

Implementing the Irrigation Reporting Portion of the Illinois Water Use Act

**Steve Wilson & Karen Bridges
Groundwater Science Section
Illinois State Water Survey**



Water Use Reporting in Illinois

- Illinois Water Inventory Program has been around since the late 70's
- Until 2010, was a voluntary program for public water supplies and industrial/commercial high capacity water users ran by the ISWS
- Irrigation has always been estimated using a very basic estimation method (inaccurate)



Water Use Act Amended In 2010

- Any person or land occupier that is responsible for a point of withdrawal classified as a high capacity well, high-capacity intake, or public water supply shall participate in the IWIP
- Agricultural irrigation is exempt until 2015, and can use ISWS approved estimation methods



What This Means

- IWIP is now a state mandated program, no longer voluntary for anyone pumping 70 gpm or more
- PWS, Industrial, Commercial withdrawals are already reporting
- Any well, series of wells, or intakes that together withdraw 100,000 gallons a day, so 5 wells pumping 15gpm constitute a high capacity user.



What This Means (cont)

- Starting at the end of 2015, the ISWS will be asking those with ag irrigation how much water they pumped from each well and intake.
- We are working to make the process as simple as possible and to provide simple online tools for reporting an estimate of water use



The Point Of IWIP

- Allow for accurate determination of water withdrawals from every water source (GW & SW)
- Characterize use by use, source, and location
- Provide the data scientists and planners need to evaluate withdrawals by aquifer, location, and proximity to other sources of withdrawal
- Provide historical data that can help predict how future changes in water use will impact water resources and the sustainability of an area

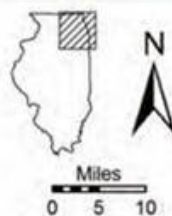
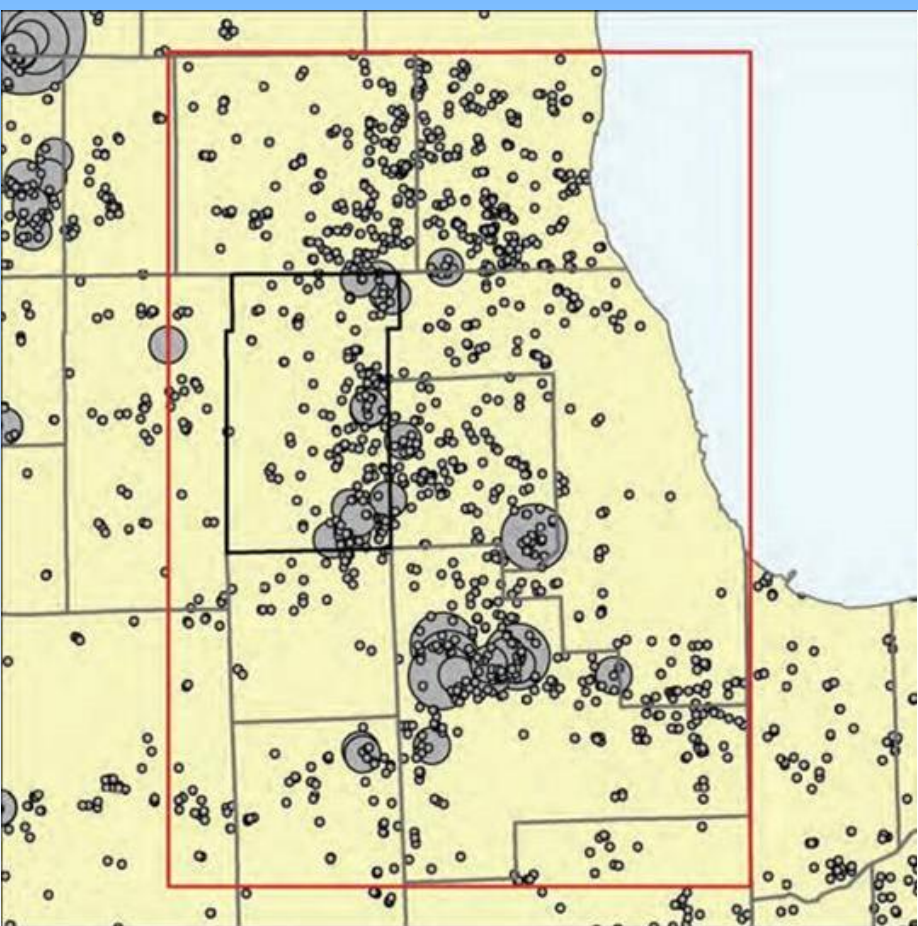
&



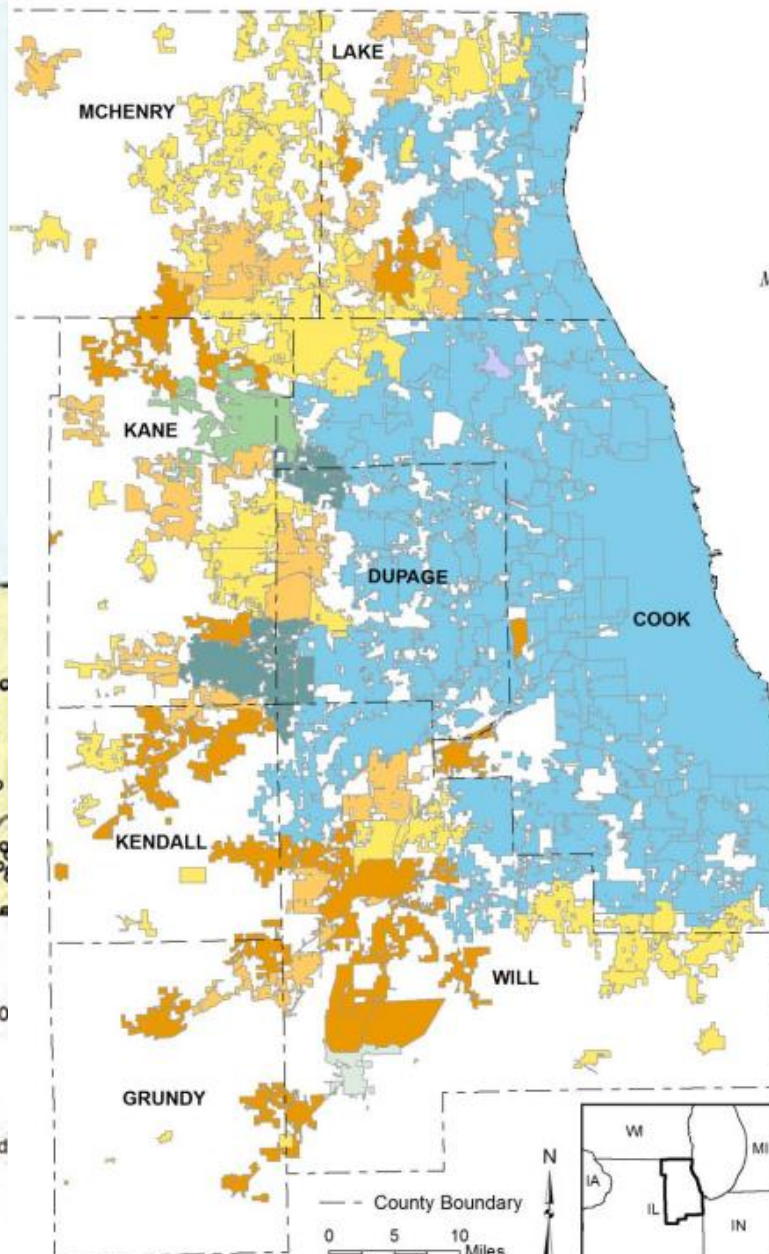
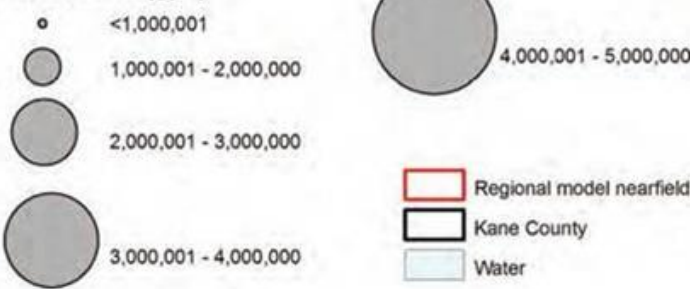
Why Does Water Use Matter?

