Championing Science in a Changing World

Bill Werkheiser
Associate Director for Water
November 2012

Partnerships

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

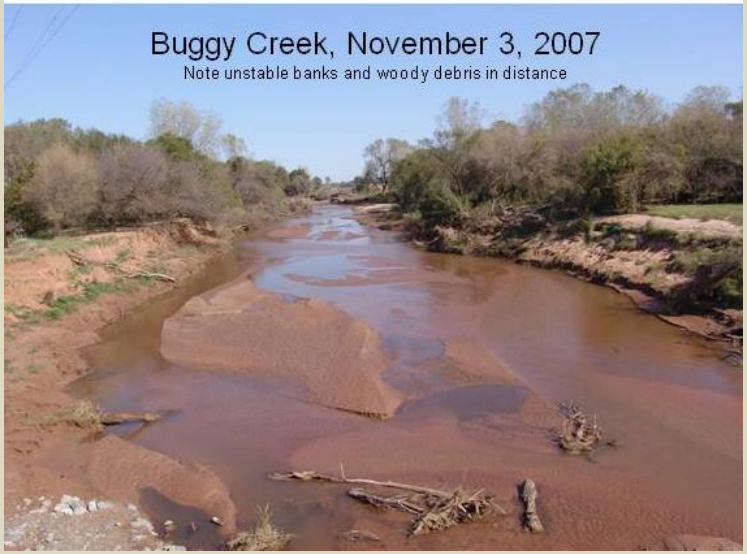
USGS

Oklahoma Cooperators/Partners

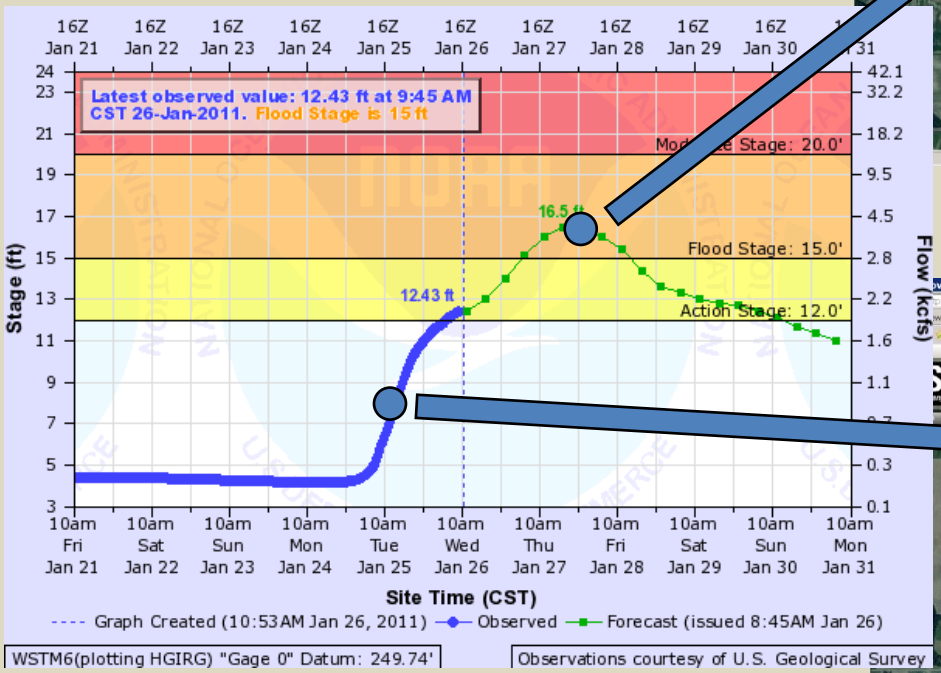
Oklahoma Scenic Rivers Commission

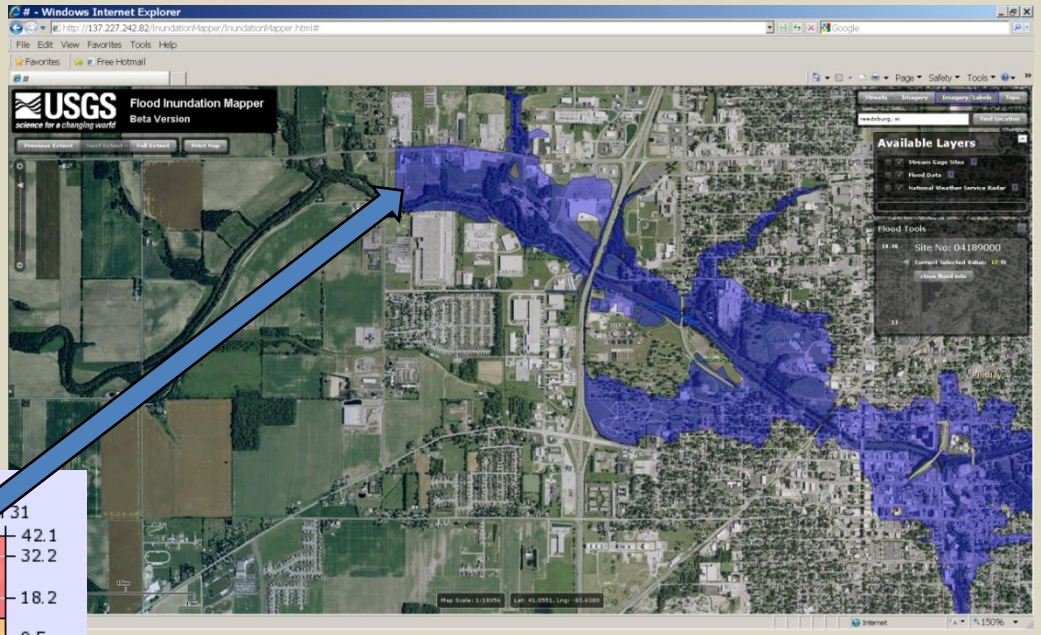
Many towns, some private industry

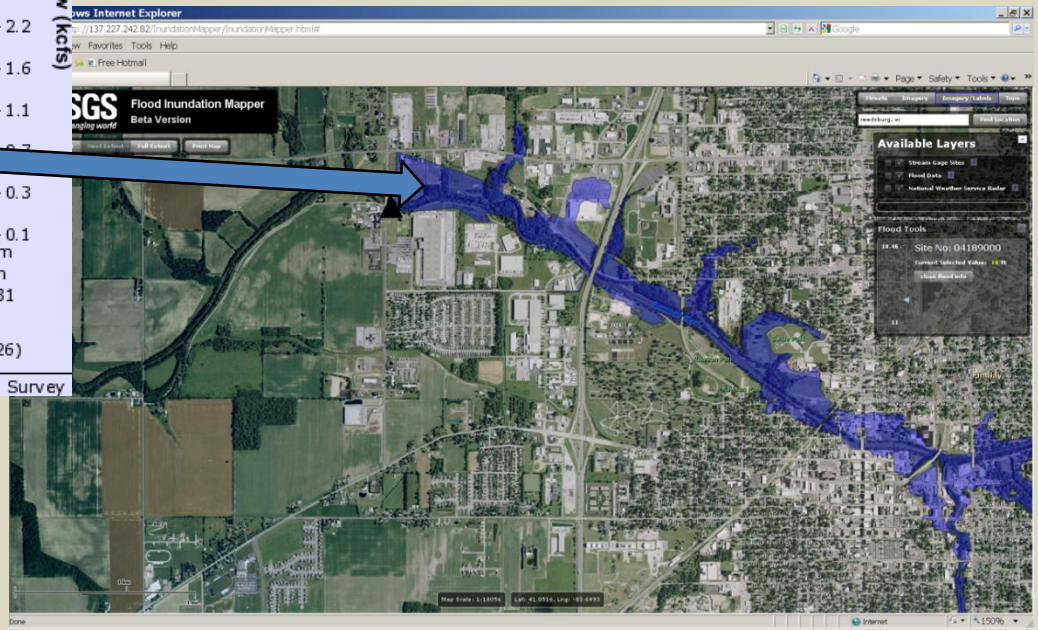
Water Vision – Providing real-time information to minimize loss of life and property from water-related hazards, such as floods, hurricanes, and oil spills



Flood Inundation Maps translate a hydrograph into operational maps that communicate risk and consequences

