.state.ny.us.

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TABLE OF CONTENTS

| | |
|--|----------|
| New Digital Ortho Imagery Program Launched | Page 1 |
| Internet Mapping Capabilities Breaking New Ground | Page 1 |
| NYS Center for Geographic Information Opens Doors | Page 2 |
| NYS OFT Center for Geographic Information Announces the NYS Statewide Digital Orthoimagery Program | (Insert) |
| Free GIS Training Available for State Agencies and Local Government | Page 3 |
| Undergraduates Apply GIS to a Wide Array of Interests | Page 3 |
| GIS Annual Conference Announcement | Page 4 |
| How GIS was used for the West Nile Virus in Oneida County | Page 4 |

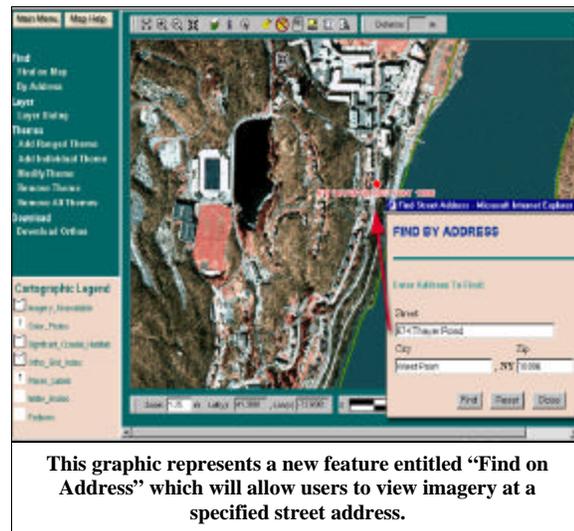
Internet Mapping Capabilities Breaking New Ground!

New York State's Interactive Mapping Gateway (<http://www.nysgis.state.ny.us/gateway/index.html>) made its public internet debut in March, 2000. The site featured access to the entire statewide aerial imagery data set covering approximately 45,000 square miles of the State. With this debut, New York State provided the first internet site in the world to offer comprehensive and completely free public access for both viewing

and downloading digital orthoimagery. Key features of the site's design are responsive navigation tools and inclusion of supporting GIS data; all geared towards ensuring that the user can conveniently find sites of interest and not get lost in the process. Since first going public, the site has provided a remarkable service. Over 100,000

files have been downloaded to date. More noteworthy though is the large number of maps generated to date, over two million in 10 months, underscoring the importance of providing internet mapping capability.

The success of New York's Interactive Mapping Gateway to date, however, is only the beginning. A new, revised application (Continued on page 2)



This graphic represents a new feature entitled "Find on Address" which will allow users to view imagery at a specified street address.

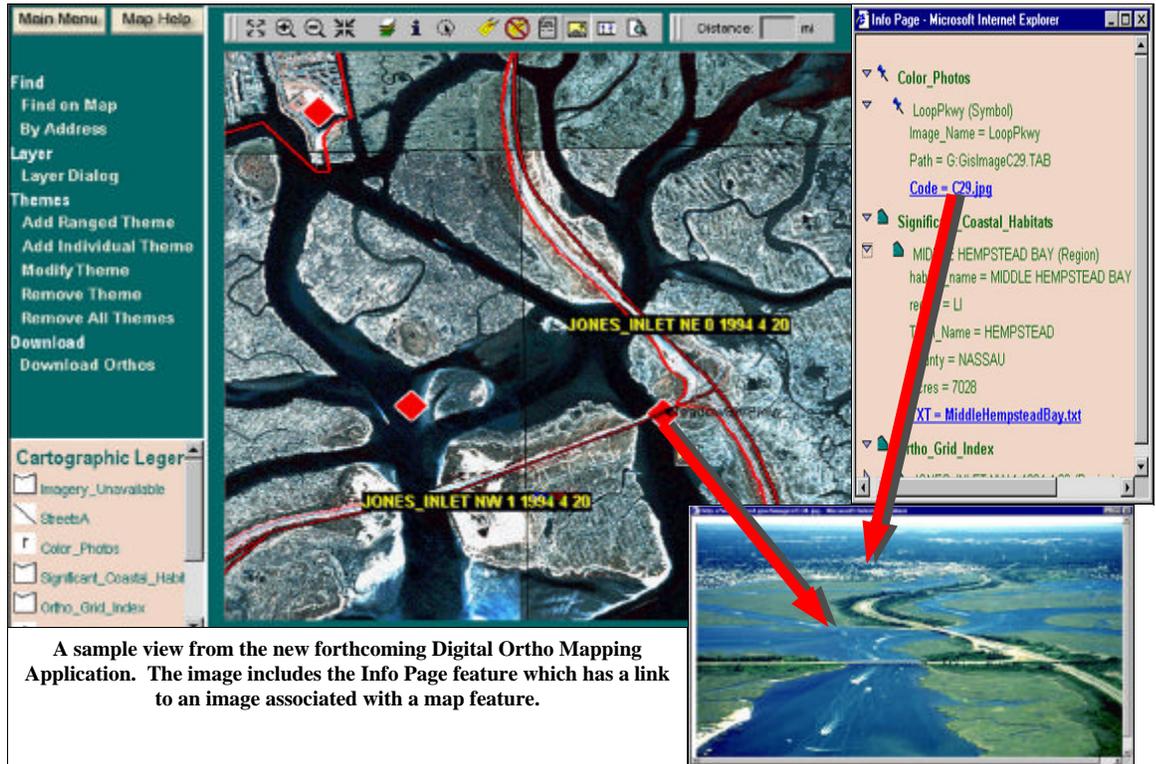
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will be featured on the site that captures the vision of what Internet mapping can provide to promote New York's leadership in the digital information age. This article highlights new features of the mapping application and describes how, in addition to continuing to provide images of the State, a new digital doorway to information will be opened.