- There are areas in Illinois where increasing water use is going to or already is causing conflict.
 - Chicago
 - Champaign County
- Planning and knowledge – its better to make informed decisions based on facts, rather than politics or because of a lawsuit.
- There are “Haves” and “Have Nots” in Illinois when it comes to water resources
- Ethanol plants, irrigation, Lake Michigan





Withdrawals (gpd)



Groundwater (GW)

- Sandstone
- Sandstone (Partial)
- Shallow Bedrock/Glacial

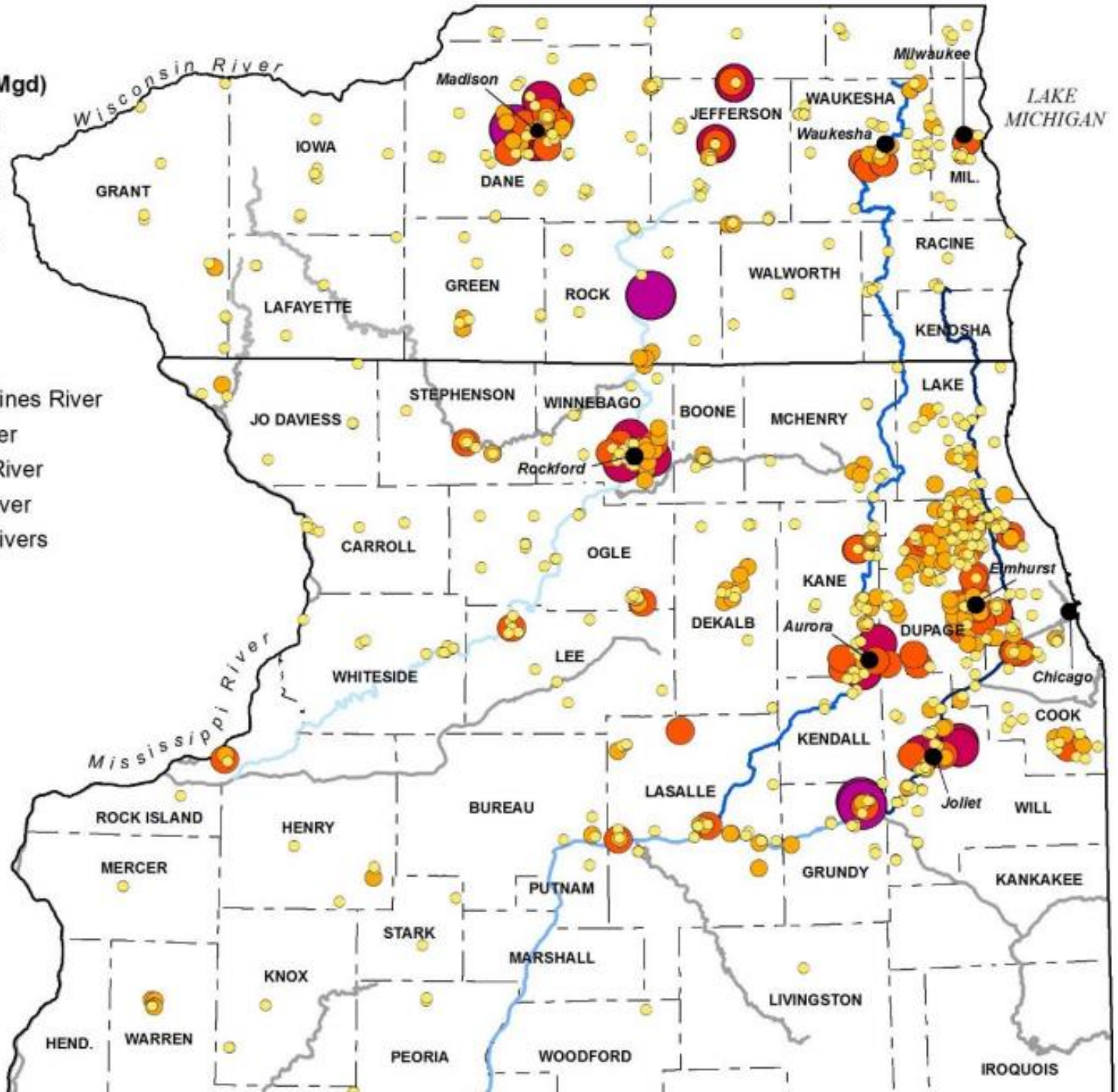
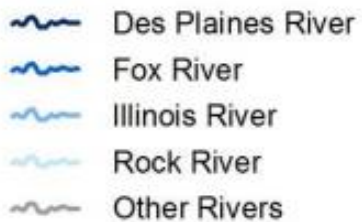
Surface Water

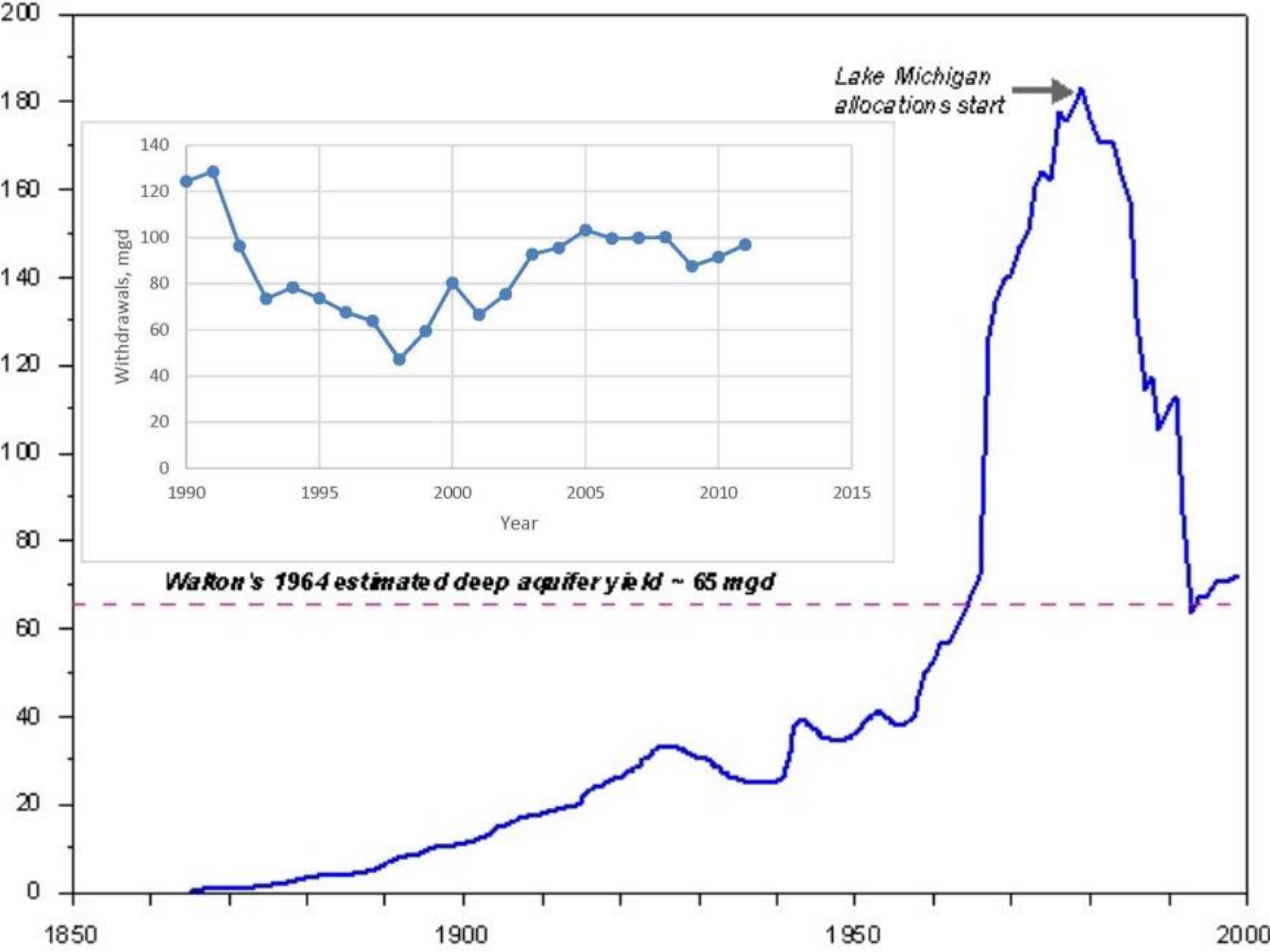
- Lake Michigan
- Fox River
- Kankakee River

