



Water Resources, Population Growth, and Land Use Change and the USGS Water for America Initiative

Matthew C. Larsen
USGS Chief Scientist for Hydrology

UF Water Institute Symposium:
Sustainable Water Resources: Florida Challenges, Global Solutions

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

You can't manage what you don't measure

Directive from Congress to USGS, 2002, House Committee on Appropriations:

“The Committee is concerned about the future of water availability for the Nation. Water is vital to the needs of growing communities, agriculture, energy production, and critical ecosystems.

Unfortunately, a nationwide assessment of water availability for the United States does not exist, or, at best, is several decades old.

The Committee directs that the USGS prepare a report describing the scope and magnitude of the efforts needed to provide periodic assessments of the status and trends in the availability and use of freshwater resources.”



Report to Congress

Concepts for National Assessment of Water Availability and Use

Circular 1223

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 (2007)



Fairmount Water Works, Philadelphia
1815 - 1911

Bureau of Reclamation activities, Water for America initiative

Three components, \$13M in new funding

- Planning our Nations Water Future
(Comprehensive Basin Supply and Demand Studies; Climate and hydrologic modeling to be included)
- Increasing Supplies through Improved Efficiency
(Challenge Grant Program and Water Conservation Field Services)
- Securing Water Supplies by Accelerating Species Recovery
(five projects – CA Central Valley/Delta; Columbia/Snake Salmon; Platte River; Middle Rio Grande; Klamath)

In the next decade, the Nation will have a new appraisal for water availability: a water census

In the FY 2009 Budget, the President has requested funds for a USGS initiative to:

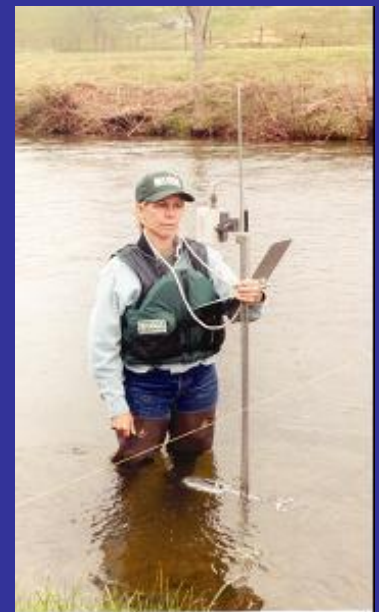
- Conduct nationwide assessment of water availability
- Regional- and local-scale studies
- Cooperate with State and local government in selected watersheds
- Cooperate with States to map the geologic framework of aquifers
- Modernize the Nation's 7,400+ streamgages



The Initiative is funded through program changes to:

National Streamflow Information Program +\$5.0 M

- Add high data rate transmission capability
- Re-establish recently discontinued streamgages
- Support regional-scale studies and intensive studies
- New cyber infrastructure to provide data to the public



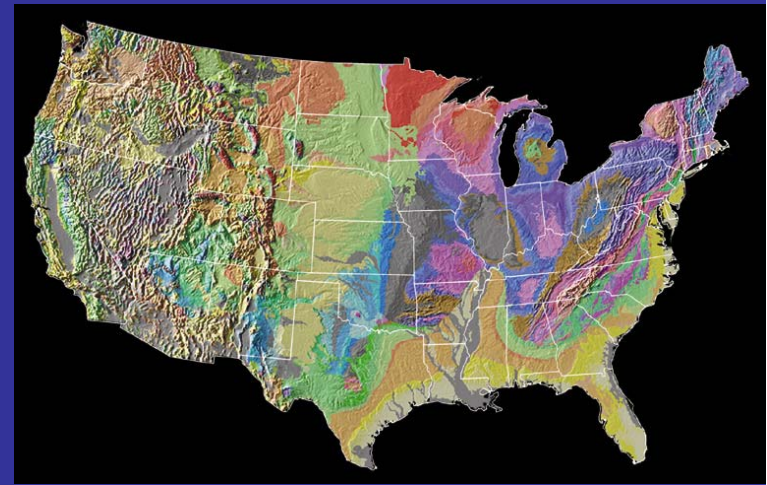
Ground-Water Resources Program +\$3.0 M

- Methods to enhance the Nation's water use data.
- Share ground-water data across multiple agencies.
- Support regional-scale studies and intensive studies