New features in the mapping application fall into four main groups. Ways of interacting with and manipulating the map window, intelligent search tools, means of retrieving information from map content, and methods of exploring data visually on customized maps to meet user needs.

Map controls have evolved from the static buttons of the current application to dynamic controls enabled by a java maplet. Controls selected by map window buttons include: zooming to the original extent of the map window; zooming into the map, either by fixed steps or by dragging and dropping an interactive box; zooming out; re-centering the map at a point; inspecting and manipulating data layers; retrieving information for all layers at a point; retrieving information for all layers within a selected radius; automatic labeling of the topmost layer in the map; displaying an image associated with a map feature; displaying text documents associated with a map feature; measuring distances between points; and, selecting a map composition for printing.

Additional information displayed with the map includes the center coordinates of the window, the width of the map window along its horizontal centerline, a separate distance window displaying results from the ruler function, and a dynamically sized scale bar. Data appearing in the map window is also provided with a cartographic



A sample view from the new forthcoming Digital Ortho Mapping Application. The image includes the Info Page feature which has a link to an image associated with a map feature.

legend, keeping the user oriented to the map content.

A significant change to menu-driven find features include changes to the search engine for "Find on Map". Users can select the "%" symbol as a wild card in searching any of the available data sets. All possible matches are returned for further inspection or selection along with an identifier such as the county within which the match falls. "Find on Address" is a new feature allowing users to type in an address and select likely matches. As with the current application, selecting a 'found object' will take the user to that location in the map.

The new statewide digital orthoimagery, produced at a resolution and with an anticipated clarity nearly twenty times greater than the current imagery, will be featured in the Interactive Mapping Gateway with this new enhanced mapping application.

For more information on the Interactive Mapping Gateway, please contact Tom Hart at 518-402-7714 or by e-mail at tfh01@health.state.ny.us.

NYS Center for Geographic Information Opens Doors!

On December 18, 2000, the Office for Technology opened the NYS Center for Geographic Information at 74 Chapel Street in Albany, NY. The Center, which is part of the NYS GIS Coordination Program, currently consists of 8 professional staff.

Since establishing the Center, the group has:

- Selected a vendor, developed and negotiated a contract for the State's statewide digital orthoimagery contract.
- Completed a draft RFP for an on-line Help Desk for Data Sharing Cooperative members that will be advertised shortly.
- Initiated a process to recruit interns for the Center's metadata development program.
- Conducted successful training seminars on

- "Introduction to Digital Orthoimagery".
- Worked to make the Clearinghouse accessible to those with disabilities.
- Worked to finalize preparations for the "Map NY" feature on Governor Pataki's new home page.
- Created an on-line "Who's Who" listing of GIS users.
- Worked with DMV and DOT to finalize a contract on the development of statewide coverage of local roads and addressing files for New York.

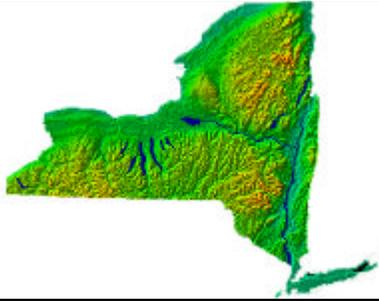
Future plans include a number of other initiatives:

- **Clearinghouse** – Redesign of the Clearinghouse website and the development of a spatial data warehouse.
- **Framework Data** – Development of digital soils data and the conversion of planimetric maps to NAD 83.
- **Map NY** – Developing an Internet concept

called "Explore NY" which will feature a GIS driven web application that will allow Internet users to learn of New York's social, cultural, educational and recreational amenities.