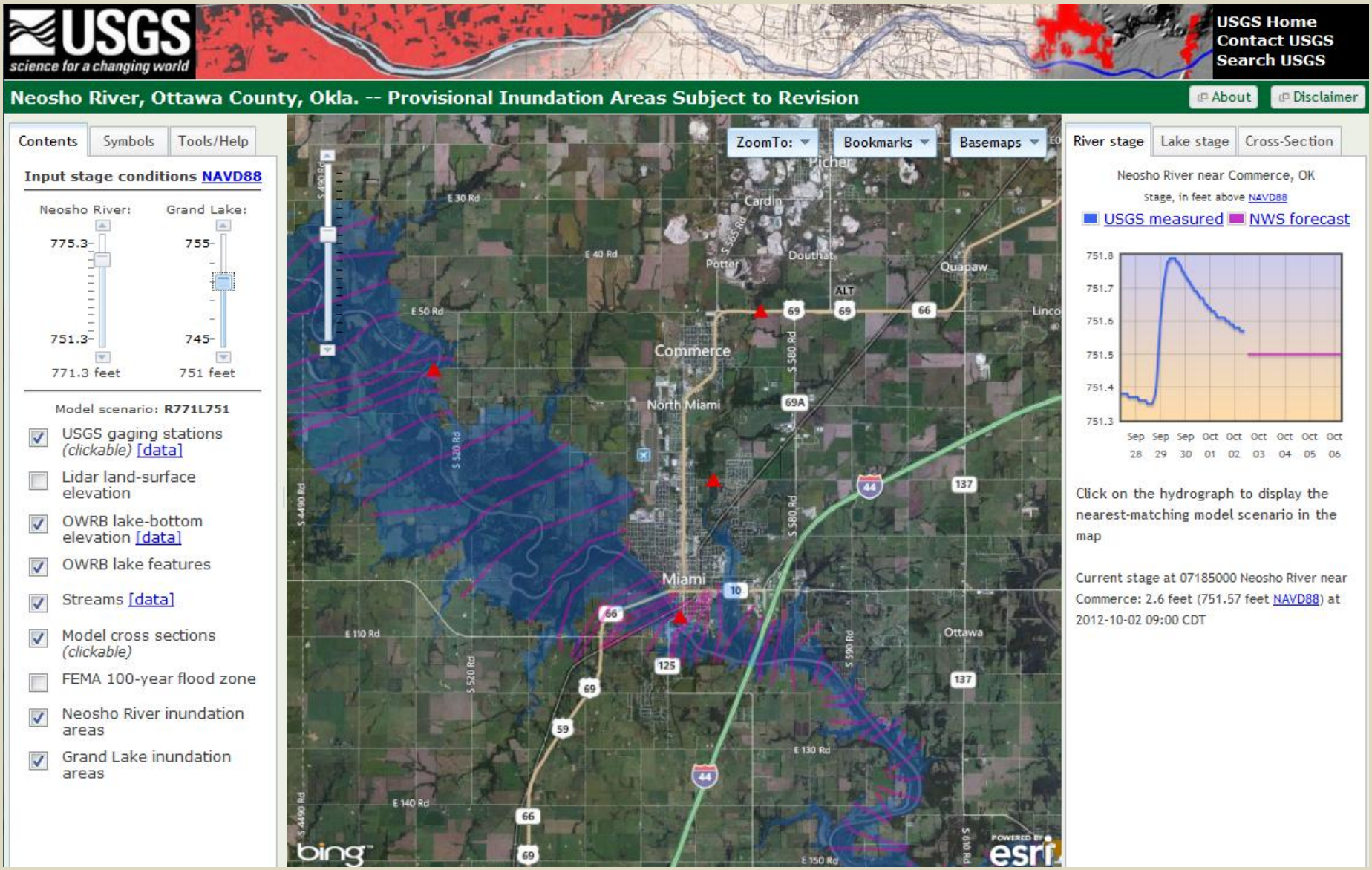






USGS

Flood Inundation Mapping for the Neosho River in Ottawa County, OK



USGS

High Hazard Dams - Dam Breach Flood Inundation Mapping for Lake Ellsworth, OK

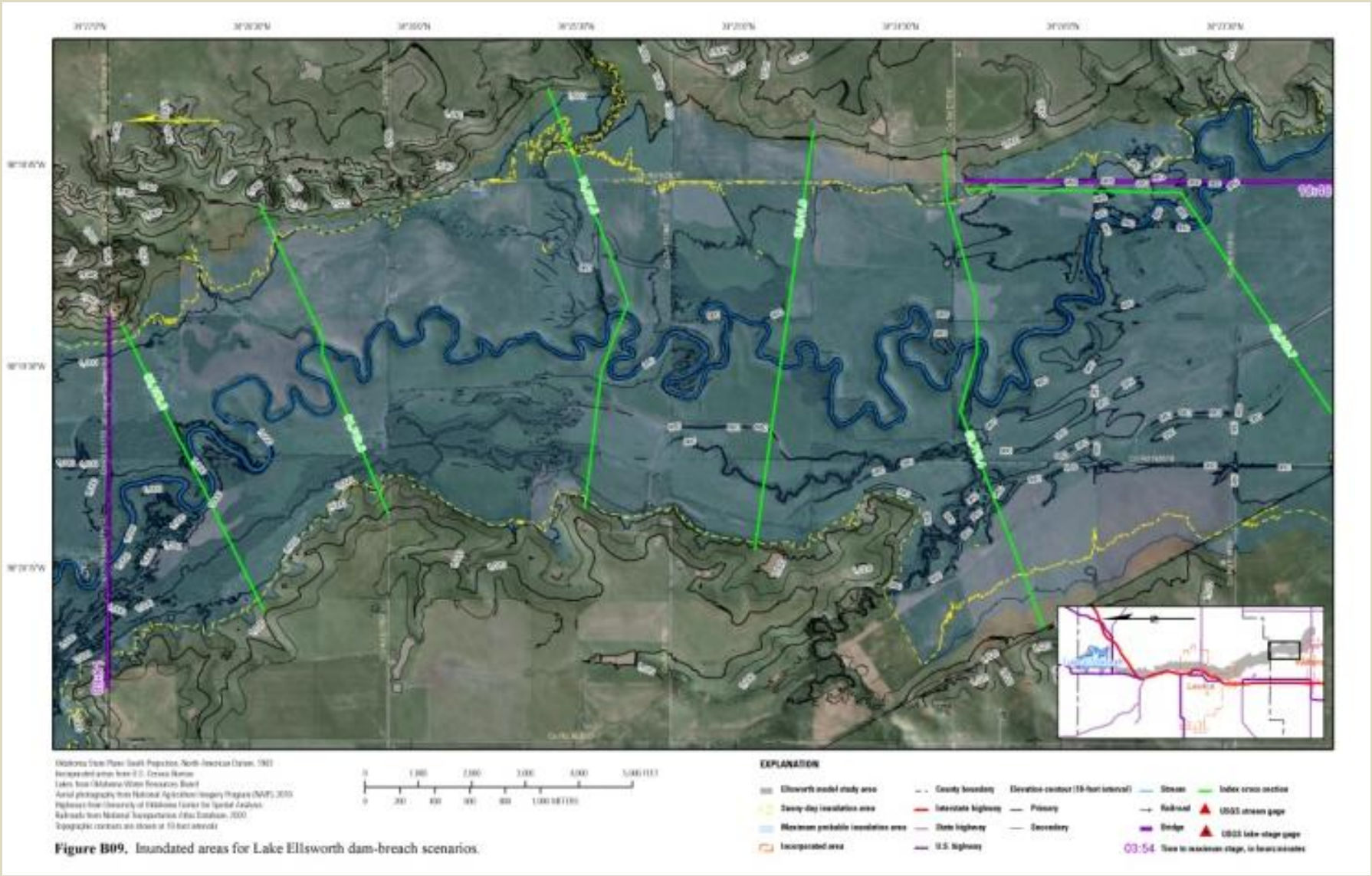


Figure B09. Inundated areas for Lake Ellsworth dam-breach scenarios.