National Cooperative Geologic Mapping Program +\$1.5 M

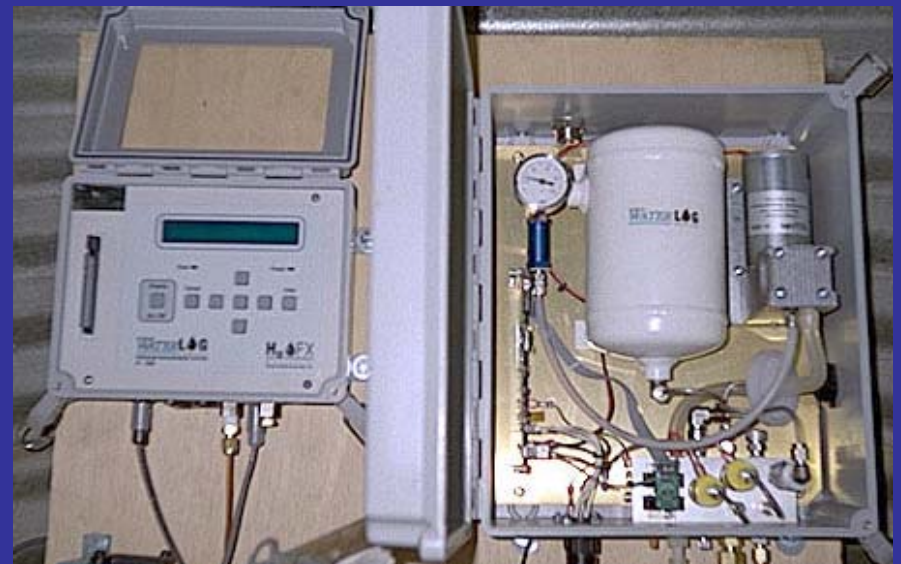
- Enhance geologic mapping and hydrogeologic knowledge of the Regions being studied.
- FEDMAP and STATEMAP



Expanding and enhancing streamflow information infrastructure



Ensure rapid realtime communications
With high data rate radios



Re-establish discontinued streamgages

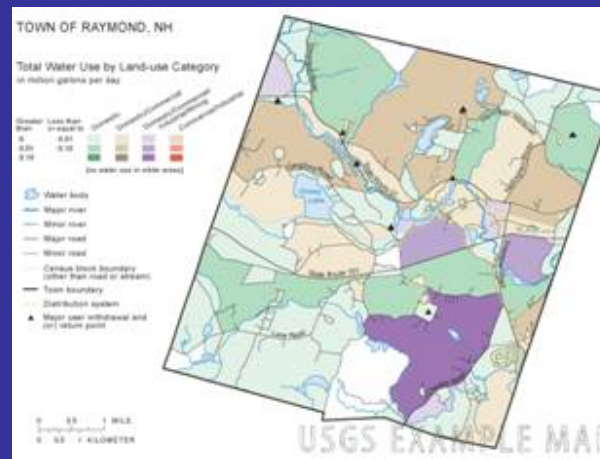
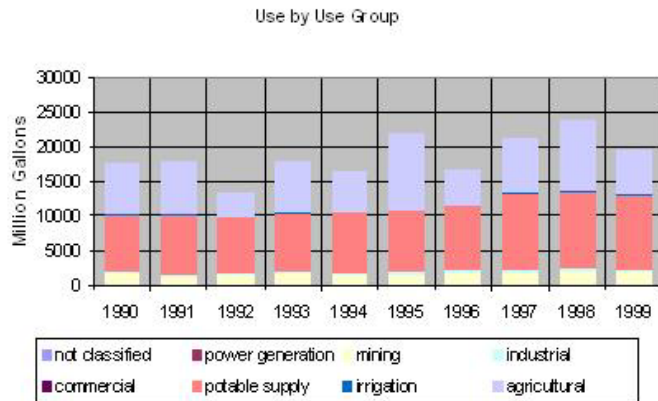
Enhancing the Nation's Water Use Information

Integrative Water Use Science Goal:
A synthesis of water flow, water use, land use and water quality information.