- **Government Liaison** – Meeting with State and local governments to assist them with the development of their GIS capacity.
- **Education/Training** – Providing "hand's on" training on GIS software as well as other topical statewide seminars.

To keep up with these exciting new initiatives, watch the NYS GIS Clearinghouse at: <http://www.nysgis.state.ny.us> and register for the NYS GIS Listserv at: <http://www.nysgis.state.ny.us/listserv.htm/newyork>.



New York State Office for Technology Center for Geographic Information

Announces The NYS Statewide Digital Orthoimagery Program!

New York State is taking a bold step forward this year with the first cycle of a new Statewide Digital Orthoimagery Program. The new program will create high-resolution orthoimagery for a portion of the State every year, and is perhaps the most ambitious state orthoimagery program in the country. We are very excited about this new program, but before describing it further, it may be worth reviewing a little history on what brought us to this point.

The US Geological Survey under partnership with the NYS Department of Environmental Conservation created the state's first coverage of digital orthophotos. The products in that coverage conform to the USGS specifications for 1:12,000-scale orthophotos at a resolution of 1 meter (see Figure 1.) Most of the high-altitude, color infrared, 1:40,000 scale photos used to produce the orthophotos were taken in the spring of 1994 and 1995. The State took delivery of the completed products from USGS in 1999. These digital orthophotos have proven to be extremely useful and popular for a wide range of GIS applications. As users have gained familiarity with the benefits of digital orthoimagery, it has



Figure 1: Sample of Existing 1 Meter Resolution Color IR Imagery—Nassau County

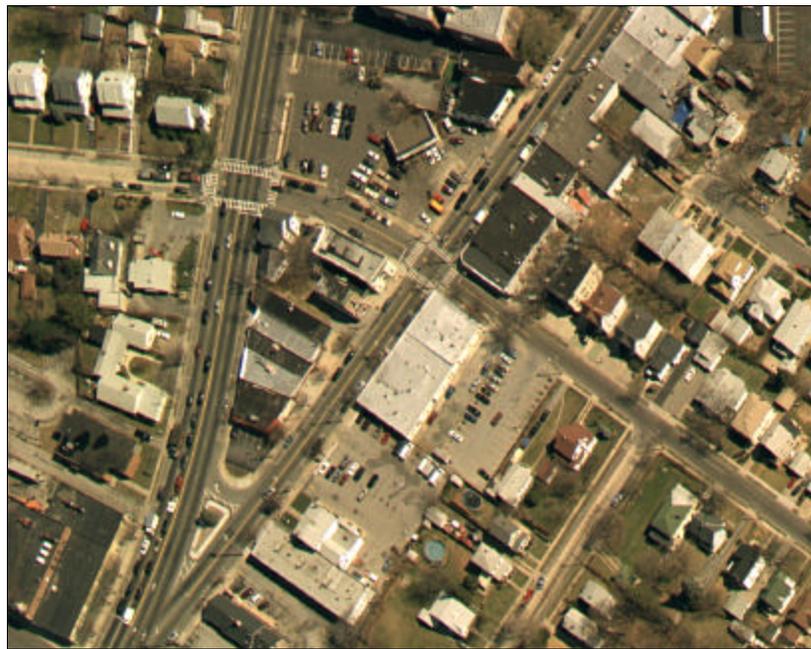


Figure 2: Sample of 1 ft. Resolution Natural Color Imagery Covering Center Area of Figure 1—Nassau County

become apparent that GIS users across the state, especially at the local government level, would derive substantially greater benefits if the state were to produce higher resolution digital orthoimagery on a more timely basis.

To address these issues, the Office for Technology (OFT), as part of its' Statewide GIS Coordination Program, established a Digital Orthoimagery Work Group in August 1998. The work group, chaired by Tom Hart of the NYS Health Department, was charged with developing recommendations for improved digital orthoimagery. The work group has members from local government, State agencies, federal agencies, and other stakeholders. One of the early actions of the work group was to provide input on the reprocessing of the USGS-generated digital orthophotos to correct radiometric (tonal) balance and reformat them into small, MrSID-compressed tiles for easy Internet download. A web-server application was developed to facilitate

on-line browsing/viewing of the orthophotos, as well as convenient free downloading. The application is part of the NYS GIS Clearinghouse <http://www.nysgis.state.ny.us>. Since launched in the spring of 2000, it quickly became one of the most popular parts of the Clearinghouse.