USGS Rapid Response: Storm Surge Monitoring

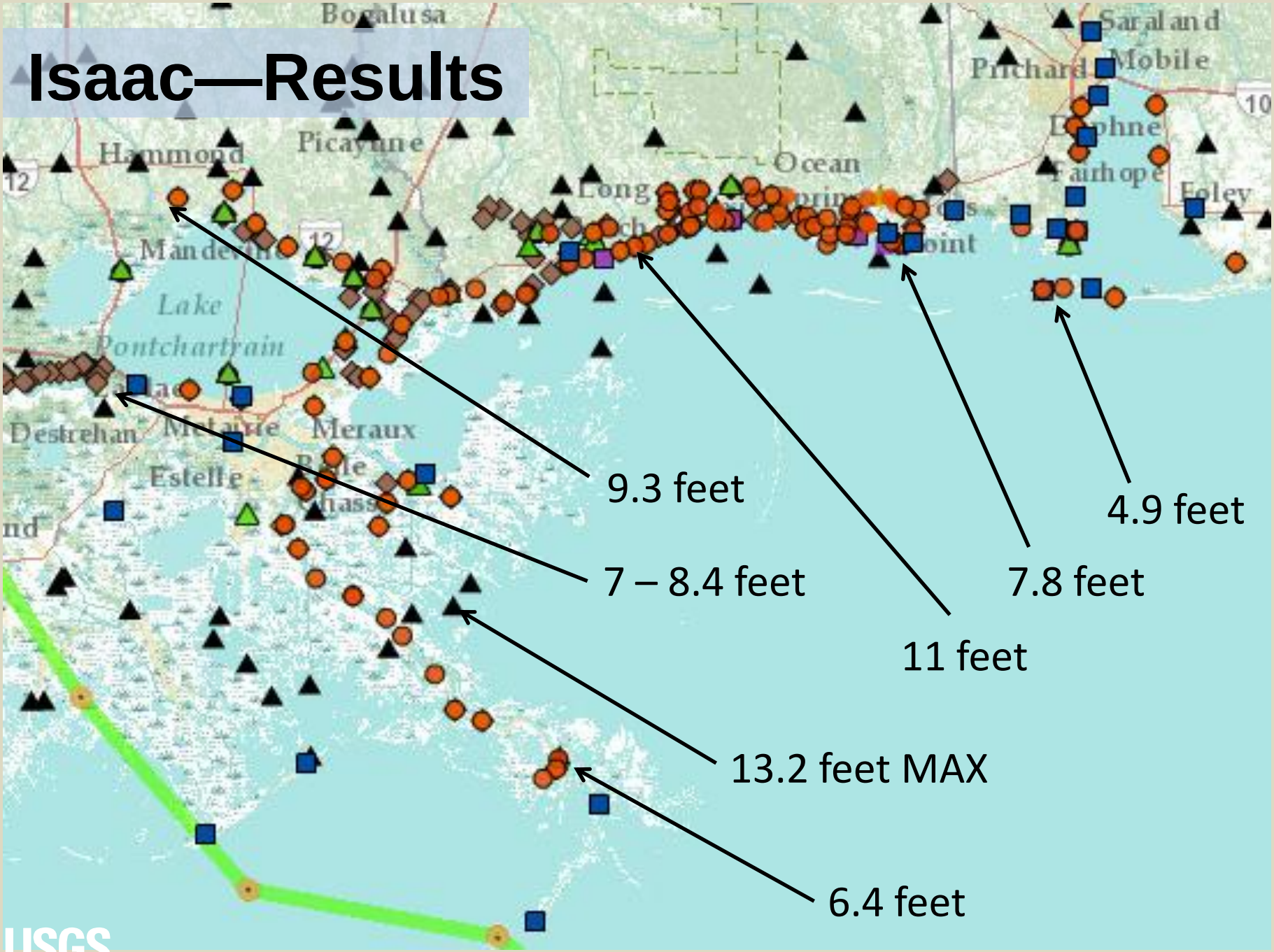
USGS

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

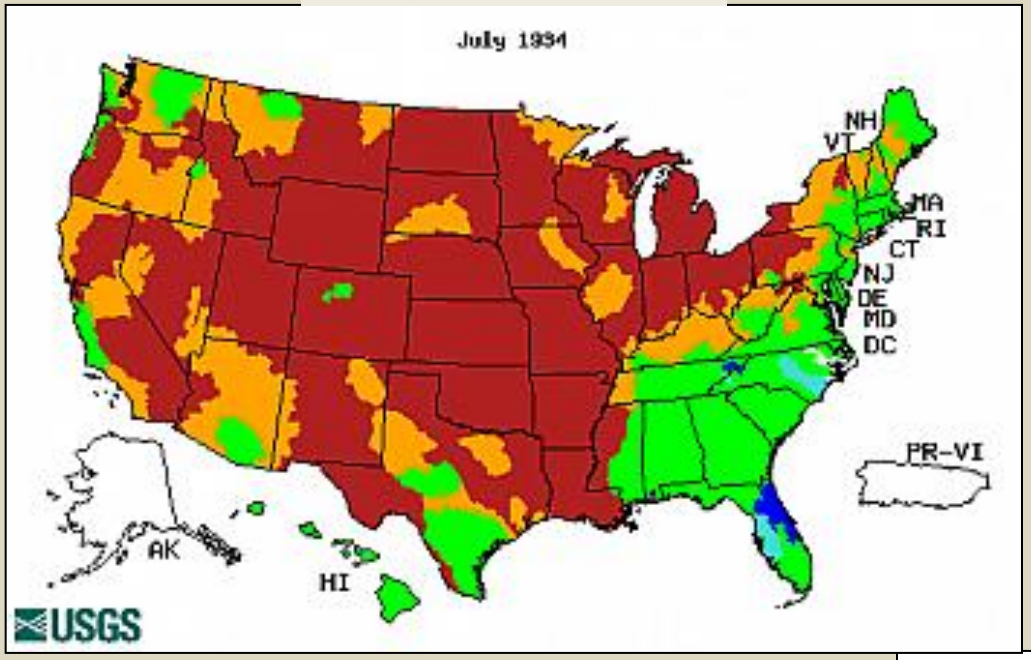
USGS

Isaac—Results



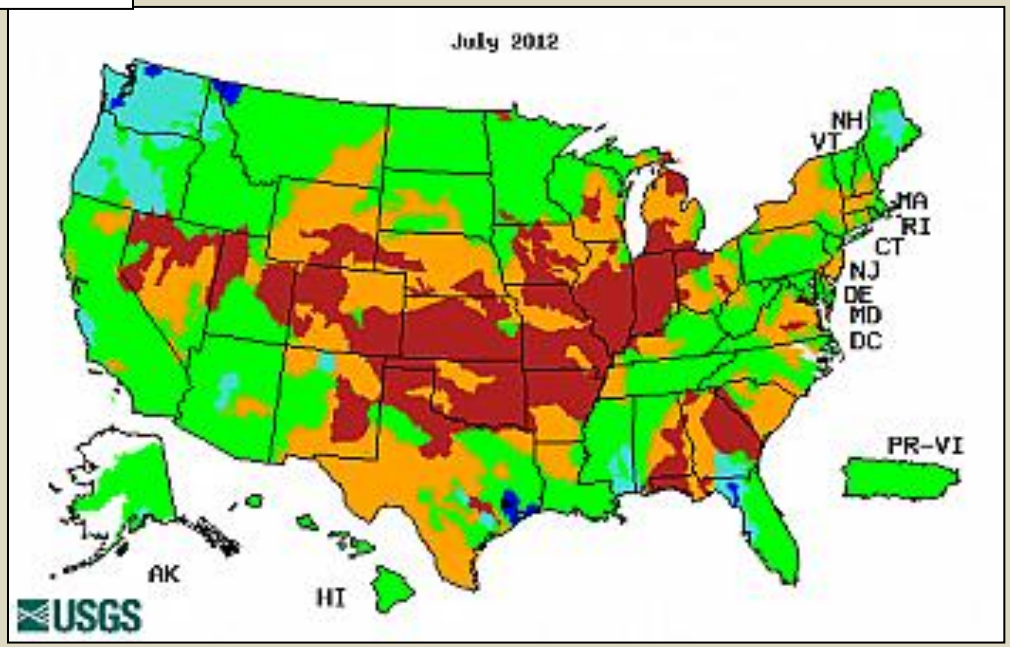
USGS

July 1934



WaterWatch Drought

July 2012



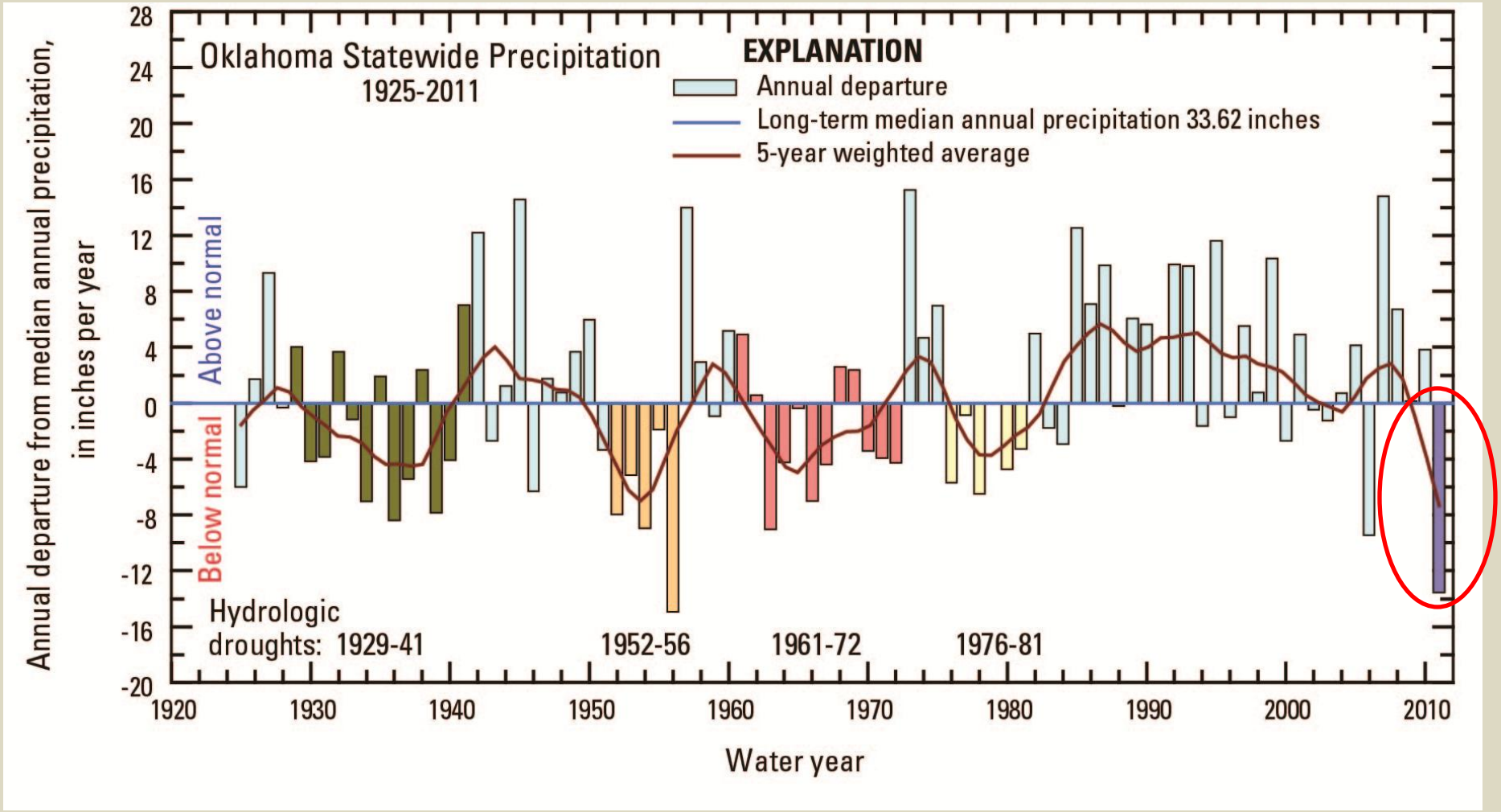
Explanation - Percentile classes

<10	10-24	25-75	76-90	>90
Much below normal	Below normal	Normal	Above normal	Much above normal

USGS

USGS

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



USGS

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*

USGS

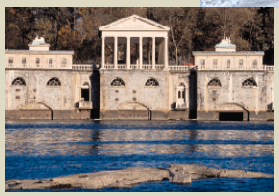
“We can never forget or let others forget that the water cycle and the life cycle are one."

