



Members

Sen. James Banks, Chairperson
Sen. Edward Charbonneau
Sen. Susan Glick
Sen. James Arnold
Sen. Lindel Hume
Sen. Richard Young
Rep. William Friend, Vice-Chairman
Rep. Jack Lutz
Rep. Robert Morris
Rep. David Cheatham
Rep. Steven Stemler
Rep. Nancy Dembowski

WATER RESOURCES STUDY COMMITTEE

Legislative Services Agency
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Authority: IC 2-5-25

MEETING MINUTES¹

Meeting Date: August 26, 2011
Meeting Time: 10:30 A.M.
Meeting Place: State House, 200 W. Washington St., Room 233
Meeting City: Indianapolis, Indiana
Meeting Number: 1

Members Present: Sen. James Banks, Chairperson; Sen. Edward Charbonneau; Sen. Susan Glick; Rep. William Friend, Vice-Chairman; Rep. David Cheatham; Rep. Nancy Dembowski.

Members Absent: Sen. James Arnold; Sen. Lindel Hume; Sen. Richard Young; Rep. Jack Lutz; Rep. Robert Morris; Rep. Steven Stemler.

The Chairperson called the meeting to order at 10:35 a.m. and asked the members and staff to introduce themselves. He then called upon Dr. Bill Blomquist, Dean of the School of Liberal Arts, IUPUI, to introduce the next speakers.

Dr. John Steinmetz, State Geologist and Director, Indiana Geological Society, presented information about the geology of Indiana as it relates to groundwater, including groundwater flow modeling (Dr. Steinmetz's presentation can be found at Exhibit A).

Dr. Ron Turco, Director, Indiana Water Resources Research Center and the Purdue Water Community, spoke concerning the role of the Water Resources Research Center

¹ These minutes, exhibits, and other materials referenced in the minutes can be viewed electronically at <http://www.in.gov/legislative>. Hard copies can be obtained in the Legislative Information Center in Room 230 of the State House in Indianapolis, Indiana. Requests for hard copies may be mailed to the Legislative Information Center, Legislative Services Agency, West Washington Street, Indianapolis, IN 46204-2789. A fee of \$0.15 per page and mailing costs will be charged for hard copies.

and associated topics related to water research (Dr. Turco's testimony can be found at Exhibit B).

Dr. Jack Wittman, Director, Layne Hydro, presented information concerning managing Indiana's water resources, including managing shortages and avoiding conflict during shortages (Dr. Wittman's presentation can be found at Exhibit C).

Ron McAhron, Deputy Director, Indiana Department of Natural Resources (DNR), distributed information concerning work done by DNR's Division of Water (Mr. McAhron's information can be found at Exhibit D).

The Committee discussed possible legislative actions that may be recommended based upon the testimony heard at the meeting, including regional water systems and planning, and a look at the various types of water research occurring in Indiana. The speakers indicated that they would be willing to provide assistance to the Committee concerning these topics.

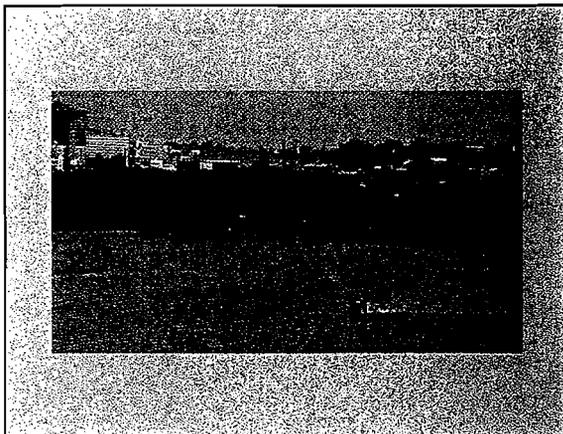
The Committee decided its next meeting will be scheduled for Thursday, October 13, at 1:30 p.m. The meeting was adjourned at 12:40 p.m.

**The shallow subsurface of Indiana
Characterizing groundwater's vessel**

Presentation for the
Water Resources Committee
Senator James Banks, Chair

By
Dr. John C. Steinmetz
State Geologist of Indiana
and
Indiana Geological Survey Director

August 26, 2011



Late Wisconsin Glaciation

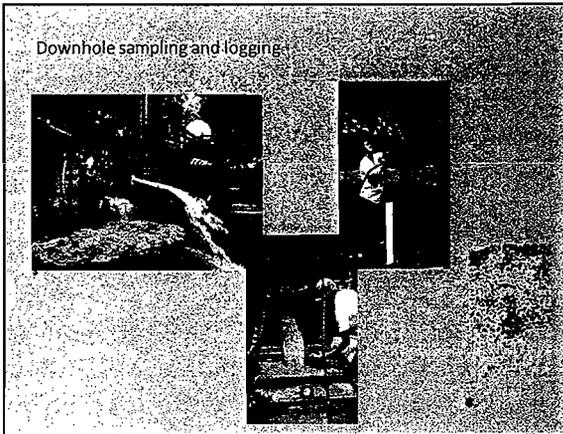
Huron-Erie Lobe
from the east

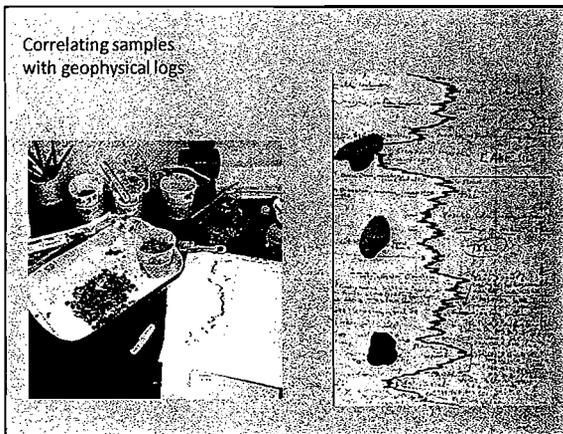
Lake Michigan Lobe
from the west

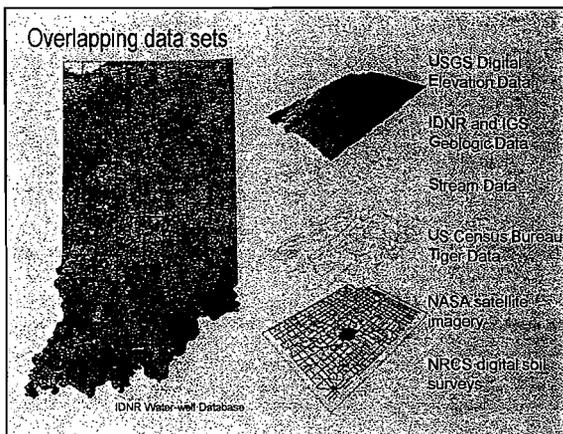
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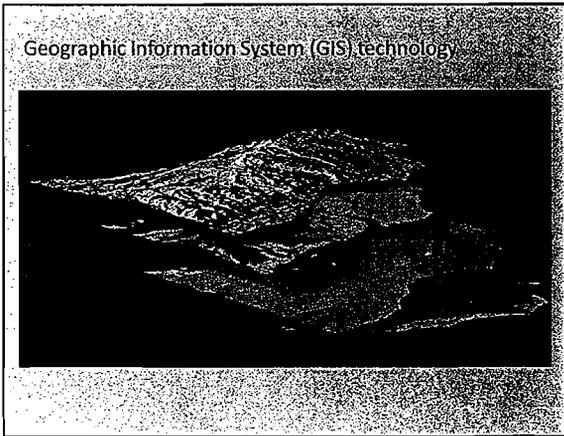


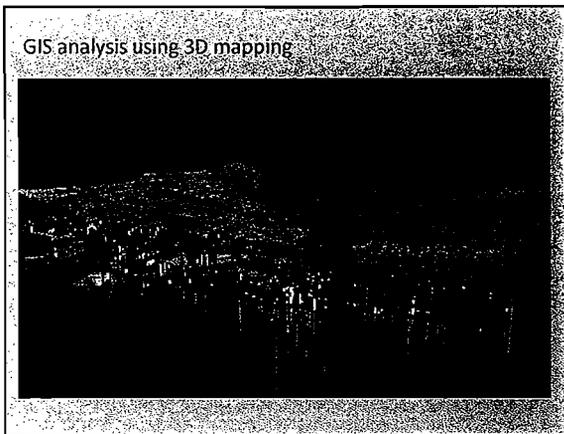
Water Resources Study
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Exhibit A