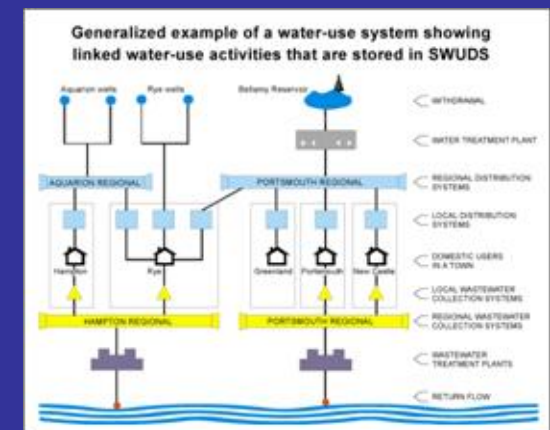
Use Recommendations of the
National Research Council Report

- Stratified Random Sampling
- Regression Models

Develop water use
characteristics by types
of land use

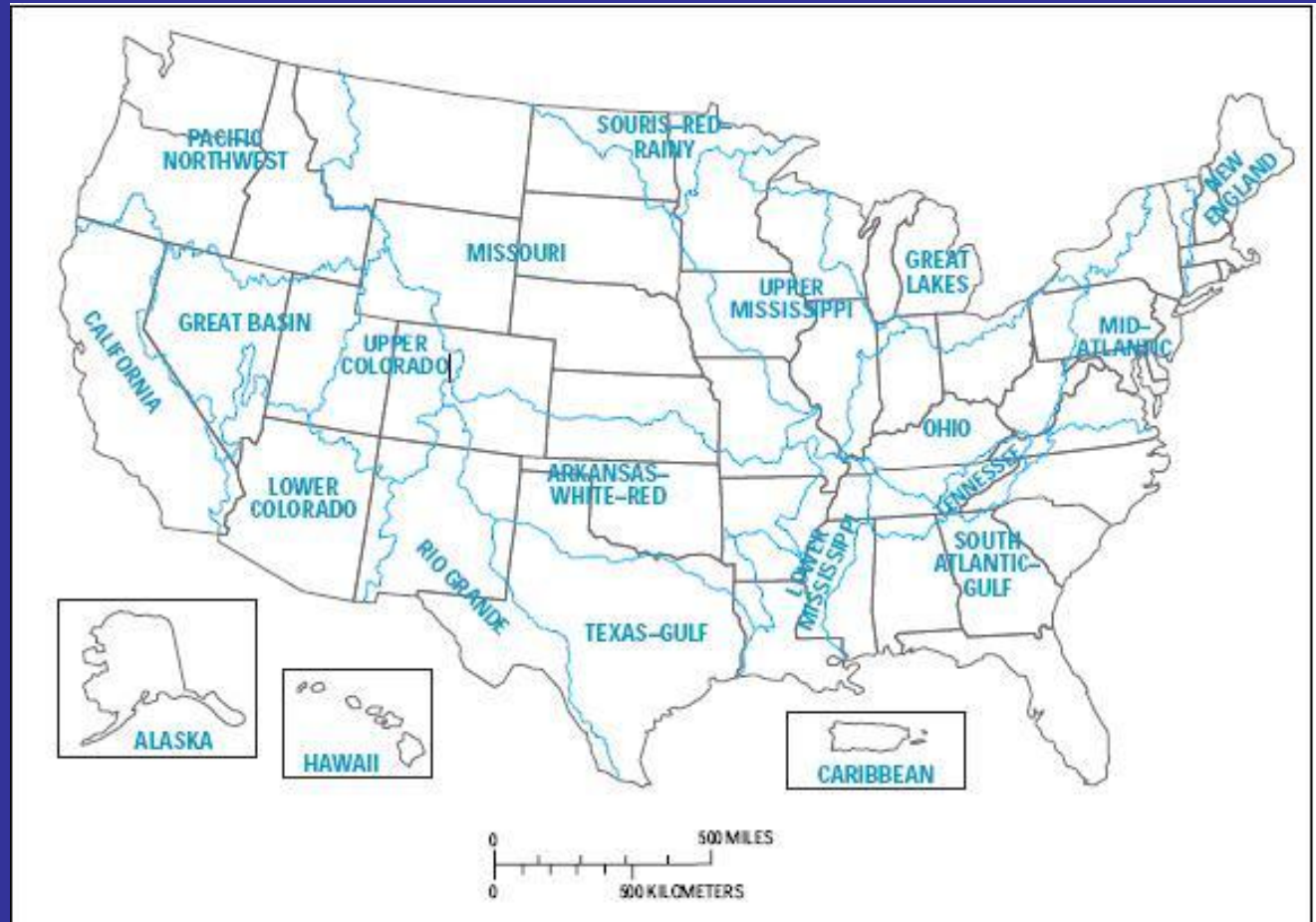


Ability to track water from
point of withdrawal thru to
return of flow



Nationwide Study Plans

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



Report to Congress: Concepts for National Assessment of Water Availability and Use, U.S. Geological Survey Circular 1223, 2002.

