

Techniques for Science Teachers: Using GIS in Science Classrooms.



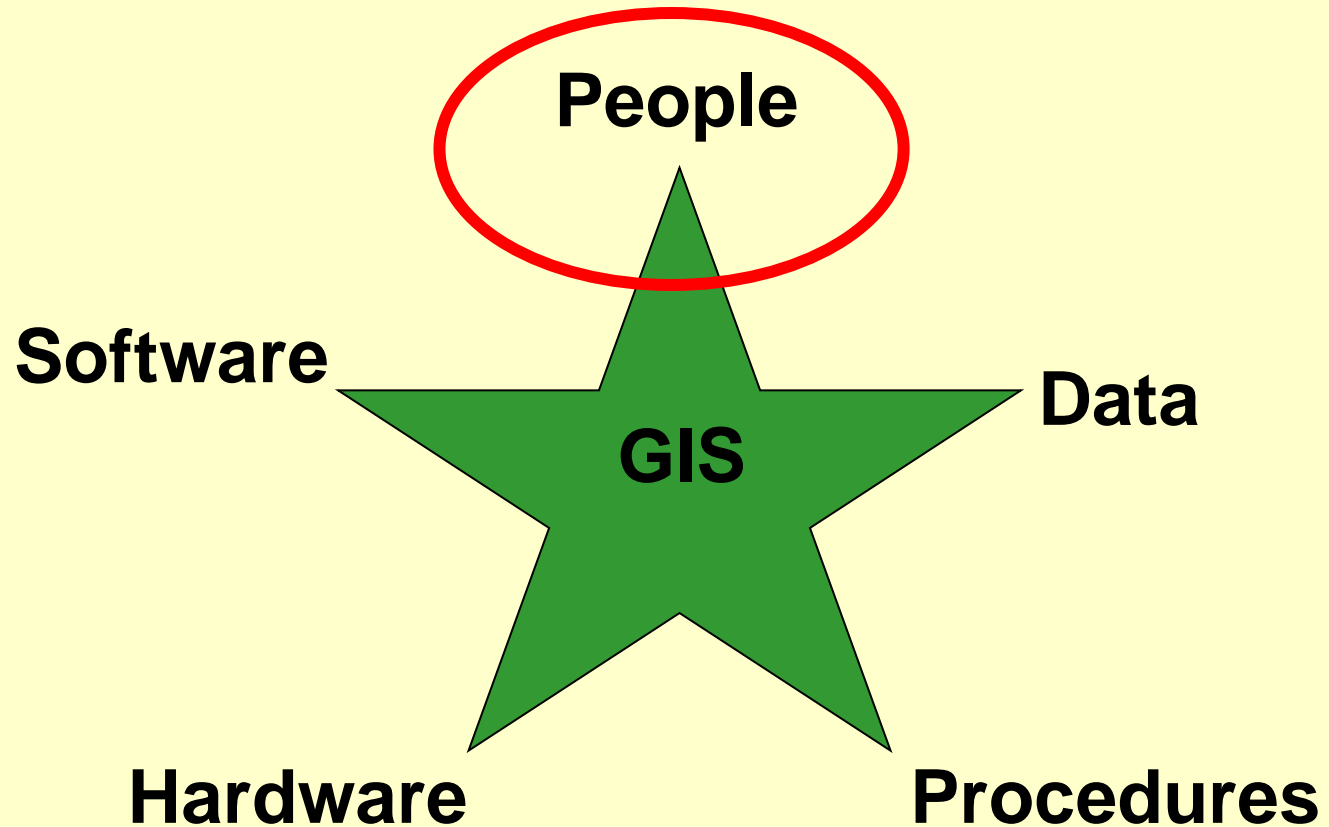
After ESRI, 2008

GIS

A Geographic Information System

- A collection of computer hardware, software, and geographic data used together for capturing, storing, updating, manipulating, analyzing, and displaying all forms of geographically referenced data... ESRI

What is a GIS?



Who uses a GIS?

People who are trying to effectively manage

- A natural resource
- A business
- An industry
- A city
- Educators!



Why use GIS in your science classrooms?

The Iowa Core Curriculum

- Helps address content, inquiry, and 21st Century skill building
- Promotes interdisciplinary activities
- It can be effective, meaningful, assessable, and fun!

Why use GIS in your science classrooms?

Data and software are generally free for educators and easily accessible

There is a bit of a learning curve

Help prepare your students for their future careers...

GIS as a Tool!

Our focus will be content driven, not tool specific...

- “*concepts NOT keystrokes*”

I will help you learn the basic methods/keystrokes

An important concept!

Layers



Tools for a GIS

- **Hardware**
 - Computer
 - Printer / Plotter
 - Digitizer
 - Scanner
- **GIS Desktop Software**
- **CAD Software**
- **Multimedia**
 - Photos, Video, 3D Models
- **World Wide Web**
- **GIS Personnel**

GIS Data

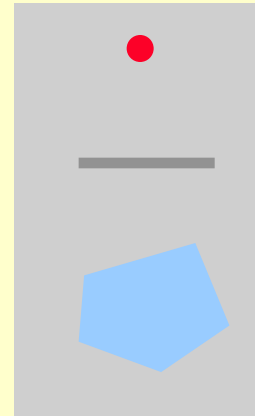
Raster Images - grids

- “pixels”
- satellite images
- aerial photos



Vector - grids

- features: points, lines & polygons
- attributes: size, type, length, etc.



Vector data (points, lines, polygons)



GIS Data Sources

Digitized and Scanned Maps

- purchased, donated, free (Internet)
- created by user

Data Bases – Tables of data

GPS (Global Positioning Systems)

Field Sampling of Attributes

Remote Sensing & Aerial Photography

Conventional Information Systems

- Answer the following questions:
 - Who ?
 - What ?
 - When ?
 - Why ?
 - How ?

GIS answers the following

- **Location:** What is at...?
- **Condition:** Where is it?
- **Trends:** What has changed since...?
- **Patterns:** What spatial patterns exist?
- **Modeling:** What if...?

