



A National Water Census

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

Primary Water Census questions:

Does the Nation have an adequate quantity of water, with sufficient quality and timing-characteristics, to meet both human and ecological needs?

Will this water be present to meet both existing and future needs?

USGS objective for the Water Census is to place the technical information and tools into stakeholders hands that allow them to evaluate water availability for the questions that they are facing.

USGS Circular 1223: Concepts for National Assessment of Water Availability

<http://pubs.usgs.gov/circ/circ1223/>

Circular 1309: Facing Tomorrow's Challenges – U.S. Geological Survey Science in the Decade 2007 – 2017

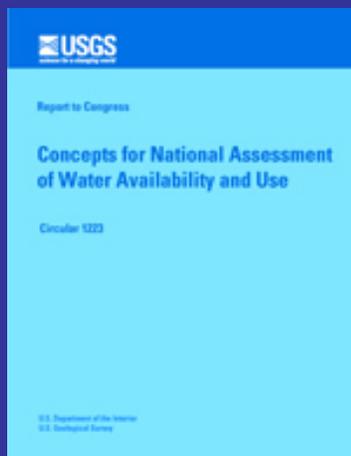
<http://pubs.usgs.gov/circ/2007/1309/>

The SECURE Water Act [P.L. 111-11 , 123 Stat. 991.]

<http://thomas.loc.gov/cgi-bin/query/F?c111:5:./temp/~c111Futjxz:e23270:>

2002 Report to Congress

Circular 1223 proposed to Congress to organize studies around the 21 Water Resource Regions that generally follow the major river basins of the Nation.

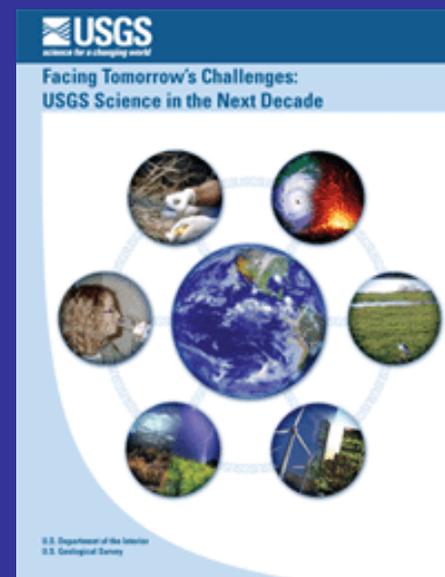


Indicators of Water Availability

- Precipitation
- Evapotranspiration
- Water in storage in snowpack, icefields, and large lakes
- Ground-water level indices
- Rates of ground-water recharge
- Changes in ground-water storage
- Stream and river run-off characteristics
- Stream and river baseflow characteristics
- Total water withdrawals by source
- Interbasin Transfers
- Consumptive Uses
- Return Flows

A Water Census of the United States: Quantifying, Forecasting, and Securing Freshwater for America's Future

- The **status** of freshwater resources and how they are changing,
- **Water use** for human, environmental, and wildlife needs,
- How freshwater availability is related to **natural storage and movement of water** as well as engineered infrastructure,
- The location of **water sources not commonly thought to be a resource** that might provide freshwater for human and environmental needs, and
- **Forecasts** of likely outcomes of water availability, quality, and aquatic ecosystem health due to changes in land use and cover, natural and engineered infrastructure, water use, and climate.



Water for America proposed two levels of study:

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



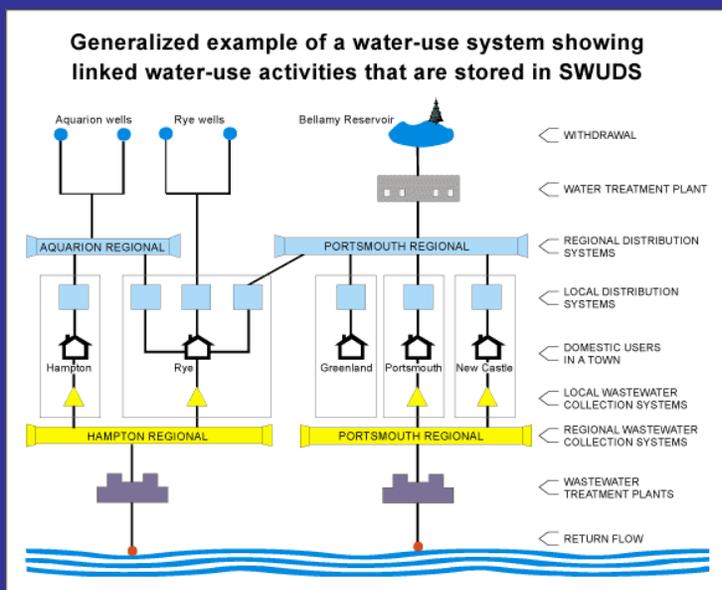
Focused Area Studies

- 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



Areas of Emphasis for Science Resources

Water Use Science



Ecological Flows



Congress said they recognized
the importance of the work in
Water for America

But recommended USGS submit a
more integrated program request in
a future budget.