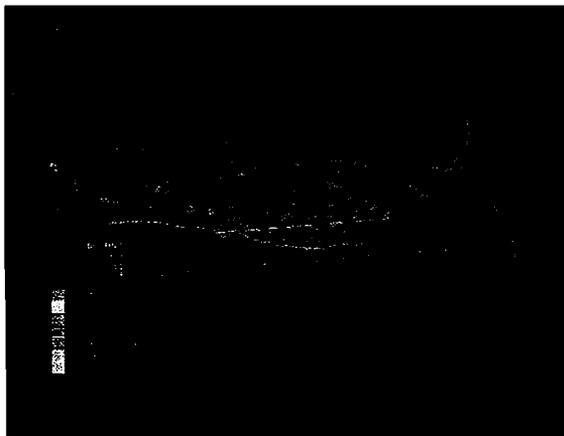




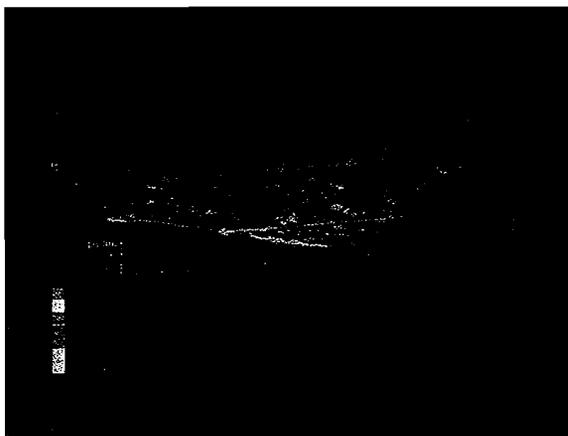


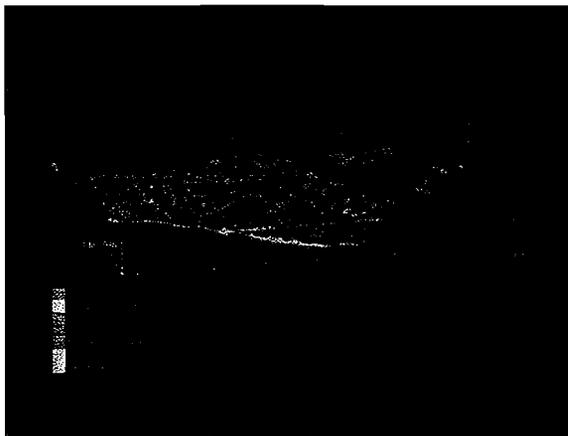




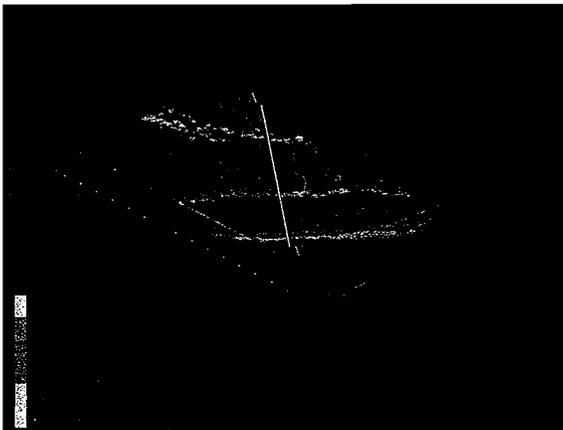


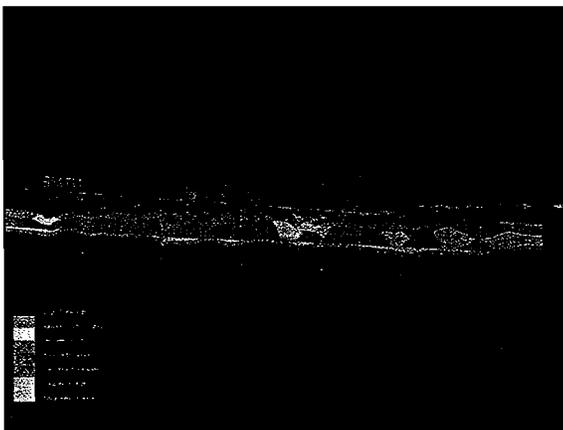


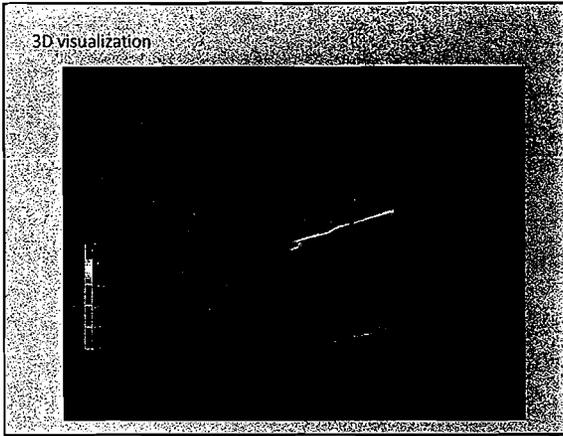


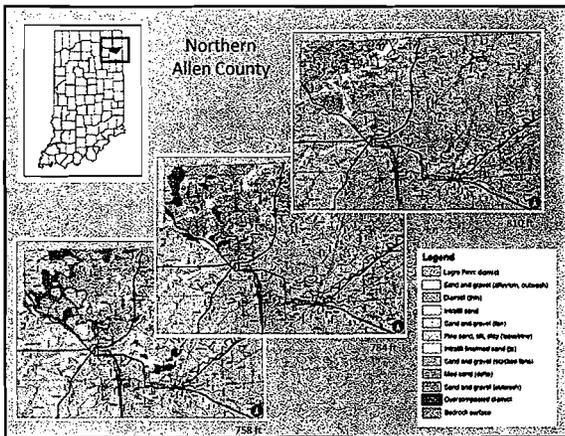


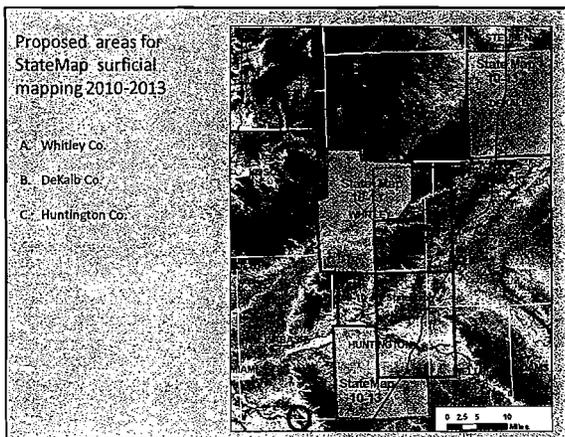


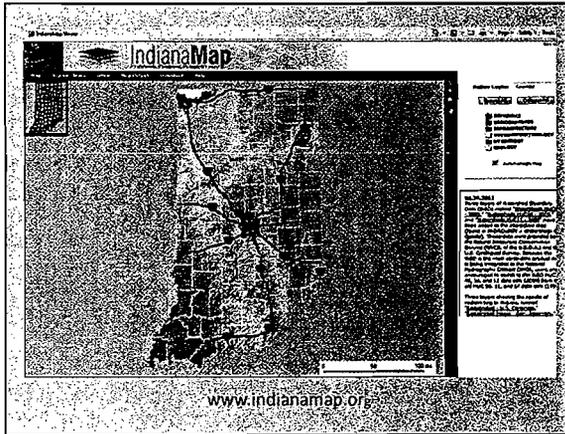


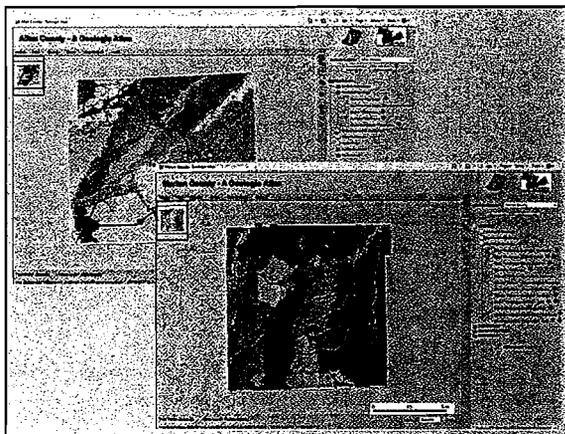


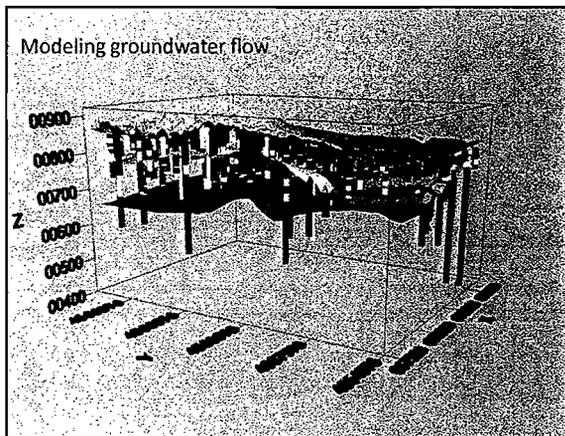


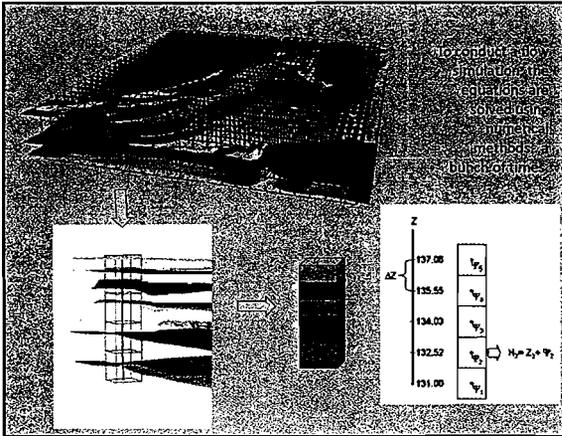


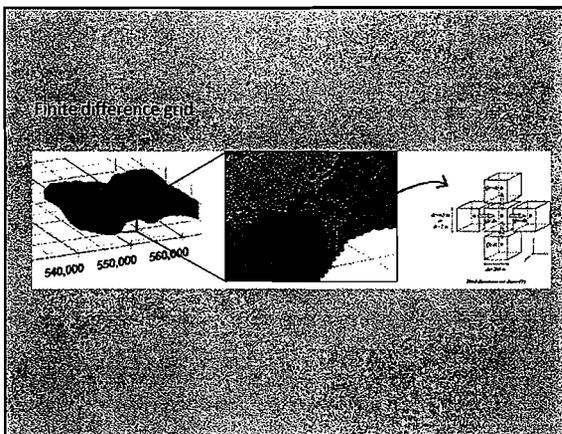


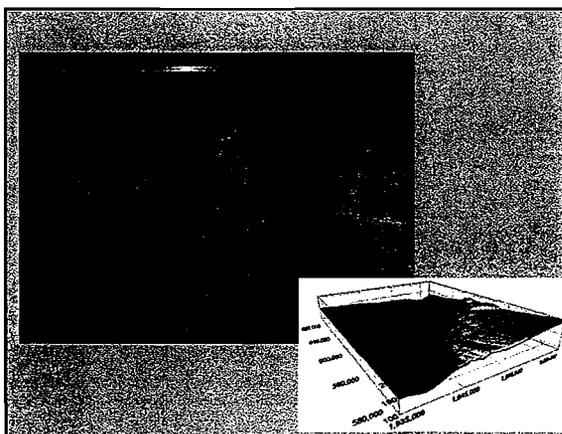


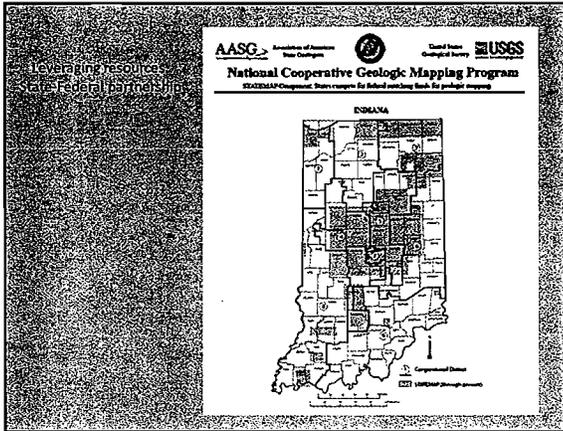


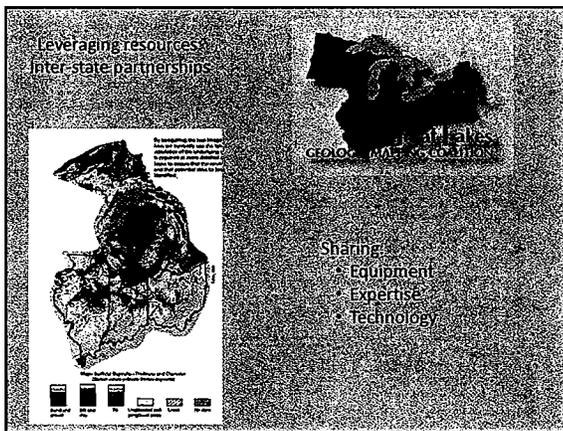


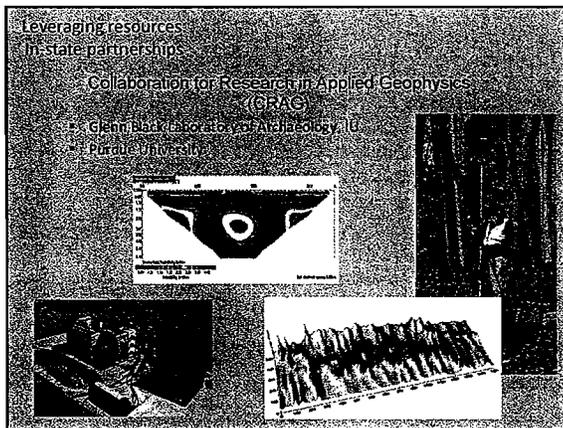












Good Morning:

I am Dr. Ronald Turco. I am a Professor at Purdue University and Director of both The Indiana Water Resources Research Center (IWRRC) and the Purdue Water Community. I have been at Purdue University for 26 years and this gives me a bit of perspective on where we were, where we are and where we could be going in terms of water research. Specifically, I would like to thank Senator Banks and Water Resources Committee for giving me this chance to address issues related to Indiana water resources research from the University and Water Center perspective.

I would like to first address the role of the Indiana Water Resources Research Center (IWRRC) in the State of Indiana and then cover associated topic areas related to water research.

The IWRRC is one of 54 institutes in the National Institute of Water Resources (NIWR) program that was established by "The Water Resources Research Act of 1964". The act authorized a state based network of institutes dedicated to solving problems of water supply and water quality in partnership with universities, local governments and the general public. The water program is administered by Secretary of Interior through USGS. We work with our program managers at USGS but the real strength of the effort is found in the fact that each state is required to establish their own agenda and form their own research portfolio. This reflected some forward thinking about the nature of water resource problems – many of which are local in their orientation and solution. Therefore, the goal of the Nation's water institute program is to provide resources for problem solving and water resources education. The 54 institutes that makeup the network are located at each state's land grant university, and in the Virgin Islands, Puerto Rico, Guam, and the District of Columbia.

In 2006, congress reauthorized "The Water Resources Research Act" as PL 109-471 and the program is currently working on new 10 year reauthorization. An independent panel appointed by the Secretary of Interior evaluates the performance of each institute on a regular five year cycle. The Indiana Water Resources Research Center is in good standing with the national program. Again, the national program is based on research, student training, and technology transfer and creating a unique network that links across virtually all research oriented universities in the United States.