Mixed Sources

- Fox River/GW
- Lake Michigan/GW

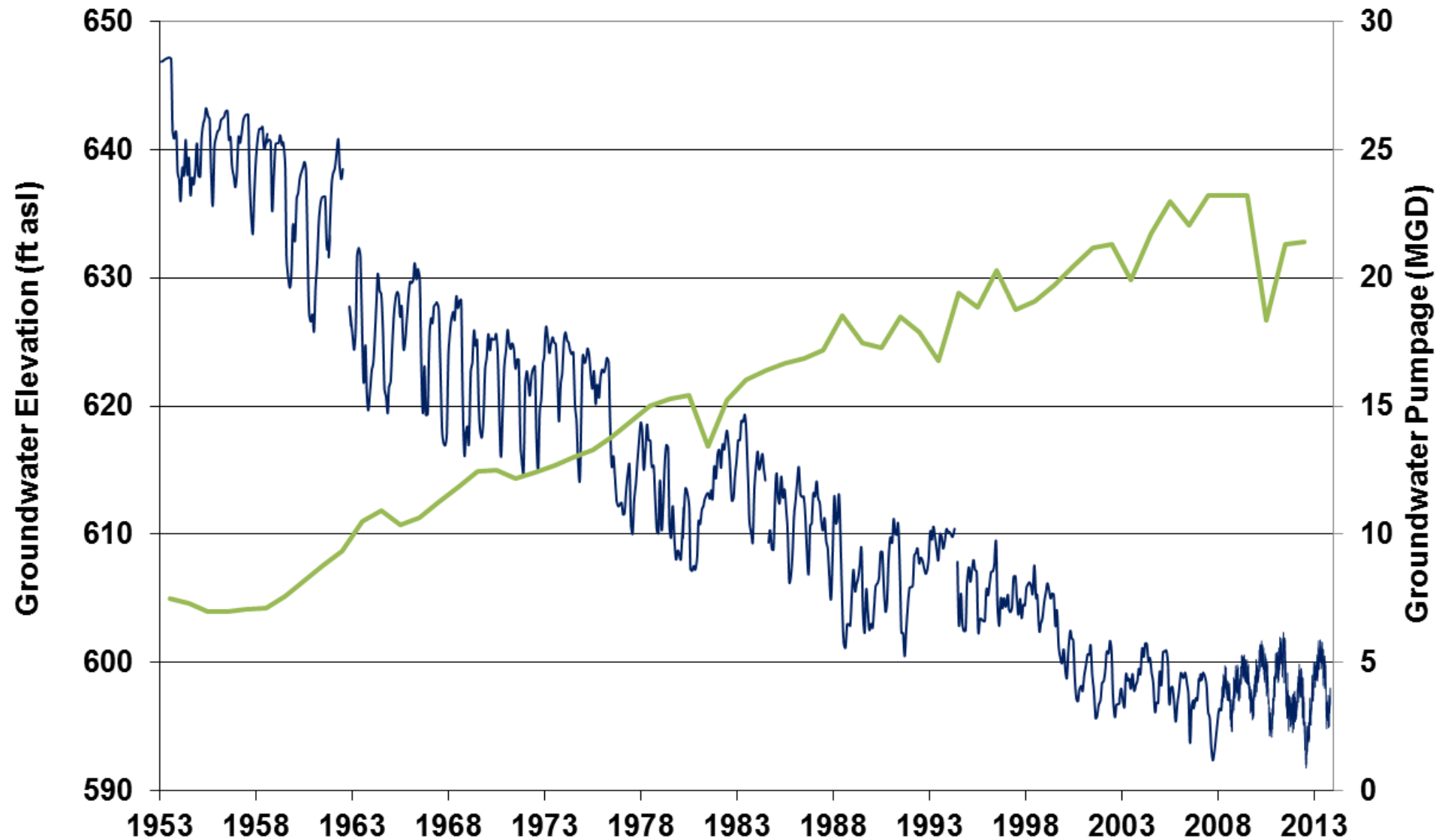
Withdrawals (Mgd)





Water Use & Water Levels

Groundwater Elevation at Petro North (1953-Present)

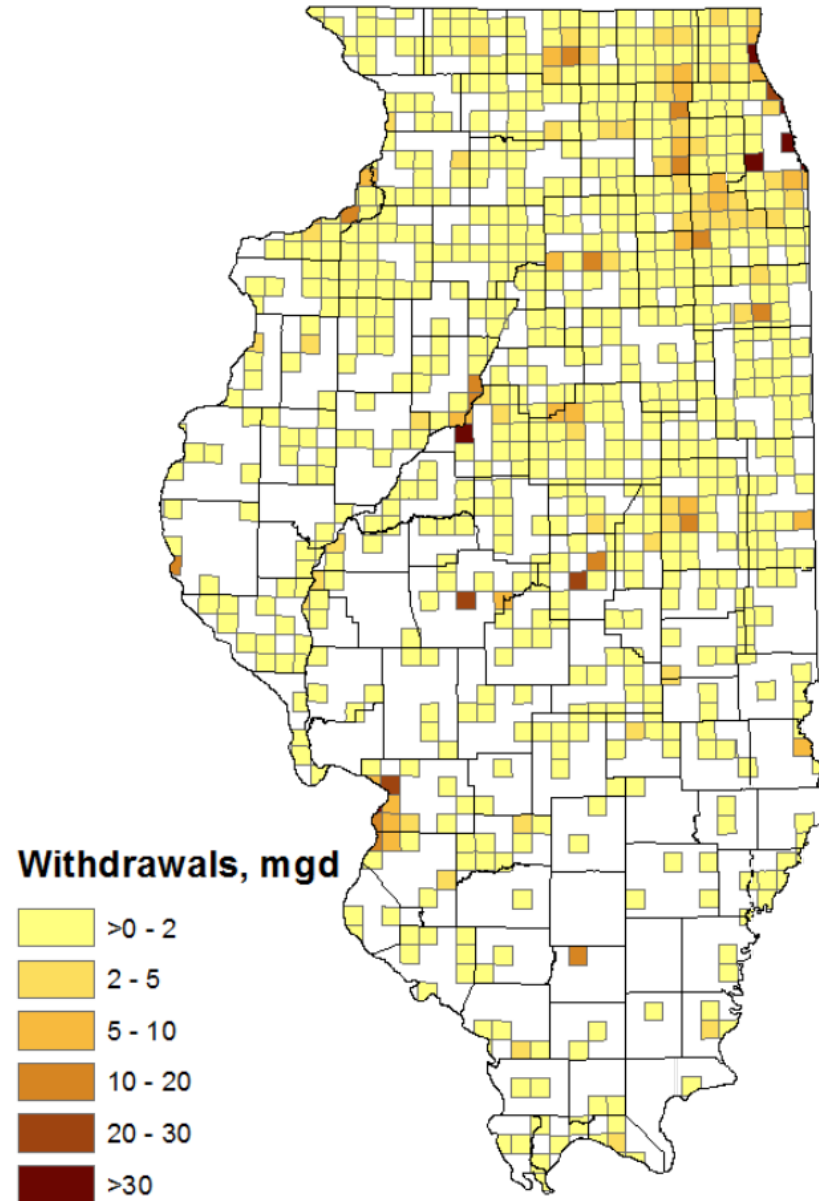
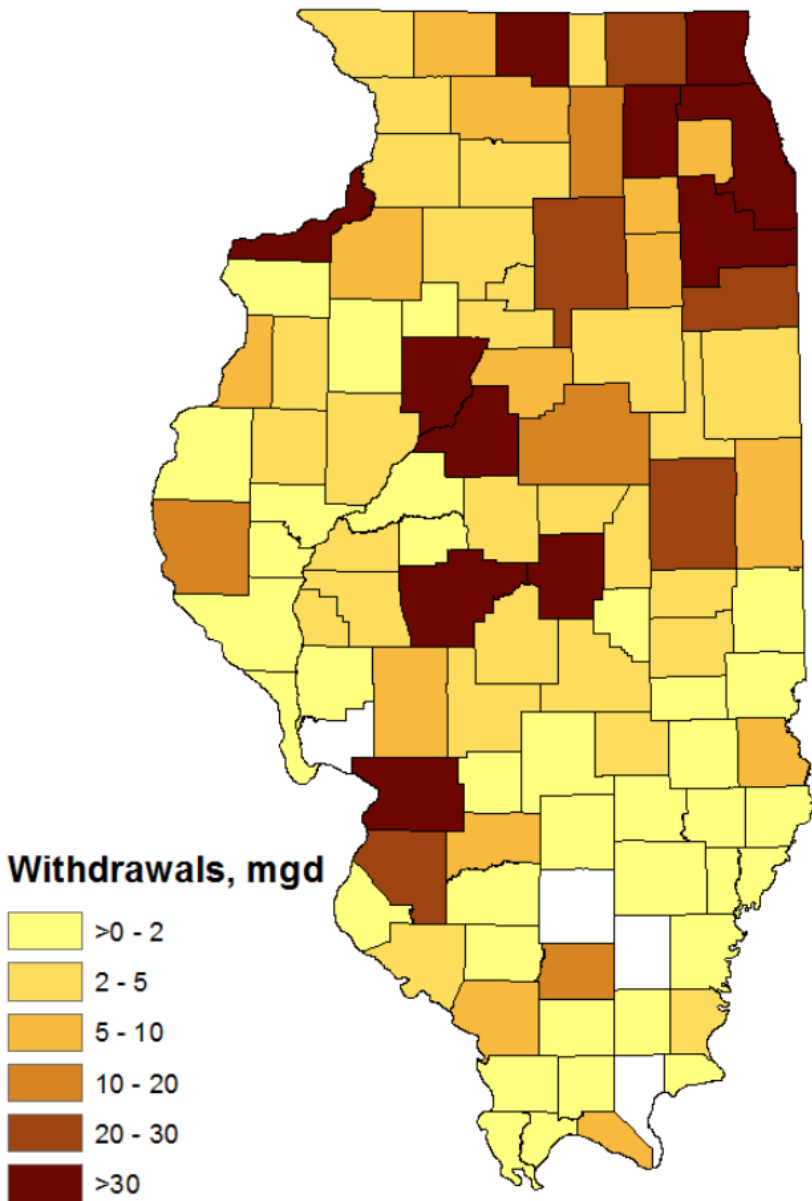