H.R. 146 Subtitle F
(SECURE Water Act as passed by the House March 25, 2009)

Section 9501: Findings

Section 9502: Definitions

Section 9503: Reclamation Climate Change and Water Program

Section 9504: Water Management Improvement

Section 9505: Hydroelectric Power Assessment

Section 9506: Climate Change and Water Intergovernmental Panel

Section 9507: Water Data Enhancement by United States Geological Survey

Full National Streamflow Information Program.

Creates a National Groundwater Resources Monitoring Program and a Brackish Groundwater Assessment.

Section 9508: Water Availability Assessments

Creates a national program to study water quality and quantity.

Requires first report in 2012 and every 5 years thereafter.

Grants are available to assist state agencies in developing and integrating state water use data.

Section 9509: Research Agreement Authority

Section 9510: Effect

H.R. 146 Subtitle F
(SECURE Water Act as passed by the House March 25, 2009)

Section 9507: Water Data Enhancement by United States Geological Survey

Directs USGS to fully implement the National Streamflow Information Program.

Establishes a base network of 4,700 gages funded directly through federal appropriation.

Creates a National Groundwater Resources Monitoring Program for each “major aquifer system,” and a Brackish Groundwater Assessment, with a report in 2 years.

Section 9508: Water Availability Assessments

Directs creation of a national program to study water quality and quantity. Describes a significant water use component. Requires first report in 2012 and every 5 years thereafter.

*Includes a grant authority for state water resource agencies. Grants are available to assist state agencies in **developing and integrating state water use data** with datasets maintained by the DOI for the Water Availability Assessments.*

Section 9508 of SECURE Water calls for a National Water Availability and Use Assessment Program

1. Assessment of the status of the water resources of the United States;
2. Quantity of water that is available for beneficial uses;
3. Quality of the water resources of the United States;
4. Long-term trends in water availability;
5. For each long-term trend - a more accurate assessment of the change in the availability of water
6. Develop the basis for an improved ability to forecast the availability.

Program Elements-

(1)WATER USE-

- comprehensive national water use inventory
- incorporate water use science principles
- integrate datasets maintained by Federal or State agency
- scientific integration - relating to water use, water flow, water quality

Program Elements-

(2) WATER AVAILABILITY-

- nationally consistent indicators
 - surface water indicators
 - groundwater indicators
 - » natural recharge;
 - » withdrawals;
 - » saltwater intrusion;
 - » mine dewatering;
 - » land drainage;
 - » artificial recharge; and
 - » other relevant factors,
 - impaired surface and groundwater supplies used for existing demands;

Program Elements-

- Maintain a national database of water availability data that--
 - maps, reports, and other forms of interpreted data;
 - electronic access to the archived data of the national database;
 - provides for real-time data collection;
- Predictive modeling tools - integrate groundwater, surface water, ecological systems.

Report- Not later than December 31, 2012, and every 5 years thereafter:

1. The **current availability** of water resources in the United States
 - (A) historic trends and annual updates of river basin inflows and outflows
 - (B) surface water storage
 - (C) groundwater reserves
 - (D) estimates of undeveloped potential resources (saline, brackish, and wastewater)

2. **Significant trends** affecting water **availability**, including documented or projected impacts as a result of global climate change

Report- Not later than December 31, 2012, and every 5 years thereafter:

3. The **withdrawal and use** of surface water and groundwater by various sectors, including—
 - (A) the agricultural sector;
 - (B) municipalities;
 - (C) the industrial sector;
 - (D) thermoelectric power generators; and
 - (E) hydroelectric power generators;

Report- Not later than December 31, 2012, and every 5 years thereafter:

4. **Significant trends** relating to each **water use** sector, including significant changes in water use due to the development of new energy supplies
5. **Significant water use conflicts or shortages** that have occurred or are occurring
6. Each **factor** that has **caused**, or is causing, a conflict or shortage.

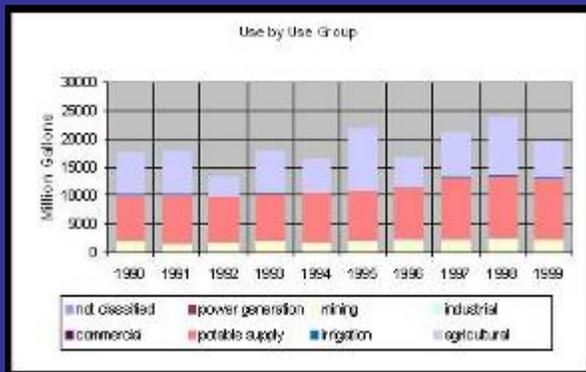
Where do we go from here?