The IWRRC is housed on the main campus of Purdue University. However, as part of the national program we are charged with supporting work at our state's many Colleges and Universities. In general the IWRRC supports research in all areas of water science with particular emphasis on agriculture, civil engineering, microbiology, biogeochemistry, and geology. Specific topic areas have included lake management, septic systems, surface water management, and wetlands. Since our inception in 1964, the Center has provided financial

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Exhibit B

support for more than 200 research and/or outreach projects at educational institutions across Indiana. (Reports prior to 1991 are available at: <http://docs.lib.purdue.edu/watertech/>) with our first report filled in 1966.) In the past, efforts have included work on Lake Monroe, water source assessments, nutrient management, ground water assessments and efforts to look at hydrologic modeling of critical watersheds. We have supported work on the control of algae and aquatic weeds, management decision making for water resources and assessments of public perceptions on critical water issues. In the last few years we have supported projects at Ball State, IUPUI, Purdue University Fort Wayne, Indiana University, Indiana State University and work on the Purdue University campus. The IWRRRC offers an excellent opportunity to define and solve water resource problems within the state of Indiana. Of specific interest is a recent effort to better understand the ecology of Wabash River. The River has been a major emphasis area for IWRRRC work and recent efforts in terms of Watershed management. In other words, the goal of the IWRRRC is to focus University research resources on solving Indiana's water issues.

The IWRRRC program works in a manner analogous to most national research programs. I work with a state level advisory council (which contains members from private, state and federal offices) to establish areas of importance. We then solicit grant applications from individuals working at the state's Universities and Colleges. Like I said earlier, our goal is to engage all members of the Indiana academic community who are interested in water research to work with the program. The proposals are received and then reviewed by an external advisory committee and then funding recommendations are made. Project areas of particular importance to Indiana for 2011 included: (a) enhancement of the quality of Indiana's rivers with a priority interest in work on the Wabash River and the Wabash River Watershed, (b) social dimensions of water related decisions making, (c) cutting edge areas such nanomaterials and water systems, (d) riparian area protection and (e) bioenergy and water use efficiency.