Exploring data using GIS turns data into information into knowledge

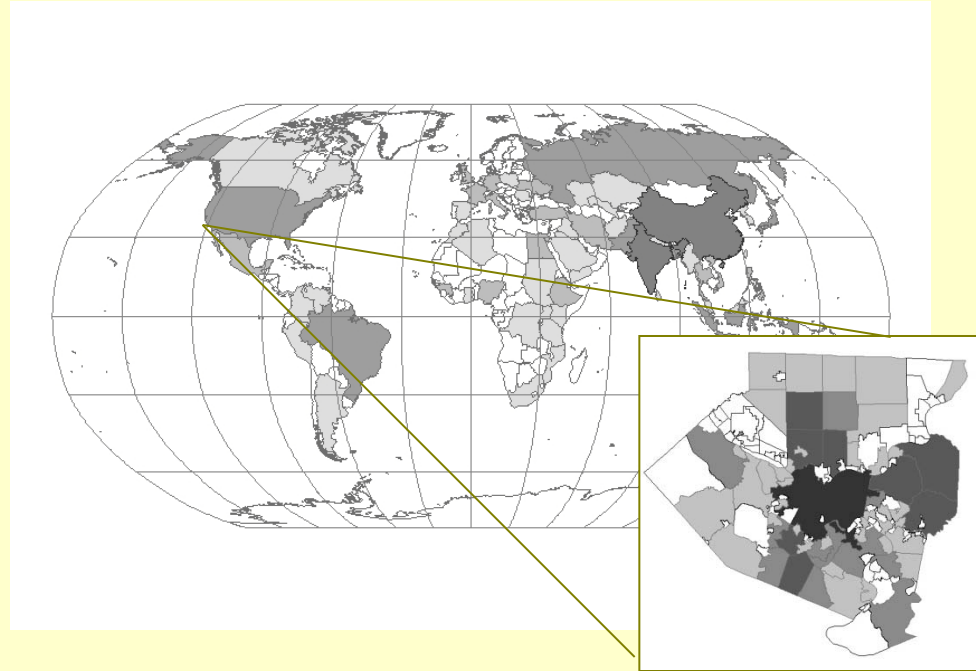
Data Data Data

- **Location Data**

How Many? – What Kind? – Where?

- **Scale of Data**

Global to Local



- **Data Presentation**

Words, Charts, Graphs, Tables, Maps, Photos

Databases

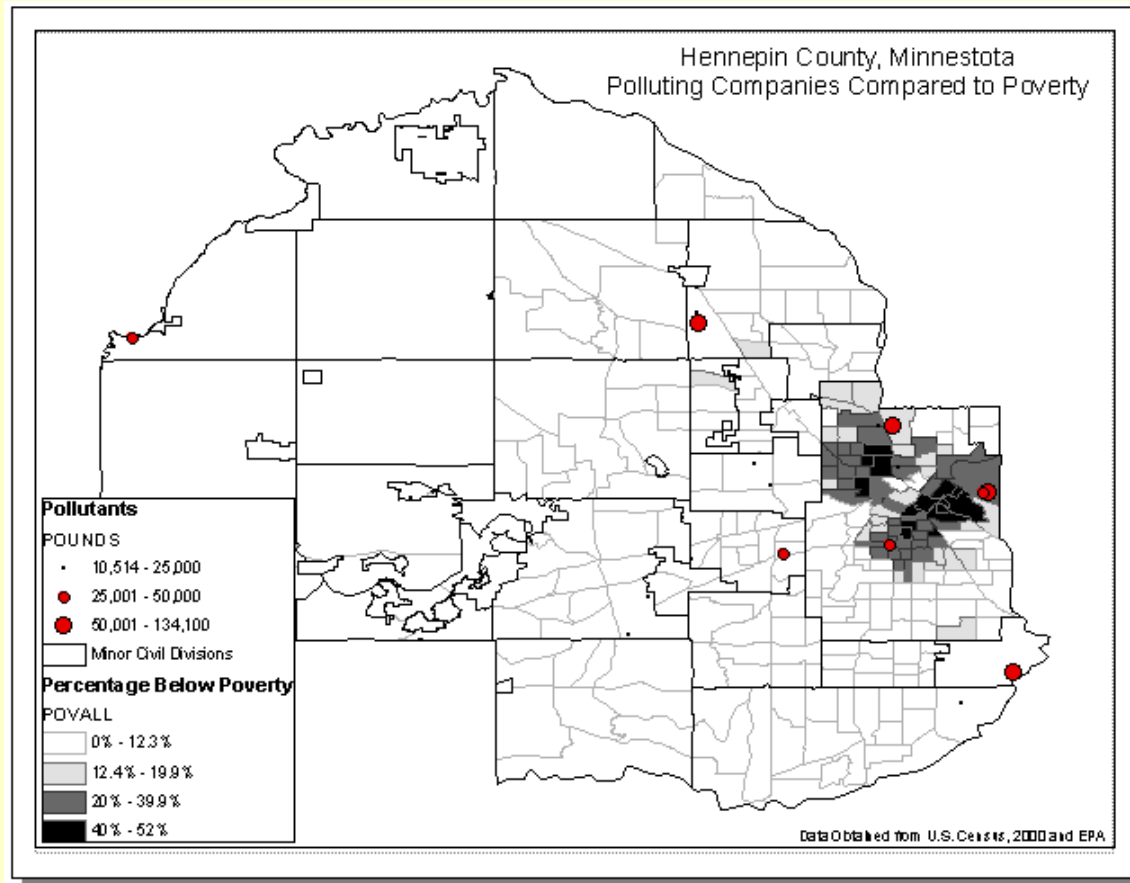
- Not easy to interpret

TRACT	MEDINC	POVALL	POVU18	POVO65	POVFAM
000101	39159	16	28	3	12
000102	36563	13	20	5	10
000300	48664	5	3	7	3
000601	40863	11	22	4	8
000603	50256	2	0	2	1
001100	41099	10	16	13	8
001700	34306	13	16	10	11
002200					
002400					
002700					
003200					
003300					
003501					
003502					
003800					