- Bring all of the existing plans and legislative mandates together.
- Integrate existing science efforts to bring more resources to bear on water availability questions.
- Develop an implementation plan for the Water Census

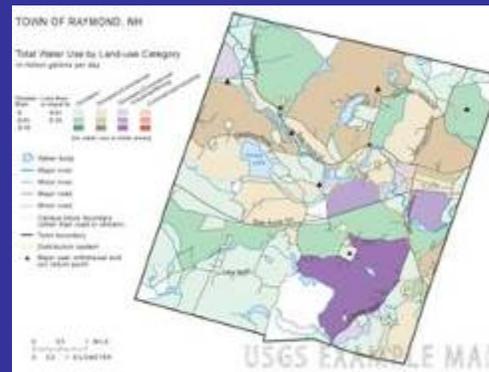
Enhancing the Nation's Water Use Information

Use New Methods to Estimate Water Use

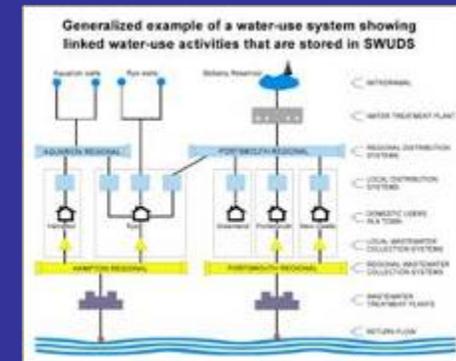
- Stratified Random Sampling
- Regression Models



Develop models of water use based on land use



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



Estimates of Consumptive Use by Categories

Map and Quantify Interbasin Transfers and Return Flows

Develop a strong Geospatial Component

Develop a stronger Trends Component

New Water Use Initiative

Flows Needs for Wildlife and Habitat

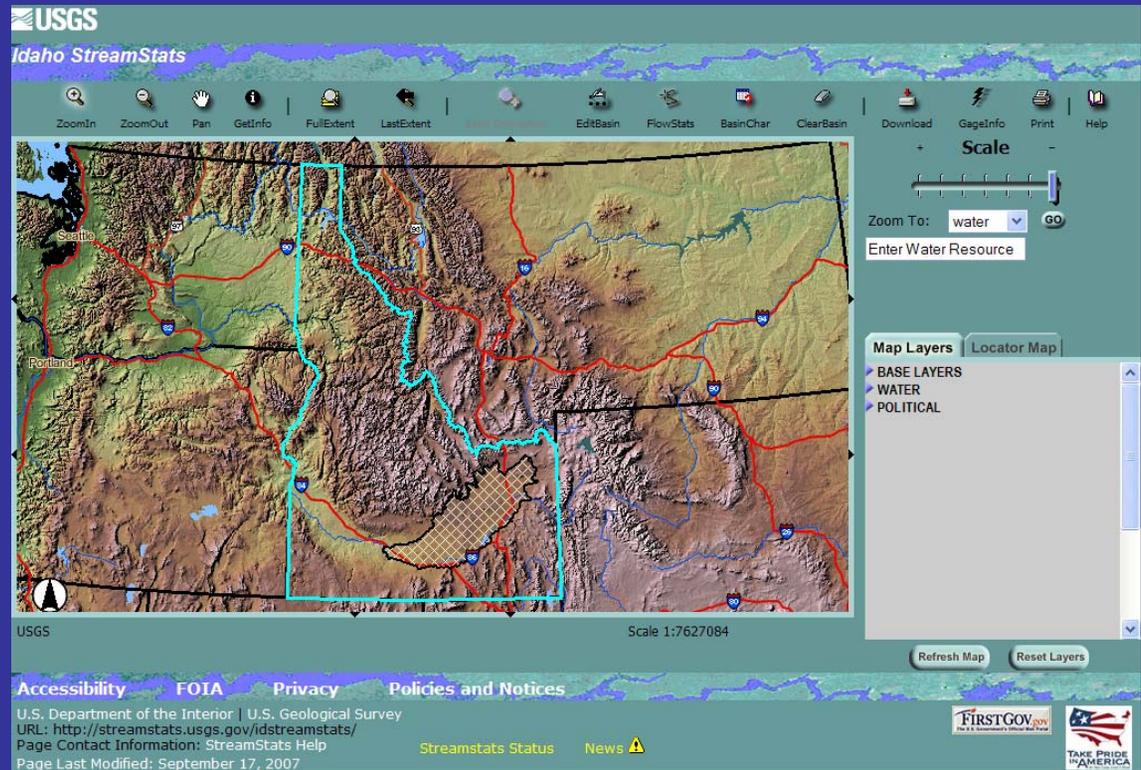
- Classify the streams across the nation for their hydro-ecological type
- Systematically examine the ecological affects of hydrologic alteration
- Develop flow alteration – ecological response relationships for each type of river or stream.



StreamStats

Use the strength of the StreamStats application to deliver the information on:

- Precipitation
- Runoff
- Baseflow
- Trends
- Integrating upstream
 - Withdrawal
 - Use
 - Consumption
 - Return flow