Irrigation Effects on Water Resources

- Large capacity wells, many over 1MGD
- Major withdrawals during droughts
- Lower groundwater levels
- Reduce discharge to streams
- Peak irrigation demand normally during relatively dry months and times of high evapotranspiration

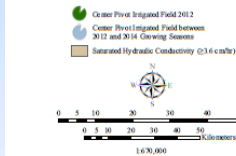


2011 IWIP Data



Center Pivot Irrigation in Illinois 2012 and 2014

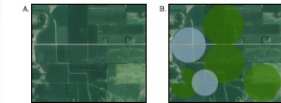
Illinois State Water Survey



This map displays center pivot irrigation systems in place in Illinois during the 2012 and 2014 growing seasons. There was significant increase in land put under irrigation during 2013 and 2014, likely due to the drought in 2012. The sustained hydraulic conductivity layer represents soils with a value of 2.0 micrometers per second (6.6 centimeters per hour) in the upper 30 inches of soil, a value typical of the glacial till that covers much of the state. The map also shows the location of the center pivot systems that are newly installed, and the value of the hydraulic conductivity in the soil. The center pivot systems are installed in areas where the soil is sandy and where shallow aquifers are available to maintain high capacity wells. In recent years, seed corn contracts that require a groundwater cap, as well as the positive return on investment for crops under irrigation, have prompted the use of center pivot irrigation to areas that have not been irrigated previously. The center pivot systems are also being installed in areas where the soil is sandy and where shallow aquifers are available to maintain high capacity wells. In recent years, seed corn contracts that require a groundwater cap, as well as the positive return on investment for crops under irrigation, have prompted the use of center pivot irrigation to areas that have not been irrigated previously. The center pivot systems are also being installed in areas where the soil is sandy and where shallow aquifers are available to maintain high capacity wells. In recent years, seed corn contracts that require a groundwater cap, as well as the positive return on investment for crops under irrigation, have prompted the use of center pivot irrigation to areas that have not been irrigated previously.

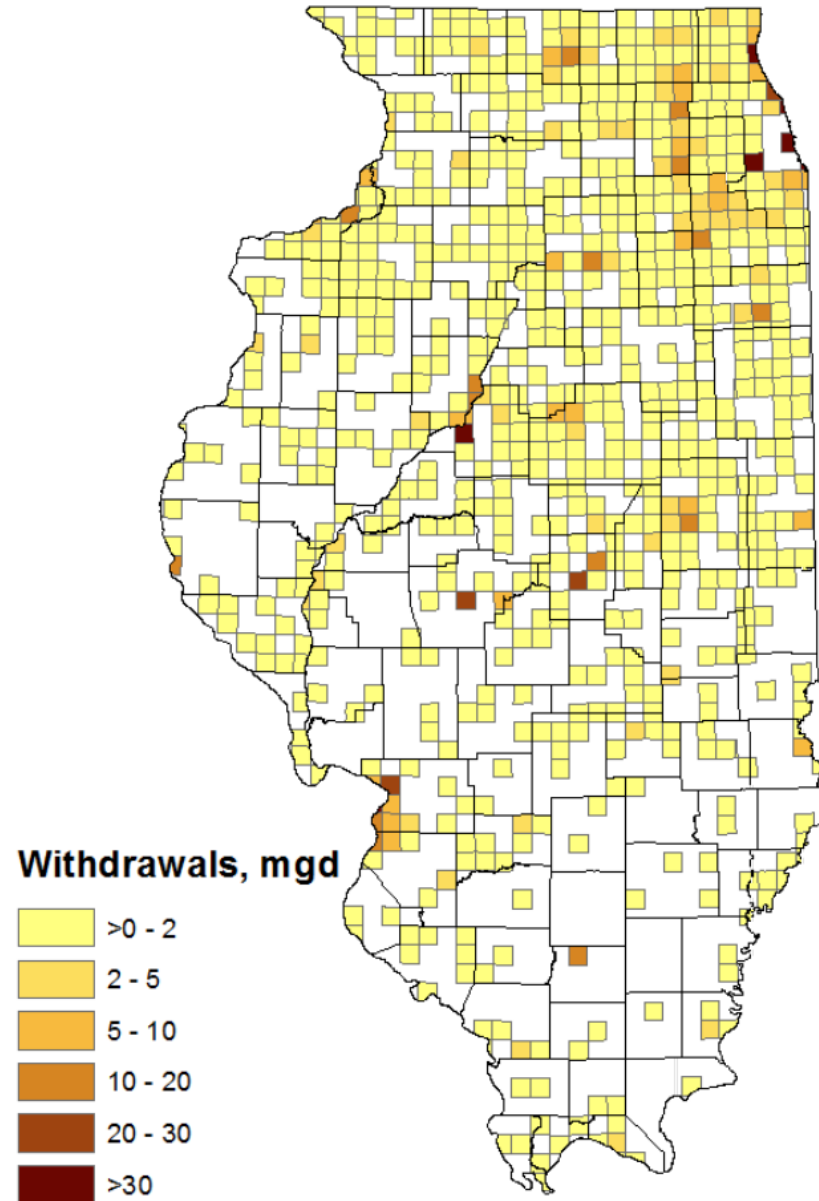
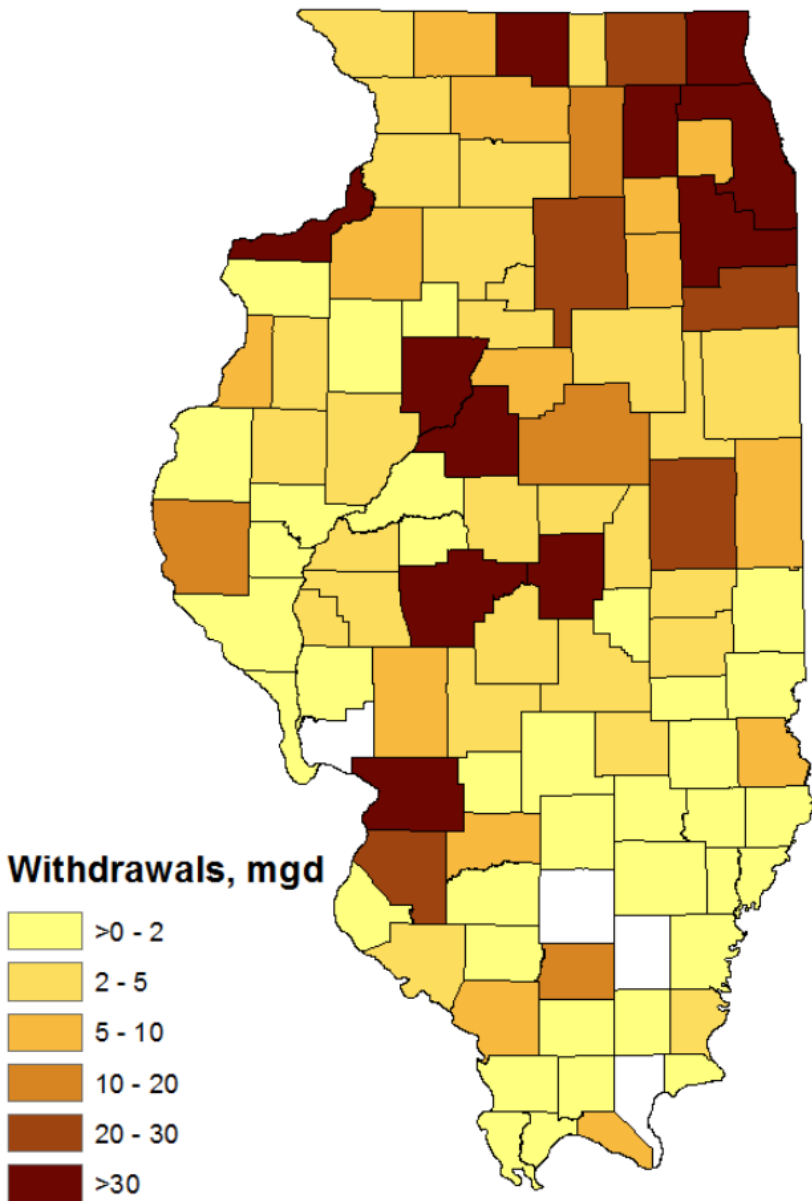
A. Center pivot irrigation imprints identifiable circular patterns on the landscape which can be visible in aerial images. The USDA Aerial Photo Access and Interpretation Program (Aerial Photo Access and Interpretation Program) makes them available through the USDA Aerial Photo Access and Interpretation Program. Images collected by the USDA Aerial Photo Access and Interpretation Program during the 2012 and 2013 growing seasons were used to develop this map. In reviewing the USDA Aerial Photo Access and Interpretation Program data, a QA/QC check indicated a few pivots were omitted from the 2012 map. This revision includes these additional pivots identified from USDA images collected during the 2014 growing season.