Each year the state is provided an opportunity to directly participate in the program by providing funds to help meet the required 2:1 (non-federal to federal) match that goes along with the IWRRRC money. Typically our federal dollars are about \$92,000 per year. Over my 15 year association with the IWRRRC we have always used in-kind contribution from the funded individuals or their universities to meet the required match. It is my feeling that by not contributing to the match, the state as a whole is only receiving a partial benefit from the program as it would provide more opportunities for projects if the state was directly linked to the effort. However, we are typical of about 1/3 of the 54 water centers and it should be noted that if federal funding was to end, we would be unable to continue. Other water centers in our region, including Kentucky and Michigan, receive significant support directly from the state and this is used to meet the match as well as for funding other research and outreach projects.

To be clear, in terms of administrative costs our program is very lean – I prefer to release almost all of the money for projects. Following proposal review we typically can support 4 to 5 projects each year at a typical level of \$15,000 to \$20,000 dollars per project. For example in the 2010 program we supported projects including, an IUPUI project: Nutrient and carbon delivery to streams in artificially drained landscapes of the Midwest: matrix flow, overland flow or macropore flow? Two projects from Purdue one to look at, Local and Regional Assessment of Biofuel Production Facilities Impacts on Freshwater Quality in Indiana; and another to look “A First Assessment of Pharmaceuticals and Personal Care Products in the Middle Wabash River, Indiana. We also supported a project from Ball State looking at the Transport, Fate, and Effects of Pharmaceuticals derived from Animal Feeding Operations: A comprehensive assessment of central Indiana streams. Of particular note is the fact that in the last few years the IWRRRC has worked directly with the Purdue Pesticide Programs office to create a series of publications on environmental stewardship and preventing water pollution. While focused mainly on agriculture, these publications have also covered other topics. Last year’s publication was entitled: Plan Today For Tomorrow’s Flood: A Flood Response Plan for Agricultural Retailers. Support is typically used to fund the cost of undergrad or graduate students.

Because of the lean operation profile we are sometimes perceived as being “Low Key.” For me the IWRRRC is always in the forefront but it sometimes difficult to act because of the way our federal funding must be committed a year in advance. One of the more significant activities of the IWRRRC has been to work the State’s USGS office and with IDEM and IDNR. We have also partnered with public groups such as the Wabash River Enhancement Corporation (WREC) and with private groups such as The Nature Conservancy. This partnership WREC has led to a number of projects and grant applications for funds for both monitoring projects and research.

It is critical to me that the IWRRRC be viewed as working at the state level and I have tried over the years to ensure that the opportunities for funding are available to all schools in the state. This desire to keep the IWRRRC more functional at the state level caused me to help create the Purdue Water Community, which is a part of the Global Sustainability Institute at Purdue University. The Purdue Water Community is an avenue to work directly with a group of 40 or so Purdue faculty on water related issues. The Purdue Water Community is highly functional, we are working on new classes, educational programs and water related proposals. More importantly, the Water Community is refocusing the interest of Purdue faculty on the importance of water here and around the world.

In an effort to understand where things are in the state in terms of water, I spend a bit of time discussing research needs with the Indiana’s Water Research Community. Some key findings from these discussions include:

- 1) A strong interest in helping to preserve and enhance Indiana's water resources exists within the State's water research community. In particular, the state's water research community is interested in the interactions between human activities and water. These sorts of interactions are often at the local level which makes it difficult to find national level grant funds to meet the need. The potential work runs from gaining a better understanding of watershed process to improving water use efficiency in industrial processes all the way to developing a better understanding of fate and behavior of bacteria or algae in water. There is a particularly strong interest at Purdue University in ag-water management specifically with issues related to farmland tile drainage systems and how to best optimize these systems.
- 2) The Indiana water research community has a strong interest in projects to protect both the quality and quantity of our water resources. This includes: developing approaches to remove nutrients from water and methods to reuse water. The community is also interested in the impacts of water withdrawals and flow modification on surface water and groundwater systems. It should be noted that while our water resources are good, there is absolutely no reason to be using high quality drinking water for many of the things it is currently used for when recycled water would work.
- 3) A portion of the community has raised a concern over our lack of understanding of why people make the decisions they do in terms of the use of natural resources. This information is critical in developing programs that address the real problems and not simply repeating the same old approaches.
- 4) Another portion of the water research community points out that much work is needed to capitalize on the importance of water as an economic driver. This take two different tracks: a.) recreational opportunities and b.) the development of advanced protection technologies – however, both of which can mean jobs.
 - a. In the first case, better water can mean boating and swimming opportunities leading to an influx of tourist dollars. However, the occurrence of algal blooms in many of our lakes reflects a need to better understand the behavior of nutrients (N and P) and sediments derived from stream bank erosion in these waters. The invasion of our streams by non-native fish and plant species needs to be addressed as well as their affect on river ecology as the invaders will impact the number of amphibians and other fishes in systems. I would be negligent in not reminding everyone that the Wabash River is the longest stretch (some 411 miles) of free flowing water in the eastern half of the United States. The recreational opportunities on the river could be tremendous. However, the opportunities must be developed and the perception that the river is "dirty" must be eliminated.

- b. In the second case, what better place than Indiana to encourage the development of companies and business related to environmental and water sensors, pollution detection tools and computer modeling systems for anticipating watershed and water quality problems.

In conclusion, Indiana has tremendous water resources and it has tremendous intellectual capacity. What could be better than to muster the resources to encourage our research community to tackle projects to protect and enhance Indiana water resources?

Again, thank you for the opportunity to speak I would be very happy to answer questions.

Indiana Water Resources Study Committee

Indiana's Water Resources

Managing shortages, avoiding conflict

JACK WITTMAN, PHD

NATIONAL DIRECTOR LAYNE GEOSCIENCES

August, 2011

Water Resources Study
Committee
8/26/2011
Exhibit C

Indiana Water Resources Study Committee

Indiana's Water Resources

Managing shortages, avoiding conflict

JACK WITTMAN, PHD

NATIONAL DIRECTOR LAYNE GEOSCIENCES

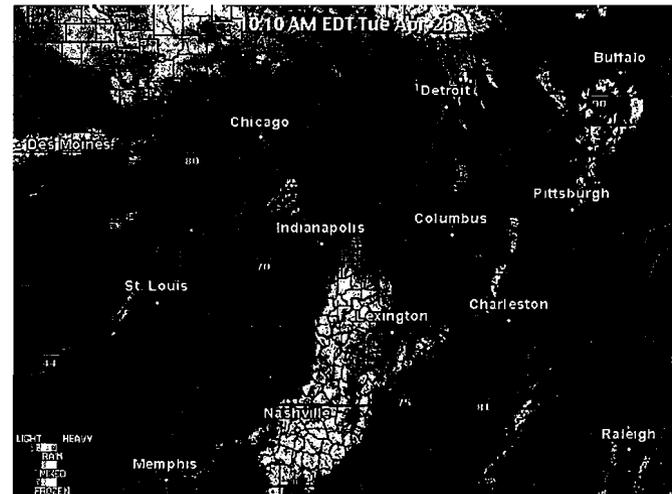
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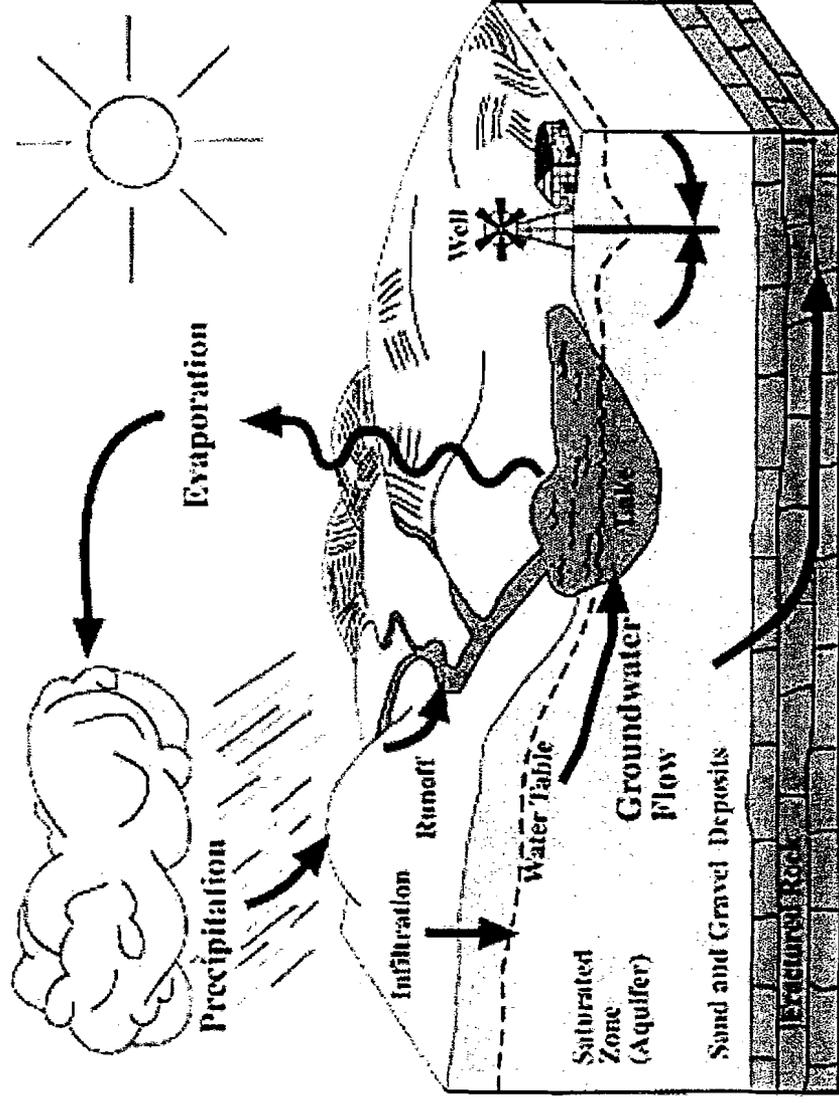
shortage