- Jacques Cousteau

USGS

WaterSmart Initiative (the “Water Census”)

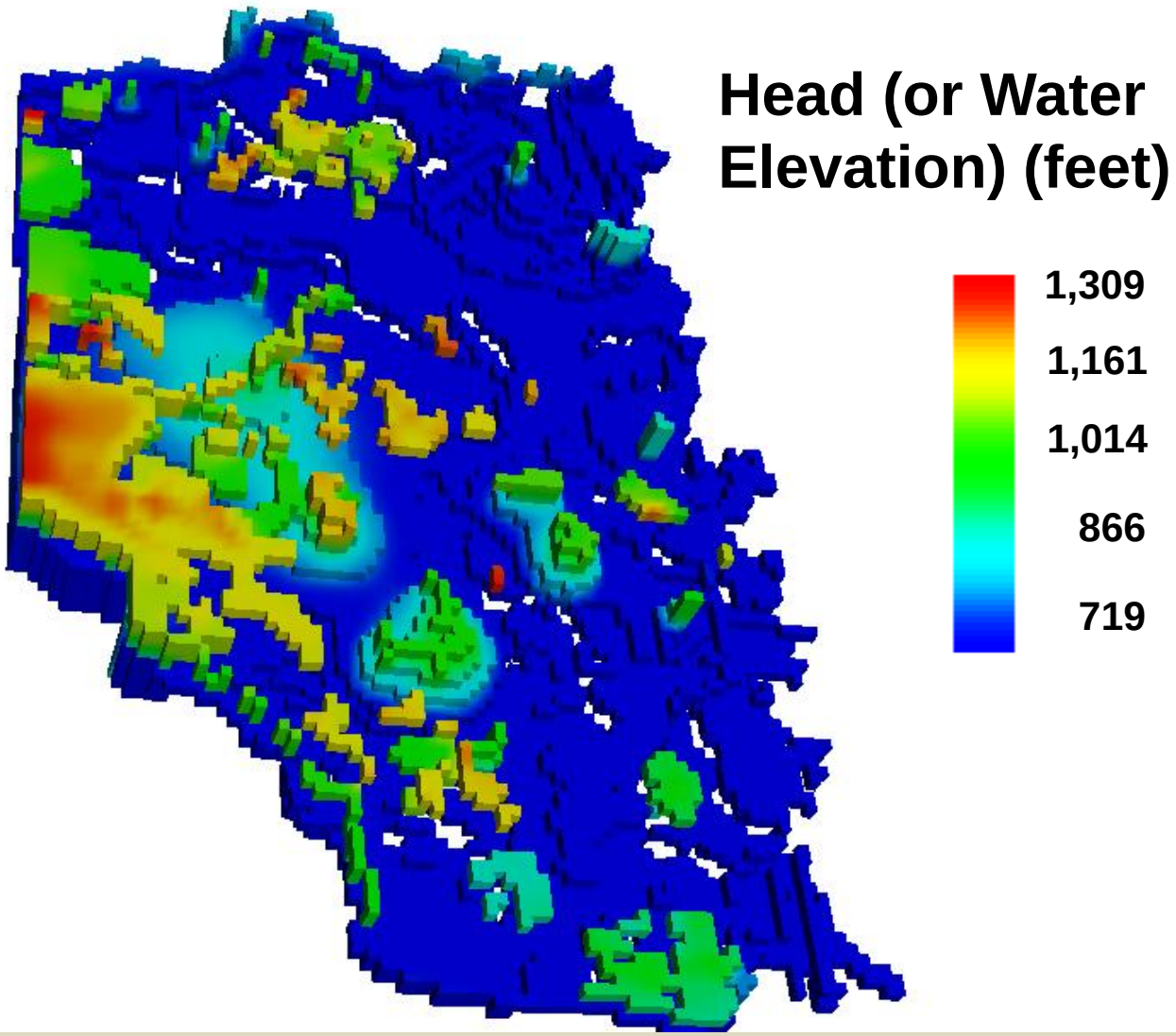
- Groundwater recharge and storage
- Improved water use estimates, particularly for thermoelectric/irrigation
- Ecological flows
- Estimates of streamflow at ungaged sites
- Evapotranspiration
- Assessments in areas with significant competition, beginning with pilots in the Colorado River Basin Delaware River Basin, and Apalachicola, Chattahoochee, and Flint River Basins
- Seamless database housing water-availability indicators



USGS

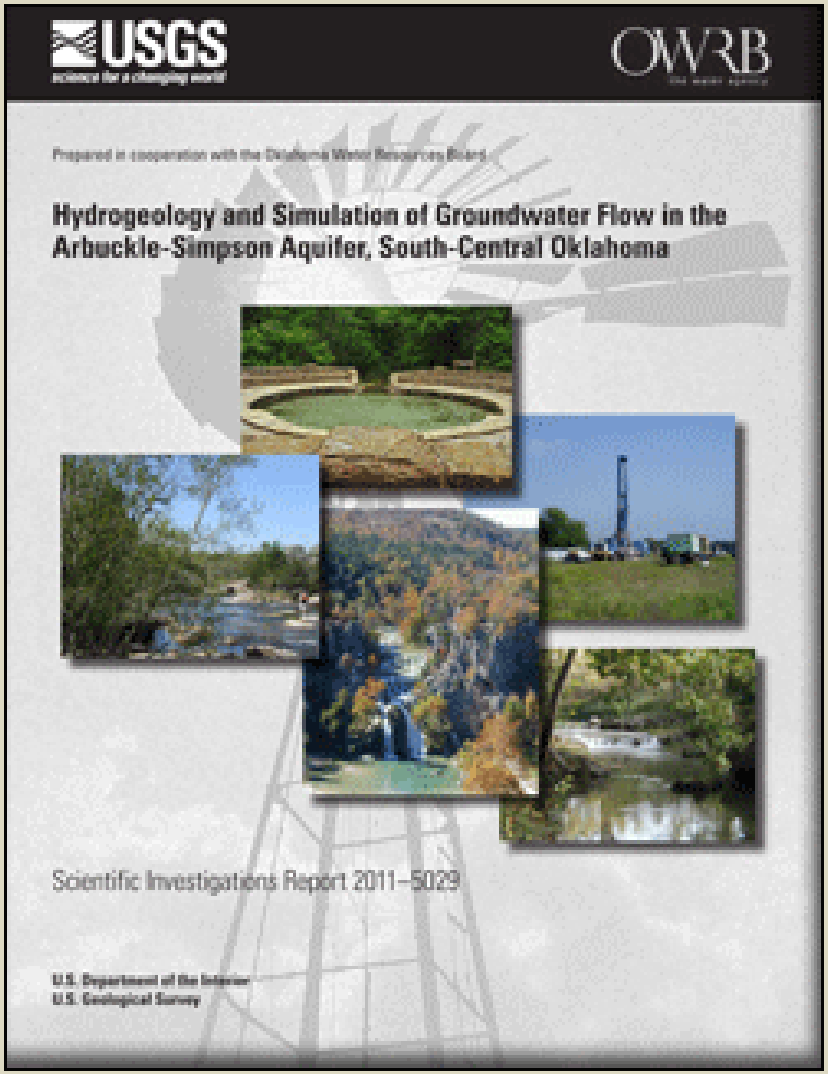
Central Oklahoma (Garber-Wellington) Aquifer Study

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.



USGS

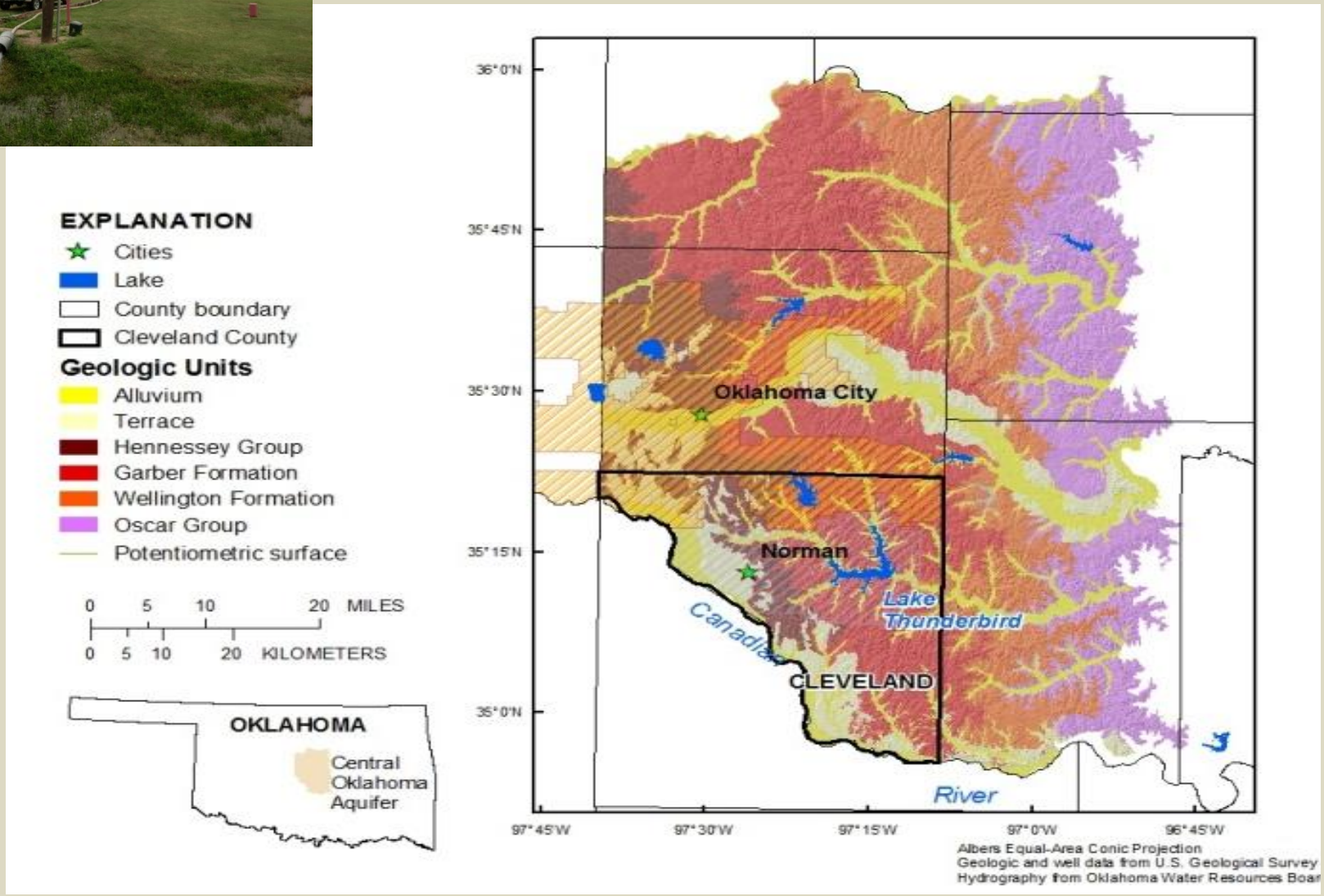
Groundwater Flow in the Arbuckle-Simpson Aquifer



