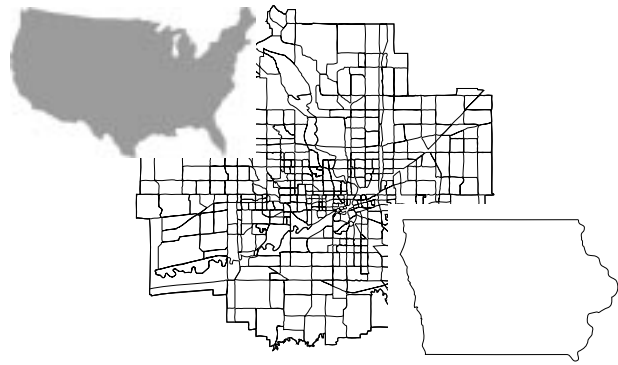


Coordinated GIS



Sharing data, exploring standards, and facilitating cooperation among Iowans who use Geographic Information Systems

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GIS across Iowa

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National Spatial Reference System in Iowa Densifies

As an increasing number of surveyors and governmental agencies purchase survey-grade GPS equipment for use in the local community, an effort is being made to establish and densify local control points, sometimes based on existing geodetic control. You may be familiar with typical geodetic control points, usually consisting of a brass disk set in concrete and bearing the words, "U.S. Coast and Geodetic Survey Bench Mark, \$250 fine or imprisonment for disturbing this mark."

Today's GPS technology allows much more accurate and precise measurements to be made between geodetic control points. Current GPS methods surpass the past positional accuracy that used the highest standards of geodetic control. This prompted the Federal Geodetic Control Committee (FGDC) to formulate three entirely new orders of accuracy (AA, A and B) beyond the historical first, second and third orders of geodetic control.

In Iowa, surveyors are bound by statute to provide specified orders of control for various projects.

By early 2001, field units from the National Geodetic Survey (NGS) will be in Iowa to observe selected HARN points referred to as the Federal Base Network (FBN). The specific intention of this program is to improve the height (ellipsoidal) component of the HARN stations. It may even be possible to co-observe local points and work directly with the NGS field unit for inclusion of those points in the statewide observations.

Co-observations are guided by these requirements:

1. Dual-frequency full wavelength receivers
2. Provided descriptions of the control points in the format prescribed by NGS using the DDPROC software (http://www.ngs.noaa.gov/PC_PROD/pc_prod.shtml)
3. Marks with a high level of stability, such as a driven rod mark (<http://www.ngs.noaa.gov/AERO/Supinst.html>, "Attachment 3-1A")
4. Three independent observation sessions of 5.5 hours, with one session offset by 4 hours.

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coordinated GIS is a publication of the Iowa Geographic Information Council. The council is a partnership consisting of representatives of the geographic information system (GIS) user community in Iowa.

The GIS community includes federal, state, and local government agencies; universities; businesses; and nonprofit organizations that use or are planning to use GIS or global positioning system (GPS) technologies. These powerful technologies combine electronic maps, databases, and precision locations and can be used to improve decisions, save money, and enhance the quality of life of Iowa's citizens.

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We welcome your comments and suggestions regarding **coordinated GIS**. What would **you** like to see in this newsletter?

Submit suggestions or questions to Reg Souleyrette

- by e-mail to reg@iastate.edu
- by mail (disk copy preferred; see the address listed above) or
- by fax to 515-294-0467

or to Marcia Brink

- by e-mail to marcia@ctre.iastate.edu or
- by fax to 515-294-0467

The opinions, findings, or recommendations published here are those of the authors and do not necessarily reflect the views of the Iowa Geographic Information Council.

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coordinated GIS is on line:
www.ctre.iastate.edu/pubs/

The Iowa Geographic Information Council is on line: www.geo.drake.edu/igic/



GIS across Iowa

Precision Agriculture and GIS

Several members of the IGIC recently attended a hands-on workshop with Terry Brase at Hawkeye Community College to better understand the needs of the precision agriculture industry. During the event, Roger Patocka, Mike Killion, Todd Bishop, Cory Brockman and I learned how GIS data are collected and used in the decision making process.

