

Oklahoma's Beneficial Use Monitoring Program (BUMP)

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State of Oklahoma

OWRB

WATER RESOURCES BOARD
the water agency

So What's the Issue?

Decisions don't *require* data
But **GOOD** decisions do!

Quality
Data

+

Quality
Interpretation

=

Quality
Management

How do states acquire quality surface and groundwater data to facilitate good decision making?

Oklahoma's Existing Monitoring Efforts

Beneficial Use Monitoring Program (BUMP)

Initiated in 1998. Physical, chemical and biological data collected from Oklahoma's streams and lakes is used to:

- Support development of Water Quality Standards.
- Prioritize pollution control activities.

Specific Objectives Include:

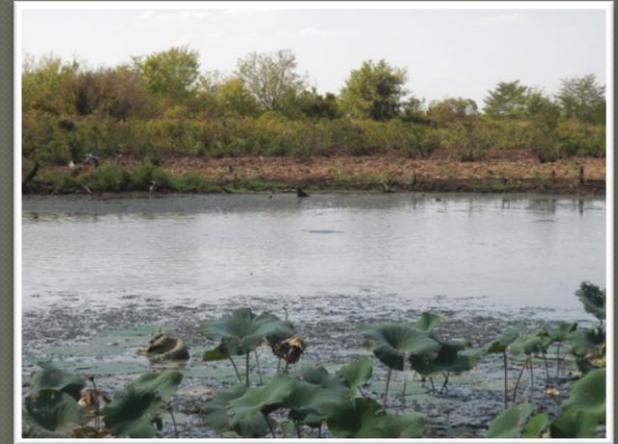
- Long-term water quality trends.
- Document impairments to beneficial use (and identify sources) 303(d) & 305(b).
- Identify pollution problems before they become a crisis.



Current Beneficial Use Monitoring Program - Lakes

● Probabilistic Based Monitoring Program

- Lakes greater than 500 surface acres in size
 - Sampling conducted four times annually to represent seasonal variation
 - Each lake sampled two years of every five
- Lakes greater than 50 surface acres but less than 500
 - Lakes drawn from a randomized list, to ensure equal probability of being selected
 - Different lakes sampled annually