In February 1999, the work group released a Request For Information (RFI) seeking the best ideas that firms in the industry could offer to guide the program design. Eleven detailed responses were received and reviewed by the work group. It was clear from the responses that a wide range of technologies was available to produce digital orthoimagery, and those technologies were evolving rapidly. Consequently, the work group made a critical decision that the new New York State program would specify only the characteristics of the final digital ortho images, rather than specifying any particular technology or workflow used to create them. The RFI suggested a multi-resolution program with high spatial accuracy and fast delivery cycles. The work group was particularly interested in reaction from firms in the industry to this program design, and was pleased to learn that the industry experts affirmed the feasibility and benefits of such a design. The respondents also offered preliminary cost estimates, though there was no incentive for them to be competitive in their pricing.

Following the RFI, the work group presented its recommendations for a new program to the GIS Coordinating Body, which endorsed it and forwarded the recommendation to OFT. The work group then began developing a formal Request For Proposal (RFP), which formed the basis for competitive bidding by firms interesting in performing the work. The RFP was released on November 29, 2000. Bid opening was on December 30, 2000. Eight proposals were received. Due to the size and aggressive schedule of the program, all of the proposals were prepared by teams of firms assembled to meet the requirements. A technical evaluation team consisting of members of the Digital Orthoimagery work group carefully reviewed the proposals in early January. Concurrent with the technical scoring, separate scores for cost and management plans were also developed. The final scores were weighted on the basis of 60% technical, 30% cost, and 10% management. As a result of this scoring, the team assembled by VARGIS, LLC was selected for contract award. The VARGIS team included Triathlon, Ltd; 3001, Inc; North West Group; and Atlantic Technologies, LLC. The contract is for the first two years of the program, with options to extend the contract for three additional years.

The program consists of base products, which are 100% State funded, and an array of options, which can be selected and funded by local governments or agency partners. The options, if exercised, replace the base products and are priced at the difference between the base product and the upgrade. This program design offers very attractive upgrade pricing for local governments to tailor the digital orthoimagery products to meet their particular requirements, at far less cost than if they were to contract for these products on their own. Since the state is contacting for large blocks of digital

orthoimagery (typically between 10,000 and 14,000 square miles each year), the cost per square mile for the products are considerably lower than what would be expected if a single county (typically 400 - 1000 square miles) were to contract for the same products.

The first Annual Lot, to be flown this spring (see Figure 3),

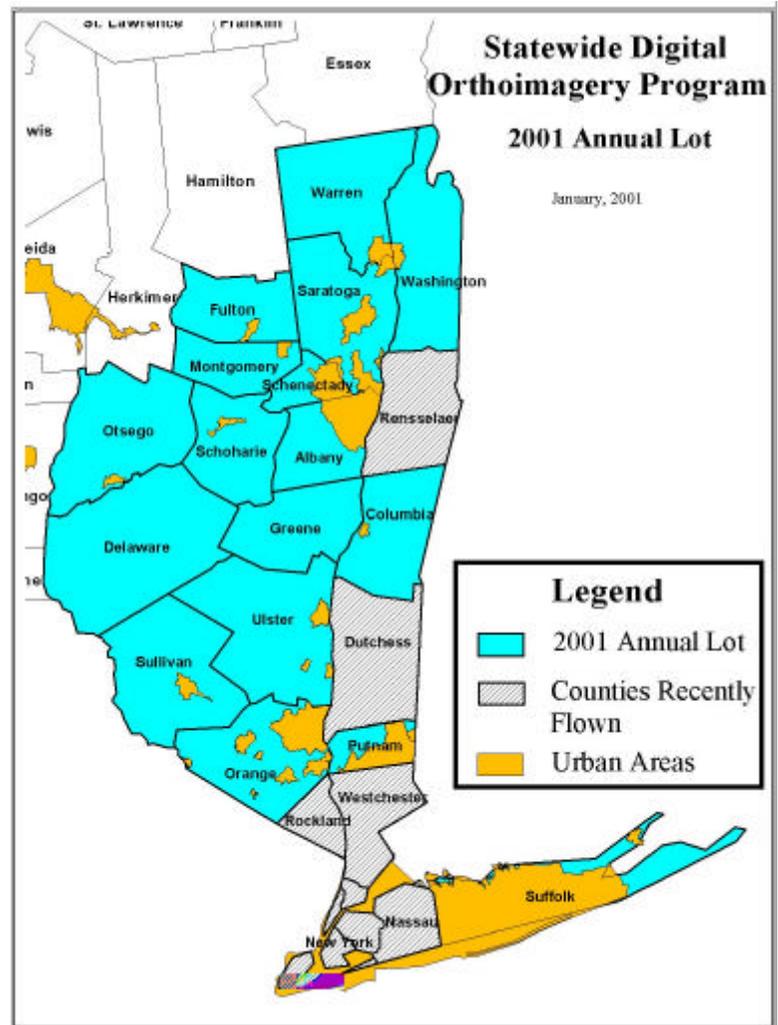
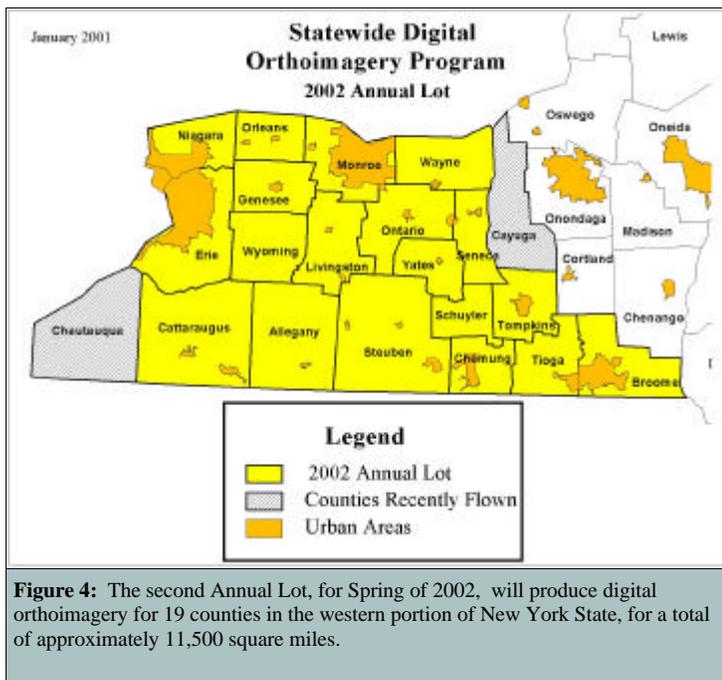