Regional Studies

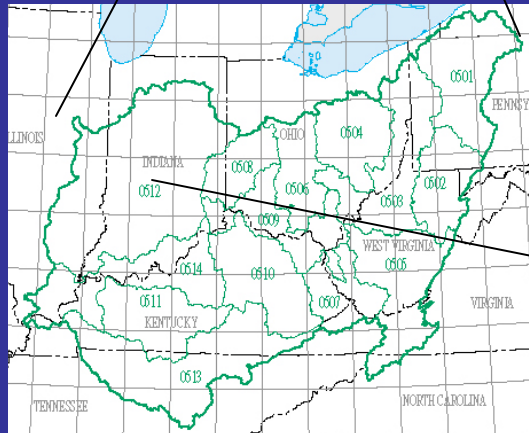
ACF basin



Six to seven regional studies will be started every three years.

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

HUC 2



HUC 4

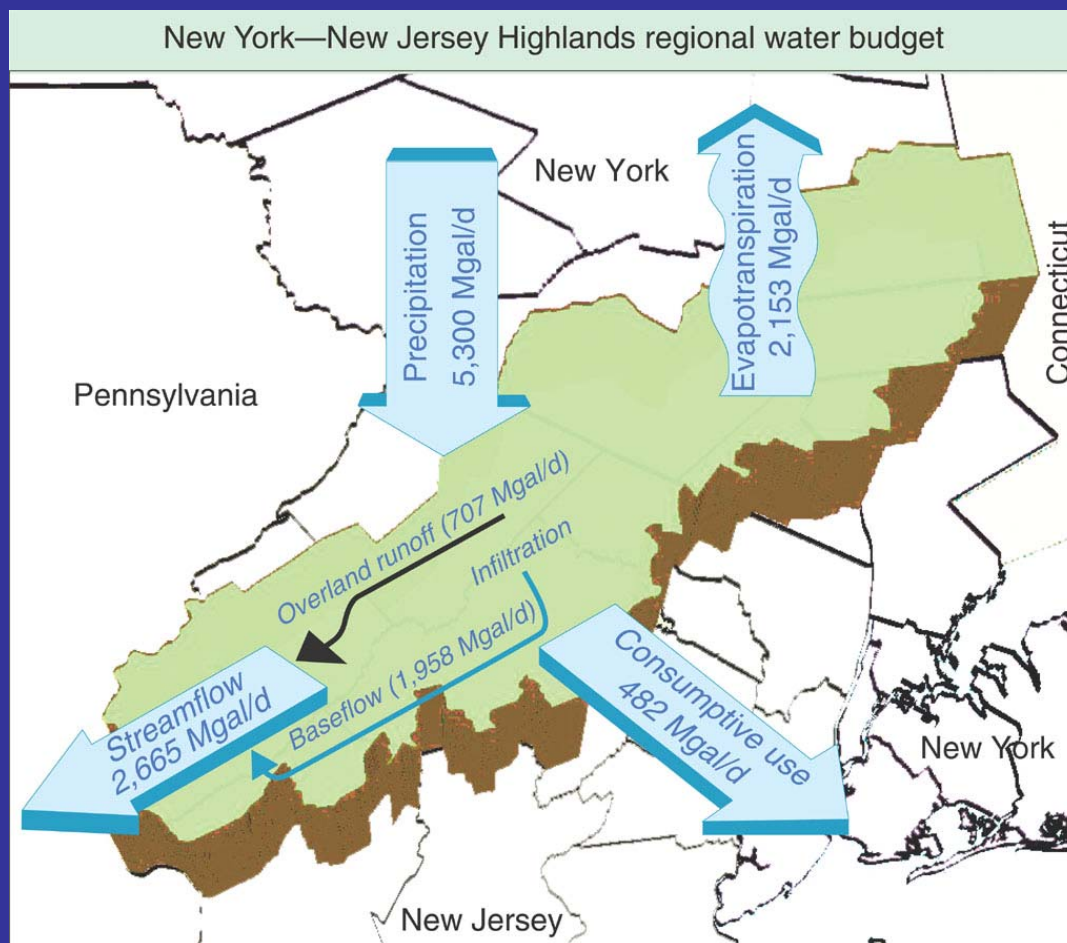


HUC 6



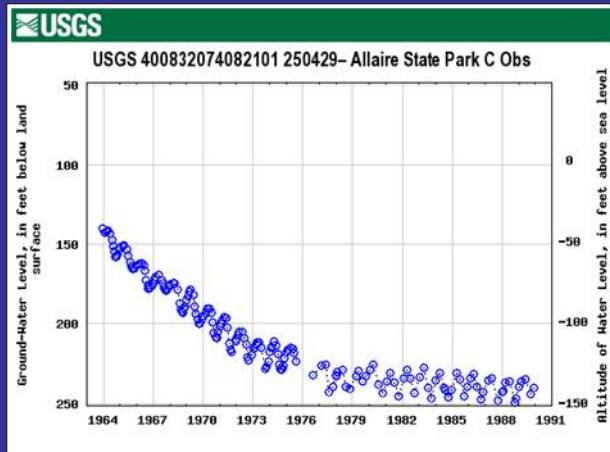
Regional scale studies will focus on water budgets

- Provides basis for evaluating change
- Accounts for system gains and loses
- For each HUC 6
 - Precipitation