http://pubs.usgs.gov/sir/2011/5029/

USGS

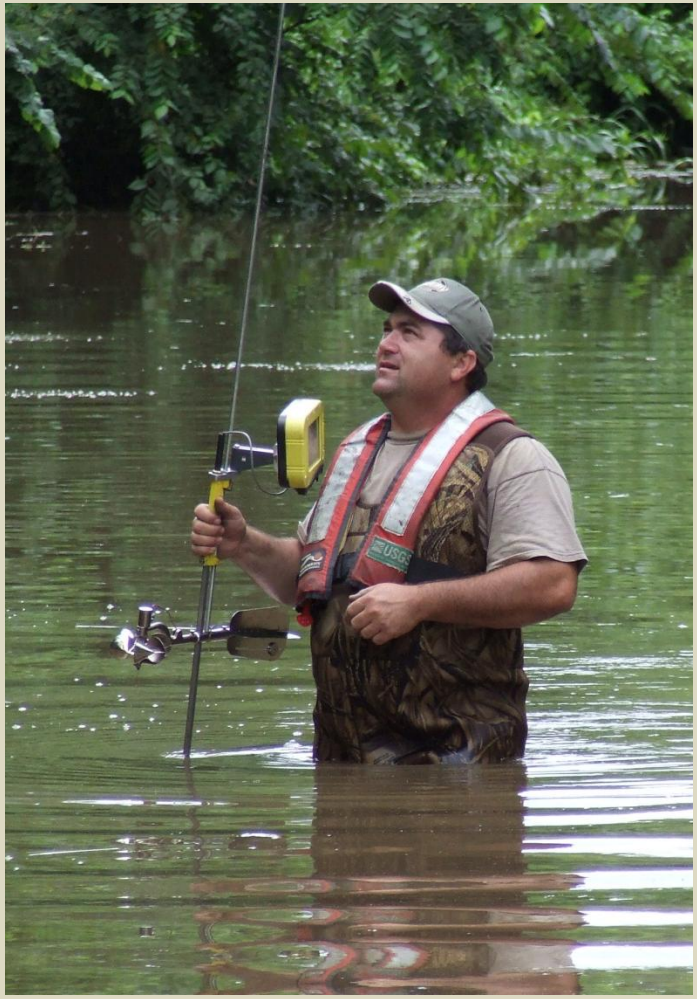
Natural Attenuation of Arsenic in Groundwater



USGS

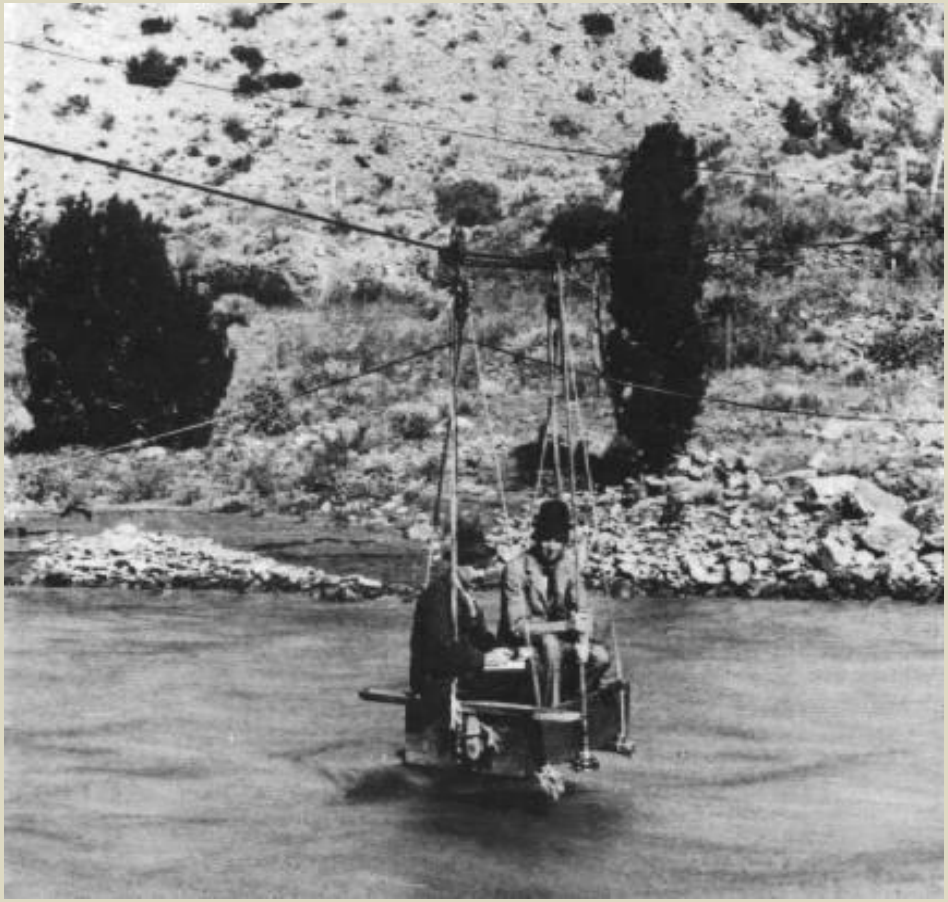
USGS

Water Monitoring – Our Highest Priority
(because we can't manage what we don't measure)