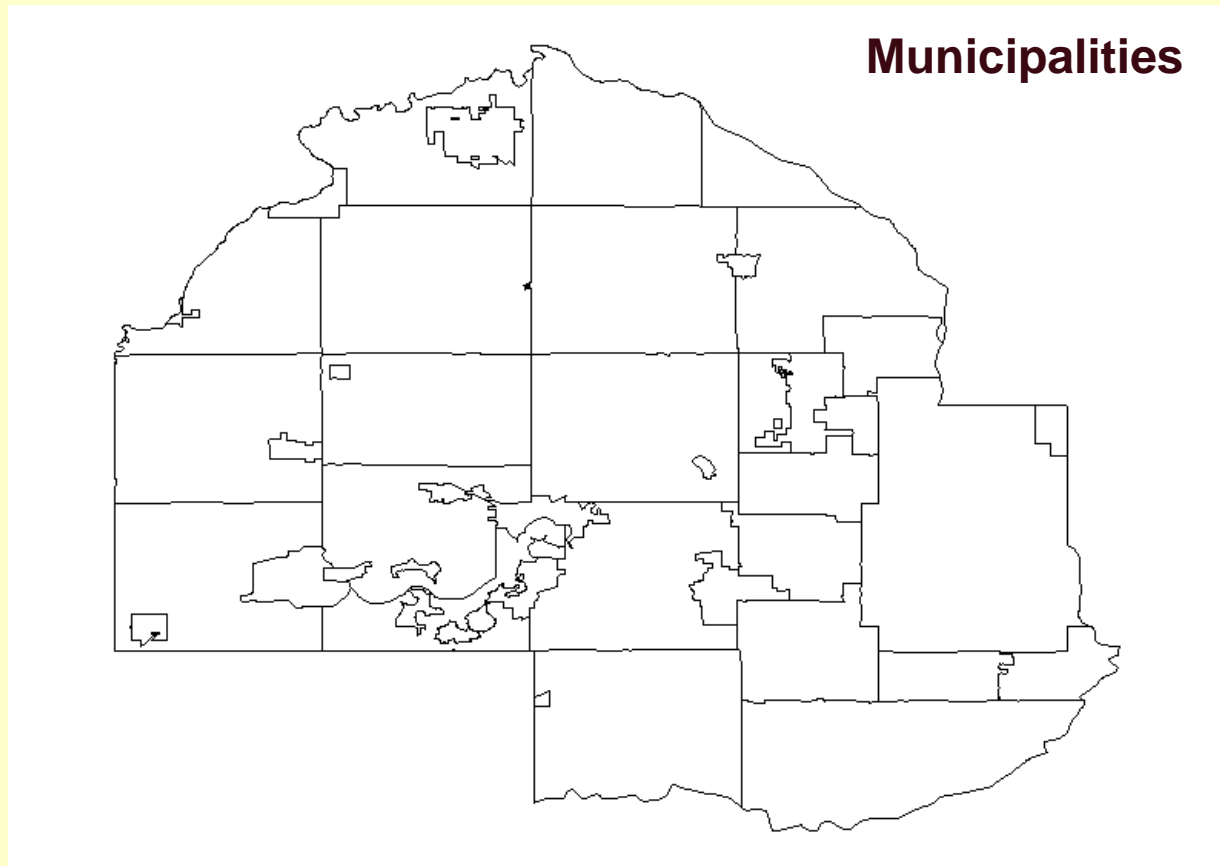
A	B	C	D	E	F
	CITY	SIC_CODE	LATITUDE	LONGITUDE	POUNDS
1	P				
2	RITRAMA INC.	26 Paper And Allied Products	44.98244	93.21470	134100
3	PERAL BATHS	30 Rubber And Misc. Plastics Products	45.08788	93.39455	69380
4	RIVERSIDE GENERATING PLANT	49 Electric Gas And Sanitary Services	45.02357	93.27372	66074
5	NORTHWEST AIRLINES INC.	45 Transportation By Air	44.87071	93.19908	65000
6	DIVERSIFOAM PRODS.	30 Rubber And Misc. Plastics Products	45.07797	93.74738	45304
7	DOUGLAS CORP.	30 Rubber And Misc. Plastics Products	44.87286	93.39926	41600
8	NICO PRODS. INC.	34 Fabricated Metal Products	44.94958	93.27600	34364
9	NORTHLAND ALUMINUM PRODS. INC.	34 Fabricated Metal Products	44.94389	93.34222	32115
10	GREATBATCH - GLOBE TOOL INC.	34 Fabricated Metal Products	44.98259	93.21810	26140
11	TENNANT CO.	35 Industrial Machinery And Equipment	44.98676	93.34954	22572
12	GRACO MINNESOTA INC. MINNEAPOLIS	35 Industrial Machinery And Equipment	44.99754	93.27018	21009
13	POLARFAB L.L.C.	36 Electronic & Other Electric Equipment	44.85164	93.23176	20111
14	MEDTRONIC INC. PERFUSION SYS.	38 Instruments And Related Products	45.09460	93.39541	19523
15	HONEYWELL INTL. INC. AUTOMATION & C	38 Instruments And Related Products	45.00000	93.35999	18500
16	SIERRA CORP. / TK PRODS.	28 Chemicals And Allied Products	44.91809	93.42575	15950
17	GE OSMONICS INC.	35 Industrial Machinery And Equipment	44.89456	93.43876	15680
18	ILLBRUCK INC.	30 Rubber And Misc. Plastics Products	45.02408	93.28278	14995
19	FILMTEC CORP.	30 Rubber And Misc. Plastics Products	44.87017	93.35457	11241

