



# Water for America Initiative

**Eric J. Evenson**  
**Briefing to the WSWC**  
**November 17, 2008**

U.S. Department of the Interior  
U.S. Geological Survey

***“The United States has a strong need for an ongoing census of water that describes the status of our Nation’s water resource at any point in time and identifies trends over time.”***

National Science and Technology Council report,  
“A Strategy for Federal Science and Technology to Support Water Availability and Quality in the United States.”

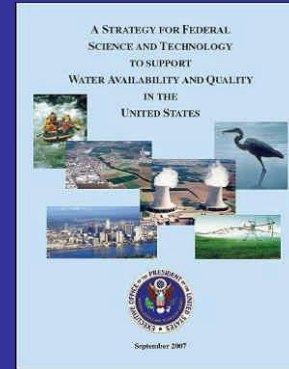


In the next decade, the Nation will have a new appraisal for water availability. In the FY 2009 Budget, the President has requested funds for an initiative to:

- Conduct a nationwide assessment of water availability through regional-scale and focused areas studies.
- Improve our understanding and analysis of water use information.
- Cooperate with States geological surveys to map the geologic framework of aquifers.
- Modernize the Nation's 7,000 streamgages.



2002



2009

\$9.5 Million

**Water for America Initiative**



National Water Availability Pilot Study on the Great Lakes

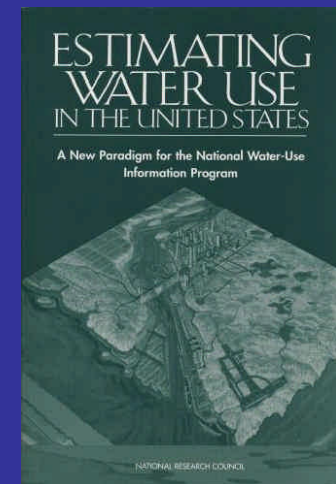
The Initiative will devote resources to:

–The Streamgaging Network

- Add 350 high data rate radios per year
- Re-establish 50 streamgages recently discontinued



–Water Use Science Program and Database Enhancements needed to manage and serve information



## –The Regional and Focus Area Studies

## –The National Cooperative Geologic Mapping Program (NCGMP)

- Enhance geologic mapping and hydrogeologic knowledge of the Regions being studied.
- FEDMAP and STATEMAP



# Water for America at the Bureau of Reclamation

- Three Reclamation Components:
  - Planning for Our Nation's Water Future;– River basin supply & demand studies with partners
  - Increasing Water Supplies through Improved Efficiency;
    - Challenge Grants Program
  - Accelerating Critical ESA Compliance;
    - CVP Delta Division
    - Columbia Snake River Salmon Recovery
    - ESRIP, Platte River
    - Klamath Project
    - Middle Rio Grande
- Coordination with Avra Morgan, Program and Policy Services

## Expanding and Enhancing Our Streamflow Information Infrastructure



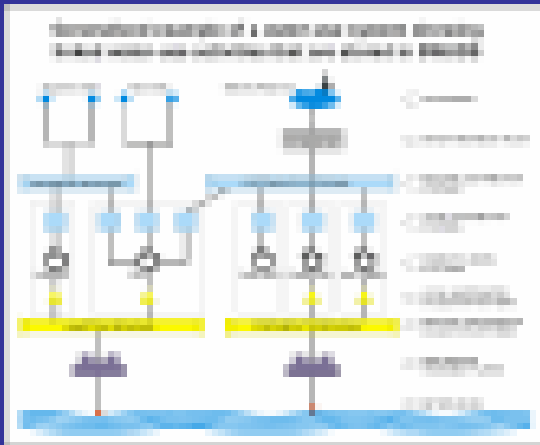
Re-establish 50 streamgages



Ensure rapid realtime communications  
with 350 high data rate radios

# Areas of Emphasis for W4A Resources

## Water Use Science



## Ecological Flows



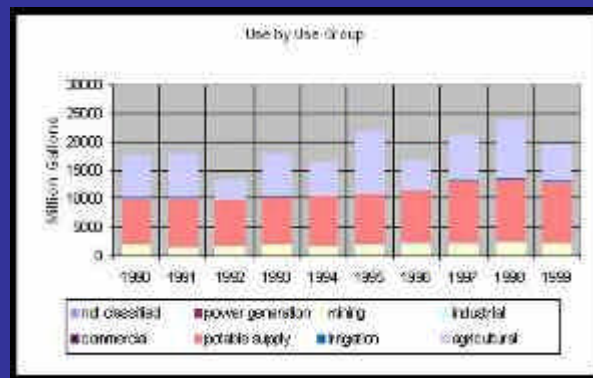
## Evapotranspiration



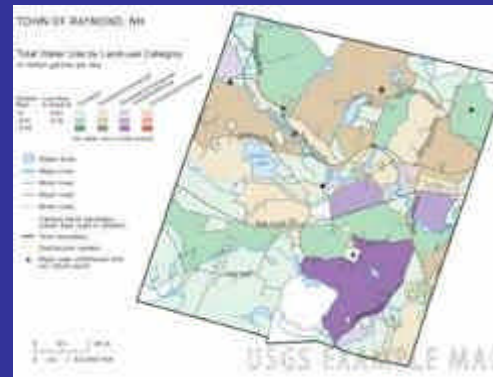
# Enhancing the Nation's Water Use Information

## Use Recommendations of the National Research Council Report

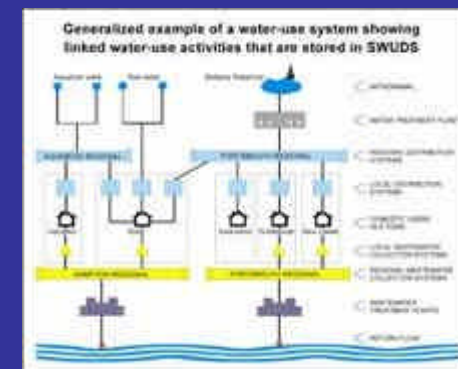
- Stratified Random Sampling
- Regression Models



Develop water use characteristics by types of land use



Ability to track water from point of withdrawal thru to return of flow.



# Nationwide Study Plans

Study activities will be organized around the 21 Water Resource Regions established in Circular 1223