The day began in one of Hawkeye's three computer labs. Traditionally, the field boundary is used as the base layer and we were shown a couple of ways to collect these data, including GPS data collecting and heads-up digitizing of orthophotography. We also discussed several methods for storing data: on a field, by field basis, and by farm. The type and desired

detail of analysis typically influences how the data will be stored.

With our newly-acquired field boundary information, we then were off to the field itself. Terry displayed three varieties of GPS units: one from Rockwell, a small CMT handheld, and a backpack unit attached to a pen-based computer. We were shown connecting procedures and

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GIS/GPS are changing the face of crop agriculture. (Top left) GPS tracks a spreader across a field. By matching the spreader's location with GIS maps of the field's agronomic data, a computer in the cab controls the kinds and amounts of nutrients spread at various locations across the field. (Bottom) State-of-the-art spreaders carry several different plant nutrients in separate bins. Photos courtesy of C-S Agrow Service, Calumet, Iowa.



Looking to the Future

GIS users throughout Iowa will have an opportunity to meet and share their work during the 1999 Iowa GIS Users' Conference, "Coordinating GIS for Iowa's Future," on July 28-30, 1999. This year, Buena Vista University in Storm Lake, Iowa, hosts the conference.

The three-day conference offers events covering a variety of GIS issues. The first day includes a poster session, featuring GIS activities in Iowa and presented by the creators themselves. Concurrent sessions

highlighting GIS in action and management are scheduled for the second day, and several breakout panels discussing the needs of the GIS community will wrap up the final day. Exhibitors also will be at their booths throughout the conference.

This year's keynote speaker, University of Maryland's Spatial Analysis

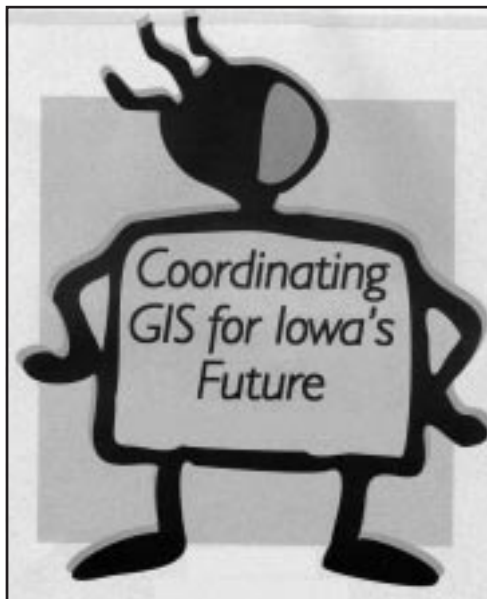
laboratory director Timothy W. Foresman, will participate in a plenary meeting to kick off the second day's sessions. And for those participants eager to get a head start on the conference events, several

pre-conference short courses are being offered for an additional fee (see right).

The housing and conference registration early deadline is June 30, after which the housing fee will increase by \$5.00 per person per night and the conference

rate will increase from \$95 to \$105. Registration information is available from the following contacts:

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Des Moines, Iowa 50319
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515-281-6137 (FAX)
gis@its.state.ia.us (E-mail)
www.gis.state.ia.us (Web site)



Logo courtesy of the Iowa DOT.

Pre-Conference Short Courses Available

Before going to the GIS Users' Conference, why not do a little preliminary learning? Several pre-conference short courses will be held during the morning and afternoon of Wednesday, July 28, 1999, the first day of the conference. Each course is \$40 and offers GIS users an opportunity to study issues both in-depth and hands-on.

Morning courses include the following:

- Data Conversion and Development
- GIS Education and Training
- GIS Implementation for Counties
- GIS in Transportation
- Introduction to ArcView GIS 3.1
- Introduction to GPS
- Multimedia in GIS
- Remote Sensing

Afternoon courses include the following:

- Data Conversion and Development
- Fundamentals of GeoMedia 2.0
- GIS Implementation for Cities
- GIS in Agriculture
- GIS on the Internet
- Intermediate GPS
- Understanding and Applying Digital Soil Survey Information

More information is available from these contacts:

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National Spatial Reference System in Iowa Densifies

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In addition to providing the above information, David Doyle, NGS, relates that their current Field Operations plan does not yet include Iowa, but it should be included within the next six months. The plan can be found at <http://www.ngs.noaa.gov/FIELDOPS/opplan99.html>. For a sample of the type of activity that will be developed during the Iowa campaign, refer to <http://www.ngs.noaa.gov/ADVISORS/Wyoming/Wyoming-home.htm>.