Visualizing Data

A picture is worth a thousand words

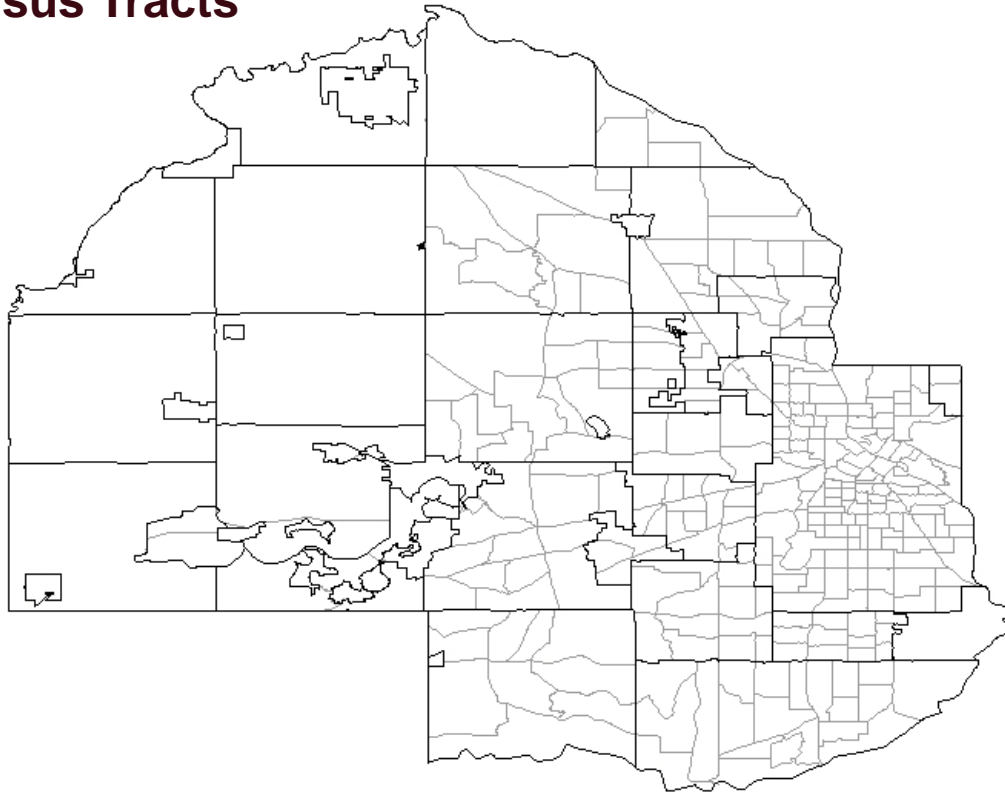


“Layers” of GIS Information



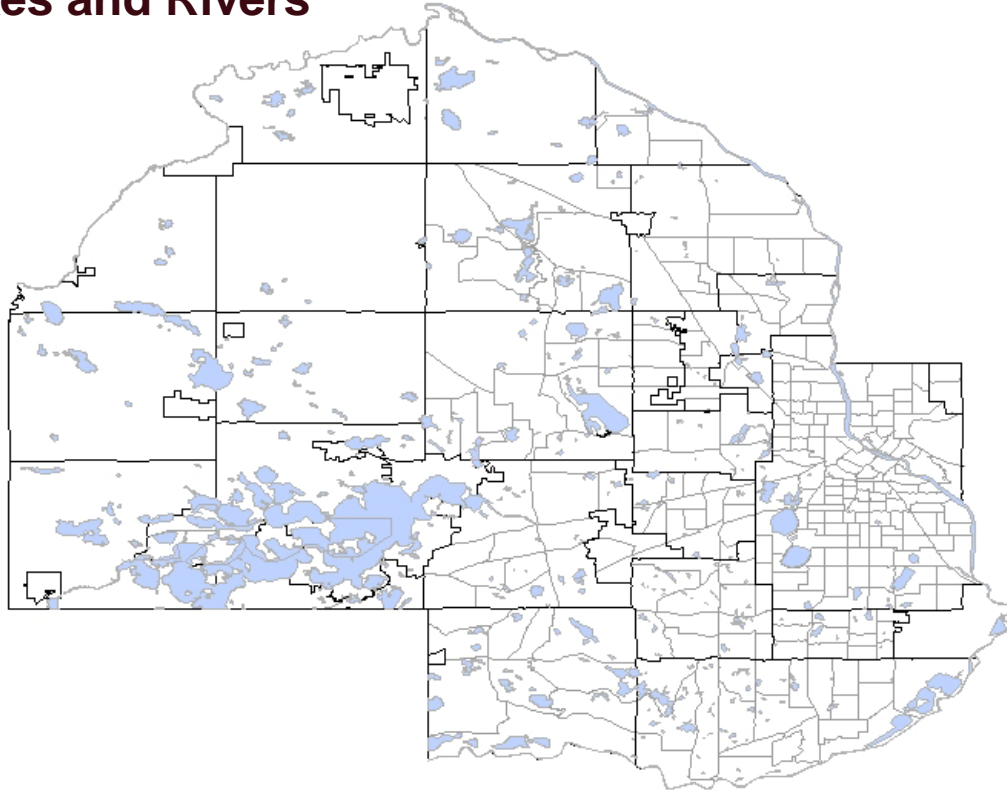
“Layers” of GIS Information

Census Tracts

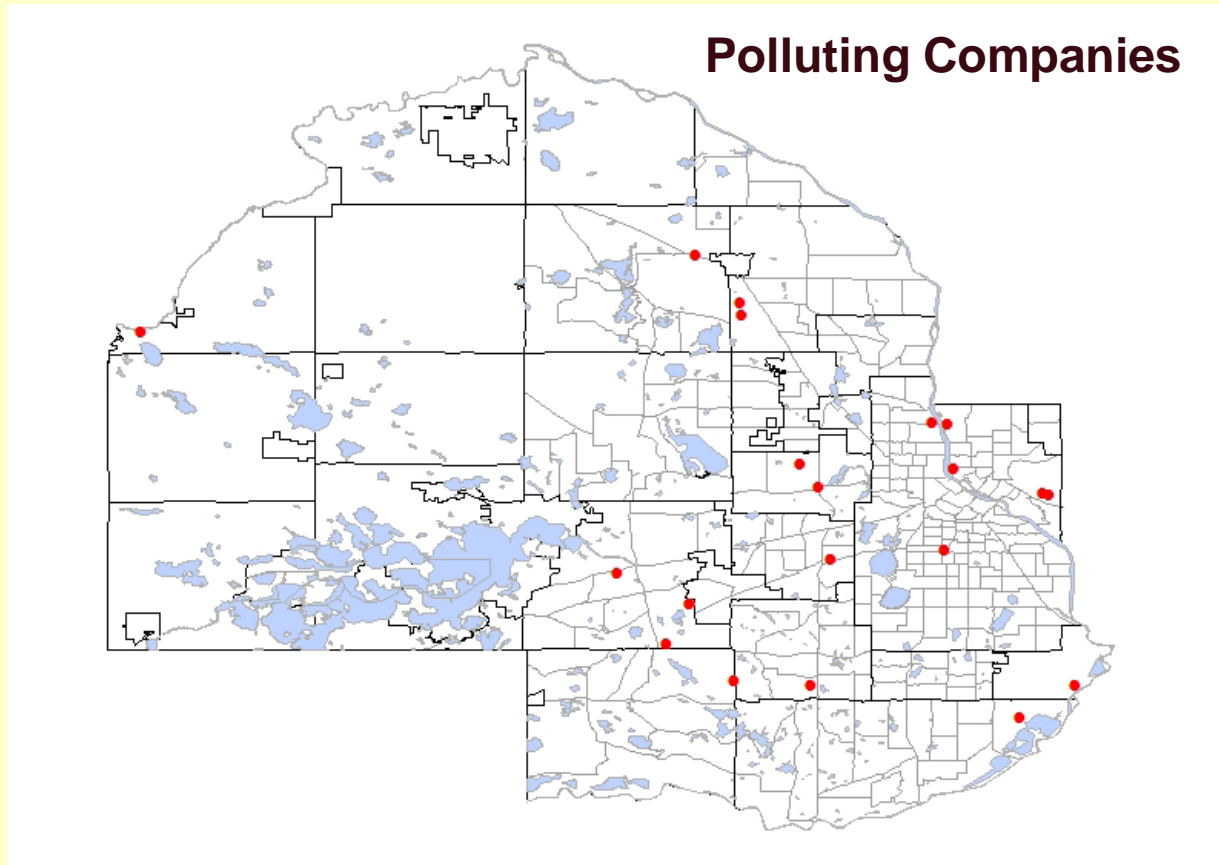


“Layers” of GIS Information

Lakes and Rivers

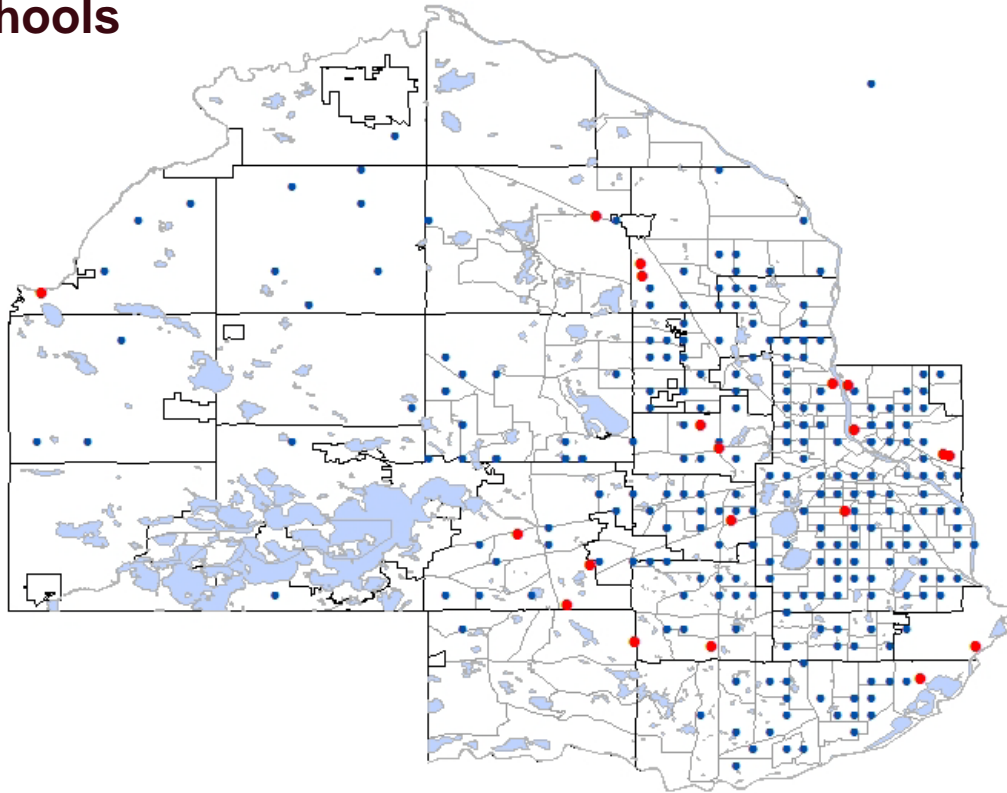


“Layers” of GIS Information

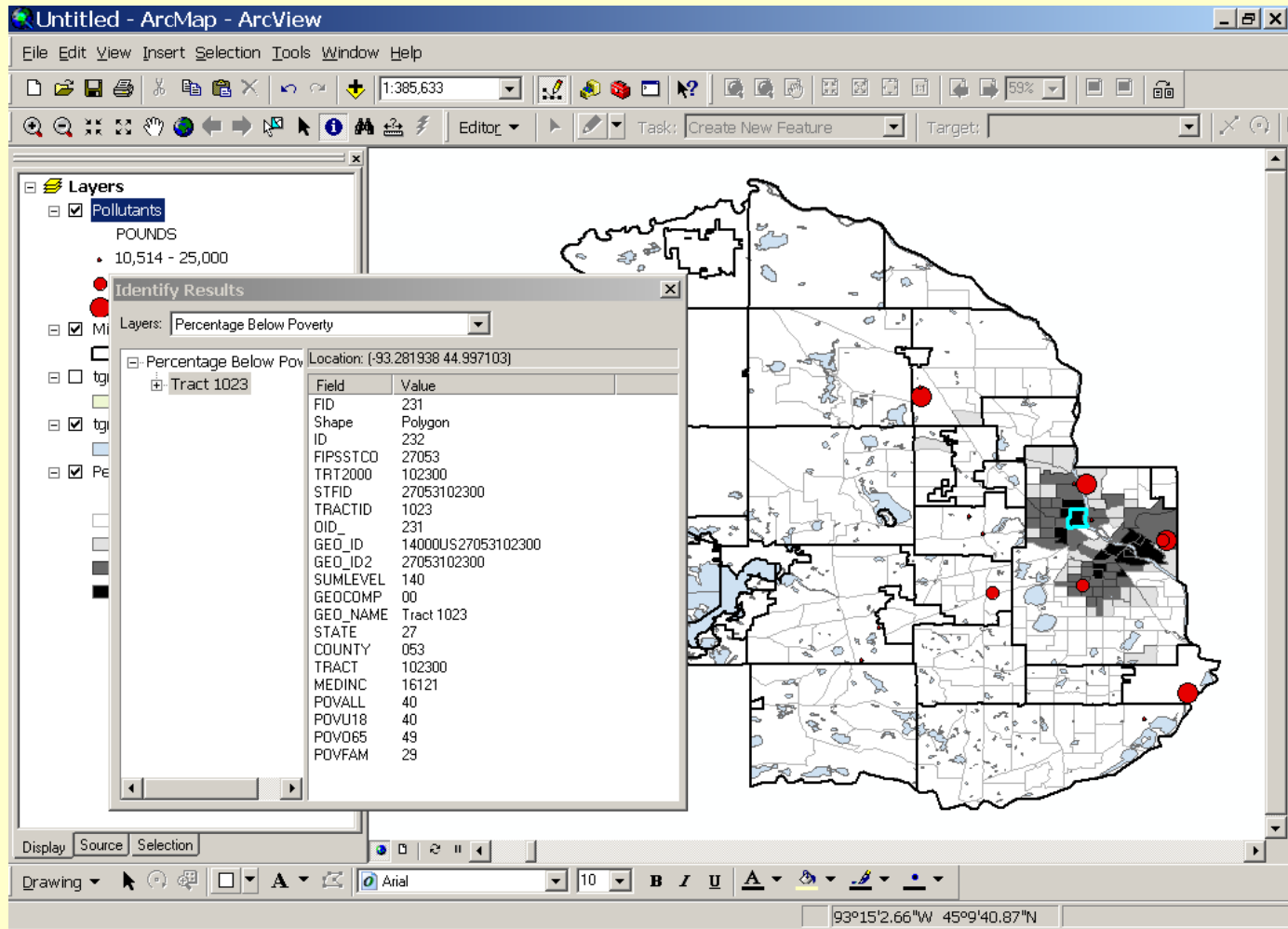


“Layers” of GIS Information