# Hydrologic Unit Code Boundaries

HUC 2-digit - 21 total  
example: Ohio River Basin



HUC 4-digit – 221 total  
example: Wabash-White River Basin

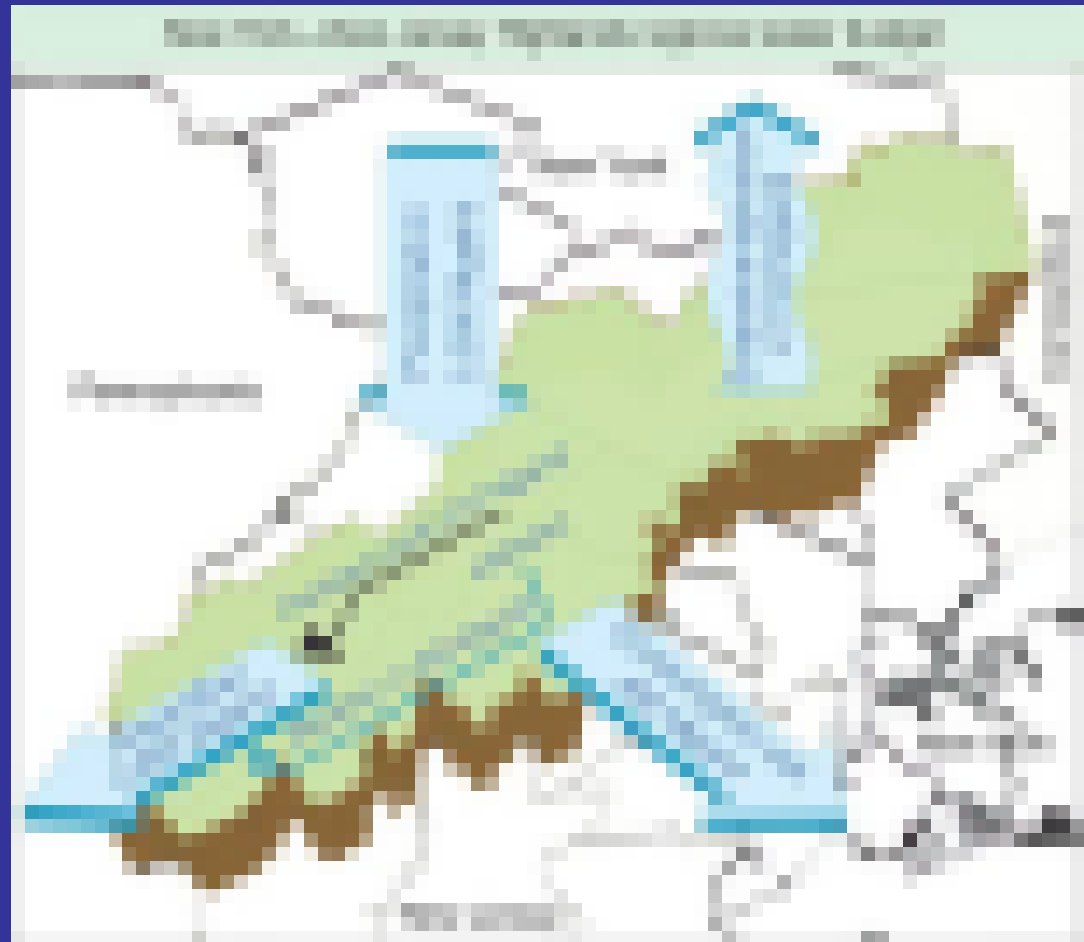


HUC 6-digit – 378 total  
example: White River Basin



## Regional Scale Studies will focus on Hydrologic Indicators

- Provides basis generating water budgets in the future
- Indicators describe system gains and losses
- Examine trends in indicators



# Indicators of Water Availability

1. Precipitation  
U.S. Historical Climatology Network (HCN) dataset is maintained at the National Climatic Data Center.
2. Evapotranspiration  
Point source measurements collected by the USGS are stored in project-specific databases, so if you are aware of E.T. measurements being collected by USGS projects, contact the applicable USGS Science Center. The USGS Water Discipline is working with the NWS, the U.S. Forest Service, the Natural Resources Conservation Service and the USGS Geography Discipline to provide databases on E.T. variability across the landscape and over time. Beyond these sources, E.T. values have to be calculated at selected basins.
3. Water in storage in snowpack, icefields, large lakes and reservoirs  
Snow Surveys in selected Science Centers, Army Corps and Bureau of Reclamation databases on reservoirs, NWIS ADAPS on large lakes

# Indicators of Water Availability

- |                                    |   |
|------------------------------------|---|
| 4. Ground-water level indices      | NWIS GWSI and ADAPS Systems, State Databases  |
| 5. Rates of ground-water recharge  | Rates of recharge are calculated from streamgage records after developing baseflow estimates through hydrograph separation. |
| 6. Changes in ground-water storage | NWIS GWSI and ADAPS Systems, State Databases, estimates of specific yield   |
| 7. Stream and river run-off        | NWIS ADAPS System, hydrograph characteristics separation  |
| 8. Stream and river baseflow       | NWIS ADAPS System, hydrograph characteristics separation  |

# Indicators of Water Availability

- |                                      |  |
|--------------------------------------|--|
| 9. Total water withdrawals by source | NWIS SWUDS System, PSBD database, USEPA- SDWIS database, State Databases                           |
| 10. Interbasin Transfers             | NWIS SWUDS System, PSBD database, State Databases  |
| 11. Consumptive Uses                 | Establish definitions, Utilize both Literature References and some calculation of consumptive use. |
| 12. Return Flows                     | NWIS SWUDS System, USEPA-PCS database, State Databases   |

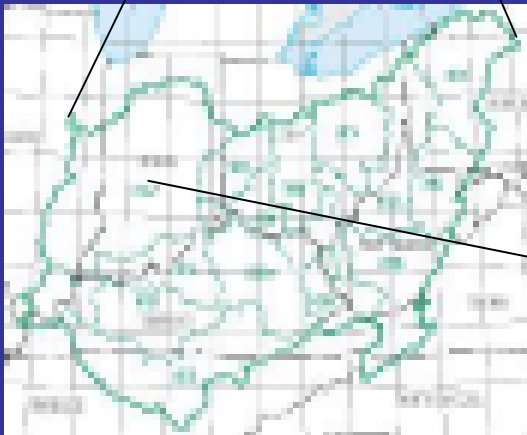
# Regional Studies



Six to seven Regional Studies will be started every three years.

- HUC 2 delineations
- Prescriptive study design to be followed
- Generate inputs for water budgets for each HUC 6
- Examine trends in components of the water budget
- Complete the Nation in 10 years

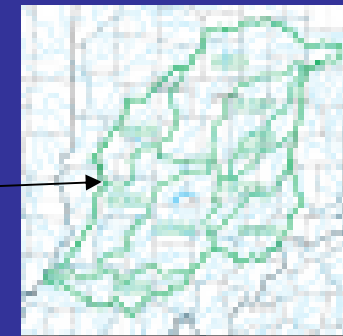
HUC 2



HUC 4

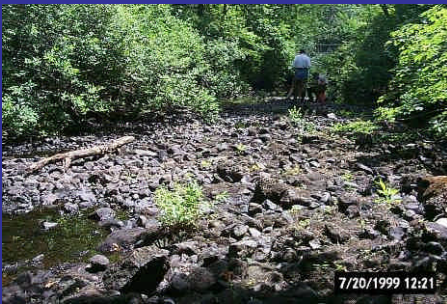
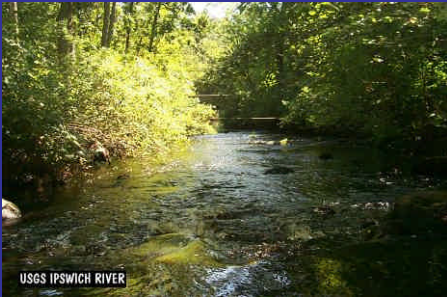


HUC 6



# Focus Area Studies

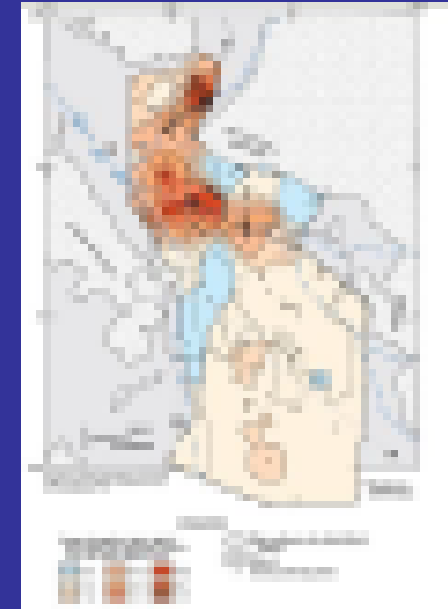
## Ecosystem flow issues



Three Studies will be started every three years.