Do we have a water problem?

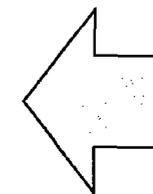
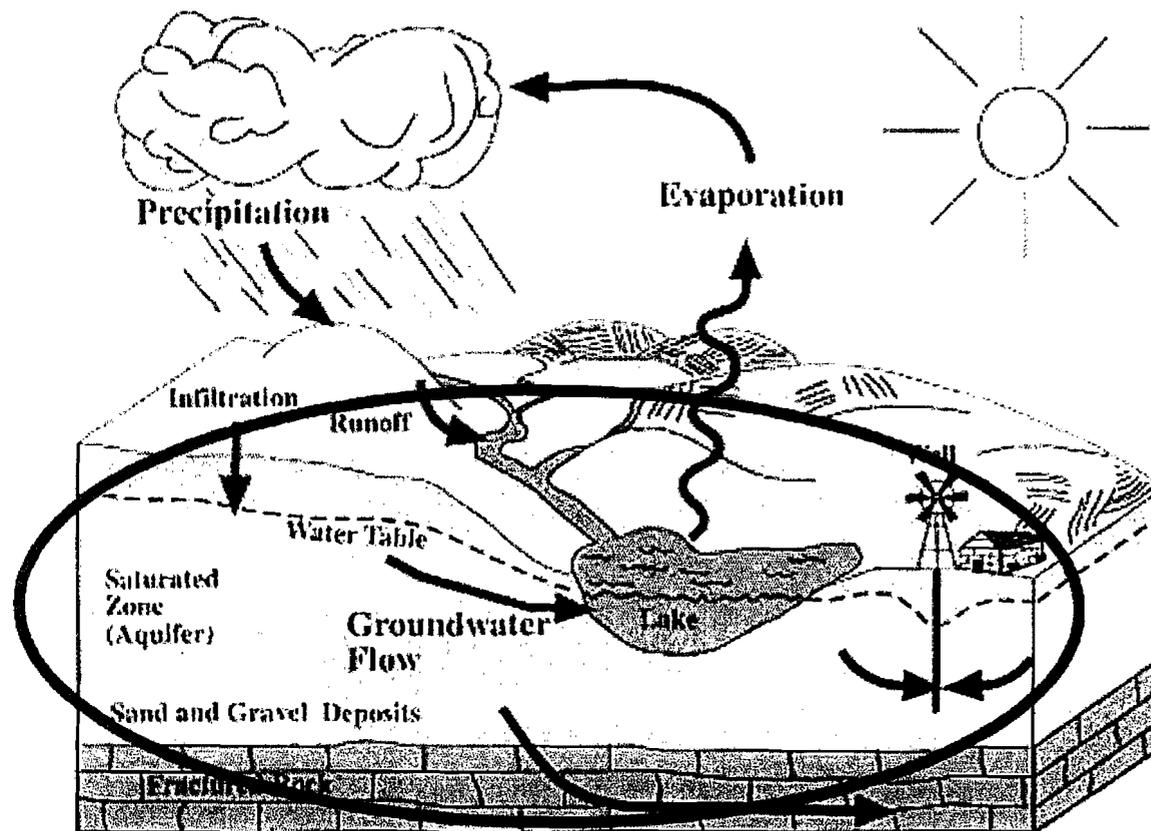
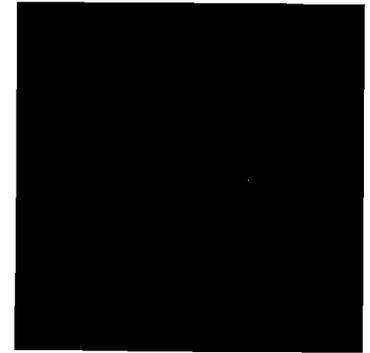
- Is the past our future?
- Georgia drought – result of unplanned growth?
- Is Indiana vulnerable to shortages?
- Price/Value of water



Hydrologic Cycle – what matters



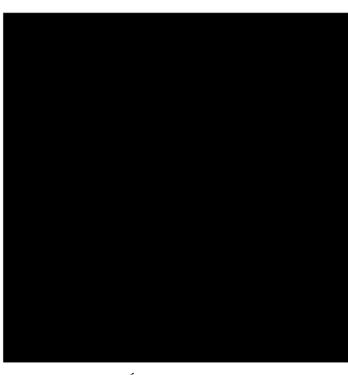
Hydrologic Cycle – what matters

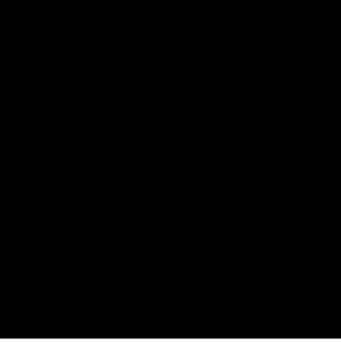


**We have
rules to
protect
this water**

Big Questions

- DEMAND
 - How much do we use/need?
 - Where, when?
- SUPPLY
 - How much water is available?

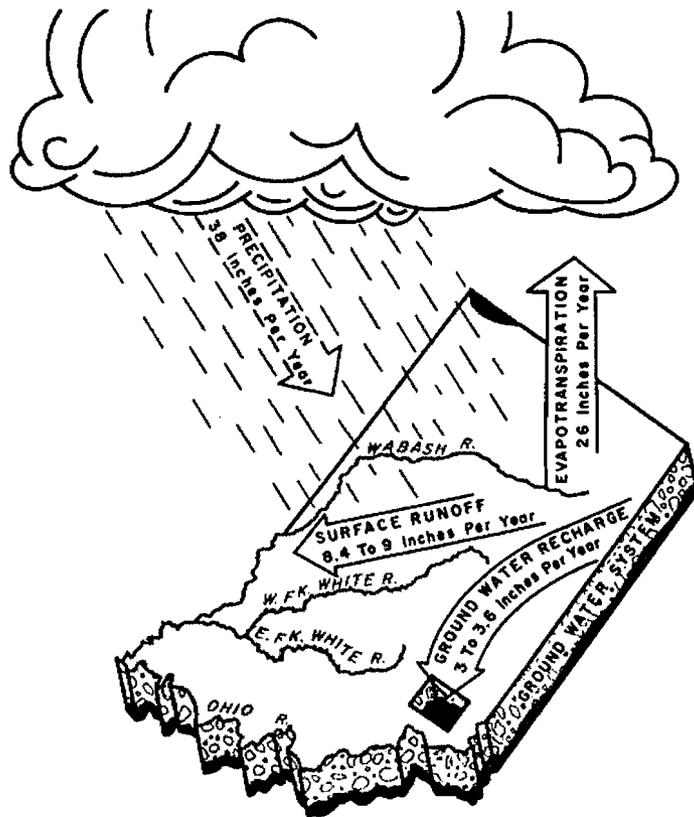




Big Questions

- Does our economy depend on water?
- Is water valuable?
- How much do we have?
- Where? When?