USGS

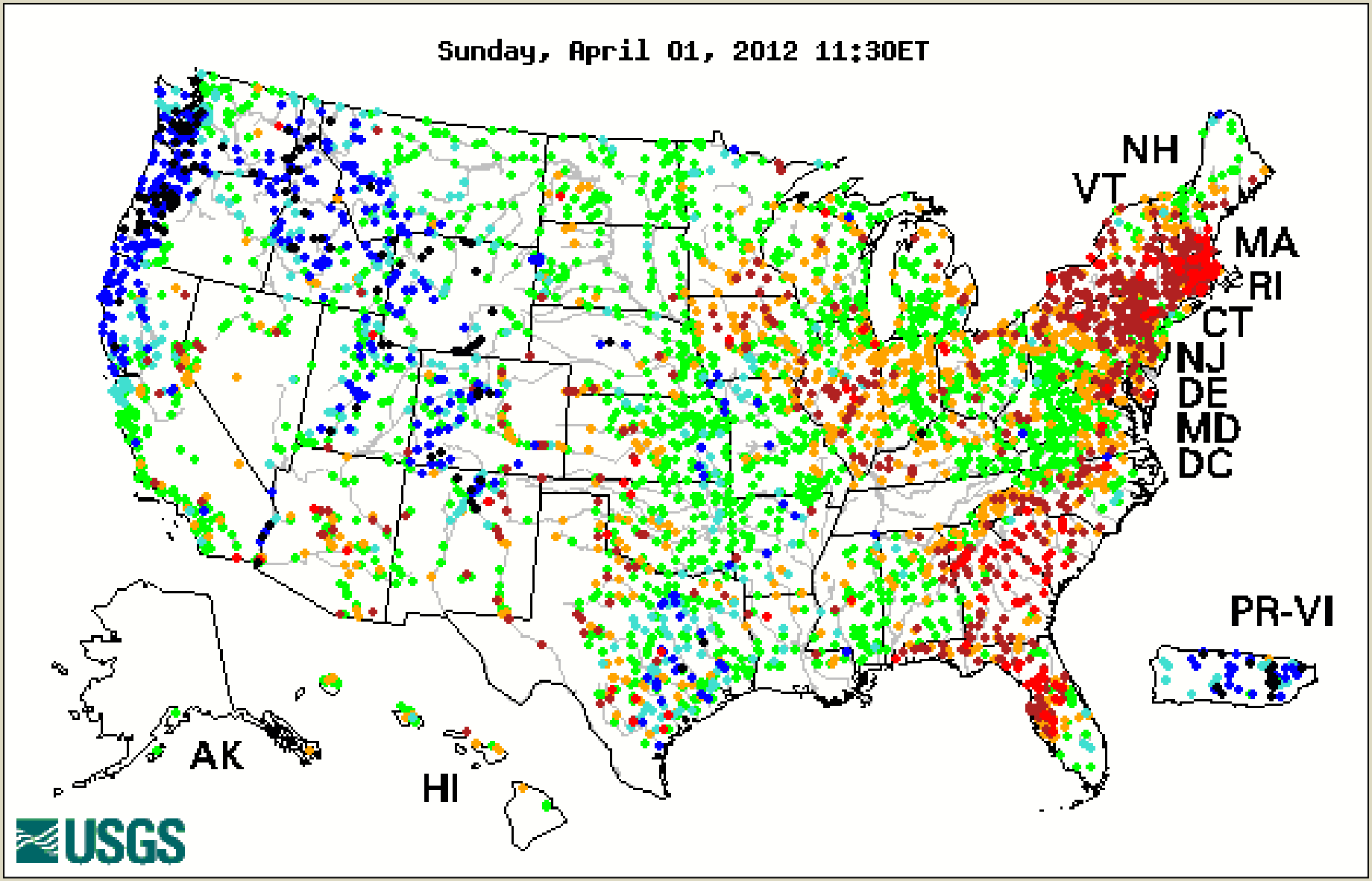
USGS National Streamgaging

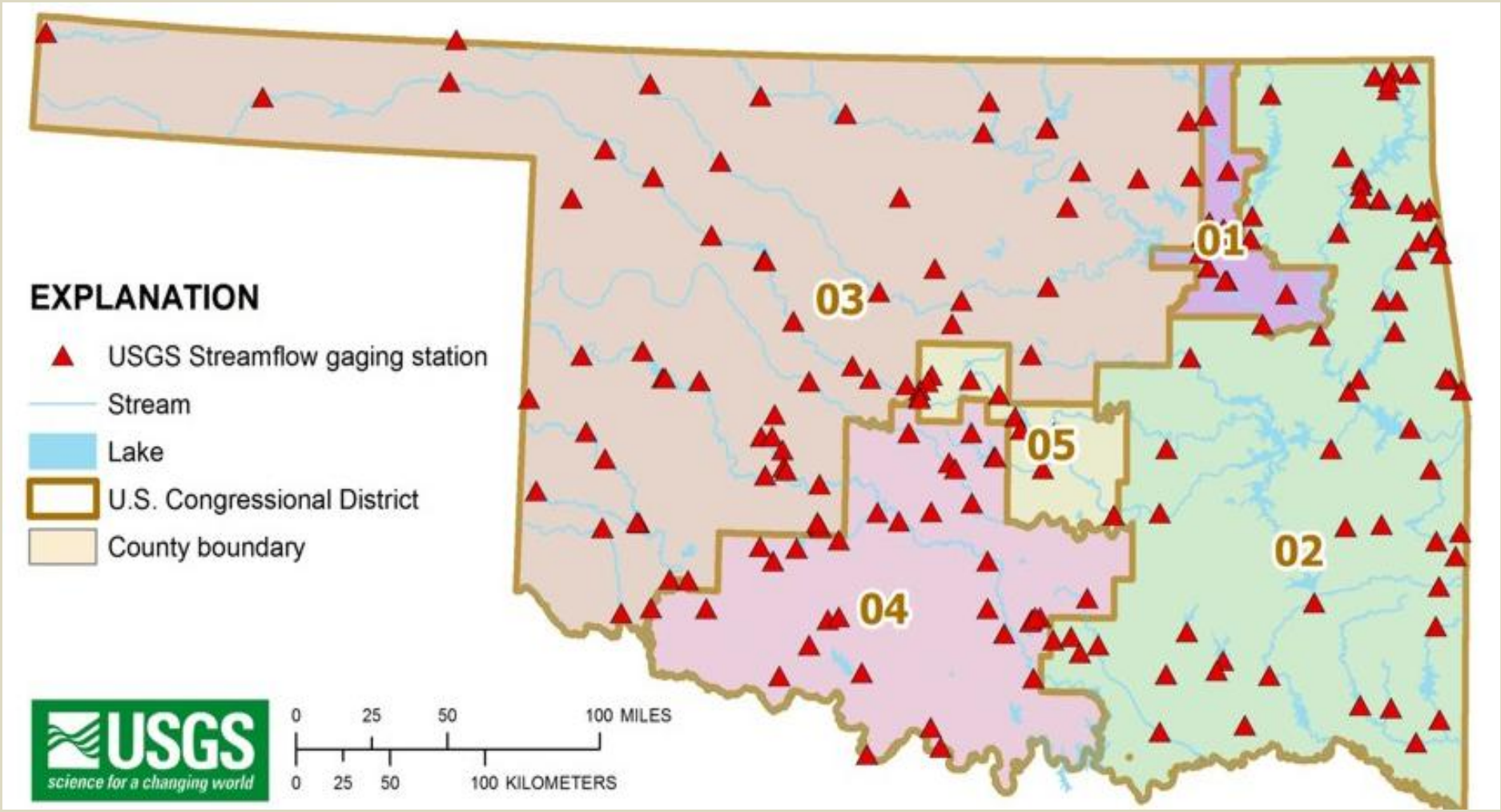


Providing information for:

- Flood forecasts and warnings
- Day-to-day water-supply operation
- Infrastructure design (bridges, dams, highways)
- Flood response and inundation mapping
- Discharge and water withdrawal permits
- Recreation (rafting, fishing)
- Operating strategies to maintain ecological flows
- Coastal and estuarine management

The USGS Streamgaging Network – 8,400 gages (99 percent in real time)

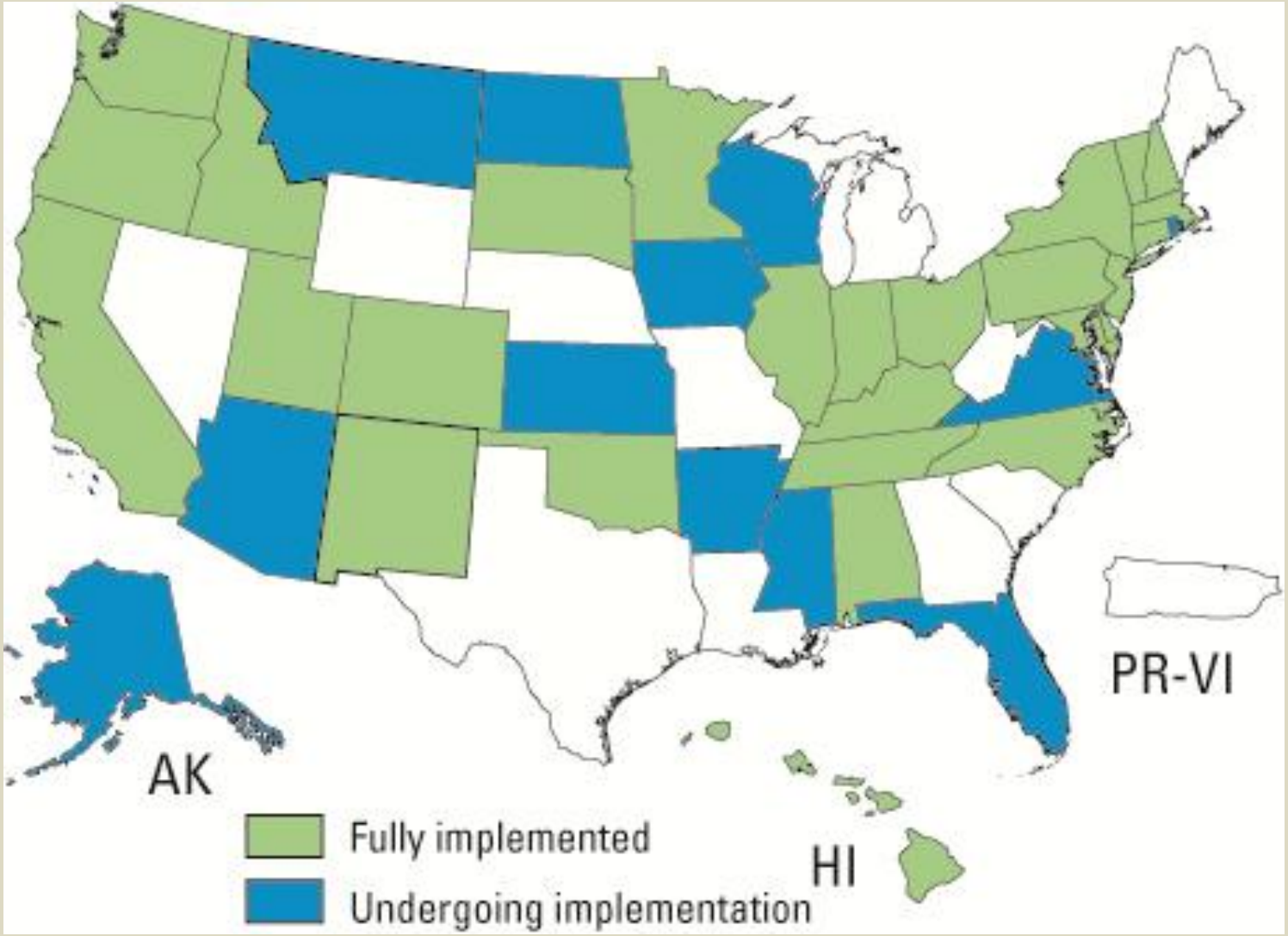




The USGS works with Federal, State, Tribal, and local governments to operate 183 gages on streams in Oklahoma.