 - Infiltration – Recharge
 - Stream Flow (runoff & baseflow)
 - Evapotranspiration
 - Ground Water Withdrawals
 - Surface Water Withdrawals
- Document & analyze trends in budget components



Intensive studies

Sustainable levels of water use



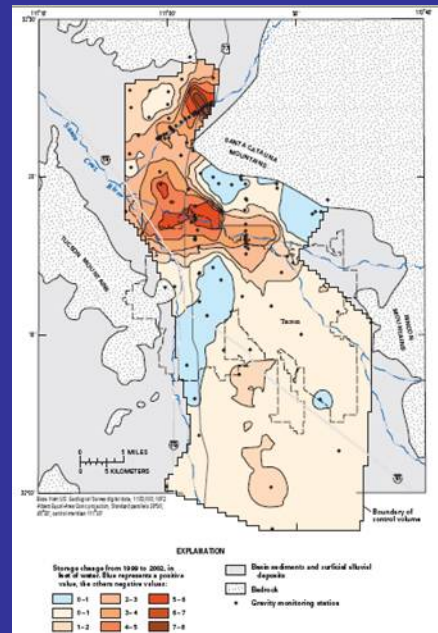
Three Studies will be started every three years

- Inside Regional Studies
- Study design – afford latitude within Initiative's mission
- Higher Funding
- Address local / national issues