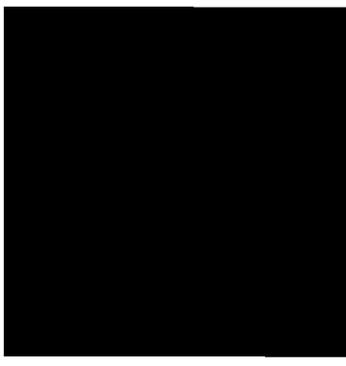
Indiana Water Budget



- About 3 – 4 feet of precipitation / year
- 1 foot of water in all the streams
- About $\frac{1}{2}$ to $\frac{1}{4}$ ft recharge to groundwater (where there are aquifers)

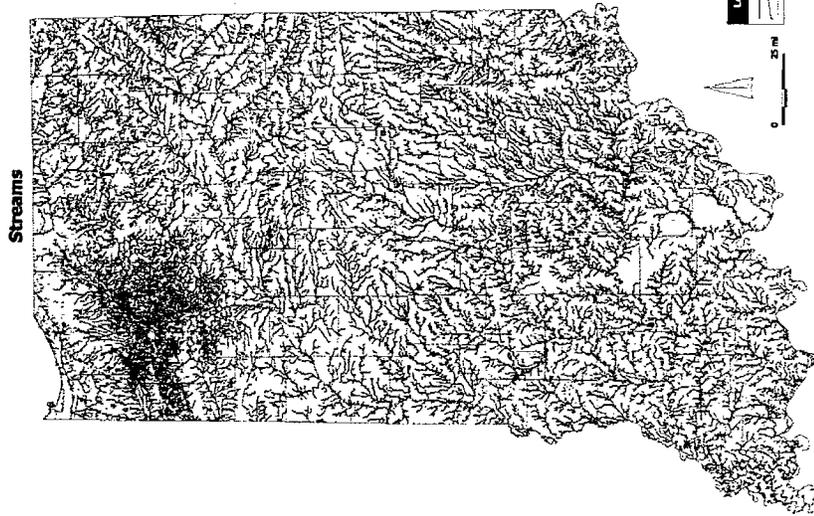
How much water do we have?

- Depends on location
- Surface water
- Groundwater

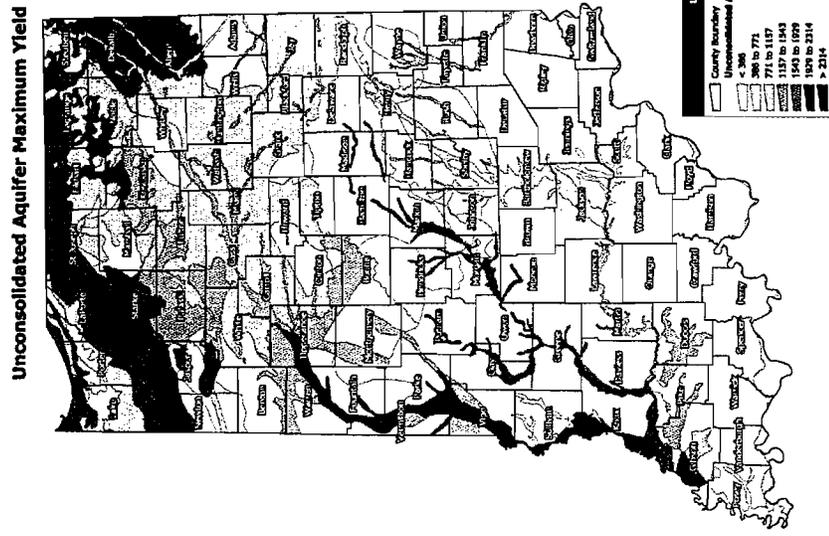


Hydro-Geography of Indiana

■ Surface water



■ Ground water (shallow)

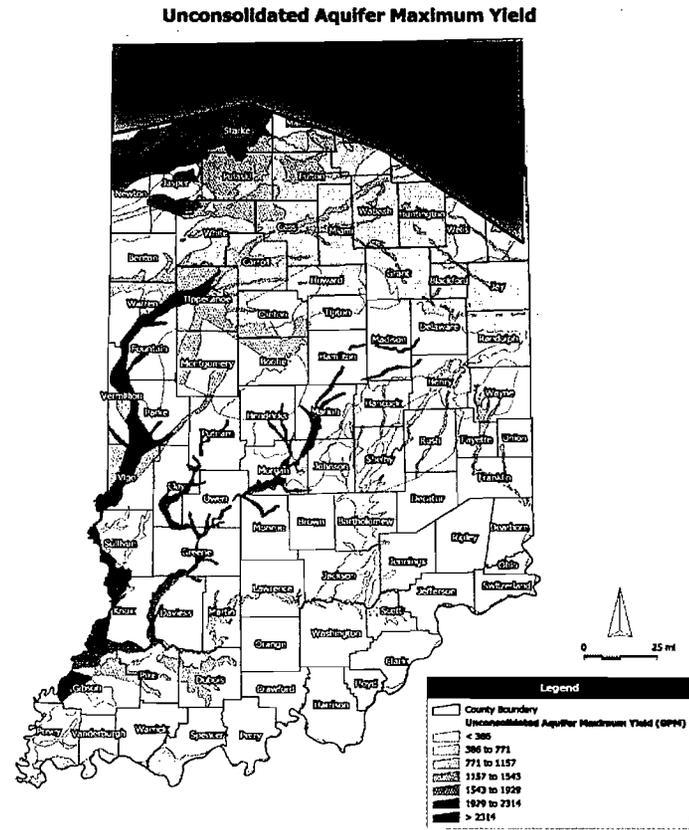


Hydro-Geography of Indiana

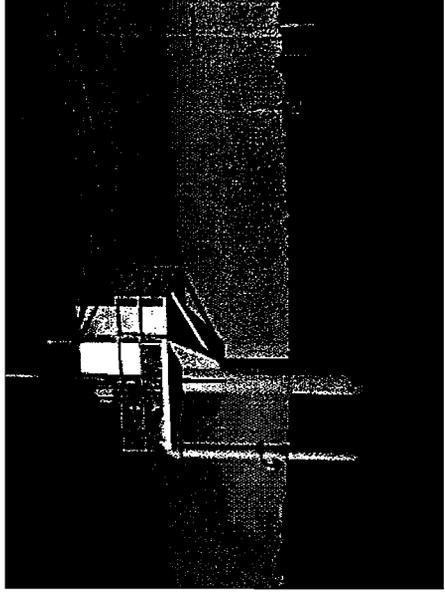
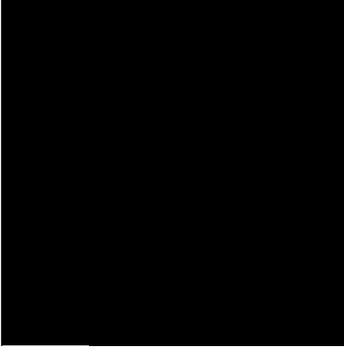
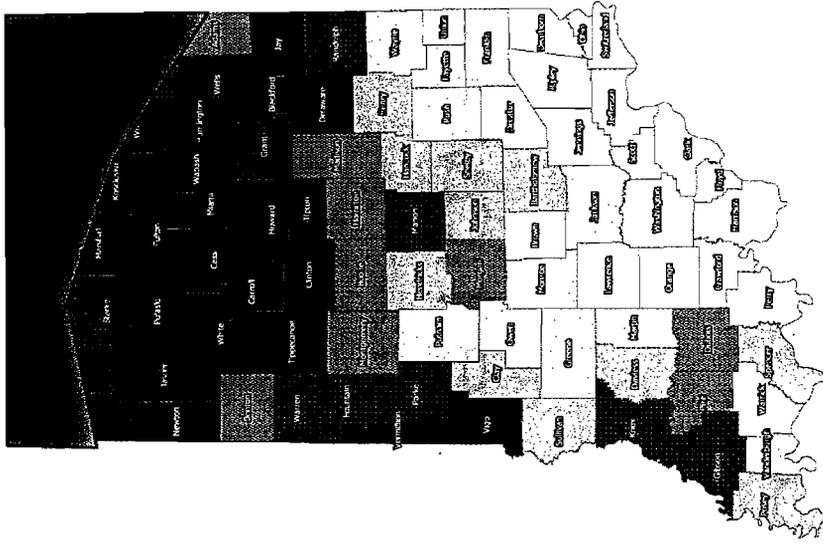
■ Surface water

■ Ground water (shallow)

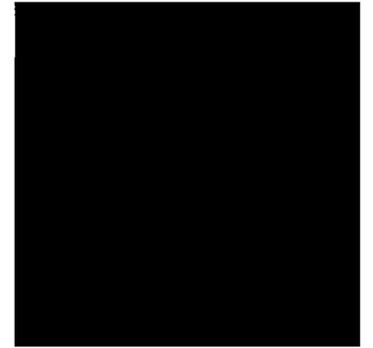
Great Lakes
Annex 2001



Groundwater availability

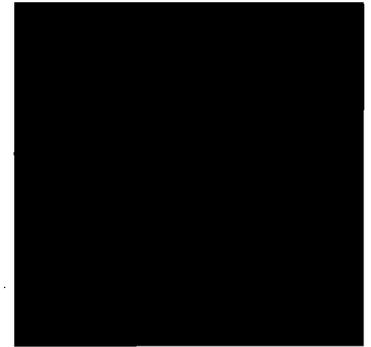


Where do we need water?