- Nested inside Regional Studies
- Designed to expand knowledge on important hydrologic processes at the end of ten years
- Higher Funding
- Address the themes of ecosystem flows/habitats and gw/sw interactions

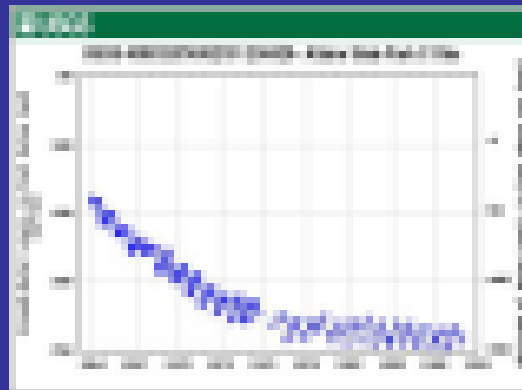
## GW/SW Interactions



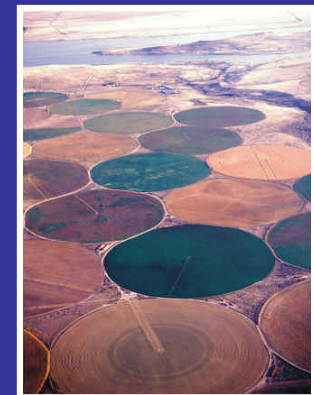
## Water Quality



Effects of current and past water use



Changing land use



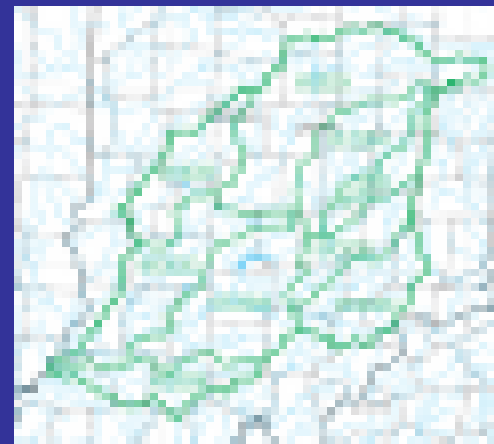
## Regional Studies

- Coverage Entire Nation
- Basis 21 Water Res. Regions
- Scale Large Basins
- Duration Three years
- Products Indicators of Water Availability  
Trends in Hydrologic  
Indicators



## Focused Area Studies

- Only Nine Selected Areas
- Designed to inform the nation on ecological needs for water
- Smaller Basins
- Three years
- Relevant Studies and Products to expand our knowledge of how hydrologic variability affects aquatic communities

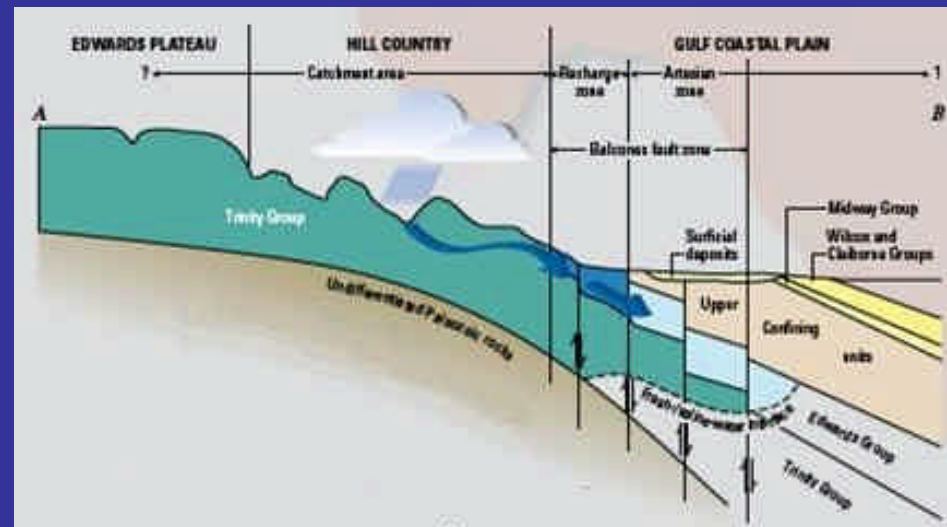
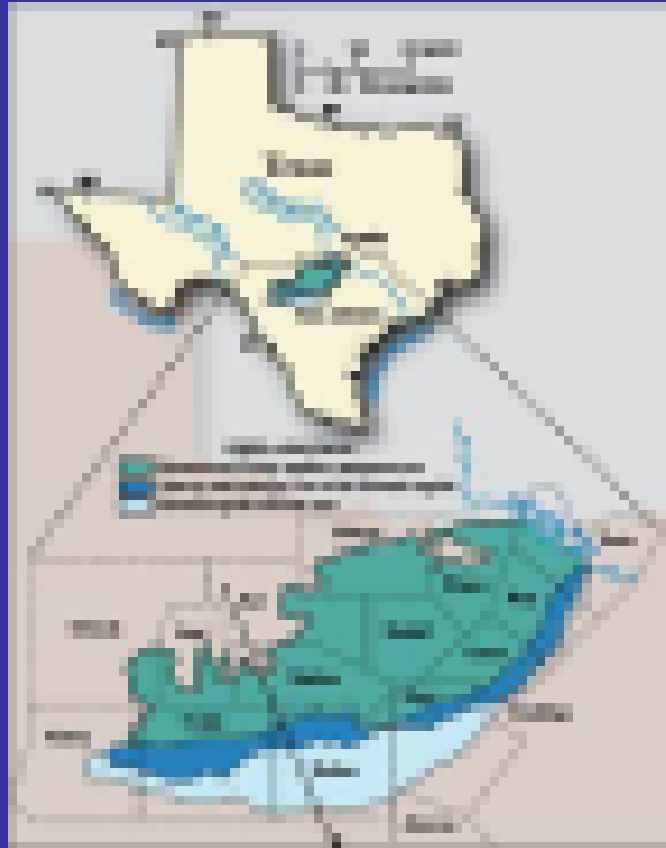


# National Cooperative Geologic Mapping Program

Integration of:

- geologic mapping,
- geophysical surveys,
- geochronology,
- three-dimensional modeling,
- geochemistry