People who wish to independently submit their control densification work for inclusion in the national NSRS network (blue-booking) should refer to "Submitting Data for Inclusion into NSRS" (<http://www.ngs.noaa.gov/products/services.shtml#STOP-S>) and "Input Formats and Specifications of the National Geodetic Survey Data Base" (<http://www.ngs.noaa.gov/FGCS/tech pub.html>).

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Richard Varn Named Chief Information Officer of ITS

Iowa Governor Tom Vilsack's office has released the following information:

Governor Tom Vilsack and Lt. Governor Sally Pederson announced the appointment of Richard James Varn as Chief Information Officer of Information Technology Services for the state.

"Senator Varn's knowledge and experience as a State Senator and as Director of Information Technology Production Services for the University of Northern Iowa allows him to understand the power of technology," Vilsack said. "He has excellent knowledge and experience in building relationships between government and communities so we can coordinate our efforts to expand and integrate technology across the state."

Mr. Varn, a native of Solon, previously served as Director of Information Technology Production Services for the University of Northern Iowa. Since 1988, Mr. Varn has also served as president of RJV Information Technology Consulting Services, a firm providing technology services to government and private industries around the world, including Canada, Latin America, and numerous European countries.

Mr. Varn served as state senator from 1987 to 1994, and as state representative from 1983 to 1986. He chaired the National Conference of State Legislatures Task Force on Communications and Information

Policy from 1990 to 1993. Mr. Varn is currently a member of the Iowa Computer-Using Educators Association and the Iowa Distance Learning Association. He holds a bachelor's degree and a law degree from the University of Iowa.

Stop by the "Depot"

Web surfers in search of GIS resources will be impressed by the GIS Data Depot (<http://www.gisdatadepot.com/>). This Web site promotes the open exchange and free transfer of geospatial data over the Internet. There currently are over 50,000 Web pages featuring free geographic data for 250 countries. These URLs will not change, so users are encouraged to link to any geographic area of interest, whether county, state, country or province.

In addition, the GIS Data Depot allows users to download data from a catalog of over one million domestic and international datasets, including almost all digitally available USGS 24K, 100K, 250K DLG quadrangles, numerous statewide datasets, available in E00, SHP, MIF, DXF, or DLG SDTS format with the raster data saved in TIFF or JPEG formats.

Iowa Agencies Benefit from GIS Technology

Many state agencies in Iowa have started using GIS in their daily work. This article describes just a few of the projects now occurring at the state level.

At the Iowa Department of Natural Resources (IDNR)

IDNR has installed GIS software on more than 40 desktops throughout the agency, and almost 80 IDNR employees have attended GIS training courses during the past 18 months. Current IDNR GIS activities include park management planning, wellhead and source water protection planning, pesticide management plan, non-point source modeling of Lake Ahquabi, land acquisition efforts, unified watershed assessment, state breeding bird atlas, state forest management, geological review of confinement construction permit applications, bedrock and surficial geologic mapping, and inventory of occurrence records for threatened and endangered species. Increasing amounts of GIS data have enabled the expansion of these GIS activities.

GIS Library

IDNR maintains a GIS data library (NRGIS) on LAN servers, and much of this data is available to the public via the IDNR Geological Survey Bureau's Web site (www.igsb.uiowa.edu). The NRGIS was created in 1992 as a collection of 450 GIS files. Currently, there are 3,900 GIS files available. This library includes data developed by the U.S. Geological Survey, Envi-



The IDNR Web site displays several GIS endeavors.

ronmental Protection Agency (EPA), Natural Resources Conservation Service (NRCS), U.S. Fish & Wildlife Service, Iowa Department of Transportation (IaDOT), Iowa Department of Agriculture and Land Stewardship (IDALS), various partners at Iowa State University (ISU), and several other organizations.

