Championing Science in a Changing World

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Partnerships – A critical component across all water programs to ensure relevance to local, State, regional, and national water-resource issues.

USGS has shared partnerships with more than 1,600 local, State, and Tribal agencies through its Cooperative Water Program. Additional partnerships and collaboration across

- Federal government
- Academia
- Public interest groups
- Professional and trade associations
- Private industry
- International community
Oklahoma Cooperators/Partners

Many towns, some private industry

Oklahoma Scenic Rivers Commission
Water Vision – Providing real-time information to minimize loss of life and property from water-related hazards, such as floods, hurricanes, and oil spills

May 2011 – Illinois River at Chewey, OK

Otter Creek, July 1, 2007

Buggy Creek, November 3, 2007

Note unstable banks and woody debris in distance
Flood Inundation Maps translate a hydrograph into operational maps that communicate risk and consequences.
High Hazard Dams - Dam Breach Flood Inundation Mapping for Lake Ellsworth, OK
USGS Rapid Response: Storm Surge Monitoring
USGS Rapid Response Monitoring of Storm Tide and Flooding from Hurricane Isaac along the Gulf Coast of the United States, September 2012

Photo by Brendan Hoffman for NY Times
Isaac—Results

- 6.4 feet
- 9.3 feet
- 7 – 8.4 feet
- 7.8 feet
- 11 feet
- 13.2 feet MAX
- 4.9 feet
- 13.2 feet MAX
- 6.4 feet
July 1934

WaterWatch
Drought

July 2012
Hydrologic drought of Water Year 2011 compared to four major drought periods of the 20th century in Oklahoma

[Graph showing Oklahoma Statewide Precipitation from 1925 to 2011 with explained bars for annual departure, long-term median annual precipitation, and 5-year weighted average. Key points marked for Hydrologic droughts: 1929-41, 1952-56, 1961-72, 1976-81.]
Water Vision – Providing water science to secure fresh water, now and into the future

USGS water science improves the quality of life of every American citizen by providing information to help assure that water

- Is available and safe for drinking and recreation,

- Is protective of ecosystems, and

- Preserves our Nation’s economic viability related to energy, irrigation, industry, navigation, and other water demands
“We can never forget or let others forget that the water cycle and the life cycle are one.”

- Jacques Cousteau
WaterSmart Initiative (the “Water Census”)

- Groundwater recharge and storage
- Improved water use estimates, particularly for thermoelectric/irrigation
- Ecological flows
- Estimates of streamflow at ungaged sites
- Evapotranspiration
- Assessments in areas with significant competition, beginning with pilots in the Colorado River Basin, Delaware River Basin, and Apalachicola, Chattahoochee, and Flint River Basins
- Seamless database housing water-availability indicators
1.4 acre-feet is the pumping rate that will maintain 15 feet of saturated thickness in 50 percent of the aquifer over 50 years.
Groundwater Flow in the Arbuckle-Simpson Aquifer

Natural Attenuation of Arsenic in Groundwater
Water Monitoring – Our Highest Priority
(because we can’t manage what we don’t measure)
Providing information for:

- Flood forecasts and warnings
- Day-to-day water supply
- Flood forecasts and warnings
- Operating strategies to maintain ecological flows
- Recreation (rafting, fishing)
- Infrastructure design (bridges, dams, highways)
- Instream infrastructure design (bridges, dams, highways)
- Operating strategies to maintain ecological flows
- Flood response and inundation mapping
- Coastal and estuarine management
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The USGS Streamgaging Network – 8,400 gages (99 percent in real time)
The USGS works with Federal, State, Tribal, and local governments to operate 183 gages on streams in Oklahoma.

(http://waterdata.usgs.gov/ok/nwis/rt)
27 states fully implemented; 10 states in implementation process
Innovative Methods and Techniques - HydroAcoustic Flow Measurements
Innovative Methods and Techniques

Gamma Ray Spectrometer

Niton XL3t analyzers easily identify a wide range of elements including Mg, Al, Si, S, Cu, Ni, Ta, Ag, Zn, Mo, Ca, K, Rare Earth Elements (REEs), and platinum group metals (PGMs). They are ideal for a wide variety of samples such as rock face, bagged or ground samples, drill cores, mineral sands, and clays.
Innovation - Fiber-Optic Temperature Monitoring

- Measurements over kilometers
- Meter-scale spatial resolution
- 0.1 °C thermal resolution
- Cycle times of minutes
Information Delivery
NWISWeb use over the last decade, in millions of successful requests per month (about 1.5 million requests per day)
USGS StreaMail—A system for accessing real-time data from hand-held wireless devices

The U.S. Geological Survey (USGS) Real-Time Hydrologic Monitoring Network has been a great success, providing an extremely beneficial service to the citizens of the United States. The real-time National Water Information System (NWIS) Web pages (NWIS Web) are heavily used by the general public, emergency managers, recreation enthusiasts, cooperators, and internally. As wireless technologies have advanced, and as hydrologic disasters during the past few years have demonstrated, there is a critical need for timely hydrologic information to be provided in remote locations to first responders, water managers, and government officials involved in managing water emergencies.

A system is proposed to provide immediate water information from the USGS Real-Time Network to various personal hand-held devices. By delivering hydrologic information to devices such as cell phones and personal digital assistants, users will have access to real-time water information at a time and location of their own choosing; they would no longer have to be at
Real-Time Warnings

USGS WaterAlert
Wireless or E-mail
Customized WaterAlert

http://water.usgs.gov/WaterAlert/
USGS Science Planning for the Future

- Expand and enhance networks
- Characterize hydrologic cycle
- Link human water use and the hydrologic cycle
- Advance ecological flow science
- Provide flood-inundation science
- Develop rapid deployment for water-related emergencies
- Integrated watershed assessments, research, and modeling
- Deliver water data and analyses to the Nation
“No man ever steps in the same river twice, for it is not the same river and he is not the same man.” - Heraclitus