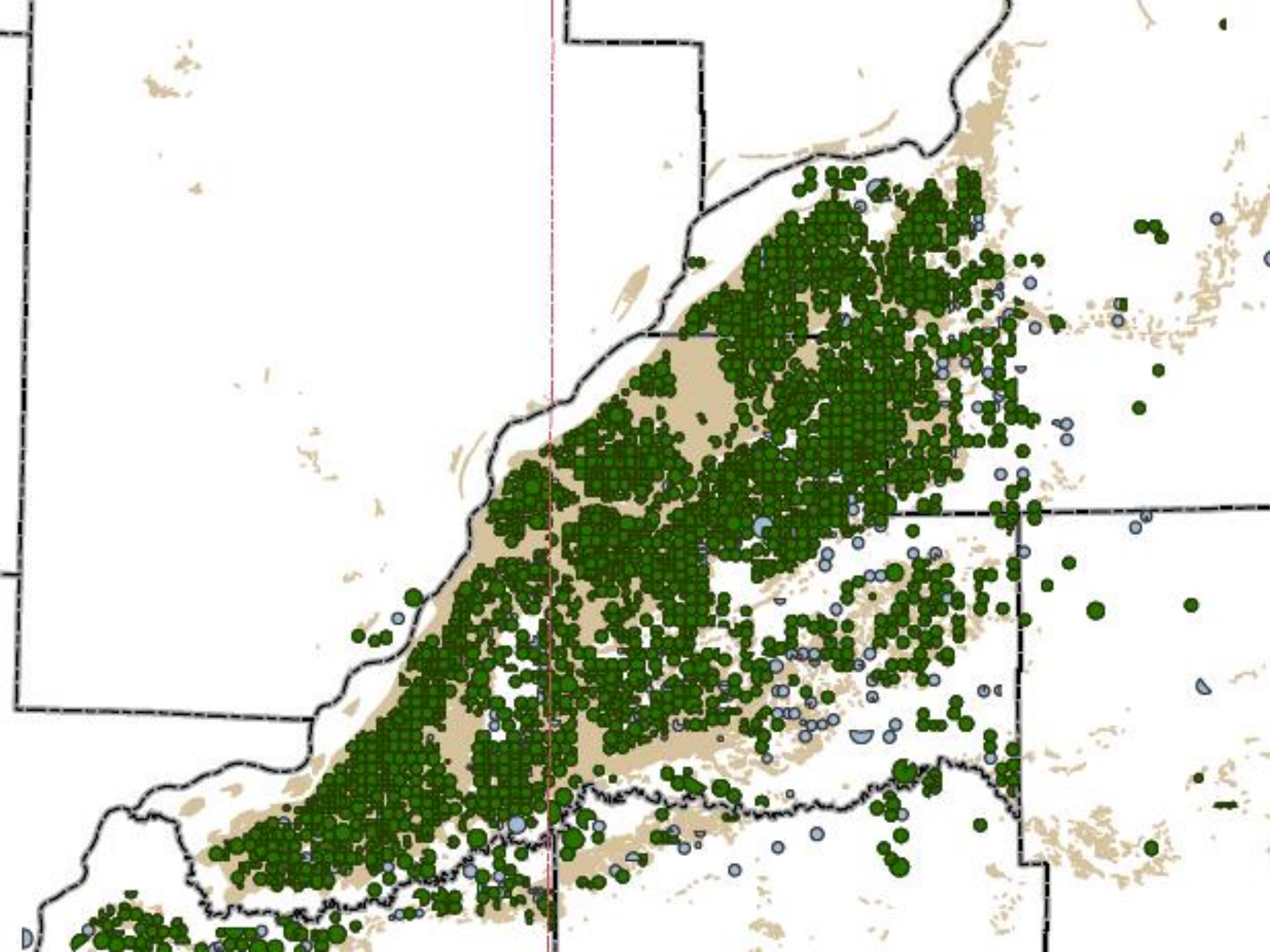
B. The NAIP images were examined for the irrigation patterns, and field boundaries were traced to create an ArcGIS map layer. A total of 582,928 center pivot irrigation systems were identified in Illinois and 1,000,000 furrow or wheel line irrigation systems were identified in 353,000 acres of farmland. An additional 8,260 pivots were in use during the 2014 growing season, bringing the statewide total to 6,656 center pivot systems irrigating approximately 625,000 acres of farmland in 2014. This map does not include all forms of irrigation employed in Illinois. Alternative irrigation methods include subsurface, low-volume, solid-set, and travelling gun. These types of irrigation systems may cover a significant number of irrigated acres not reflected in this map.