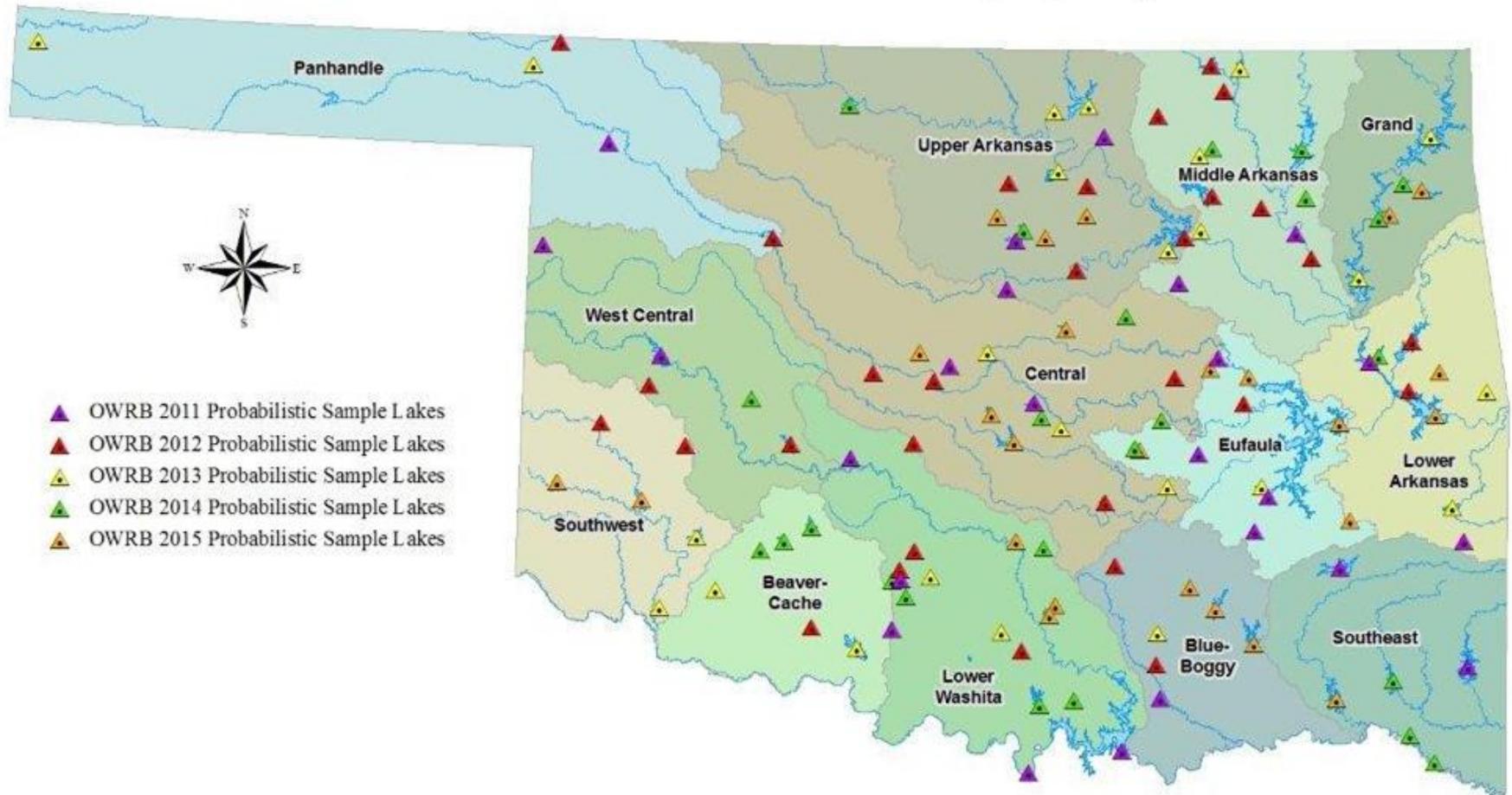


● Broad based parametric coverage

- Traditional chemistry and water column profiles
- Metals, bacteria, Phyto- and Zooplankton information collected
- Habitat monitoring



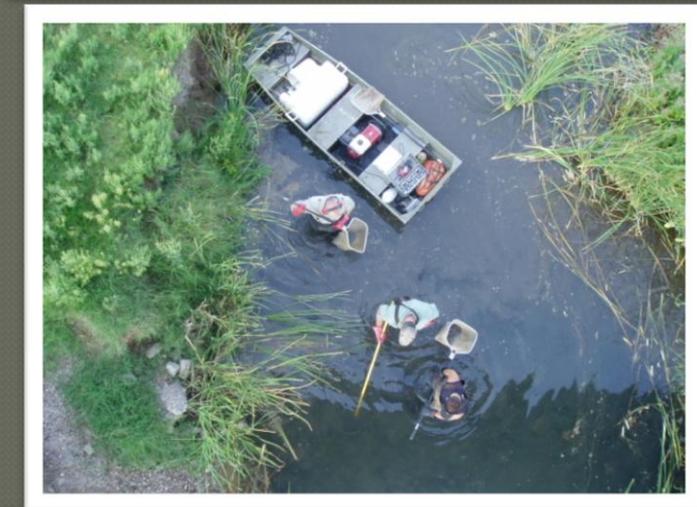
Oklahoma's Lakes Probabilistic Sampling Program



Current Beneficial Use Monitoring Program – Streams Water Quality

● Streams/Rivers

- 96 fixed river and streams sites sampled Bi-monthly (6 times annually)
- 100 probabilistic stations sampled once during a four year period
- Fish collection made on fixed sites once every 5 years and once at each probabilistic site.
- Winter and summer macro-invertebrate collections made once every 2 years at fixed sites and once at each probabilistic site.