to develop geologic and hydrologic frameworks

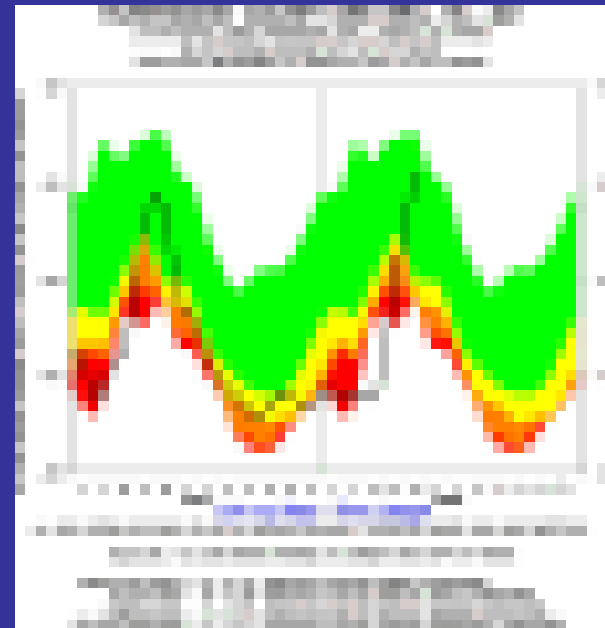


# Expanding National Capabilities

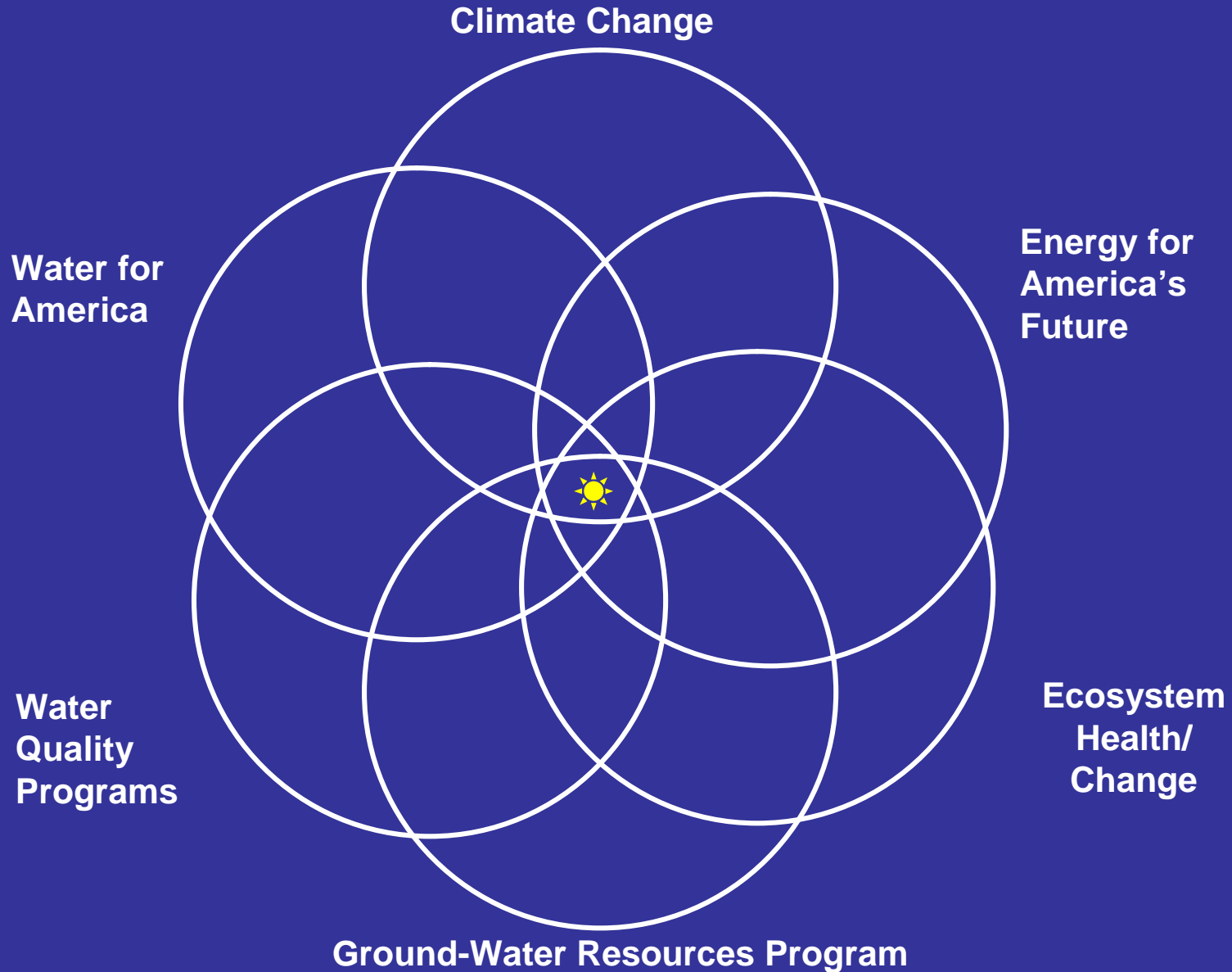
New Cyber Infrastructure  
Providing Hydrologic Data  
to the Public



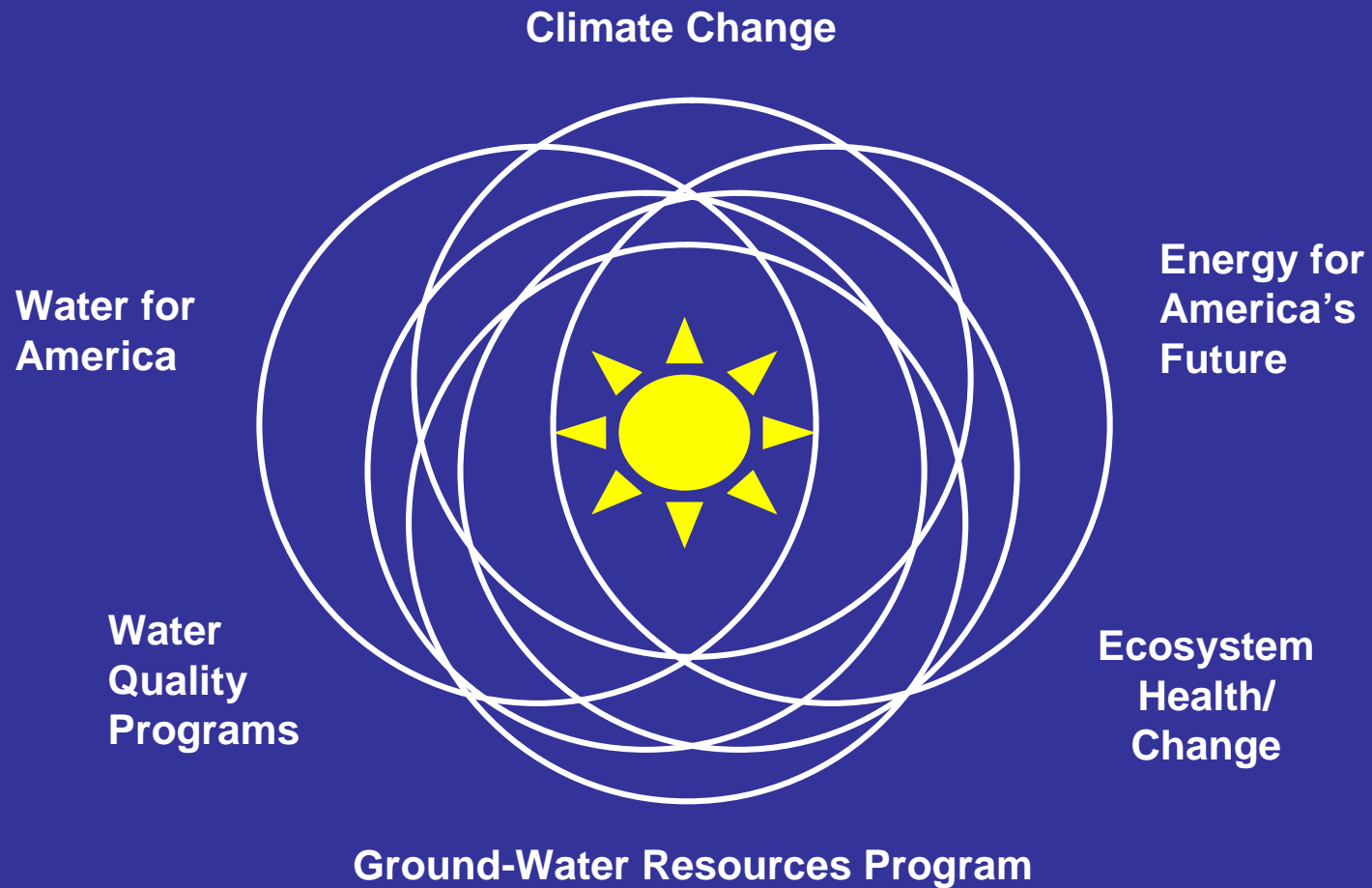
Enhance Accessibility of Data  
ACWI, Subcommittee on Ground Water  
Expand Capability to Share Ground-Water  
Data Across Agencies that Collect Them.