Karen Bridges, Steve Wilson, and Rebecca Penny
Co-authors: Science Section, Illinois State Water Survey
Funding was provided to us by the Illinois Department of Natural Resources. The technical content of the paper is the responsibility of the authors. The user assumes all liability for the interpretation and use of the map. Map compiled by Karen Bridges. Projection: Lambert Conformal Conic.
Sources:
National Agricultural Imagery Program (NAIP) and Soil Survey Geographic Database (SSURGO 2012) from the USDA Geographic Program, <http://nwigwmapwww.usda.gov>
Clark et al., 2014, A 20-Cent Fire Ignition in Illinois, ISWS Map Series 2014-03.
www.illinois.edu, 217-3134600
University of Illinois, www.illinois.edu

2011 IWIP Data







TAZEWELL

MASON

LOGAN

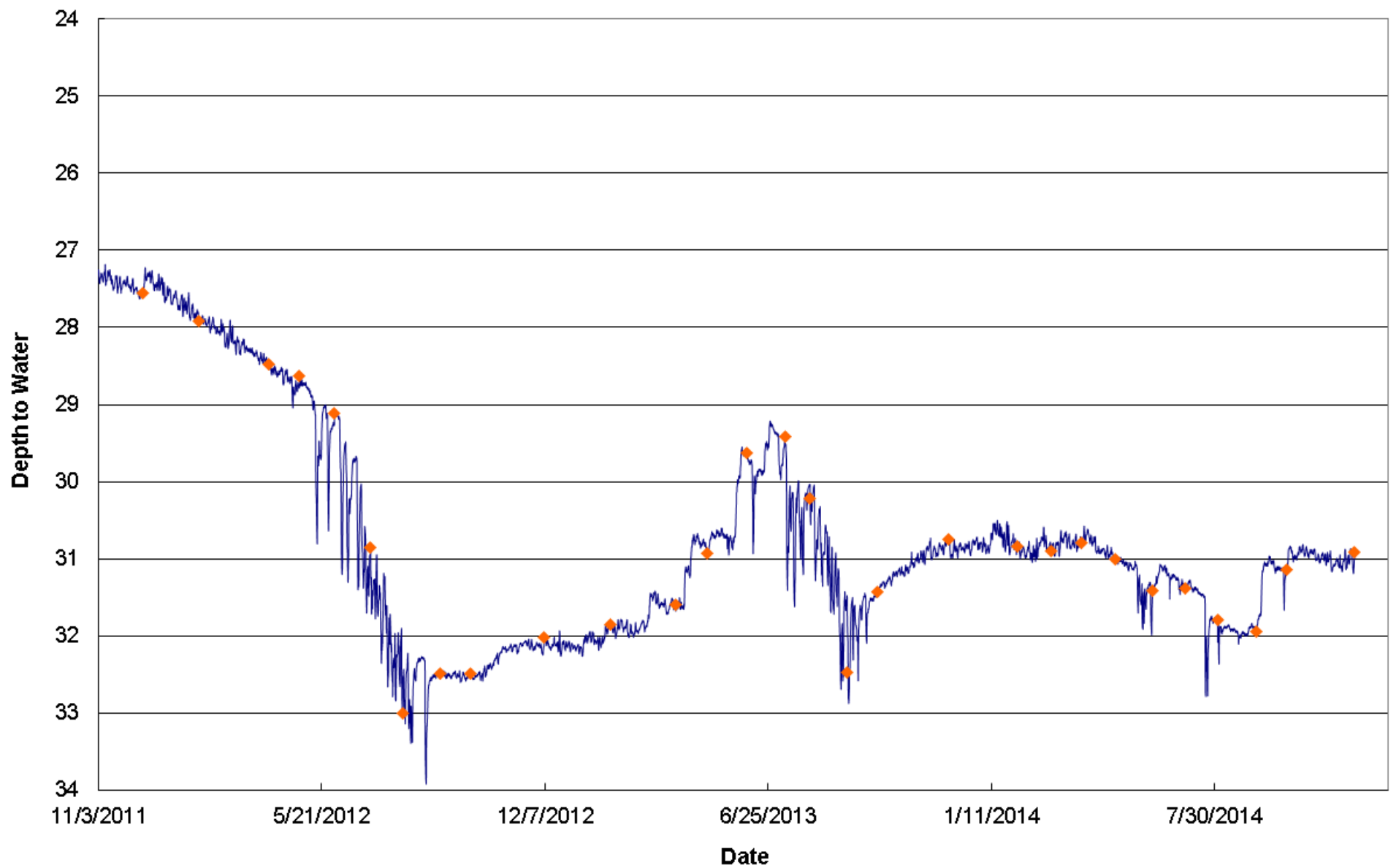
MTOW-10

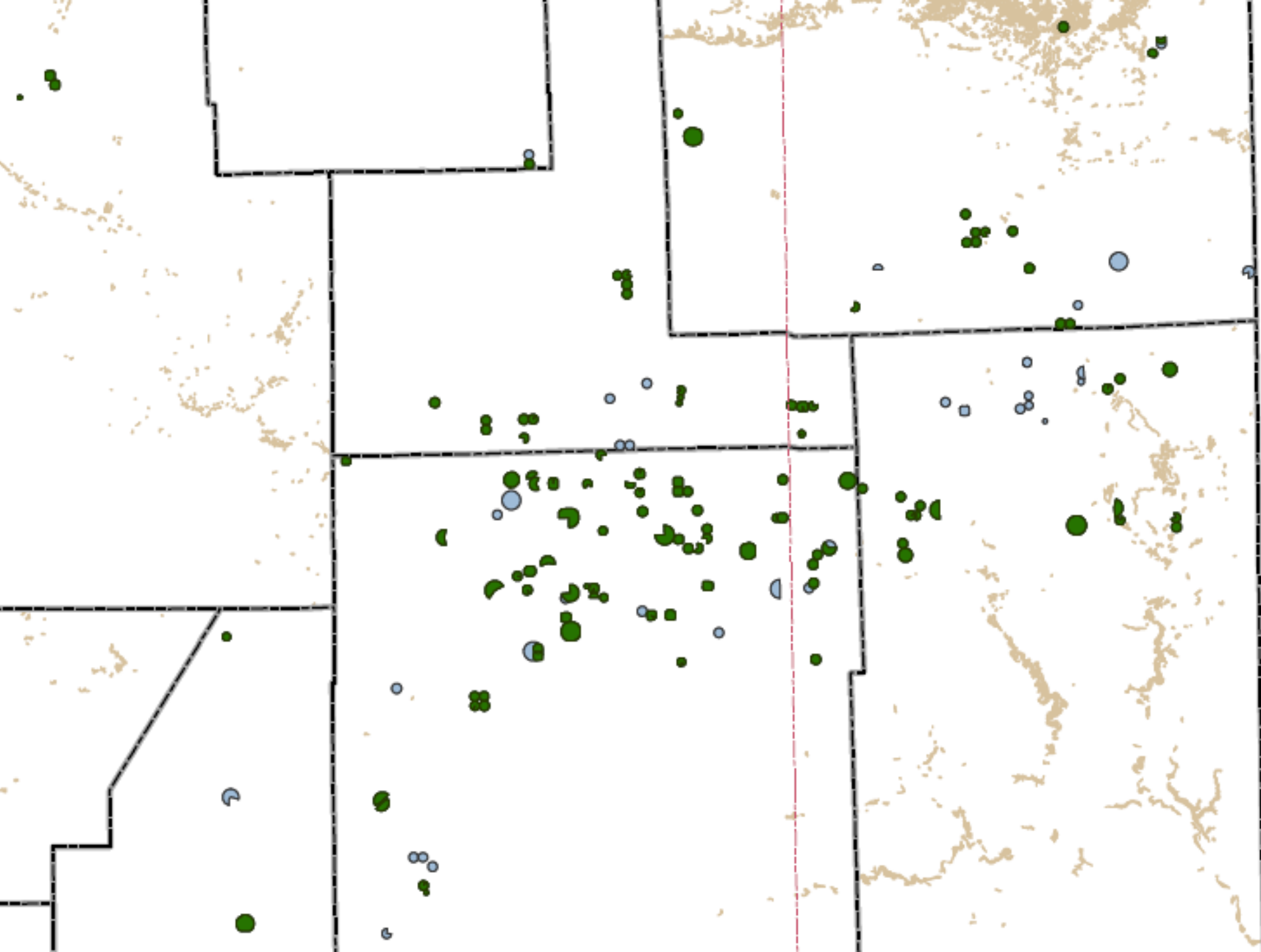
R-12

San Jose

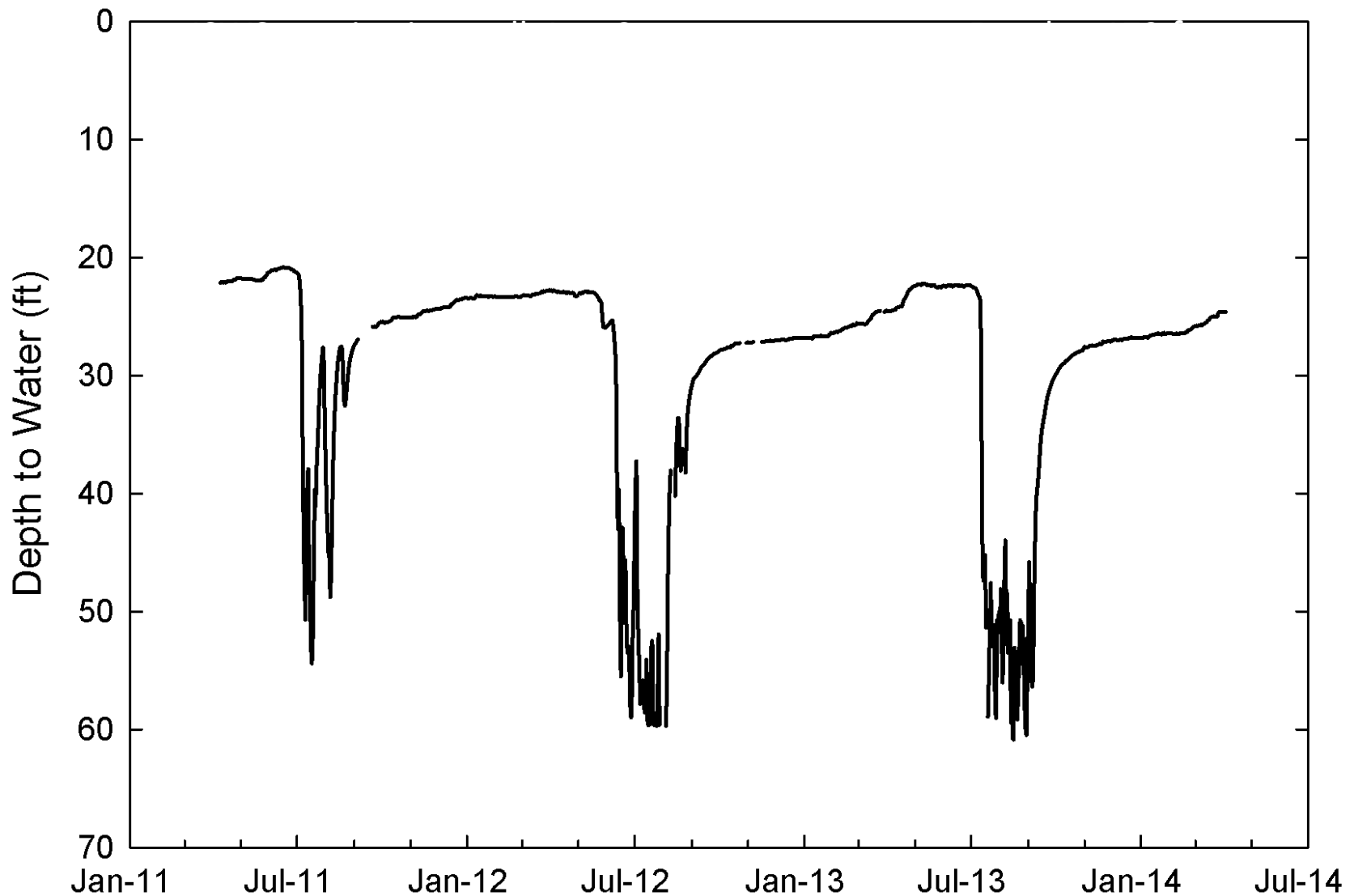
0 250 500 1,000 Feet

Depth to Water at San Jose (MTOW-10)





Effects of Irrigation Pumping on Groundwater Levels in Champaign Co.



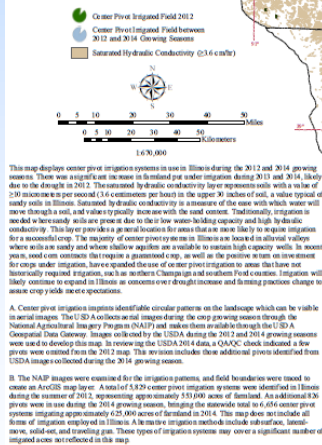
Irrigation Challenge

- There are virtually no flow meters on systems
- Many irrigators don't know about the law
- Our knowledge of irrigation use and even irrigated acres is weak
- So we are working to change all of this



Center Pivot Irrigation in Illinois
2012 and 2014

Illinois State Water Survey



Kewanee Bridges, Steve Wilson, and Rebecca Perry
Groundwater Science Section, Illinois State Water Survey
Funding was provided in part by Illinois Department of Natural Resources. The technical content of the map is the responsibility of the authors. The authors assume all liability for the interpretation and use of the map. Map compiled by Karen Bridges. Projection: Lambert Conformal Conic.
Source:
National Agricultural Inventory Program (NAIP) and Soil Survey Geographic Database (SSURGO 2.2) from the USDA, Geospatial Inventory. <http://hdhogearty.usda.gov>
Bridges, et al., 2014. 2012 Center Pivot Irrigation in Illinois. ISWS Map Series 2014-03.
www.isws.illinois.edu, 212-533-6400
University of Illinois, www.illinois.edu

Irrigation Estimation

- You don't have to have a meter, can estimate water use using ISWS approved method:
Inches applied x acres
hours ran x gpm
- Identifying wells and intakes:
Setting up "facilities"
Need better well information
- A handbook, examples, and worksheets you can use during the year to make things easier is now available

<http://www.sws.uiuc.edu/gws/iwip/irrigation/>





ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

[About ISWS](#)[Research](#)[Data](#)[Publications](#)[Library](#)[News](#)[Staff](#)

Illinois Water Inventory Program

Irrigation Reporting Information

In 2010, the Illinois Water Use Act was amended to make reporting for all high capacity wells or intakes mandatory in Illinois, including agricultural irrigation. Ag irrigation was given five years to comply, which means that starting with 2015, irrigators are required to report their water use from both wells and surface water intakes. A high capacity well/intake is defined as a single point of withdrawal or a series of points that together pump more than 70 gallons per minute.