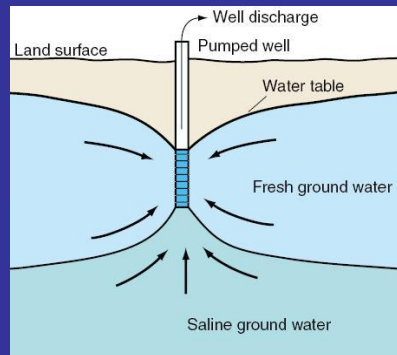
Ecosystem flow issues



GW/SW interactions



Changing land use



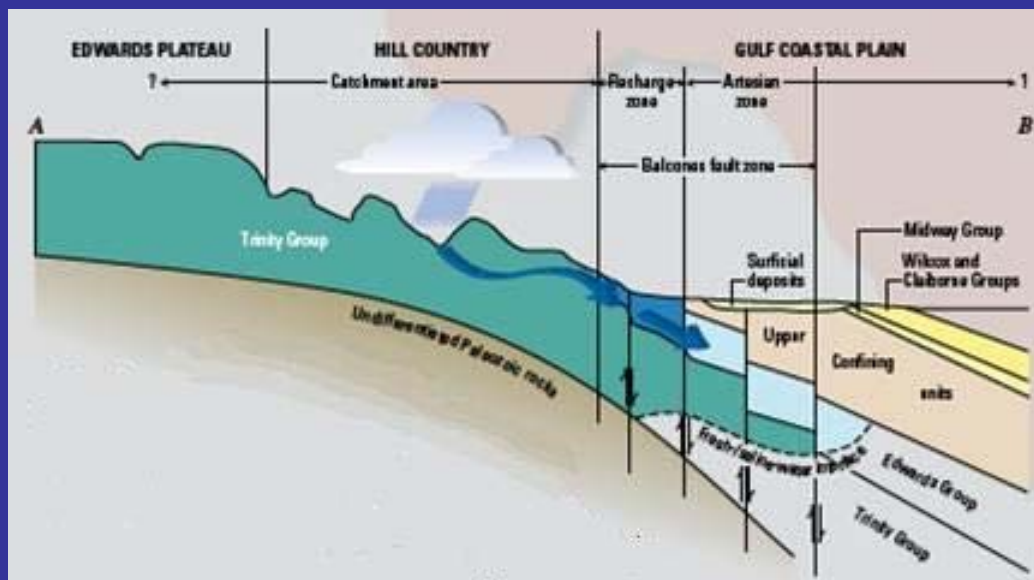
Saltwater intrusion

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

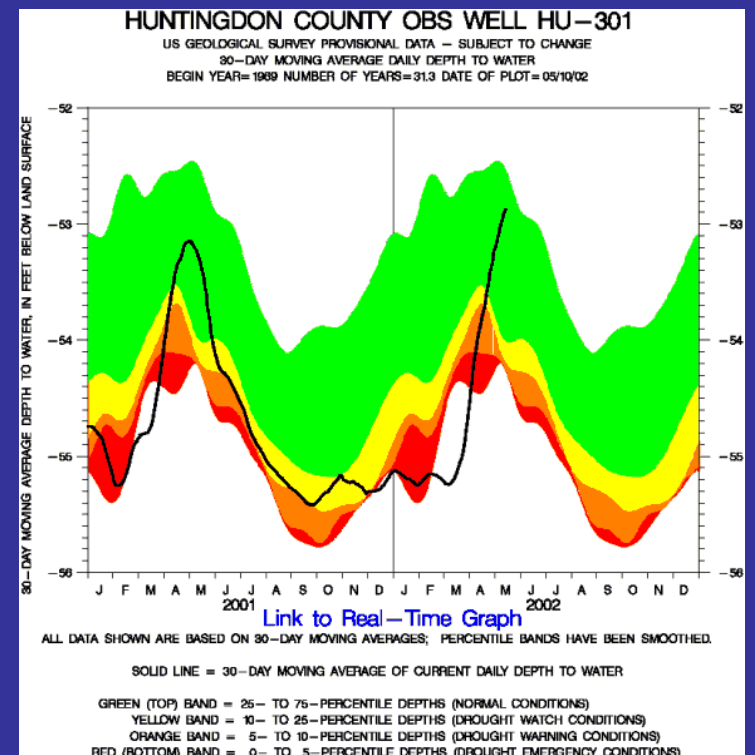
- New cyber infrastructure providing hydrologic data to the public



St Elizabeth Flood, 1421

- Enhance accessibility of data
(Advisory Committee on Water Information,
Subcommittee on Ground Water)

- Expand capability to share ground-water data among state, local, Federal water agencies



Indicators of Water Availability

Surface-water indicators

- Streamflow: annual and seasonal summaries; assessments of long-term trends
- Reservoir storage, construction, sedimentation, and removal
- Storage in large lakes, perennial snowfields, and glaciers

Ground-water indicators

- Ground-water-level indices for a range of hydrogeologic environments and land-use settings
- Changes in rates of recharge
- Changes in ground-water storage due to withdrawals, saltwater intrusion, mine dewatering, and land drainage
- Number and capacity of supply wells and artificial recharge facilities

Indicators of Water Availability

Water-use indicators

- Total withdrawals by source (surface water and ground water) and sector (public supply, domestic, commercial, irrigation, livestock, industrial, mining, thermoelectric power, and hydropower)
- Reclaimed wastewater
- Conveyance losses
- Consumptive and depletive uses

A Water Census of the United States

Quantifying, forecasting, and securing freshwater for the Nation's future



- Freshwater quantity and quality present in surface/ground waters, snow and ice
- Freshwater quality and quantity for human and ecological needs
- Changes in water quantity, over time and space, as a function of population/climate change, landuse/land cover and human usage



Thank you!

For more information, contact:

Matt Larsen, Chief Scientist for Hydrology
mclarsen@usgsg.gov

Eric Evenson, Coordinator, Water for America Initiative
eevenson@usgs.gov

<http://water.usgs.gov/wsi>