# Program Integration

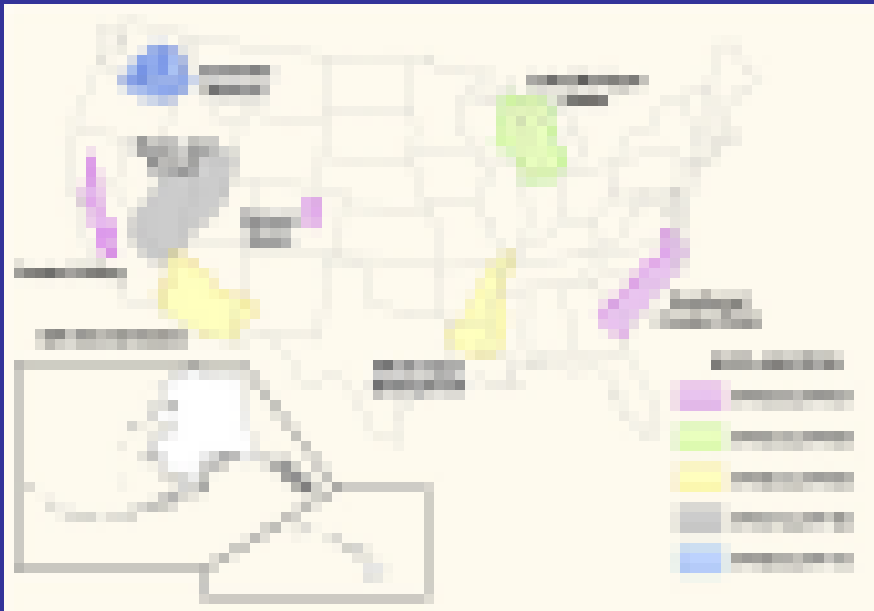


# Program Integration

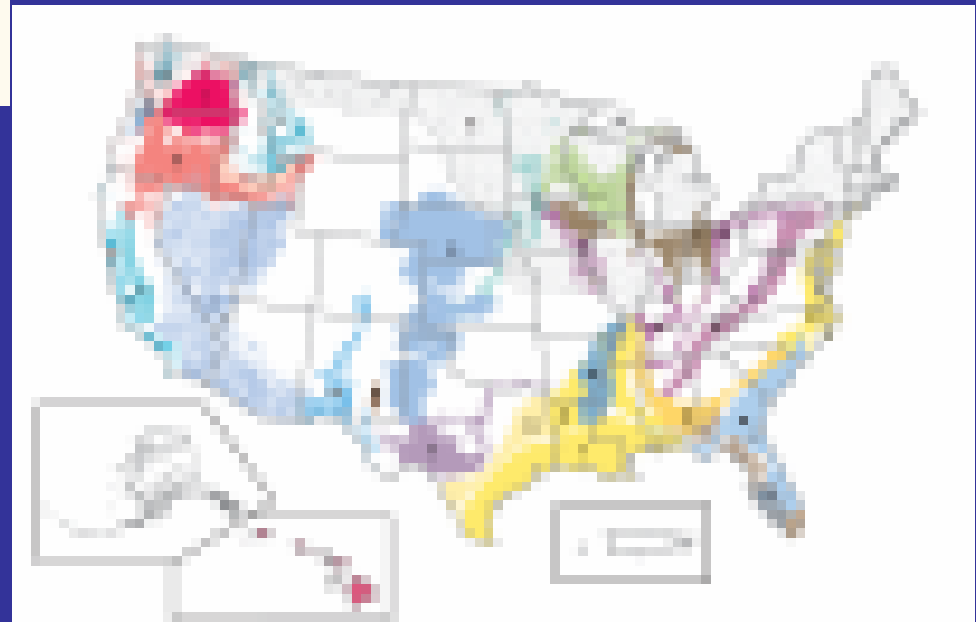


# Substantive Information about Ground Water

## The Regional Ground-Water Availability Studies



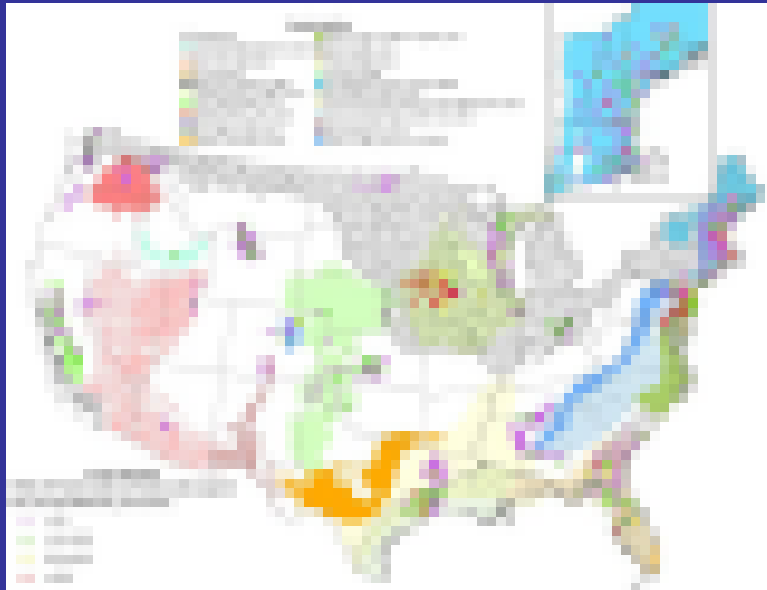
These studies will be the deep ground-water component of the Water Census



# Collaborative Work Under Discussion

## Water Quality

How do widespread naturally occurring constituents like total dissolved solids, arsenic or radionuclides influence water availability?

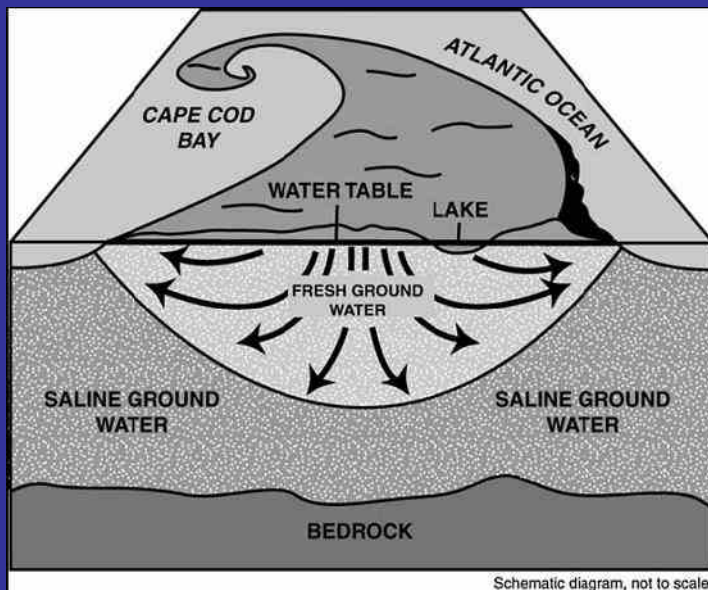


How do widespread anthropogenically-introduced constituents like high nitrate ground water influence water availability?