- Where we have demand
- Where infrastructure exists
- Where there will be growth

Where do we need water?

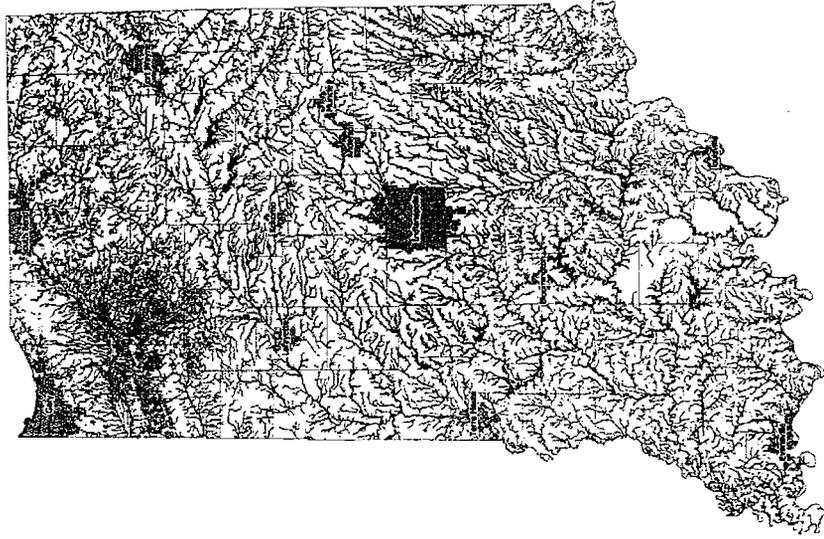


- Where we have demand
- Where infrastructure exists
- Where there will be growth

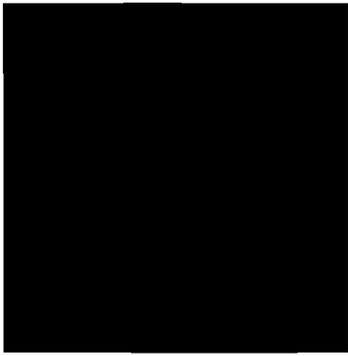
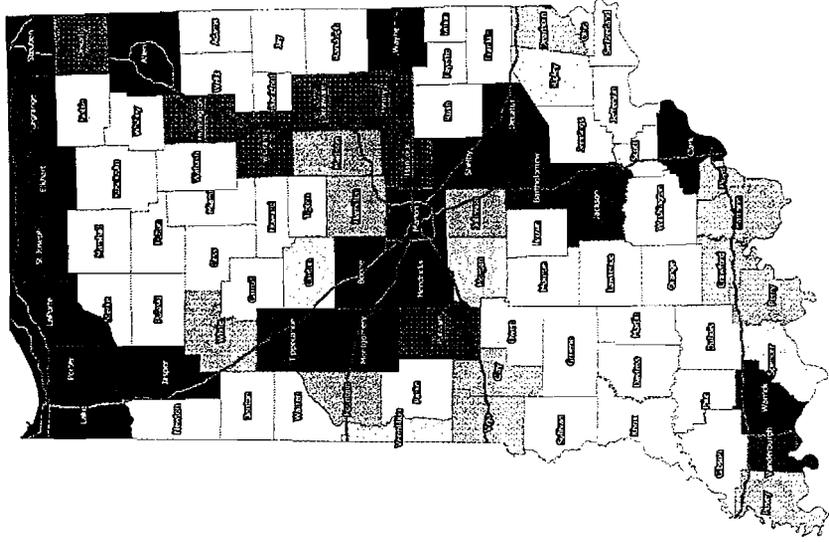
Where do we use water?



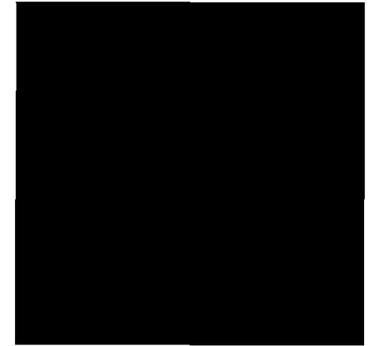
- Cities
- Power Plants
- Industrial facilities
- Irrigation

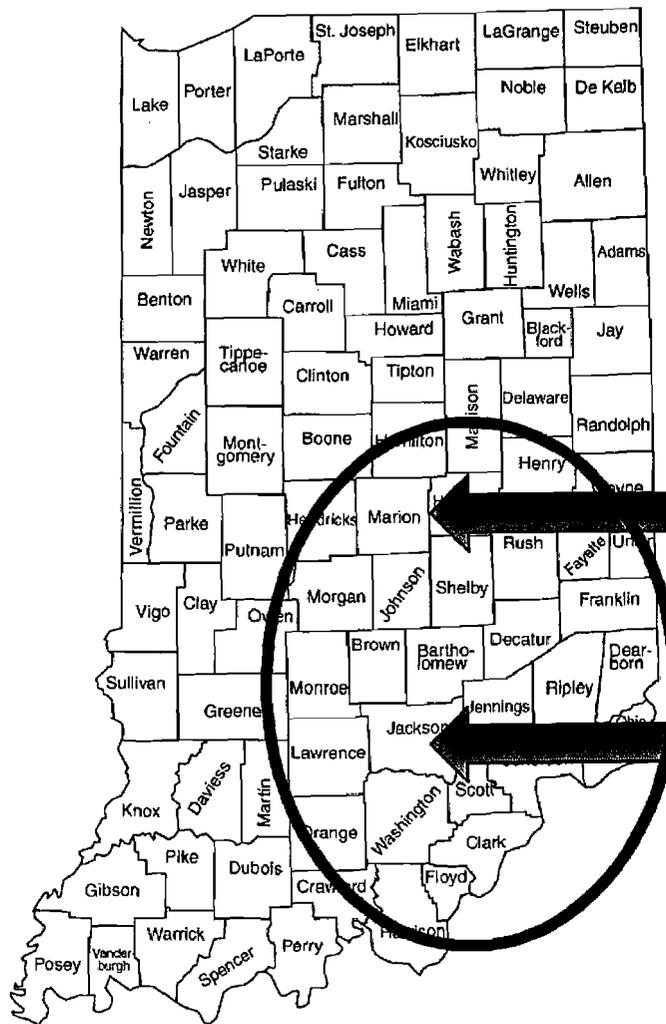
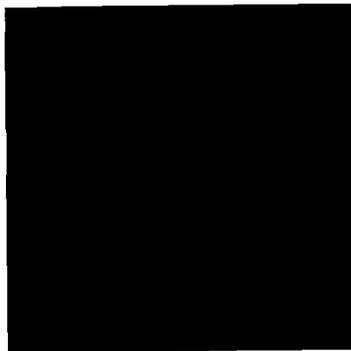


Transportation Infrastructure



Do We Know the Risk?