[The Illinois Water Use Act of 1983](#) states that irrigators can provide an actual number of gallons pumped, if using a flow meter, or estimate their water withdrawals using a method approved by the ISWS. The ISWS has identified two estimation methods that are both simple to use and don't require a lot of effort by irrigators:

1. The *acre-inches method* – Number of inches applied x acres x 27150 gallons per acre-inch
2. The *hours-flowrate method* – Number of hours ran x rated gallons per minute of system x 60min/hr

The irrigation handbook available on this webpage includes forms and provides guidance on what an irrigator needs to do now and during the year for recordkeeping, calculating, and reporting irrigation water use for the 2015 growing season. All of the forms are also downloadable below as fillable PDF's, which can be filled out electronically and then printed once filled in. Online reporting will be available by October 2015, which will allow you to report through a dedicated web application, instead of printing and mailing in a paper form. If you prefer, paper forms can be downloaded from this website, printed, filled out with pen, and mailed in. We will also encourage local extension and farm bureau offices to keep copies of the handbook and forms on hand.

Locations of each withdrawal point are a critical part of the data collected by the ISWS. Irrigators are asked to provide an accurate location of each well and intake. A short video tutorial will soon be available on this website that will demonstrate an easy method of determining the coordinates of your well using Google Maps. There is also an example in the handbook. You can also call the ISWS for assistance, contact information is below. Once you have registered and receive a facility ID, the online system will automatically add your well information to the reporting form for you.



[Irrigation Handbook](#) (pdf ~6mb) – explains the program, provides forms and examples of how to fill them out. (Read this first)

These individual forms are also included in the handbook listed above:



Irrigation Handbook (pdf ~6mb) – explains the program, provides forms and examples of how to fill them out. (Read this first)

These individual forms are also included in the handbook listed above:

These forms include formulas for automatic calculations. Please save a copy to your computer, and fill out your saved copy. Filling out an unsaved form may affect the format of the document.

Registration Form (pdf ~80k) – a fillable form that can be printed and mailed in.

Reporting Form – (pdf ~65k) fillable form for reporting total gallons used from each well or intake, due at the end of each year.

Flowmeter Data Sheet – (pdf ~100k) form you can use to track gallons pumped during the irrigation season from a totalizing flow-meter that will calculate total gallons.

Acre-Inches Data Sheet (PDF) (pdf ~100k) – form that helps you track the number of inches applied to each field during the irrigation season that will calculate total gallons

Rated Gpms-Hours Data Sheet (pdf ~90k) – form that helps you track the total hours ran for an irrigation system during the irrigation season that calculates total gallons pumped, assuming you know the rated gallons per minute your system pumps.

Irrigation Handout (pdf ~260k) - one page explanation to pass out to irrigators that includes this website URL.

Questions?