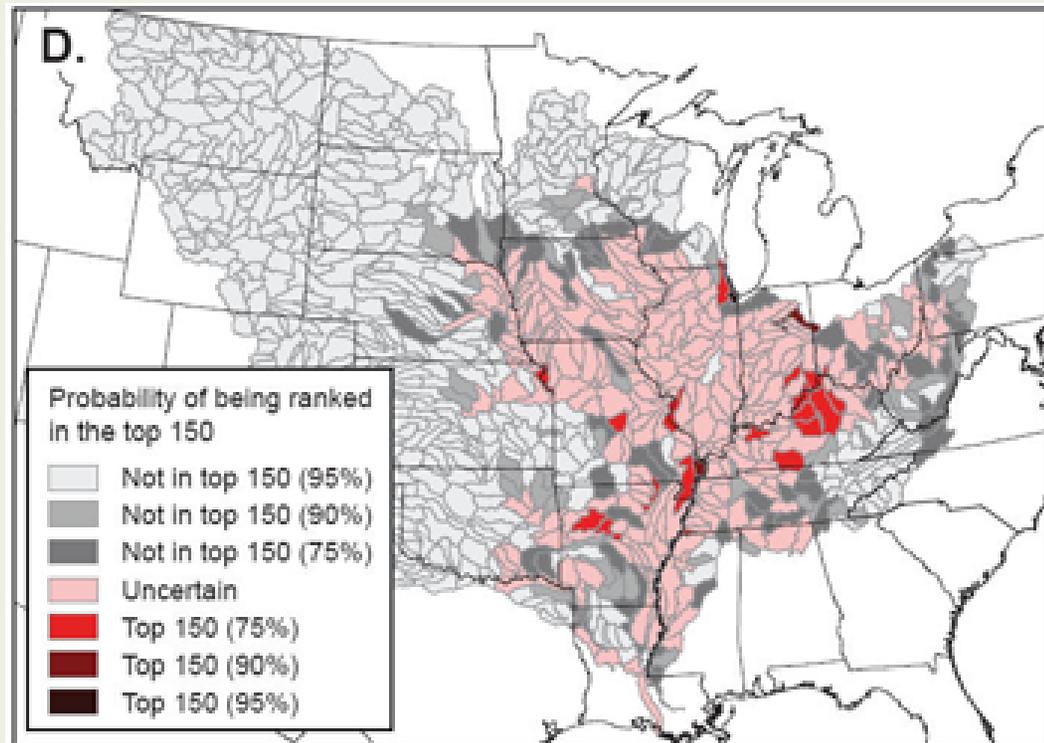


NAWQA Program

Use the strength of the NAWQA Program and tools like SPARROW to:

- Demonstrate the degree of water quality impairment that limits water availability
- Define the main compounds of importance.
- Relate to water use and return
- Trends

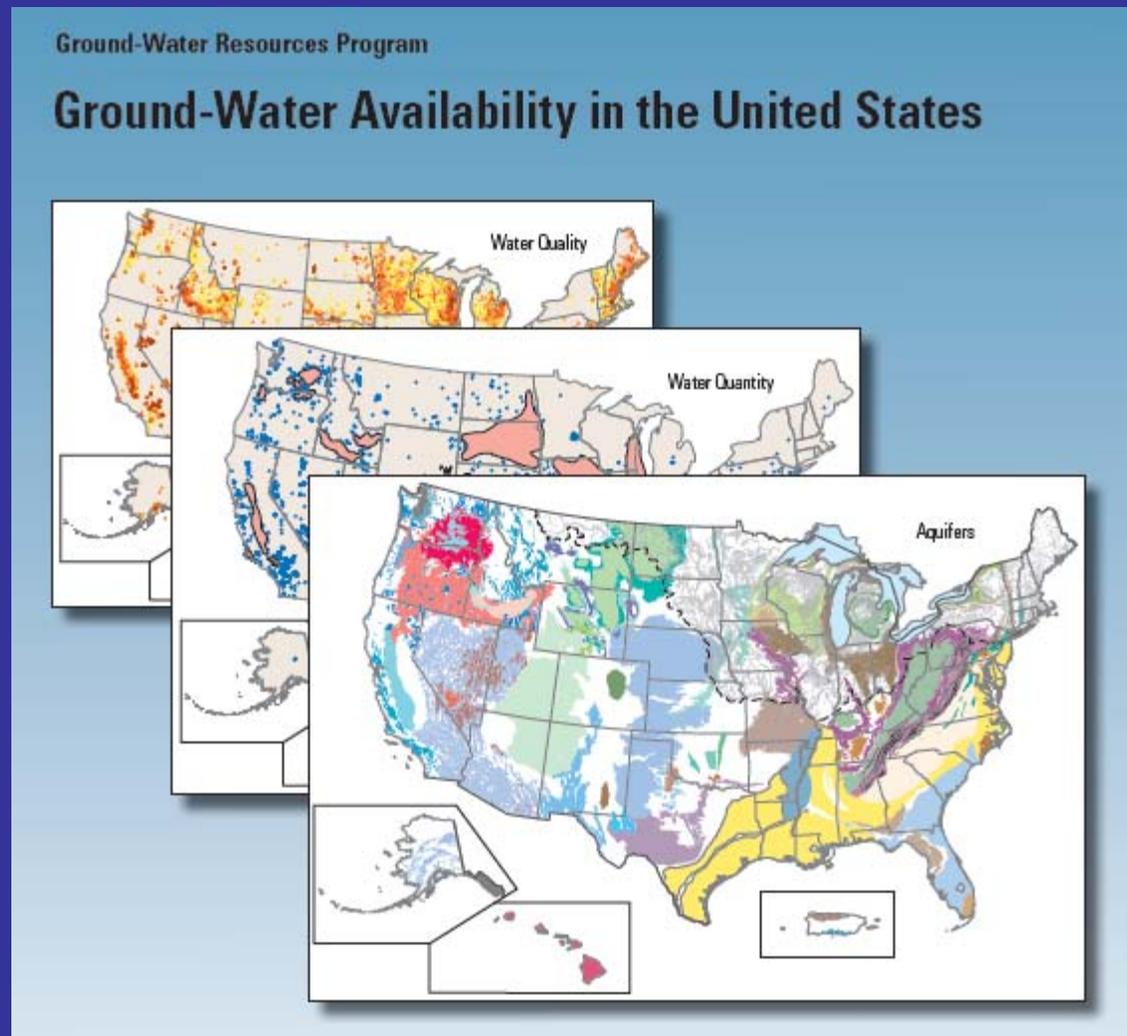
Ranking of Total Phosphorus Yields Delivered to the Gulf of Mexico