Digital Soils Maps

In addition, IDNR is working with the Iowa Cooperative Soil Survey (ICSS) to complete the conversion of their Digital Soils Maps into countywide Arc/Info coverages. IDNR has contracted with the ISU GIS Research and Support Facility (ISUGISRSF) to join and aggregate the sectional soil polygon data into townships, along with countywide drainage and spot feature coverages. The ISUGISRSF also provided metadata files for each coverage. Funding for the conversion project came from IaDOT and the IDNR Non-point Source Program. Currently, two-thirds of the state's digital soil maps are in the NRGIS

library, with the remainder of the available counties to be added by July 1, 1999 (<http://icss.agron.iastate.edu/>). Digital soil maps are a critically important resource for many applications. Completion of this data set for the state was made possible through an enormous cooperative effort involving many agencies and individuals.

Collision Prevention

IDNR also is working with the ISU Department of Animal Ecology to develop a model that will predict the probability of deer/vehicle collisions, given a set of roadway and land cover parameters. This model is being built through analysis of a nine-year deer/vehicle collision data set maintained by IaDOT. IaDOT also provided GIS data layers for Iowa's primary road system. The ISU Department of Animal Ecology GIS facility conducted the majority of data analysis. Check out <http://www.public.iastate.edu/~mhubbard/deer/> for more information.



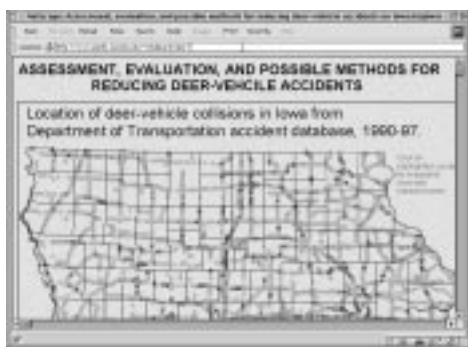
The ICSS Web site offers countywide Arc/Info coverages.

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GIS across Iowa

Iowa Agencies Benefit from GIS Technology

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The ISU Department of Animal Ecology is developing a model that will predict the probability of deer/vehicle collisions.

Iowa Gap Project

To construct the collision probability model, the land cover data layer created by IDNR for the Iowa GAP Project played an essential part. Headed by the Iowa Cooperative Fish & Wildlife Research Unit located at ISU, the Iowa GAP Project includes an impressive list of cooperators. With critical assistance from the Natural Areas Inventory Office, NRCS, IDNR has developed a state-wide, six-category land cover map using LANDSAT imagery. The imagery was purchased with funds from IDNR, Iowa GAP Project, and EPA.

IDNR also has been cooperating with Iowa GAP project staff to develop two other state-wide data layers: A stewardship data layer that includes boundaries for all public lands in the state of Iowa, and a wetland basin layer based on National Wetlands Inventory data

that can be used to model wetland species distributions. Additional GIS data layers produced by this effort will include an alliance-level land cover map (approximately 24 categories); range maps for hundreds of species of birds, mammals, reptiles, and amphibians; and habitat relationship models that predict species distribution within their estimated ranges. A more detailed description of this project is available at <http://www.ag.iastate.edu/centers/cfwru/iowagap/>.



IDNR has developed a state-wide, six-category land cover map using LANDSAT imagery.

Chichaqua Bottoms Greenbelt

Finally, IDNR and Polk County Conservation Board (CCB) are collaborating to develop GIS data layers to support the Chichaqua Bottoms Greenbelt land acquisition efforts. The project, initiated by Polk CCB, now counts IDNR, USFWS, and NRCS among its many partners. This project has had unprecedented success, and GIS data has figured largely from the project's outset.

Cooperation within and among

organizations has been a key to the successful development of GIS data within IDNR and the state of Iowa. The emphasis on cooperation is evident from the number of inter-agency GIS data development efforts currently underway.

At the Iowa DOT

Implementation of GIS also continues at the Iowa DOT, where the integrated GIS database is known as the Coordinated Transportation Analysis and Management System (CTAMS). CTAMS will integrate the pavement, accident, road characteristic, traffic, airport, rail, and bridge data into a single environment. The Iowa DOT continues to enhance the data and user interface to allow easier access to the data for the end user. This includes the development of metadata for all the datasets.