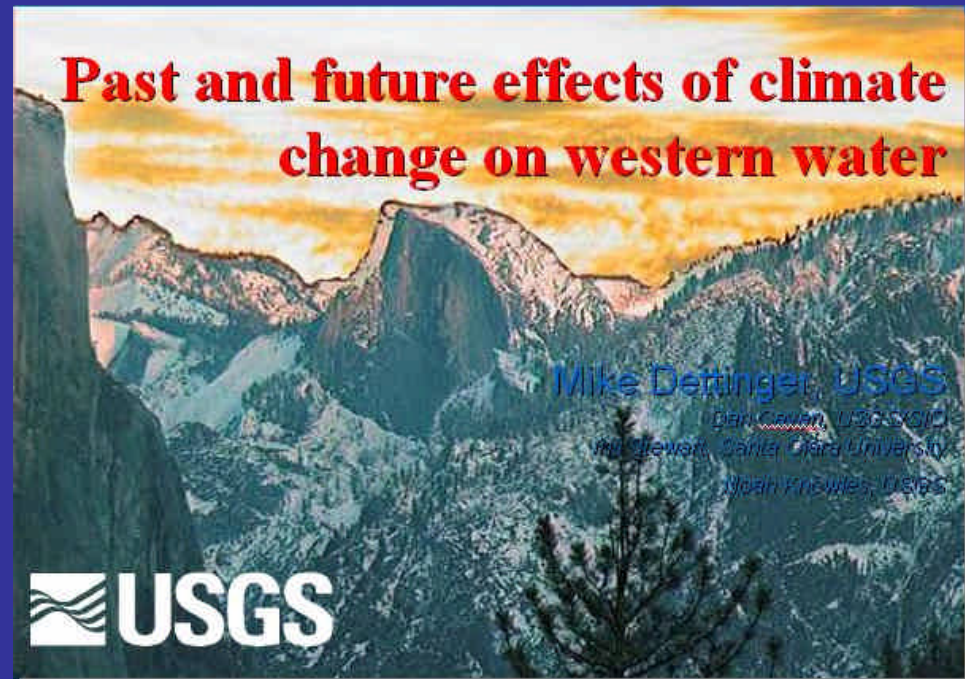
# Collaborative Work Under Discussion

## Climate Change

How will projected sea-level rise influence coastal ground water and surface water sources?



J.P. Masterson, S.P. Garabedian *GROUND WATER* 45, no. 2: 209–217



How will climate variability affect existing water sources?

# Collaborative Work Under Discussion

## Ecosystem Flows / Habitat

- Classify the streams across the nation for their hydro-ecological type
- Develop a regionalization approach to provide ecological flow estimates for regional-water-budget studies
- Better understand the ecological needs of aquatic species for quality aquatic habitat and streamflow



# Collaborative Work Under Discussion

## Geographic Research

Develop new approaches to monitoring and tracking changes in land cover, including changes due to irrigation activities, that can be used to drive predictive models