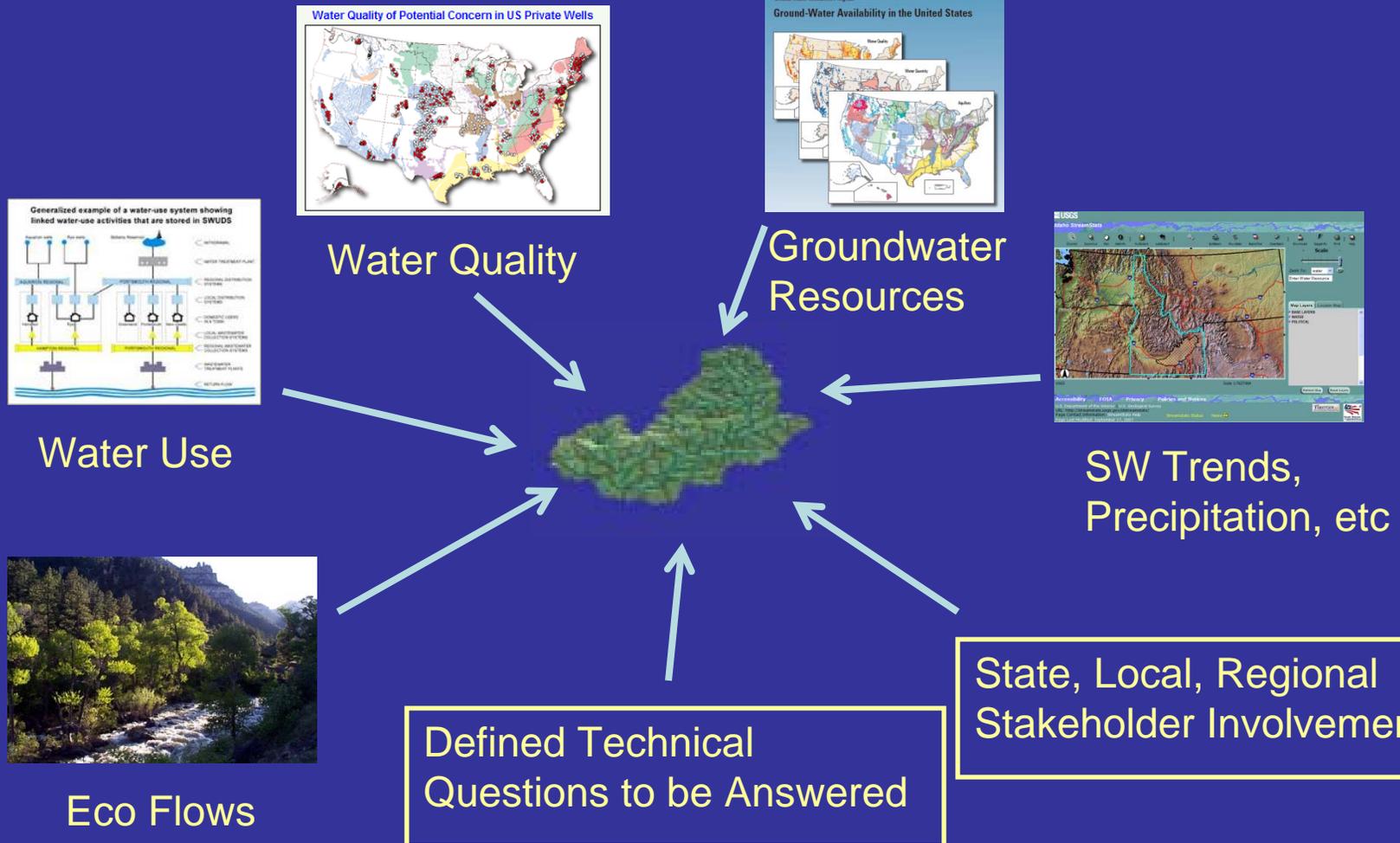
Regional Groundwater Assessments

Use the strength and enhance the resources within this program to provide the information on:

- Recharge
- GW yields
- Changes in storage.
- Saltwater Intrusion
- Trends in GW Indices
- Artificial Recharge
- Brackish and Saline Resources
- GW/SW Interactions
- Ecological Flows



Focused Water Availability Assessments



How is New Jersey positioned in this process?