Figure 3: The first Annual Lot, to be flown Spring 2001, consists of 17 counties spanning the area from Long Island, Hudson Valley and Catskills through the northern reaches of the Capital District.

consists of 17 counties spanning the area from Long Island, Hudson Valley and Catskills through the northern reaches of the Capital District. Two additional counties, Nassau and Rensselaer, were flown in the Spring of 2000 as a pilot project, and will have digital orthoimagery produced from those aerial photos in the first contract year, as well. New York City, Westchester, Rockland, and Dutchess counties all have similar digital orthoimagery either under contract or recently produced, and are therefore not included in this program cycle. Total land area for new digital orthoimagery in the first year is approximately 12,300 square miles. The second annual lot, for spring of 2002, as shown in Figure 4, will produce digital orthoimagery for 19 counties in the



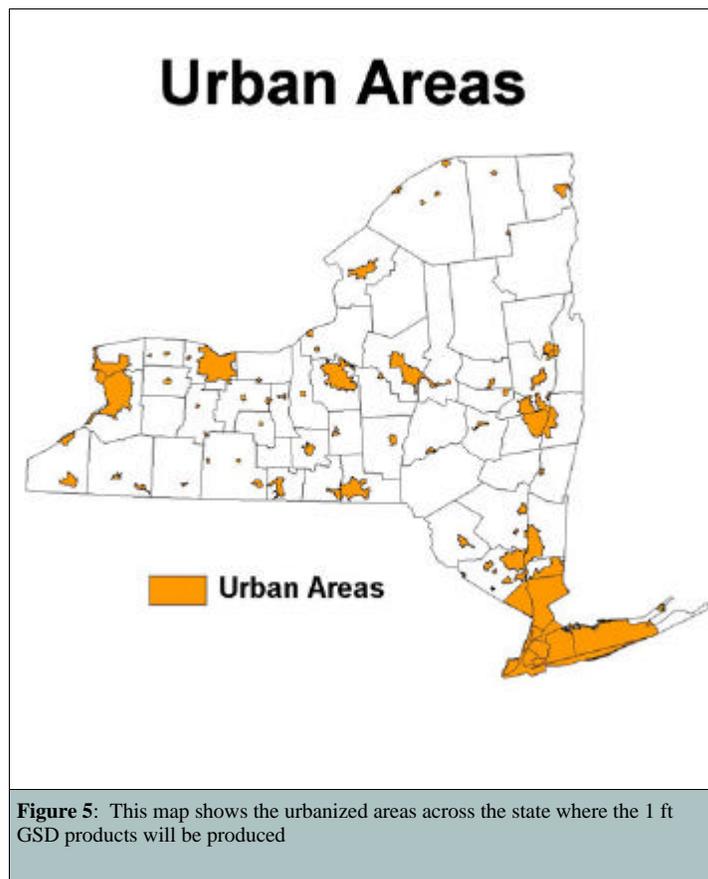
western portion of New York State, for a total of approximately 11,500 square miles. Annual lots to complete the remainder of the state and to begin re-flying portions of the state in successive years have not yet been determined, though it is expected that the first cycle through the state will be completed in four years.