Y2K and E911

GIS also helps with the Y2K planning at the Iowa DOT. In the event of a major winter storm during the first week of January 2000, the Iowa DOT must plan for the small possibility of interrupted electrical service to its maintenance garages and limited availability of diesel fuel. GIS has shown the Iowa DOT the regions with limited diesel availability for snowplows and which garages do not have propane fueled backup generators. Using the maps generated by the GIS, a strategy to keep Iowa's roads safe can be created in the event of a Y2K-related problem.

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Iowa Agencies Benefit from GIS Technology

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the Iowa DOT is also adding the E911 road names to its road centerline file. This file is being updated to improve its spatial accuracy and to clean the topology in the data. This is an improvement over what is available from other sources since it will include rural as well as urban areas. Although this process will be ongoing, an official release of the data will be available in August. The GIS data will be made available by the Iowa DOT directly and through the Iowa GIS Clearinghouse.

Furthermore, the Iowa DOT is working with many regional planning groups to provide data and guidance in the use of GIS data. The Iowa DOT is striving to create a set of data that will be usable by local governments for their transportation planning, traffic modeling and road fund requests.

Elsewhere in the State

The Iowa Emergency Management Division and the Information Technology Services have worked together on a project for the Iowa Department of Public Health and the Iowa DOT. The project resulted in a map depicting the location of designated maintenance facilities and weigh scales in preparation of potential future shipments of spent nuclear fuel. With information from an Iowa DOT Computer Aided Drafting file and that provided by the Iowa DOT Motor Vehicle Enforcement Division, GIS was used to merge the information into

a single map, thus meeting a requirement by the various agencies involved in the planning process.

The Need for Education

To use GIS most productively, education is critical. While educating our state agency professionals is beneficial, the Iowa Department of Education (IDOE) is attempting to start the educational process at earlier stages. Iowa Lakes Community College, for example, offers a program to provide a certification program for GIS professionals. Several other colleges, including North Iowa Area Community College, are also very interested in developing a program. The National Sciences Foundation has funded several GIS curriculum development projects at community colleges, and there is an effort to develop certification standards for GIS technicians. Says Dr. Jan Friedel, Division of Community Colleges Administrator for the Iowa Department of Education, "The community colleges need to be involved and a part of any state effort to meet these employment needs." Groups such as the IDOE will continue to work with the IGIC to help meet the education and training requirements of Iowa.

Our state organizations continue to work closely to share data, resources and experience. By working together, the goal of the state agencies is to provide data, expertise and support to all the constituents of Iowa, whether local and regional governments, the public, or educational institutions.

GIS, Transportation and Land Use Relationships in Iowa

[Editor's note: A more detailed version of this article is included in the July 1999 issue of CTRE en route.]

Urban sprawl and development of precious farmland are significant public policy concerns in Iowa. The Center for Transportation Research and Education (CTRE) at Iowa State University has been conducting a public policy research and education project on transportation and land use on behalf of the Iowa Department of Transportation (Iowa DOT) and its partner organizations, such as metropolitan planning organizations (MPOs) and regional planning commissions (RPCs).

The intent of this project is to provide the Iowa Transportation Commission, the Iowa DOT, and their partner agencies with a better understanding of the impacts of their decisions about land use and development patterns. This project is being conducted in cooperation with a complementary project managed by the Public Policy Center at the University of Iowa that is researching past impacts on land use patterns of transportation investments in Iowa.

CTRE is utilizing ArcView 3.1 GIS software to integrate a variety of secondary spatial data sources and visualize past and likely future transportation and land use trends around the state. ArcView and some

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of its extensions allow a number of visual display techniques to be used, including simple thematic maps and 3-D surfaces derived from data.