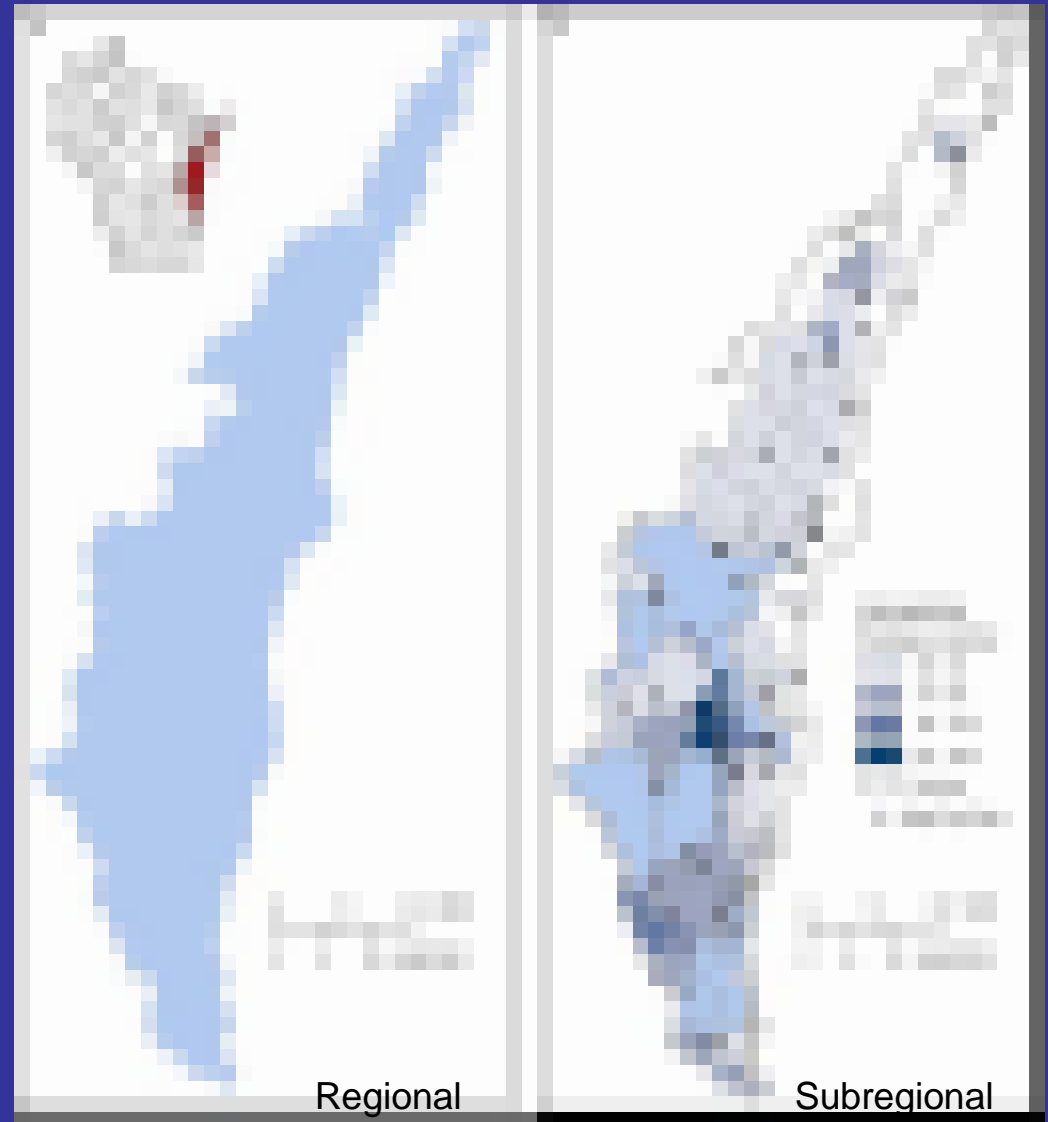


# GREAT LAKES BASIN PILOT PROJECT



<http://water.usgs.gov/wateravailability/greatlakes>

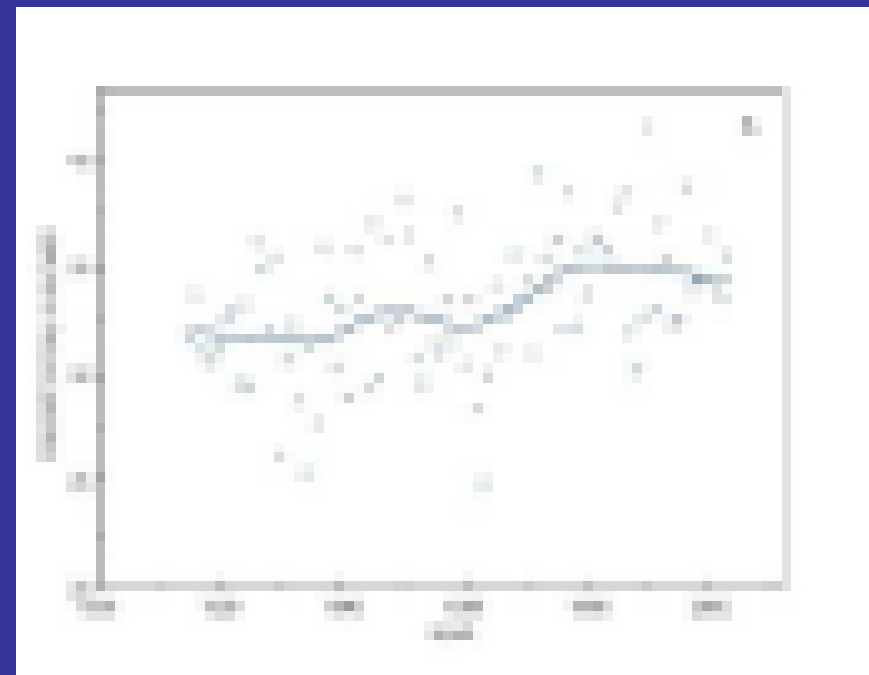
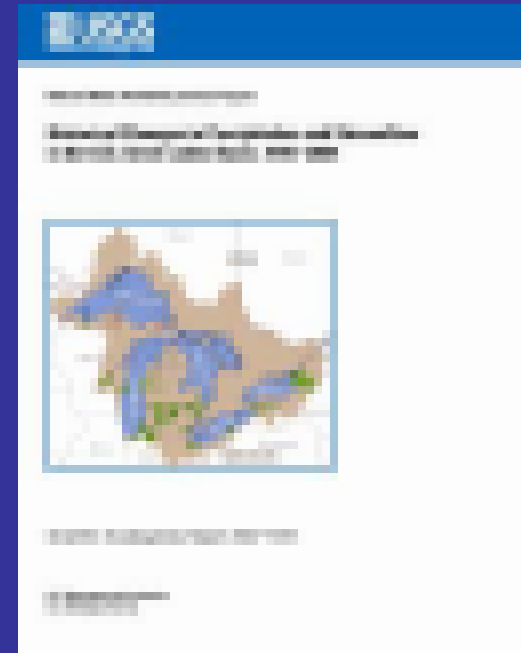
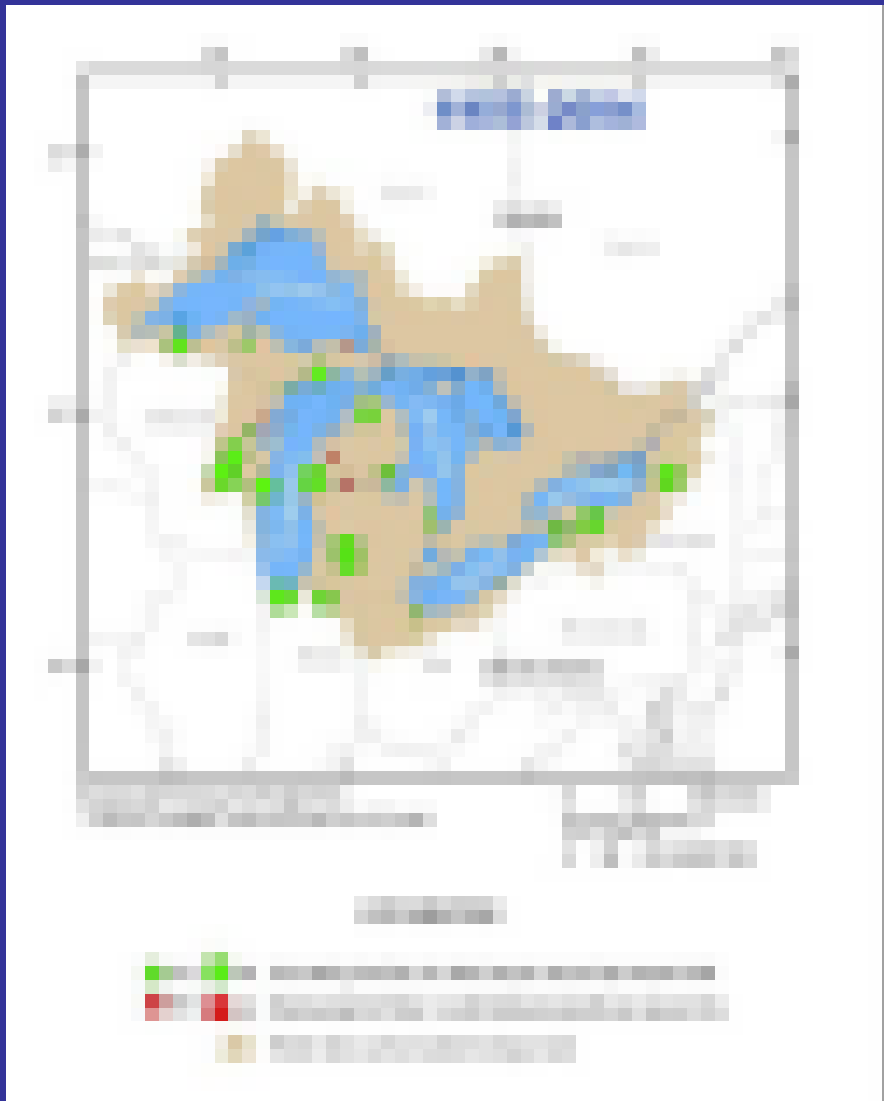
# GROUND-WATER RECHARGE



# GROUND-WATER STORAGE AND DIVIDES

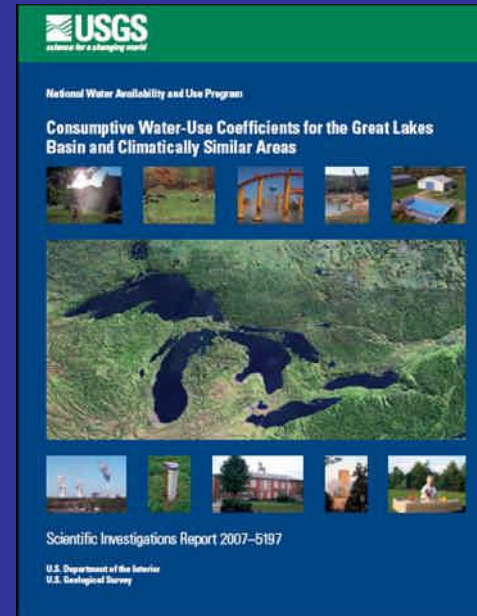


# HISTORICAL CHANGES IN PRECIP. AND STREAMFLOW



# WATER-USE PRODUCTS

- Consumptive water-use coefficients for the Great Lakes Basin and climatically similar areas.