Steve Wilson – ISWS, Groundwater Hydrologist, 217-333-0956, sdwilson@illinois.edu

Karen Bridges – ISWS, Field Tech/GIS Specialist, 217-300-4731, klbridge@illinois.edu

Conor Healy –ISWS, IWIP Program Coordinator, 217-244-9674, healy19@illinois.edu

[Illinois Water Inventory Program](#)

Irrigation Registration for the Illinois Water Inventory Program
Illinois State Water Survey

Operator/Irrigator Contact Information

<u>Irrigator</u>		<u>John</u>
Last Name	First Name	
<u>123 W. 200 N. Rd.</u>	<u>San Pedro</u>	<u>IL 69999</u>
Street Address	City	State, Zip Code
<u>(217) 999-9999</u>	<u>(217) 999-0000</u>	<u>Irrigator@gmail.com</u>
Home Phone	Cell Phone	Email

Land Owner Contact Information (leave blank if the same)

<u>Same</u>		
Last Name	First Name	
Street Address	City	State, Zip Code
Home Phone	Cell Phone	Email
Total Number of Wells and Intakes _____		

Well/Intake Information (please use additional sheets if necessary, every withdrawal point should be listed)

1st Well <input checked="" type="checkbox"/> or Intake <input type="checkbox"/>	2nd Well <input checked="" type="checkbox"/> or Intake <input type="checkbox"/>	3rd Well <input type="checkbox"/> or Intake <input checked="" type="checkbox"/>
ISWS Well ID (if known) <u>unknown</u>	ISWS Well ID (if known) <u>458123</u>	ISWS Well ID (if known) <u>unknown</u>
County/Fips Code <u>125</u>	County/Fips Code <u>Mason (125)</u>	County/Fips Code <u>Mason</u>
GPS Coordinates <u>40.314569</u> <u>-89.604670</u>	GPS Coordinates <u>40° 5' 16.6" N</u> <u>-88° 21' 21.4" W</u>	GPS Coordinates <u>40.310929</u> <u>-89.609814</u>
Or Legal Description	Or Legal Description	Or Legal Description
Township <u>Jonesboro</u>	Township <u>Jonesboro</u>	Township <u>Jonesboro</u>
Tier <u>T 7 N</u>	Tier <u>T 07 N</u>	Tier <u>T 7 N</u>
Range <u>R 3 W</u>	Range <u>R 03 W</u>	Range <u>R 3 W</u>
Section <u>12</u>	Section <u>12</u>	Section <u>12</u>
Original Well Owner <u>J. Irrigator</u>	Original Well Owner <u>J. Irrigator</u>	Original Well Owner <u>J. Irrigator (Father)</u>
Well Depth <u>160 ft</u>	Well Depth <u>175 ft</u>	Well Depth <u>N/A</u>
Well Driller <u>Massive Drilling</u>	Well Driller <u>Massive Drilling</u>	Well Driller <u>N/A</u>
Year Drilled <u>1985</u>	Year Drilled <u>unknown</u>	Year Drilled <u>N/A</u>

Working With Stakeholders

- Illinois Farm Bureau
 - Language for forms
 - Setting up meetings
 - Aggregate reporting
- Irrigation Dealers
 - Lee-Whiteside Counties
 - Kankakee-Iroquois Counties
- Water Authorities
 - Imperial Valley Water Authority
 - Russell-Alison Water Authority

I've given 12 presentations since October 2014
representing irrigators in 17 counties.



Where We Are – Slow Going

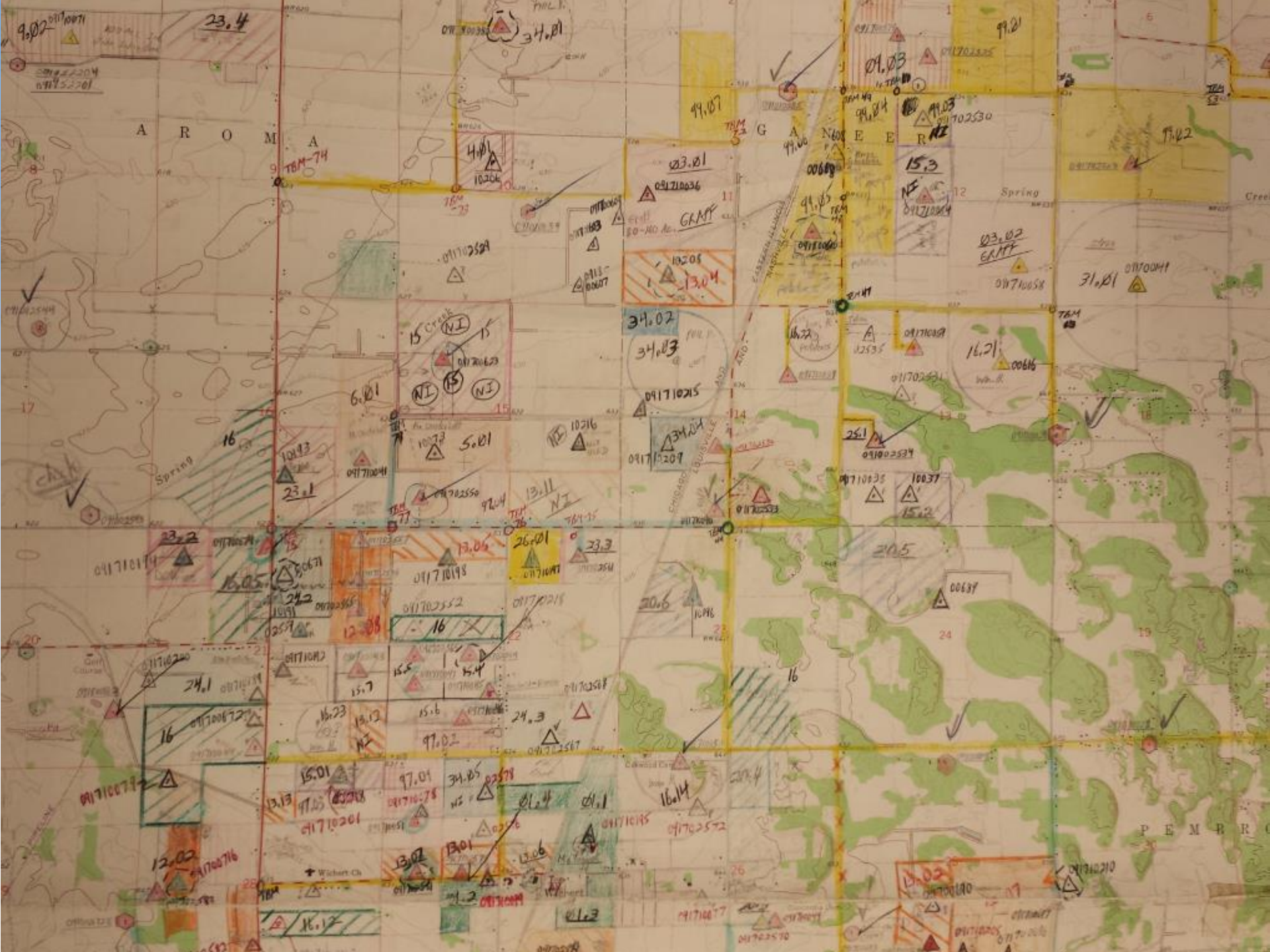
- Information is available on our website
- There are over 6600 pivots alone in Illinois, we expect the IWIP program to double in size
- We are developing an online reporting page that should be ready before the end of the year

Status

321 wells/points have been submitted by irrigators out of an estimated 7000 (< 5%)

Based on well logs, we have created 446 irrigation “facilities” in the database with 1500 wells





Where We Are

- Just bought a clamp on flow meter. Hope to use around the state next year to get more accurate estimates
- Have several more meetings lined up
- Looking at estimation method used by USGS to improve
- We understand many likely not to report, so working to develop better science for estimating withdrawals

A Lot Still To Do!!



ISWS Services - (Completely Voluntary)

- **Public Service Lab – water sample analyses**
 - \$35 Now, Free until 2006
 - Irrigation wells, evaluate scale and iron issues
 - House well, inorganics and metals (should test every few years, ask your local health department)
- **Flow Meter**
 - Easy to use, free info for irrigator
 - Helps us, more accurate flow rate information
 - Helps you, can better understand loss of capacity
- **Water Level Information**
 - Over time pivot will lose capacity
 - Water level measurements are one way to monitor
- **Online Class for Home Well Owners**
 - www.privatewellclass.org



Questions?