The base products, paid for at state expense, include natural color digital orthoimagery at a resolution of 1 ft Ground Sample Distance (GSD, or pixel size) for urbanized areas, and panchromatic (black and white) digital orthoimagery at a resolution of 2 ft GSD for the remaining areas. The imagery used to produce the 1 ft GSD orthos will be flown at lower altitude than the imagery used for the 2 ft GSD products. Figure 5 shows the urbanized areas across the state where the 1 ft GSD products will be produced. Spatial accuracies of the products will be very high, with the 2 ft GSD products having an accuracy of +/- 8 ft at the 95% confidence level, while the 1 ft GSD products will have an accuracy of 4 ft at the 95% confidence level. Both of these accuracies exceed New York State requirements for 1:25,000 maps, thus making the new digital orthoimages ideally suited for local government uses involving tax parcel information.

In addition to the high resolution and spatial accuracies, perhaps the most dramatic improvement of this program over the previous orthoimagery is the speed at which the new digital orthos will be produced. Aerial imagery will be collected in the spring, between the time of complete snow melt and before the appearance of leaves on deciduous trees. This limited season, normally from late March until early May, provides the clearest and least obstructed view of the ground. Due to the requirements for cloud-free skies and good flying conditions, there are generally less than two weeks of actual flying weather. This is further limited by the need to acquire imagery during the few hours each day when the sun angle is highest. Once the imagery is collected, it must be digitized and oriented to ground control points. A new digital terrain representation is then created, and the imagery is processed into

¹ For those more familiar with spatial accuracy reported as a Root Mean Square Error (RMSE), the corresponding values are +/- 4.6 ft. for 2 ft. GSD products and +/- 2.3 ft. for 1 ft. GSD products.

digital orthoimagery. Finally, the digital orthoimagery is color balanced and formatted for final delivery. All of these steps must be completed and final products delivered to the State in three partial deliveries timed for the end of November, December, and January. This is a production turnaround of just 7-9 months, which is virtually unprecedented in the industry. The contractor can earn bonuses for early delivery, or liquidated damages for late delivery. The Photogrammetry Unit at the Department of Transportation will perform quality assurance acceptance testing of all contract deliverables.



Options or upgrades will allow funding partners to replace the base products with other products. Options for the 2 ft GSD panchromatic base product covering rural areas include an upgrade to color infrared film; resampling the imagery to produce orthoimagery at 1 ft GSD (having the same accuracy as the 2 ft GSD product); or upgrading to the true 1 ft GSD orthoimagery (produced from lower altitude imagery) in either natural color or color infrared. Options for the 1 ft GSD natural color base product covering urbanized areas include color infrared film, and resampling to produce orthoimagery at either .75 ft GSD or .5 ft GSD (at the same accuracy as the 1 ft GSD product).

All of the delivered digital orthoimagery will be in State Plane Coordinates, based on the North American Datum of 1983 (NAD-83), compressed in MrSID format and tiled to 3000 ft x 2000 ft (for 1 ft GSD products) or 6000 ft x 4000 ft (for 2 ft GSD products) tiles. The State will be funding an option to provide an additional delivery of the same digital orthoimagery

in Universal Transverse Mercator (UTM) coordinates, based on NAD-83. The imagery will be available on the GIS Clearinghouse website, in a manner similar to the currently available orthoimagery.

Figures 6 through 9 depict samples of orthoimagery in the various resolutions and film types. Digital copies of these samples are also available for viewing and download at http://www.nysgis.state.ny.us/sample_orthos/index.html. A description of the samples and links to free viewing software are also provided at this website.

This new statewide digital orthoimagery program is a major achievement, and is the result of the involvement and hard work of many people, including the volunteers who participate on the Digital Orthoimagery Work Group, the GIS Coordinating Body, and staff of the Office For Technology. The leading firms in the industry have contributed considerable effort, as well, both in responding to our RFI and

in developing detailed proposals for our program. We believe that our program design combines stringent technical specifications, unprecedented product delivery schedules, and flexibility to adapt the program to local requirements through options and upgrades. It is our aim to provide the GIS users of New York State with a foundation GIS layer of high-quality, timely digital orthoimagery to expand and improve the effectiveness of GIS applications.

Please contact us at the Office For Technology's Center for Geographic Information at 518-486-3580, or you send an e-mail to:

Bruce Oswald — bruce.oswald@oft.state.ny.us,
Bill Johnson — william.johnson@oft.state.ny.us,

or

Thomas Henderson — thomas.henderson@oft.state.ny.us

Samples of Digital Orthoimagery in the Various Resolutions and Film Types



Figure 6: .5 ft GSD Natural Color Sampled from 1 ft.