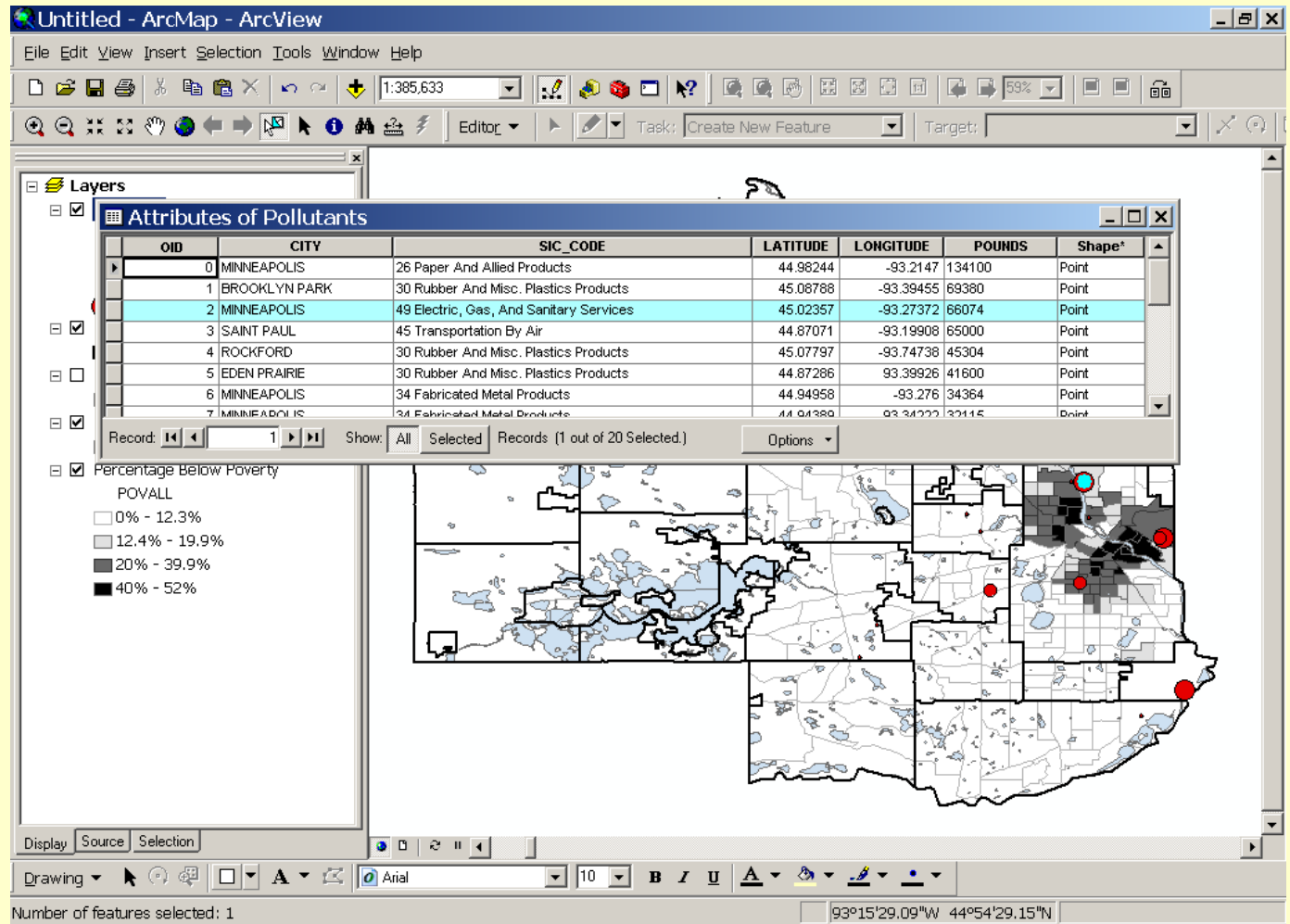
Schools



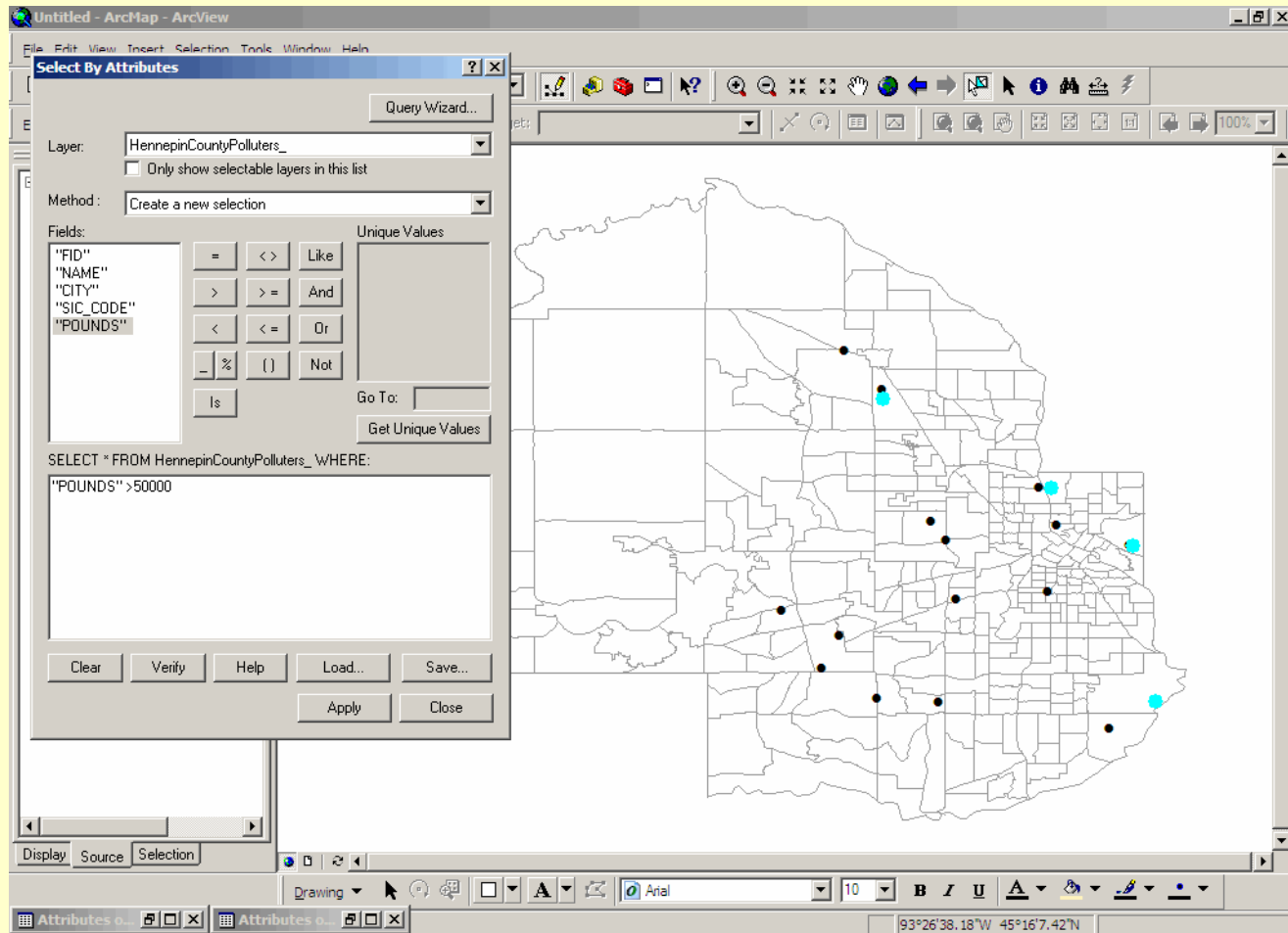
Maps and Databases are Interactive



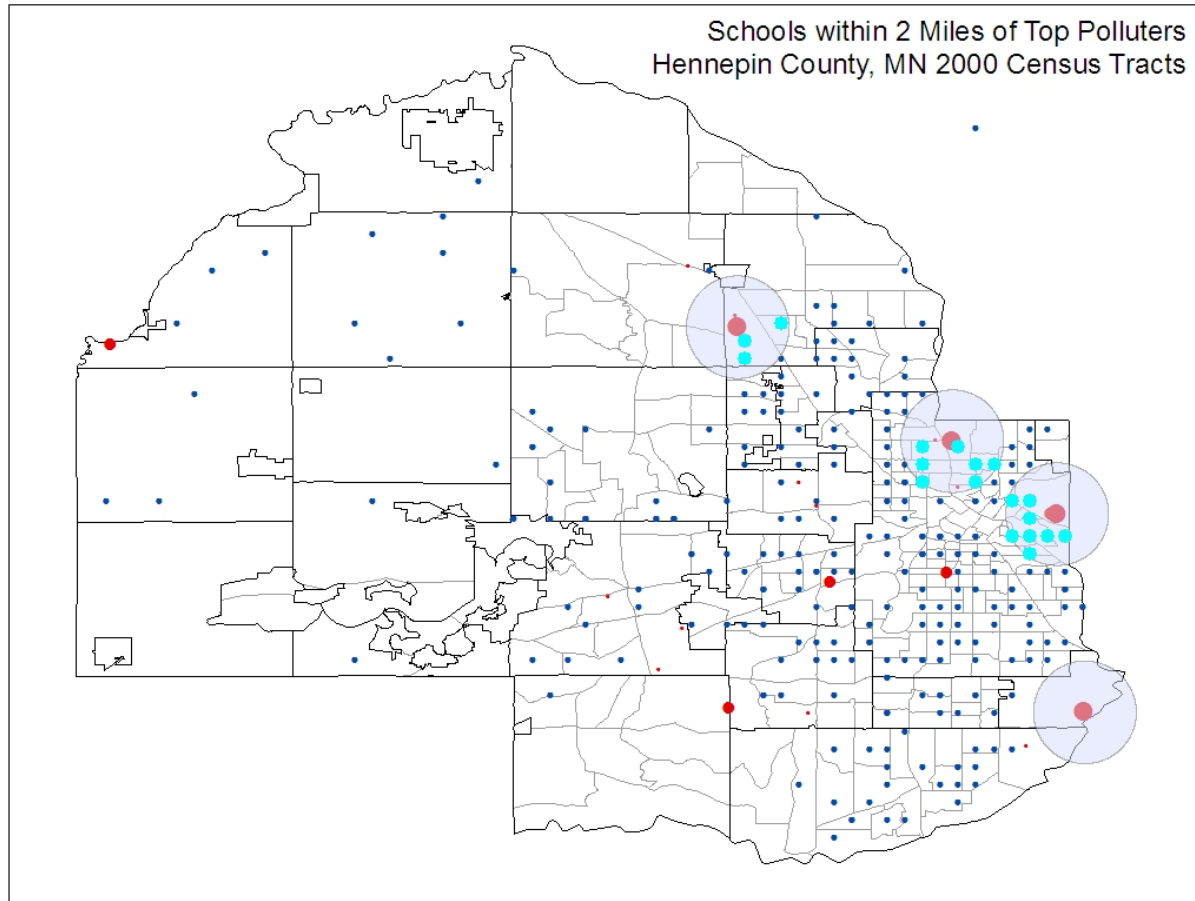
GIS Connects Graphics to Data



Queries and Restrictions



GIS Turns Data Into Information



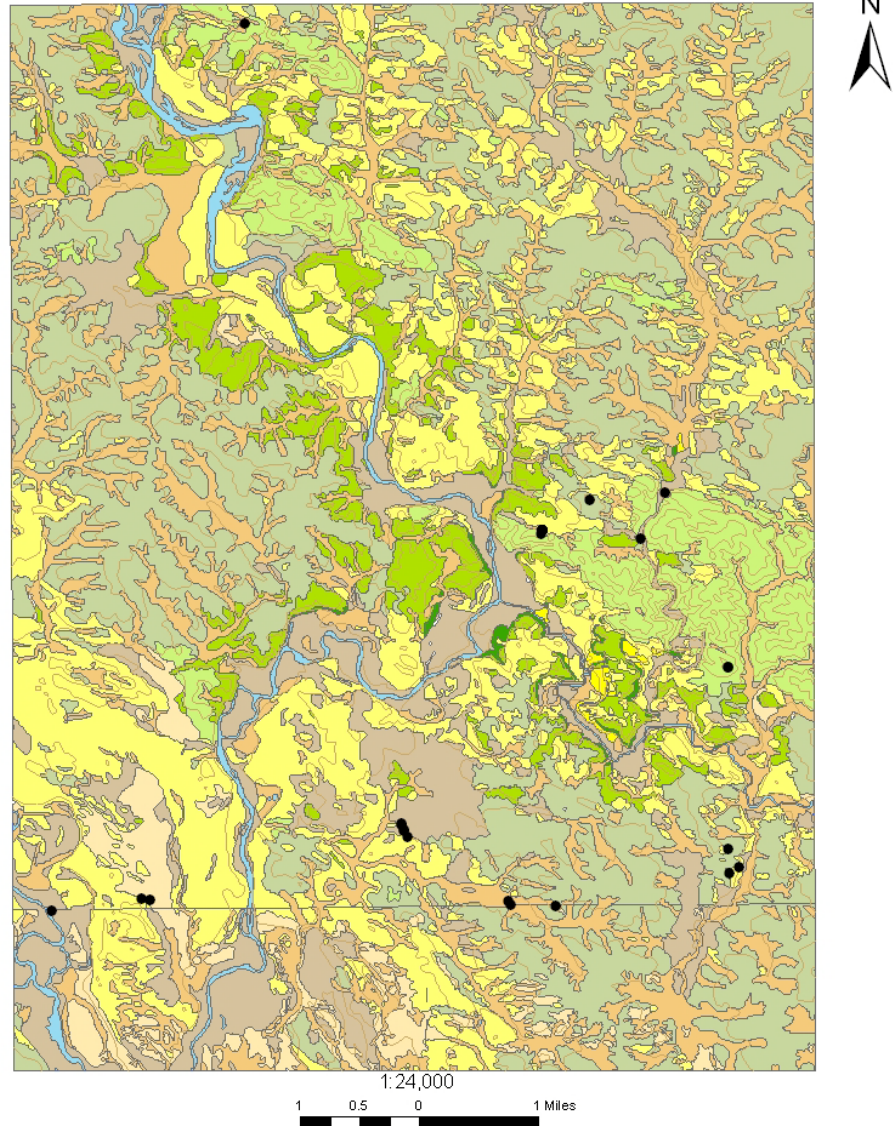
GIS Examples

GIS Applications

- **Business** *Site Location, Delivery Systems, Marketing*
- **Government** *Local, State, Federal, Military*