- Great coverage of monitoring stations to look at trends in water quality, groundwater, surface water.
- Absolutely, one of the best water use datasets in the Nation.
- New Jersey Water Tracking Model and consumptive use coefficients to use for hypothesis testing.
- NJHAT and HIP tools to use for Ecoflow analysis.
- Excellent coverage of groundwater models for a large percentage of the State.
- State Water Supply Master Plan lays out many future alternatives to be evaluated.

What should New Jersey do from here?

- Stay in touch as we define objectives for implementing the Water Census implementation plan.
- Define the water availability questions that you would like to answer and the technical information needed.
- Communicate through the USGS NJ WSC to the USGS Eastern Region about your needs, questions, past planning/technical advances, and the potential for early products.

GREAT LAKES BASIN PILOT PROJECT



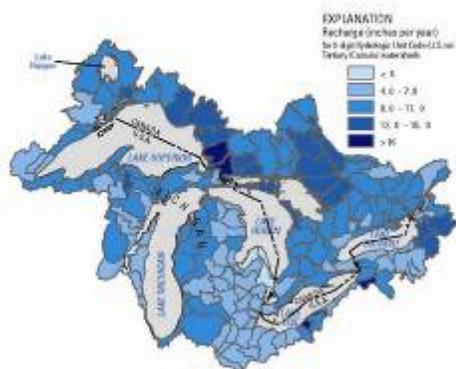
<http://water.usgs.gov/wateravailability/greatlakes>

GROUND-WATER RECHARGE



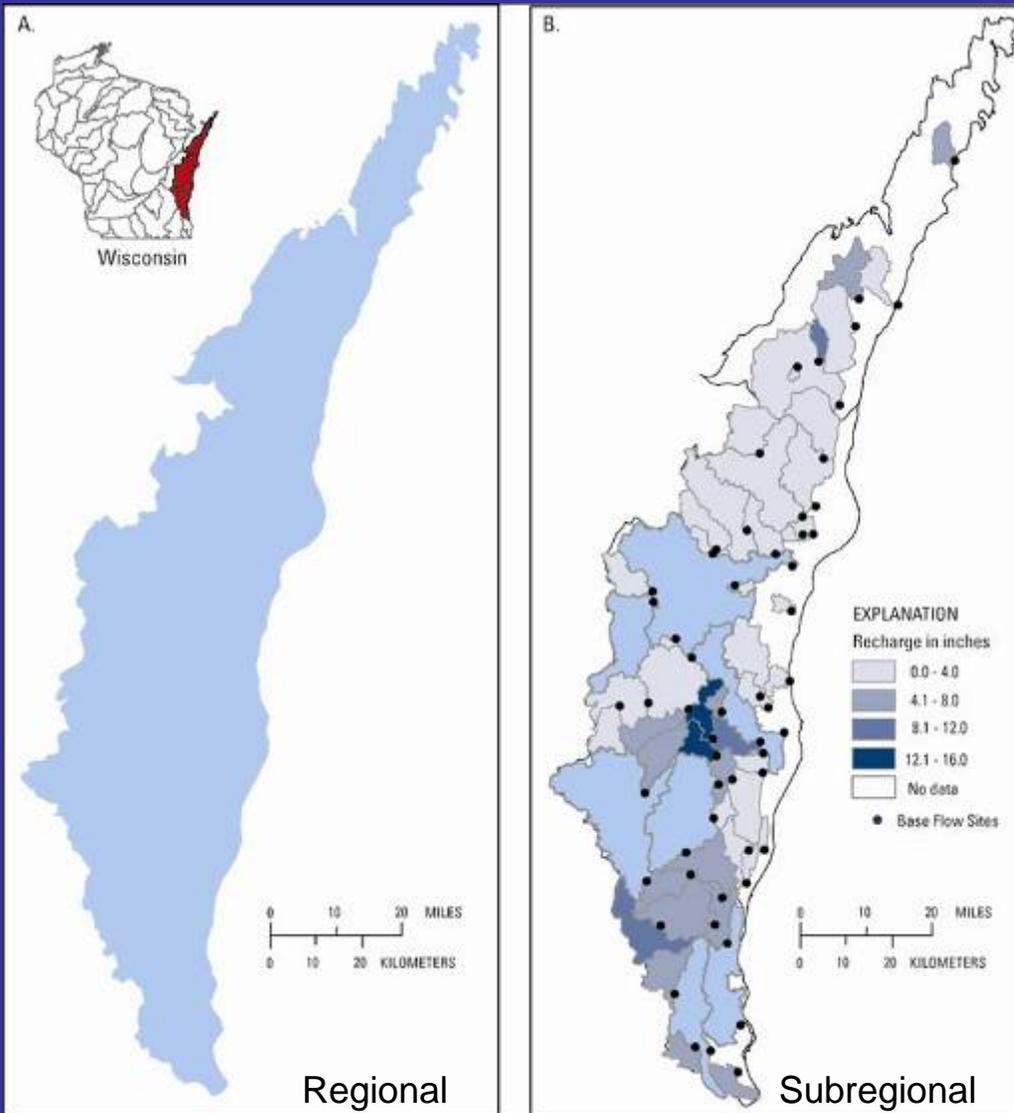
In cooperation with the National Water Research Institute, Environment Canada
National Assessment of Water Availability and Use Program