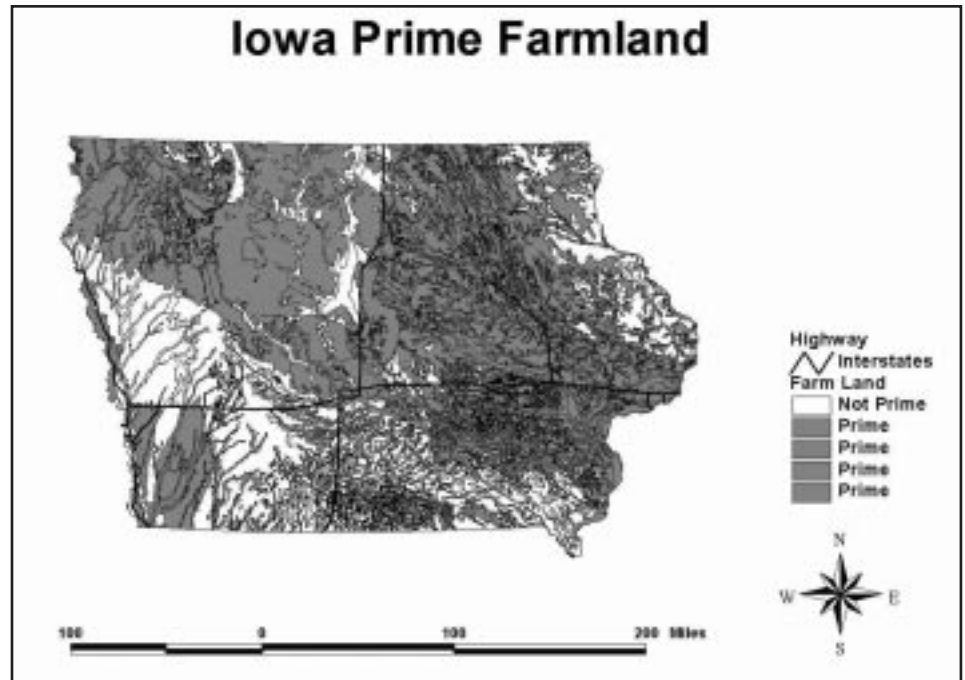
Particular emphasis is being given to those counties included in and adjacent to Iowa's eight metropolitan areas. Topics that are being studied using GIS include

- the tradeoff between past cropland loss to urbanization and improvements to the transportation network
- the loss of future cropland, given demographic, economic, and transportation trends and forecasts
- past trends (1980s and 1990s) in terms of demographics, housing, retailing, manufacturing and industrial development, agriculture, land use, school enrollment, and transportation system use and development
- key economic relationships among variables; for example, the comparison between housing rent and value and commuting distance.

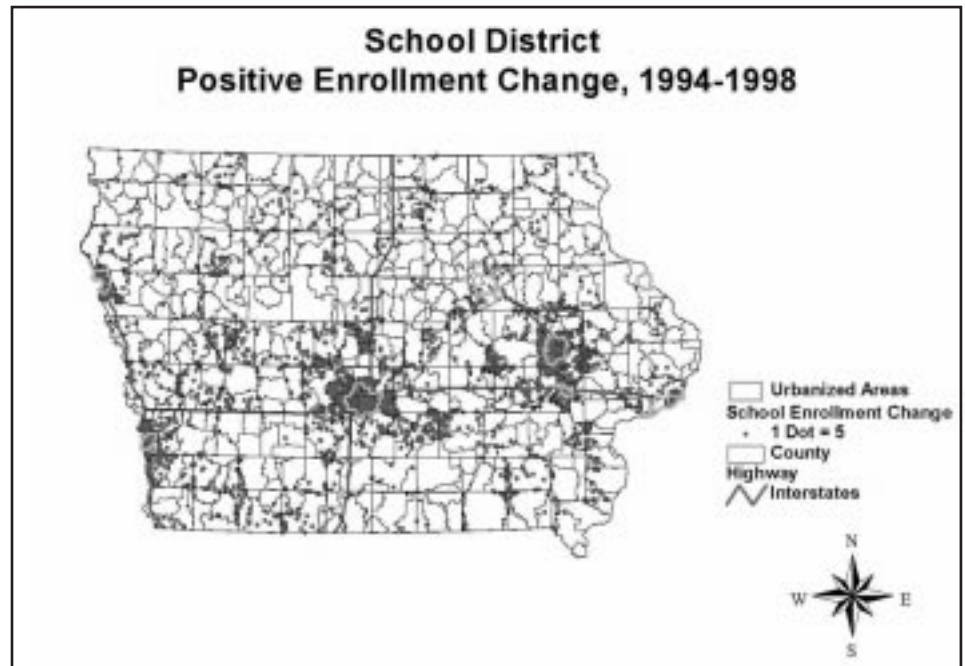
CTRE is using a wide variety of secondary data sources in this project; many useful data sources are in the public domain. Key data sources being used include