(http://waterdata.usgs.gov/ok/nwis/rt)

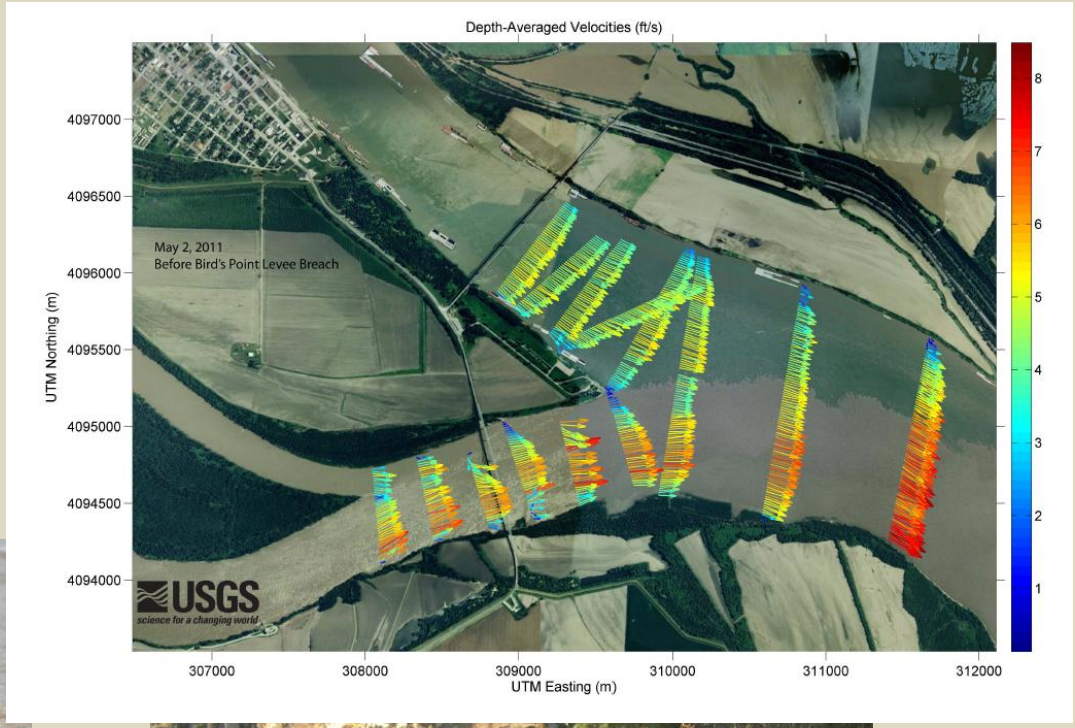
StreamStats



27 states fully implemented; 10 states in implementation process

USGS

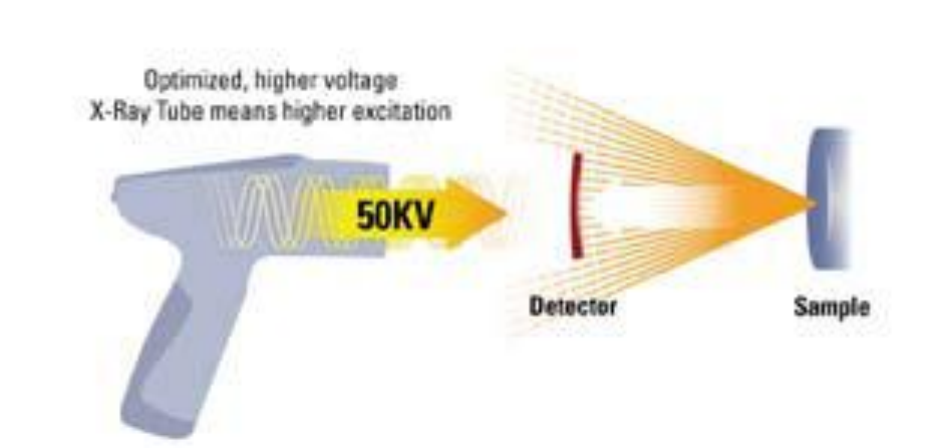
Innovative Methods and Techniques - HydroAcoustic Flow Measurements



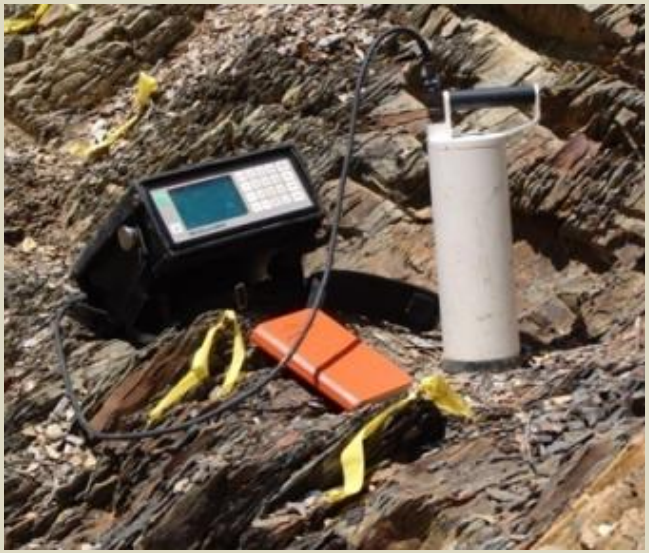
USGS

Innovative Methods and Techniques

XRF



Gamma Ray Spectrometer

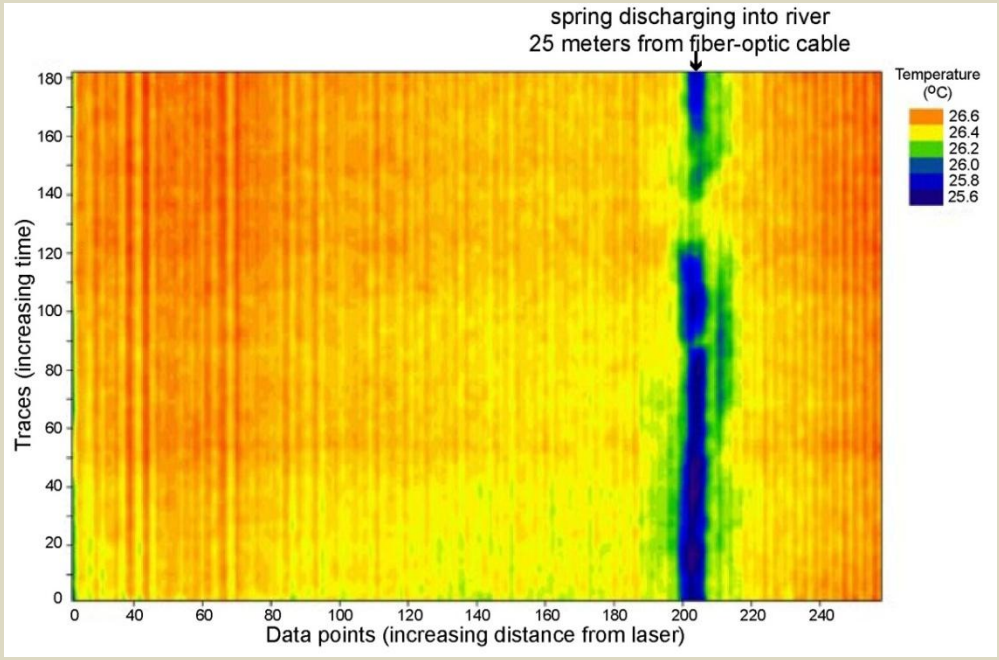


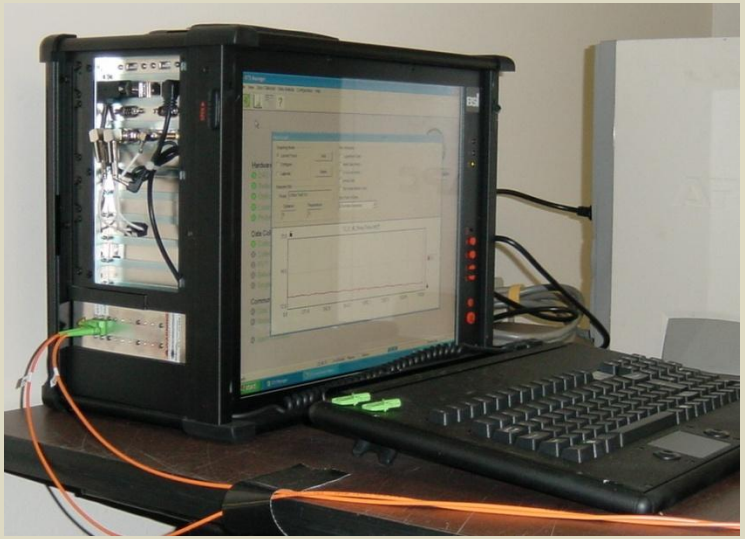
Niton XL3t analyzers easily identify a wide range of elements including Mg, Al, Si, S, Cu, Ni, Ta, Ag, Zn, Mo, Ca, K, Rare Earth Elements (REEs), and platinum group metals (PGMs). They are ideal for a wide variety of samples such as rock face, bagged or ground samples, drill cores, mineral sands, and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