- Seasonal and monthly water use and consumptive use for selected water-use categories and water-use types.
- Estimated use of water in the Great Lakes Basin by hydrologic unit code (HUC 8) in 2005

# LAKE-LEVEL VARIABILITY

**THE USGS**  
UNITED STATES GEOLOGICAL SURVEY

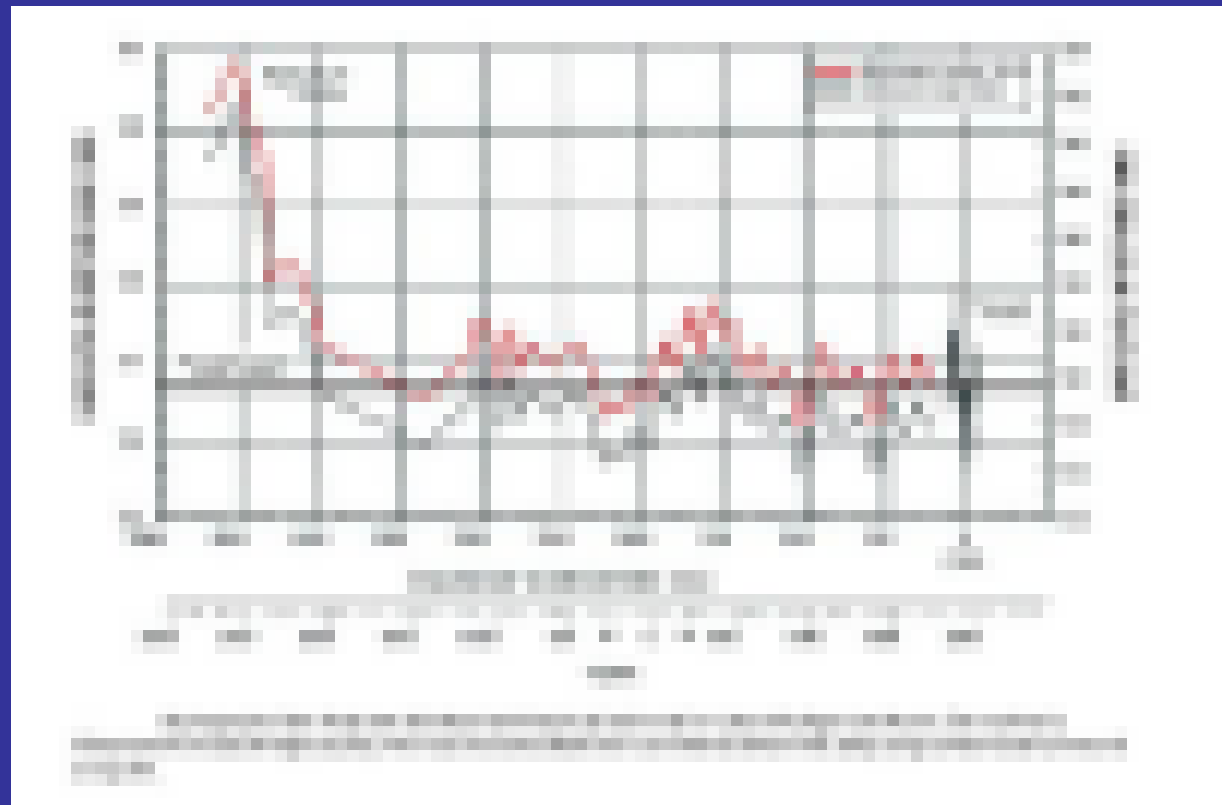
Environmental Research and Data Center

Estimating and Predicting Interannual Variability  
in the Laurentian Great Lakes



Volume 102

© 2004 USGS



# The Voice of our Stakeholders

Stakeholders have asked and we have heard!

What we will do:

- Engage State water resource agencies in detailed discussions about work that has been done and how it can be incorporated into the regional and National assessments of water availability indicators.
- Provide products that demonstrate knowledge of the relevant Regional issues and answer the States questions.
- Once a Regional study has achieved its primary obligations, we will utilize its resources towards a more detailed analysis of water availability within the region.

What we won't do:

- Proceed with these studies without talking to the State agencies and without accounting for the wealth of information that States have already assembled and analyzed.
- Utilize a “cookie cutter” approach of producing the same types of information across the Nation, where that information has no relevance to the Regional conditions.

# The Voice of our Stakeholders

Nineteen formal comments received from the May 28th letter.

Three Federal Agencies

Six State Agencies

Two County/Water Districts

Two Private Citizens

Four National NGOs

One State NGO

One Water Company

Geographic Distribution of non-Federal and non-National NGOs:

One - North East

Three – South East

One – Midwest

Two – North Central

One – South Central

Two – North West

Two – South West

Twenty-two presentations were made over the last 30 weeks where feedback was obtained. The venues included the following organizations:

ACWI

ICWP

ASWIPCA

AASG x2

AMWA

SWAQ

WSWC

NWQMC

USACE

TVA

SWRR

EPRI x2

NWS x2

DRBC

State of Ohio Cooperators

States of IA, IL, WI Cooperators

Environment Canada

Alabama Water Resources Conf.

NAWQA National Liaison Comm.

# The Voice of our Stakeholders

Main points that stakeholders raised in response to the question: “*What criteria should be used to decide where to start our first regional studies?*”

- A. Regions with **large and growing populations** that are experiencing **critical shortages recently**.
- B. Areas experiencing significant **environmental stress** due to anthropogenic alterations in flow patterns and availability, emphasizing areas with numerous **T&E species habitats**.
- C. Regions with significant **interstate conflicts** or **intrastate conflicts** over water allocation or **water quality protection** where additional science may be useful to help reduce or resolve legal or political conflicts.
- D. Regions in which **water uses** are **approaching the limits of availability** in many of the watersheds; what is the likelihood of **population centers being de-watered**.
- E. Regions in which significant changes in use are anticipated due to **energy development** or other economic or demographic changes;
- F. Population size and **economic sensitivity** to current and potential water management risks; and
- G. Areas where you have seen an increase in the **frequency and intensity of drought conditions**.
- H. Areas of **large historic groundwater level decline**
- I. Areas that have shown a **pro-active attitude** in the development on integrated watershed management plans.

# The Voice of our Stakeholders

Main points that stakeholders raised in response to the question: *“What criteria should be used to identify candidate areas for focused area studies?”*

- A. Weight heavily - areas of **contentious issues** between states.
- B. Areas that experienced **dramatic population growth** and demand on water resources.
- C. Areas **pipng water over great distances**.
- D. Significant **drops in the potentiometric surface**, or water table.
- E. **Projected need versus actual supply** in dry/ slightly dry years giving **due heed to fisheries, recreation** etc.
- F. Opportunity to develop **new GIS or modeling functions** with substantial transfer value.
- G. To provide a **variety of water resource analyses, such as groundwater-surface water interaction, aquifer storage and retrieval, reservoir operations and supply challenges in contrasting precipitation zones** across the country.
- H. Regions with significant **interstate conflicts** or **intrastate conflicts** over water allocation or water quality protection.
- I. Regions in which **water uses** are **approaching the limits of availability** in many of the watersheds;
- J. Regions in which significant changes in use are anticipated due to **energy development** or other economic or demographic changes;
- K. **Rate of change in water quality**-positive or negative.

# The Voice of our Stakeholders

Main points that stakeholders raised in response to the question: *“What criteria should be used to identify candidate areas for focused area studies?”*

- L. **Critical ecological issues,**
- M. **Rapid land use change.**
- N. Socioeconomics of water-----what is the likelihood of **population centers being de-watered.**
- O. **Size:** Large enough area to adequately represent urban and rural issues, but small enough to conduct an effective study.
- P. **Importance of environmental issues within the area.**
- Q. Accessibility and resources already in place to help in the study.
- R. The focus area should also have a major population center and other land uses (agricultural, open space, mining, etc.), and a uniform climatic zone, among other considerations.
- S. Local areas with problems that have regional or national significance.
- T. Areas of **large historic groundwater level decline**
- U. Areas with **endangered species or environmental concerns.**
- V. Candidate areas could be determined based on a history of resource mismanagement, overuse, environmental degradation, or problems with long-term supply planning and water shortage.
- W. Areas of concern identified by interagency teams of federal and state agencies

Visit the USGS Water for America website at:  
<http://water.usgs.gov/wsi>