Current Beneficial Use Monitoring Program – Streams Water Quantity

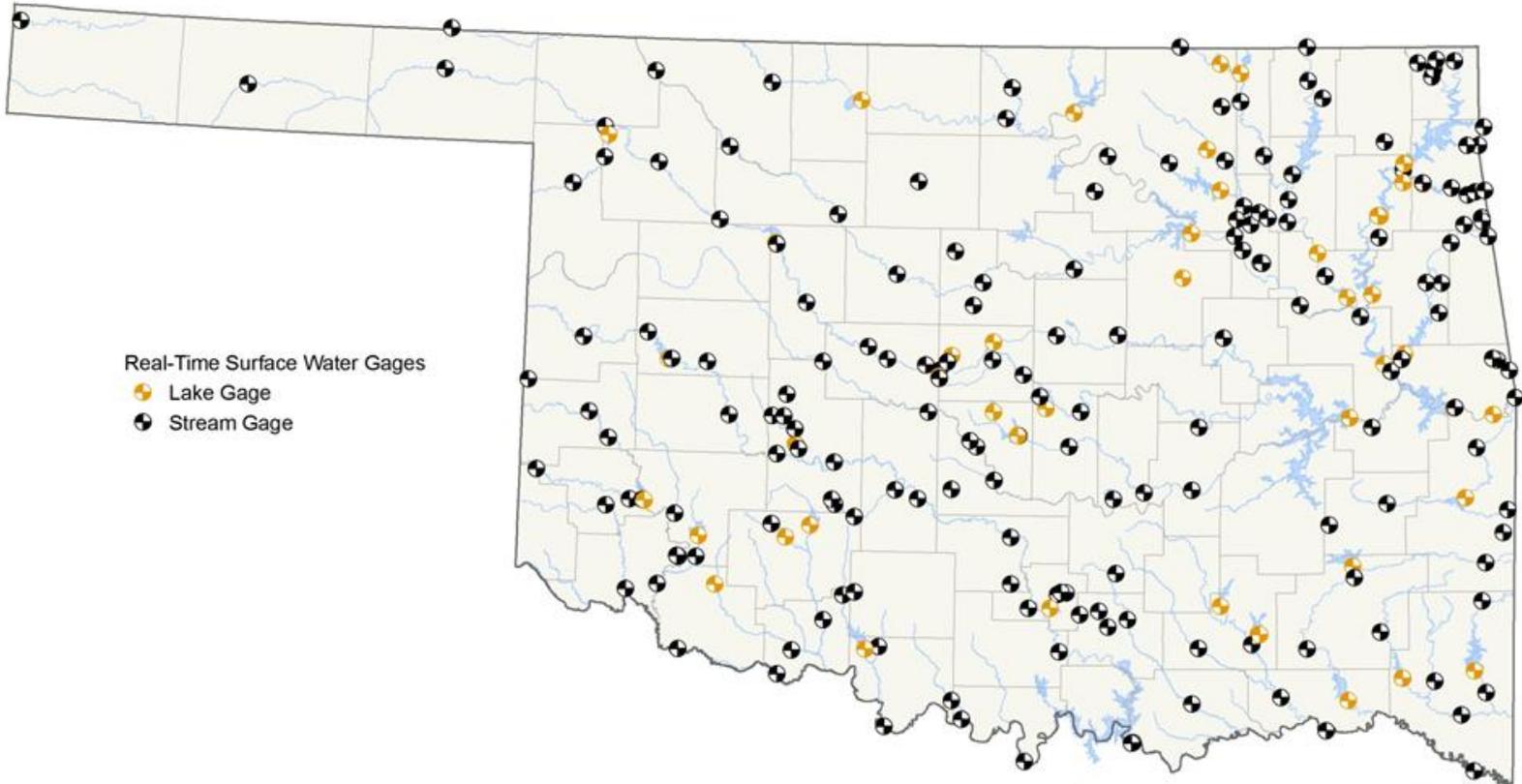
○ Streams/Rivers

- 14 sites operated by the OWRB with real-time river stage gages and an additional 12 sites that are measured for river discharge during site visits.
 - All OWRB gauged sites require base flow monitoring as well as targeted high flow monitoring
- **USGS Co-operative program**
 - 65 river gages operated by the USGS at a cost of \$691,100
 - 21 of those river gages are funded by BUMP at a cost of \$115,000