Figure 7: 1 ft. GSD Natural Color



Figure 8: 2 ft. GSD Panchromatic



Figure 9: 2 ft. GSD Color Infrared (IR)

FREE GIS TRAINING AVAILABLE FOR STATE AGENCIES AND LOCAL GOVERNMENT



Digital Orthoimagery Seminar on Long Island, New York on December 13, 2000

The first training being offered as part of the Statewide GIS Training Program is a general topic seminar entitled "Introduction to Digital Orthoimagery." The New York State Office for Technology is pleased to offer this free, one-day Geographic Information Systems seminar for State agency and local government employees, hosted by OFT's Center for Geographic Information. The Center for Geographic Information is working in cooperation with the New York State GIS Coordination Program and the NYS Technology Academy to provide these general topic GIS seminars. The classes will be offered free of charge in a variety of locations throughout the State.

This seminar is designed to introduce individuals to digital orthoimagery by explaining what it is, how it is created and how it can be used in GIS by State agencies and local government. In addition, the Center's newly established Statewide Digital Orthoimagery Program is introduced.

Digital Orthoimagery (DOI) is aerial photography that has the positional accuracy of a map. DOI offers a rich source of information to help understand and visualize real ground conditions while providing much more information than conventional line maps. Digital Orthoimagery is an ideal data source for Geographic Information Systems and can be used to serve a wide variety of purposes. Planners can use digital ortho images to identify open space and growth patterns, facility managers can develop infrastructure inventories, disaster responders can quickly determine field conditions and access to aid, health officials can identify likely mosquito breeding habitat to guide insecticide application, environmental professionals can identify wetland areas or manage watershed resources, and much, much more. The number of uses for DOI is nearly unlimited.

To date, "Introduction to Digital Orthoimagery" has been offered at locations in Schenectady, Rochester, and on Long Island, and been extremely well attended. Over the coming months, the course will be held at locations in the Hudson Valley area, central New York, northern New York, western New York and at the 2001 Annual NYS GIS

Conference. The proposed training schedule is available on the NYSGIS Clearinghouse at <http://www.nysgis.state.ny.us/resource.htm#training>.

This Spring, the course presentation and materials will be available for viewing on line or for downloading from the NYSGIS Clearinghouse. Information on current course offerings will be posted on the NYSGIS Clearinghouse and the GISNY listserv. Due to expected high demand, once the particular training location has been officially announced, individuals are asked to register on-line at <http://www.nysgis.state.ny.us/resource.htm> to ensure seating is available. If you have any questions, feel free to contact Elizabeth Novak at the Office for Technology at 518/486-3580.



This graphic represents the growth in the GIS Data Sharing Cooperative

Don't Be Left Out...
 Sign up for GISNY-L at
<http://www.nysgis.state.ny.us/listserv.htm#newyork>.

Undergraduates Apply GIS to a Wide Array of Interests

December 21, 2000 saw the unveiling of 19 undergraduate GIS projects at the annual exhibit of work by the students in GIS 201, the introductory course in GIS at the SUNY College at Fredonia. The course is 3 credit hours and meets twice a week for lecture and once a week for lab. This exhibit was particularly successful in terms of the number of both substantive and graphically appealing projects. Like Alfred University (see the Fall/Winter 2000 issue of the GIST News), Fredonia has no formal geography program, so the students taking the introductory class typically have no background in fundamental concepts such as coordinate systems or map design. This does not, however, keep them from executing useful and interesting applications of GIS.



GIS Project at Annual Exhibit of work by the students at the SUNY College at Fredonia

There were projects from students in history, health services administration, economics, biology, criminal justice, business, and engineering. These projects included an analysis of local burglary and grand larceny data, a soil analysis of the Cattaraugus Indian Reservation, changes in nationwide wheat production since 1995, a municipal-level study of NY voter turnout in Presidential elections, an analysis of hurricane paths relative to topography using the Global 30-Arc-Second DEM data available from USGS, the potential for the local contamination of public water sources from inactive landfills, the adequacy of health care facilities relative to population characteristics, an overlay of Forestville grape vineyard polygons and soil samples with digital orthophotos, a study of ideal residential building locations based on views of Lake Erie, and several studies using socioeconomic, real estate, and weather data at a variety of scales. Most students used data downloaded from the NYS GIS Clearinghouse. These applications are fairly sophisticated given that the students begin the semester with no knowledge of GIS and 15 weeks later exhibit a completed project while enrolled in other courses, working one or more jobs, and, in some instances, raising families. It's an excellent testimony of the vast resource we have in New York's young people.