Estimation of Shallow Ground-Water Recharge in the Great Lakes Basin



Scientific Investigations Report 2005-5284

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

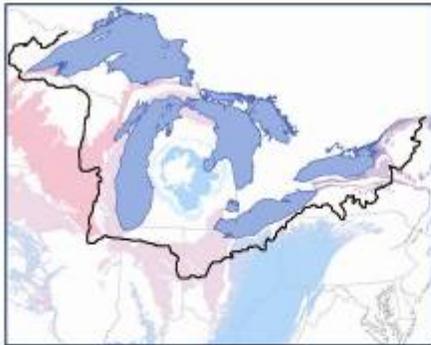


GROUND-WATER STORAGE AND DIVIDES



National Water Availability and Use Program

Compilation of Regional Ground-Water Divides for Principal Aquifers Corresponding to the Great Lakes Basin, United States



Scientific Investigations Report 2006-5102

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



EXPLANATION

- Center of pumping, 1950 (16.9 million gallons per day)
- Center of pumping, 2000 (33.5 million gallons per day)
- Deep sandstone aquifer ground-water divide
 - 1860 (Predevelopment)
 - 1950
 - 2002
- Regional surface-water divide

HISTORICAL CHANGES IN PRECIP. AND STREAMFLOW



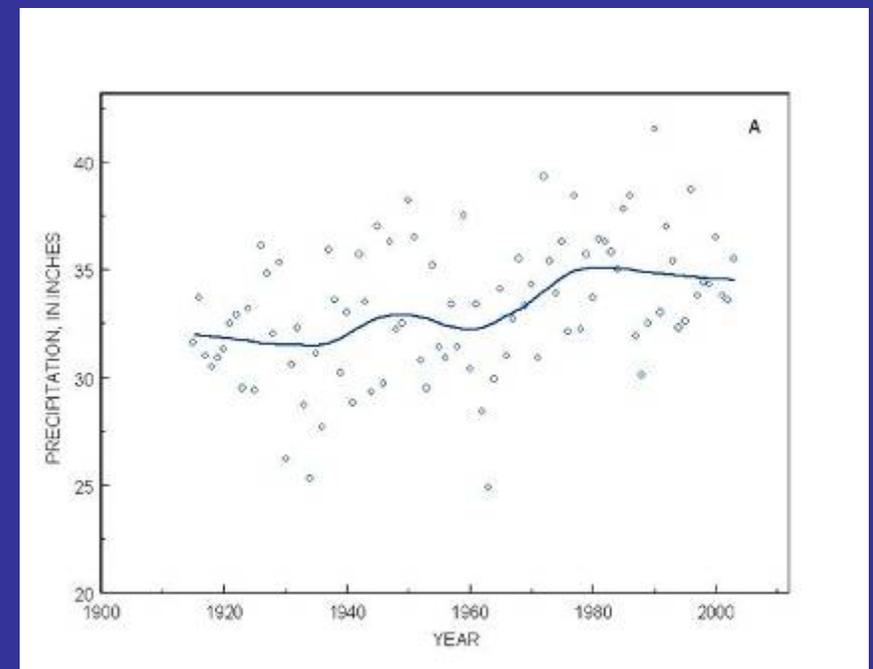
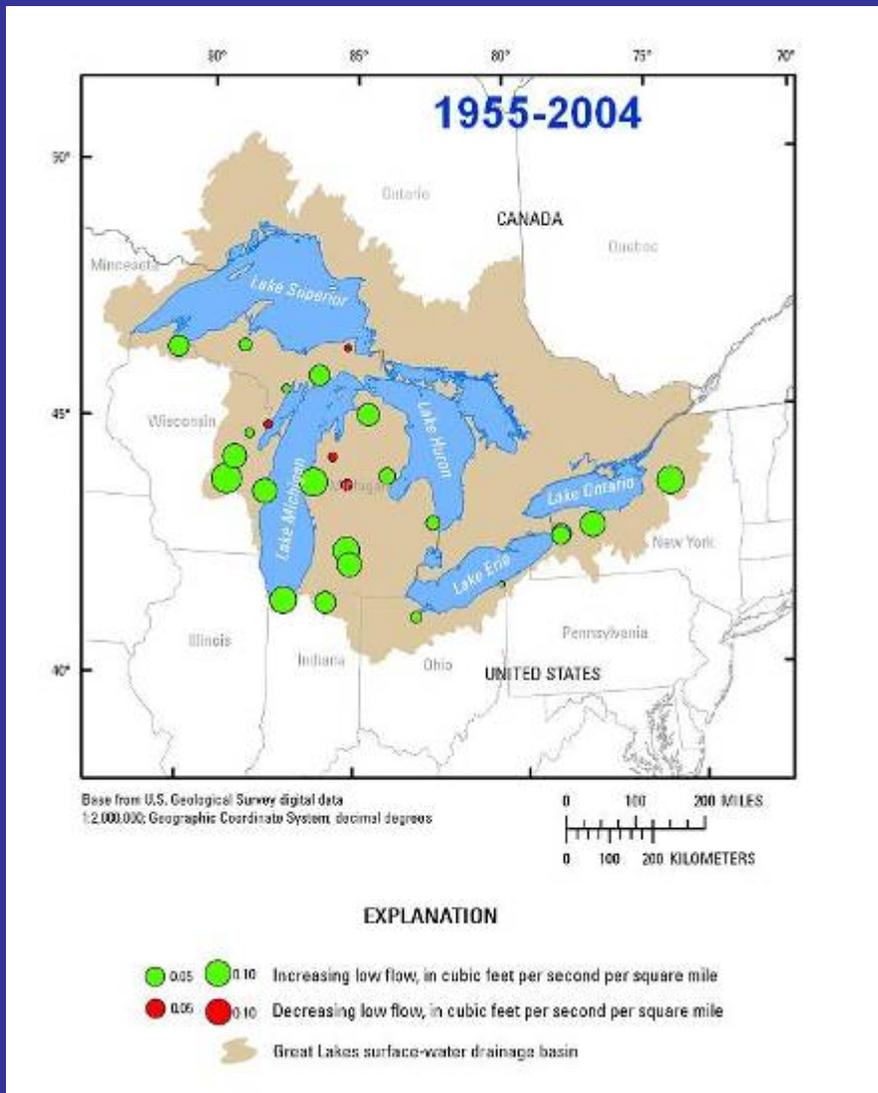
National Water Availability and Use Program