USGS

Innovation - Fiber-Optic Temperature Monitoring

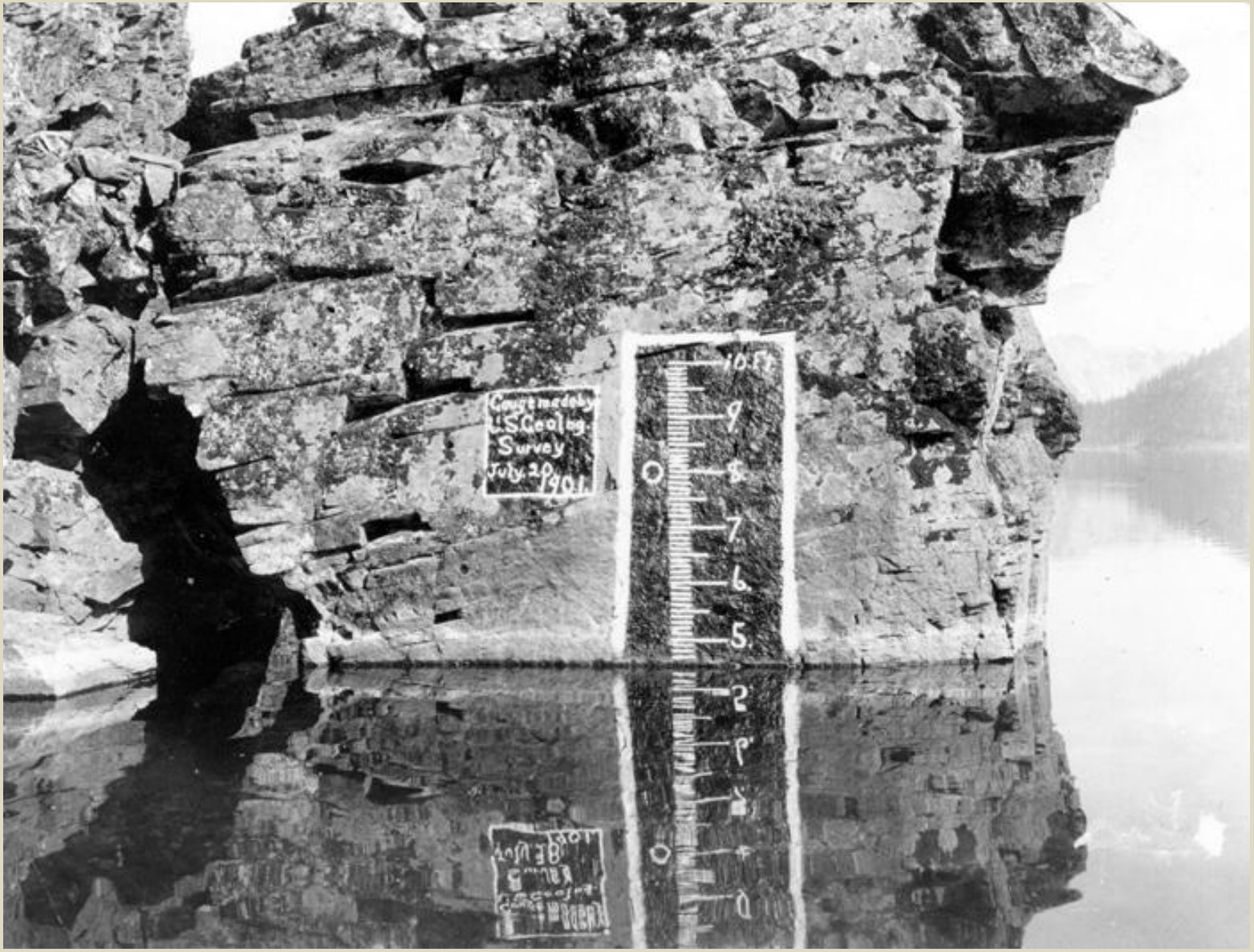
- Measurements over kilometers
- Meter-scale spatial resolution
- 0.1 °C thermal resolution
- Cycle times of minutes



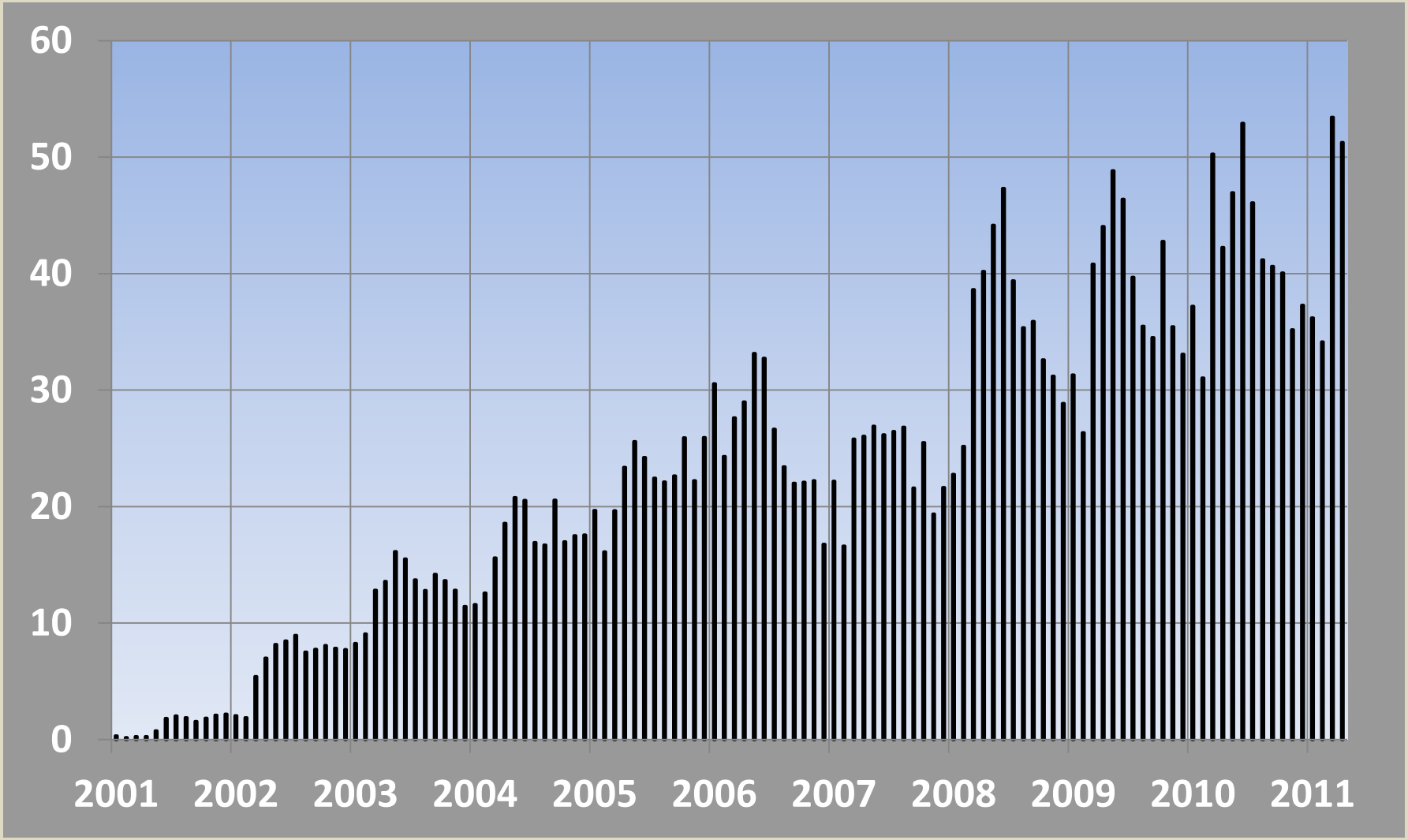


USGS

Information Delivery



NWISWeb use over the last decade, in millions of successful requests per month (about 1.5 million requests per day)



USGS
science for a changing world

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

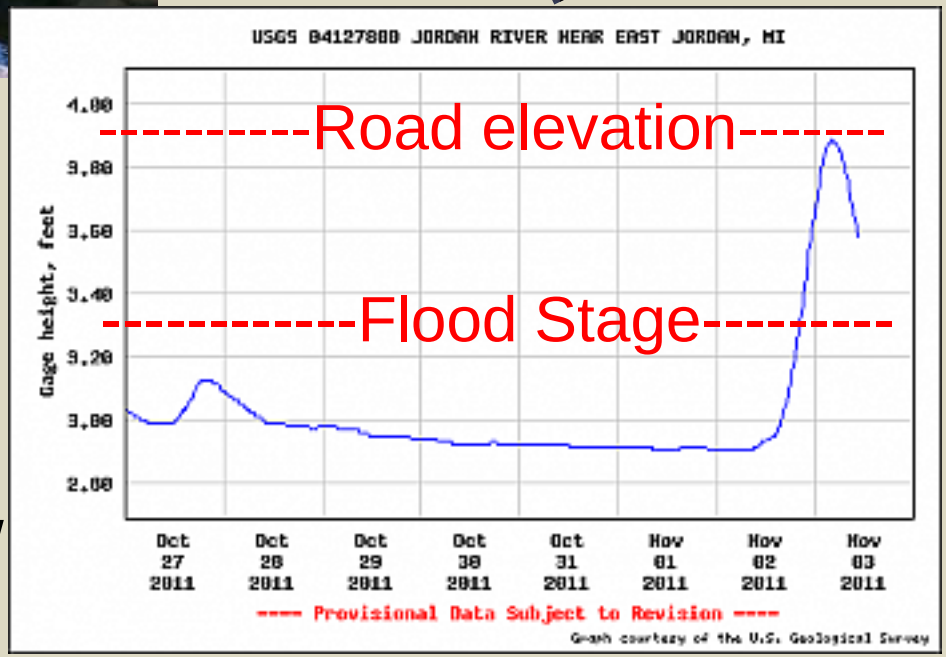
Real-Time Warnings

USGS WaterAlert

Wireless or E-mail

Customized WaterAlert

http://water.usgs.gov/WaterAlert/



USGS

USGS Science Planning for the Future

serving water needs

- 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

USGS

….“No man ever steps in the same river twice, for it is not the same river and he is not the same man.” - Heraclitus

Contact:
Bill Werkheiser
(703) 648-4557
whwerkhe@usgs.gov