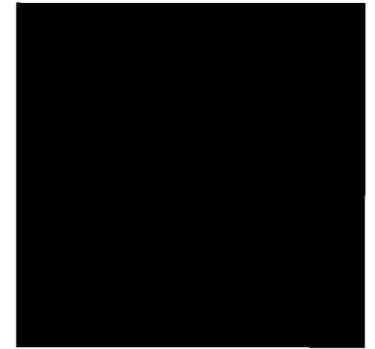




**Large demand,
marginal supplies**

**Growing demand,
vulnerable
supplies**

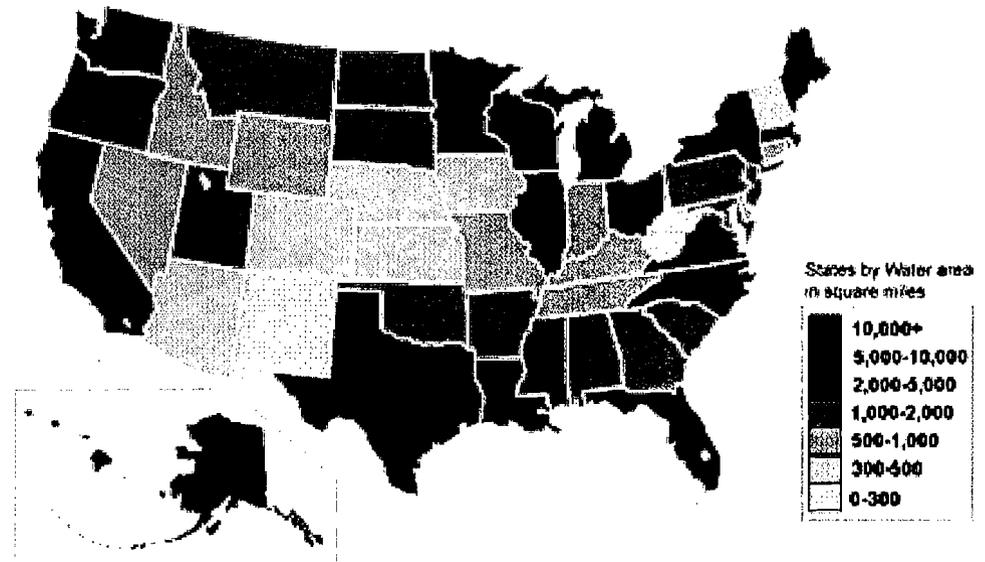
What are the challenges?



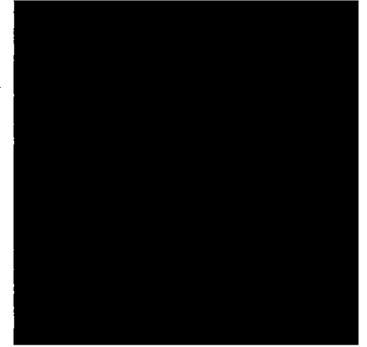
- Interbasin transfer
- Aquifer storage
- Ecosystem flows
- Jurisdictions

Water Supply Planning

- Planning is the norm
 - TX, KY, VA, PA, MI
- Management of resource
 - Growth
 - Regional demand
- Collective self-interest

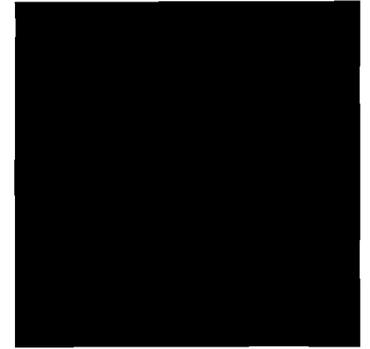


Risk of Regional Shortages



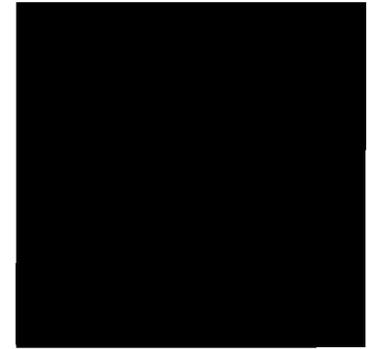
- Barely adequate local supplies in Central Indiana
- Limited groundwater in Southern Indiana
- Growth and infrastructure investment in the South
- Regional planning the norm (MI, IL, KY)
- New law on groundwater may be made in court

Water Policy and Law



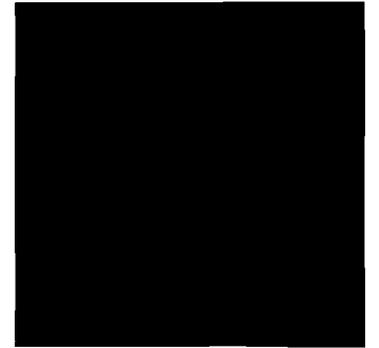
- Indiana's water "grid" is a patchwork of local systems.
 - Local concerns
 - Limited resources
 - No investment
 - Difficult to integrate
 - $1+1+1 = 1$
- Regional systems
 - Reliable
 - Resilient
 - Diversified

Water Policy and Law



- Evolution of regional systems
 - Rethink the water grid
 - Physical infrastructure
 - Institutional infrastructure
 - Economic incentives

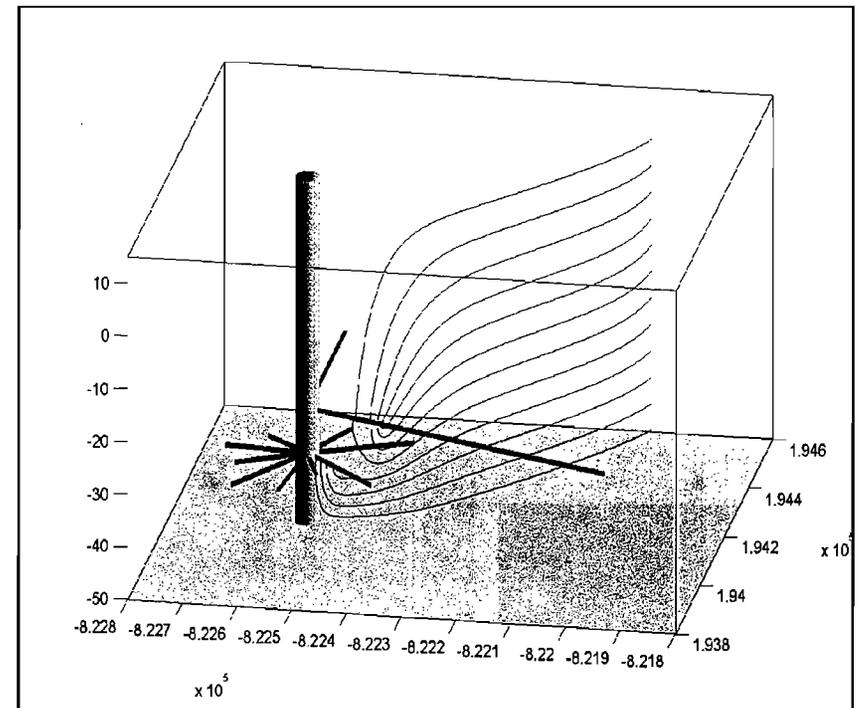
Water Policy and Law



- Rethinking local control
 - IURC needs to revisit water pricing policy
 - Need incentives for wholesale water providers
 - Regional systems can manage supply, local utilities can manage demand and deliver

Drought Proofing

- Ohio River is a sustainable supply in the South
- Bank filtration could be the best of surface water and groundwater
- Drought-proof supplies in aquifers along the River

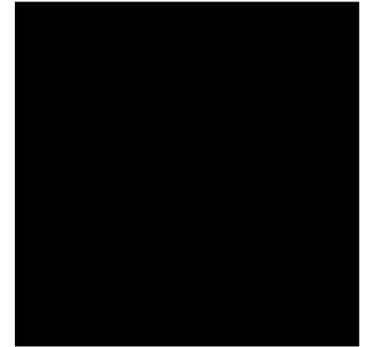


Answers

- Does our economy depend on water? **YES**
- Is water valuable? **YES**
- How much do we have?
 - GW: 100 M acre feet
 - Price \$300 - \$3000/AF
 - **\$30 - \$300 B**

What needs to happen?

- Modernize regulatory infrastructure
- Develop statutory guidance
 - Survey resource
 - Map needs
 - Consider options
 - Make investment priorities





We decide our
future



STATE OF INDIANA
DEPARTMENT OF NATURAL RESOURCES
BUREAU OF RESOURCE REGULATION

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Water Resources Summer Study 8/26/11

Groundwater Availability Maps

Division of Water has completed consolidate and unconsolidated aquifer mapping for all 92 counties: <http://www.in.gov/dnr/water/3468.htm>

Real Time Stream Flow USGS: <http://in.water.usgs.gov/>

Significant Water Withdrawal Facilities IC 14-25-7

3500 Facilities
Capacity 22 – 23 BGD
4.5 Ground water 18 Surface Water
Actual 13% 45%

Water Sale from Reservoirs @ \$33.00 per million gallons

<u>Lake Monroe</u> Yield 122 MGD Contracts 47.66 MGD 39%	<u>Brookville Lake</u> Yield 82 MGD Contracts 0.16 MGD 0.2%	<u>Patoka Lake</u> Yield 78 MGD Contracts 20 MGD 26%
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Well Field at Charleston State Park
Yield 75 MGD
Current set up for 2 MGD

Great Lakes Compact IC 14-25-15

Rulemaking
Conservation Survey and Information

Water Shortage Plan IC 14-25-14

2010 July to December => 95% of Indiana experienced Moderate to Extreme drought
Much after growing season with lessened demand

FEMA Map Modernization

15 counties are complete
40 counties have been issued preliminary
20 counties will be issued prelim by 9/30
17 counties will be issued preliminary by January 2013

*Water Resources Study
Committee
8/26/2011
Exhibit D*