- **Economic Development** *Population Studies, Incomes, Census and Demographic Studies*
- **Emergency Services** *Fire & Police*
- **Environmental** *Monitoring & Modeling*
- **Industry** *Transportation, Communication, Mining, Pipelines, Healthcare*
- **Public Health** *Epidemiology Studies*
- **Urban Planning** *Land Use, Historic studies, Environmental and Conservation Studies, Housing Studies, Crime Analysis*
- **Politics** *Elections and Reappointment*
- **Education** *Research, Teaching Tool, Administration*

GIS Examples

Surficial Geology of the Waverly Quadrangle



[Switch to Route Reports](#)

Select Map Go

Future Info:

There are closures or blockages on US 18, US 65

Survey

Your feedback is needed for a short anonymous opinion poll

[Click Here](#)

Current Reports

- ☒ Closures/Blockages
- ☒ Danger
- ☒ Restriction
- ☒ Crash
- ☒ Traffic Problem
- ☒ Weather
- ☒ Warning
- ☒ Lane Closure
- ☒ Roadwork
- ☐ Info

Road Conditions

- ☒ Normal/Seasonal
- ☒ Partially Covered
- ☒ Completely Covered
- ☒ Travel Not Advised
- ☒ Impassable or Closed
- ☐ No Report Available

Traffic Speeds

- ☐ Iowa DOT Slow Fast
- ☐ Google Slow Fast

Future Reports

- ☒ Coming Soon

More Info

- ☐ Cameras

TripGuide

[Des Moines](#)
[Quad Cities](#)
[Iowa City](#)

Other Info

- ☐ Other States' Info