- federal agency data such as Census data, County Business Patterns, Bureau of Economic Analysis (BEA) economic forecasts, and US Department of Agriculture (USDA) agricultural production data
- state agency data, such as property tax assessment data, housing permit data, school enrollment data, and land use classifications from several points in time originally collected to assess wildlife habitat

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Over 60 percent of area of Iowa is prime farmland and it surrounds some of the fastest-growing cities in the state.



The above map shows recent K-12 school enrollment growth as dots within school district boundaries.

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- transportation activity, system characteristics, and system investment data. The Iowa DOT maintains a large transportation management information system, much of which can be depicted in a GIS
- proprietary data sources such as Woods and Poole, Inc. population and employment forecasts and business and industrial directories
- local government property taxation and parcel records also available for use in some counties.

A key outcome of this project will be more informed decisions regarding the land use and sprawl

repercussions of major transportation investments on the part of the Iowa Transportation Commission, the Iowa DOT's management and staff, transportation planning organizations, and others.

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Other Locations Algona, Emmetsburg, Spencer & Spirit Lake

GIS across Iowa

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Name/Title _____

Business or agency _____

Address _____

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To get on the e-mail address list, contact Reg Souleyrette (reg@iastate.edu) or David Plazak (plazak@ctre.iastate.edu).

To send a message to everyone on our e-mail address list, address your message to **igic@iastate.edu**.

Thanks for your help!

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discussed various power options. After taking sample field boundaries, we were ready for a tour of the larger equipment (the farm woodchuck even made an appearance on our way to the barns).

Terry uses the GPS equipment with several pieces of machinery, such as the Mule, a machine for field boundary and soil sample collection. Hawkeye Community College also has a large John Deere tractor, which is used for planting and harvesting.

We learned that many people are aware of this technology, but it can be cost prohibitive and difficult to find. Although many co-ops are

talking about using precision ag, few actually have purchased the equipment.

That afternoon we returned to the classroom to work more with the GIS. Using yield data collected from several fields, we attempted to find correlations between yield variation and location. We also used ArcView and the Spatial Analysis extension to create several maps showing estimated productivity of specific areas. The 3D extension enabled us to experiment with the yield data as well.

Terry's workshop opened our eyes to the changes in farming today. Because the farming community is

cautious of the sweeping consequences posed by unfamiliar technologies, important steps are being taken to make this technology not only more available but amenable.

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The 1998–1999 Iowa Geographic Information Council is comprised of representatives from Iowa’s GIS user community, including federal, state, and local governments; universities; businesses; and nonprofit organizations.

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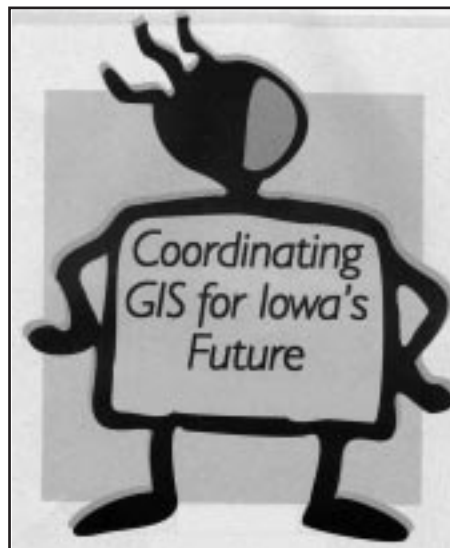
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Looking for Something?

This issue of **coordinated GIS** contains information on the upcoming 1999 Iowa GIS Users' Conference, "Coordinating GIS for Iowa's Future." Also included is a description of the pre-conference short courses available to interested conference attendees. See page 3 for more details.



Meet and greet other Iowa GIS users at the upcoming conference. Logo courtesy of the Iowa DOT.

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