Historical Changes in Precipitation and Streamflow in the U.S. Great Lakes Basin, 1915–2004



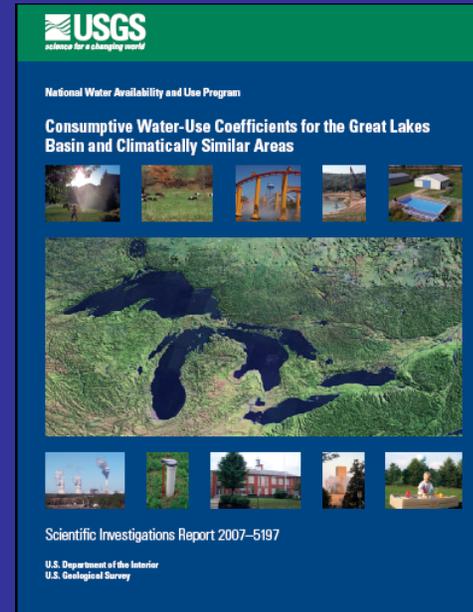
Scientific Investigations Report 2007–5118

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



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



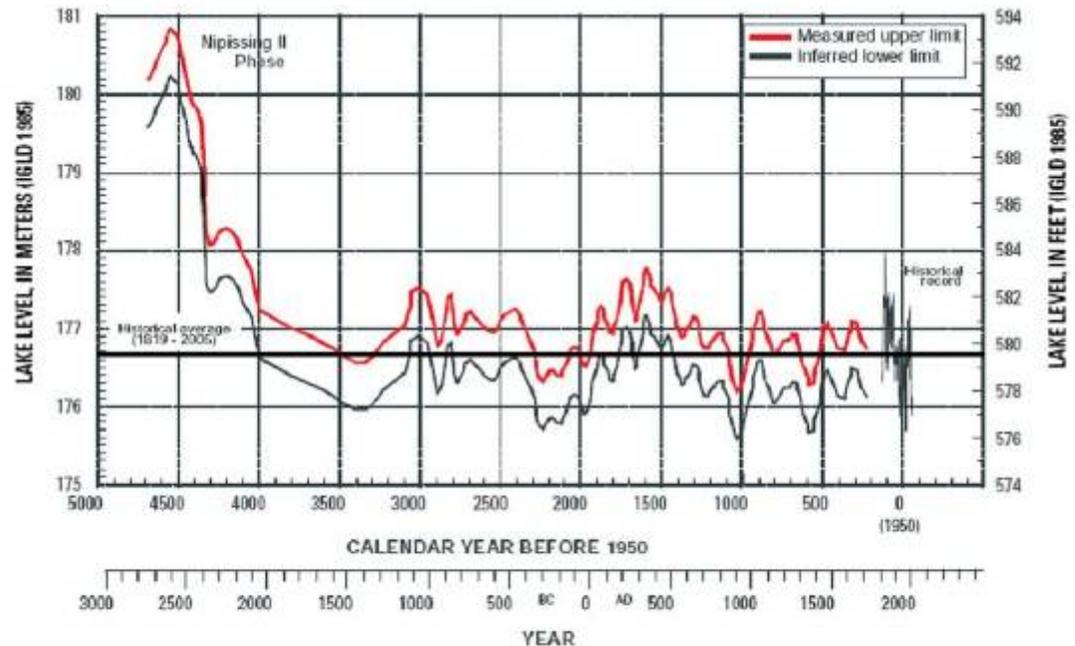
National Water Availability and Use Program

Lake-Level Variability and Water Availability
in the Great Lakes



Circular 1311

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



Hydrograph of late Holocene lake level and historical lake level for Lakes Michigan and Huron. The red line is interpreted from beach-ridge studies, whereas the lower black line is an inferred lower limit using range of the historical record as a guide.

The objective is to place the information and tools into stakeholders hands to answer the questions they are facing.



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