Fredonia offers a 24 credit hour Minor in Interdisciplinary Studies in GIS. Students are required to take the 2-course sequence in GIS, Visual BASIC, C++, two GIS elective courses, an interdisciplinary elective that has the potential for GIS applications, and a practicum experience. In addition to specific applications of GIS, the required GIS courses stress an understanding of the inherent geographical context underlying most physical and social phenomena to

(Continued on page 4)

(Continued from page 3)

their respective disciplines. Problem-solving and logical analysis skills are encouraged in these courses to foster students' confidence and independence in their use of GIS. The GIS elective courses include Remote Sensing & Image Processing, Mapping the Social World, Cartography, and Special Topics in GIS.

For further information, please contact Ann Deakin at (716) 673-3884 or by e-mail at Ann.Deakin@fredonia.edu.



MARK YOUR CALENDAR!

**The 2001
NYS GIS Annual Conference
Holiday Inn - Turf
Albany, NY**

October 29-30, 2001

The New York State GIS Conference has become a major GIS professional development opportunity for hundreds of GIS users in the State. The conference is a great place to discover how New Yorkers are using GIS to accomplish important objectives in the public and private sectors. Technical presentations feature working professionals who share their GIS experiences and solutions in dealing with real world problems like yours.

For more information, please go to <http://www.esf.edu/outreach/conted/conferences/nysgis2001.htm>

How GIS Was Used for the West Nile Virus in Oneida County

The West Nile Virus was a newcomer to the Oneida County region this year. The presence of dead birds infected with the virus was cause for great concern among our citizens and County leaders. The Oneida County Department of Planning was called upon to not only to map the location of the dead birds, but also to develop spray boundaries for mosquito control. The Department of Planning worked in conjunction with the Department of Health to develop spray boundaries that were strategically placed to protect the population centers and also target swampy/wet areas, while avoiding other features such as public swimming pools and other sensitive areas.

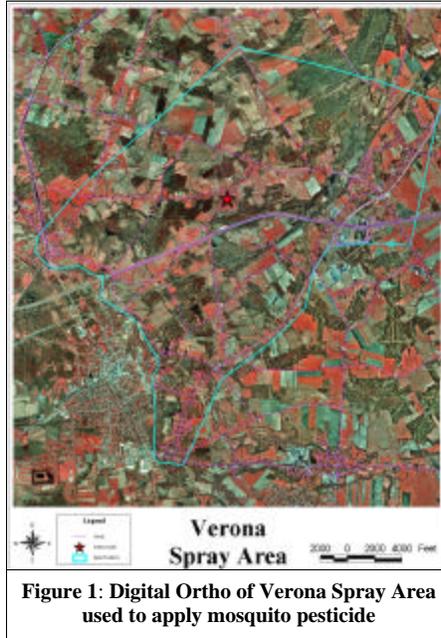


Figure 1: Digital Ortho of Verona Spray Area used to apply mosquito pesticide

The method used to develop the spray boundaries was essentially done in real time on screen in our conference room. We used a projection system to display the important map entities onto our conference room

projection screen. Department of Health and Planning managers could then request data themes such as DOQQ's, wetlands, parcels, and streams to be overlaid in real time. This allowed them to make informed decisions with speed and accuracy. The end result was a spray boundary that was then used by the airplane pilot to apply mosquito pesticide (see figure 1).

One additional time and money saving technique that we used was in the application of the pesticide itself. The pilot contracted to apply the pesticide used a navigation and spray control system that would import our ESRI Arcview shapefiles. Using this navigation and spray control system the plane's sprayers would turn themselves on and off as the plane crossed spray boundaries. GPS navigation allowed the plane to place itself in space with 10 meter accuracy and control the sprayers with the same accuracy. This navigation technique also assured Oneida County leaders that sensitive areas, such as water supply reservoirs, were not sprayed.

The use of GIS in situations such as described above allow Oneida County and its leaders to respond to many situations with increased speed, efficiency, accuracy, and confidence. The data and contacts on the NYS GIS Clearinghouse (<http://www.nysgis.state.ny.us/cooplist.htm>) allow our County to continue on our path toward better serving the citizens for whom we work.

For more information, please e-mail Jeff Quackenbush at jquackenbush@co.oneida.ny.us.

A special thanks to the contributors to this issue: Ann Deakin (SUNY College at Fredonia), Tom Hart (DOH), Jeff Quackenbush (Oneida County), and Bruce Oswald, Bill Johnson and Elizabeth Novak (OFT).

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**On-line Version Available at
<http://www.nysgis.state.ny.us/comm.htm>**

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