Oklahoma Surface Water Resources

Real-Time Lake and Stream Gages



Real-Time Surface Water Gages

- Lake Gage
- Stream Gage

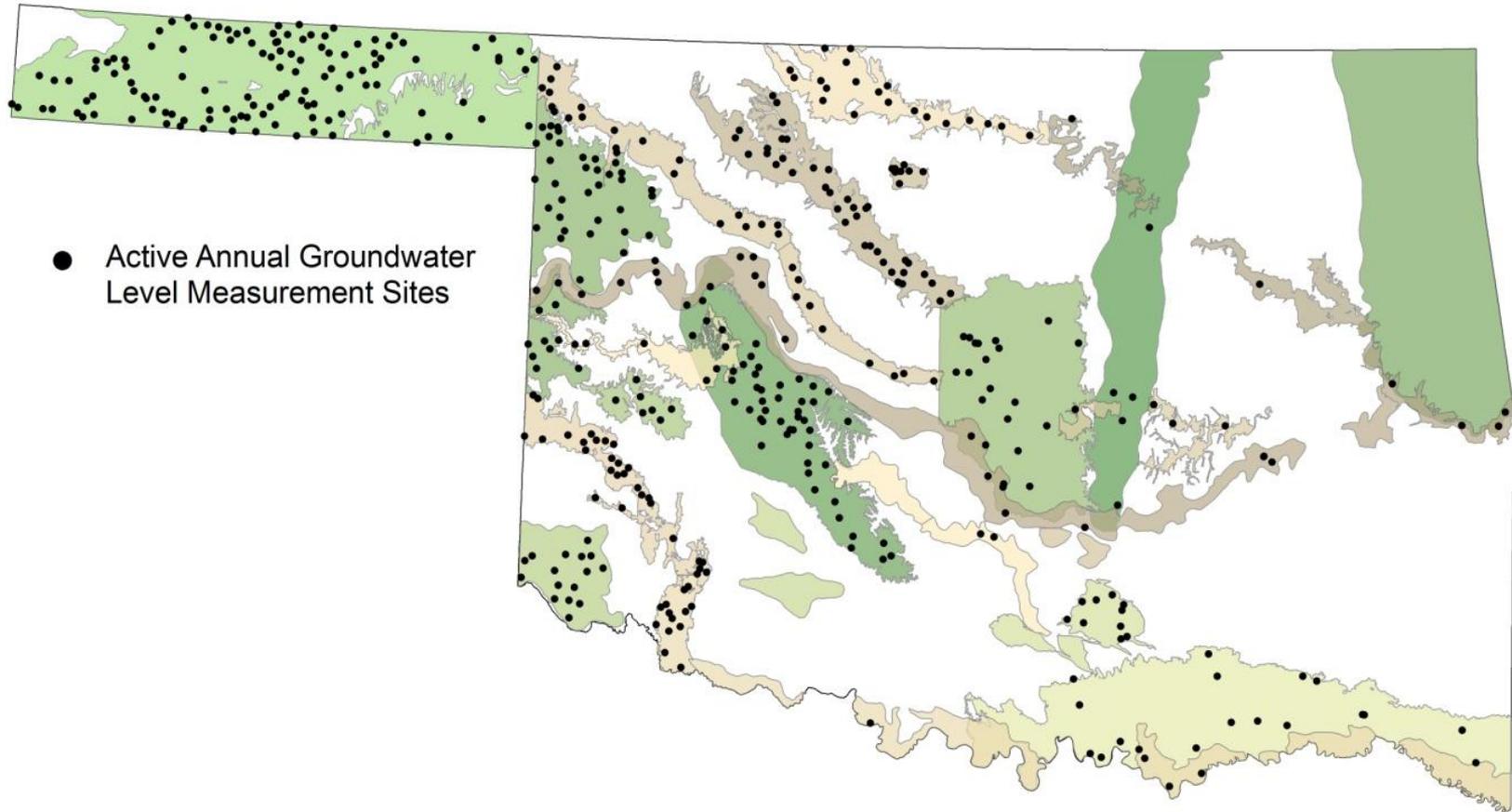
The purpose of this map is to give the relative location of real-time lake and stream gages in Oklahoma. These sites are a combination of USGS, USACE, and OWRB gages. For more information please visit the OWRB's web site at: (<http://www.owrb.ok.gov>) 10/11/2011



So What About Groundwater?

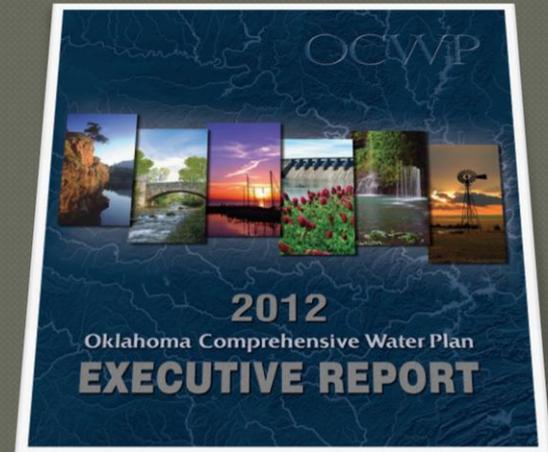
- ◎ No baseline WQ monitoring
- ◎ Rudimentary water level depth to water program (Mass Measurement) with no dedicated funding, scale limits its utility
- ◎ Maximum Annual Yield/Basin studies continue to occur
- ◎ No broad, statistically sound groundwater quantity/quality program

Existing Groundwater Level Sites in Oklahoma's Major Aquifers



Update of Oklahoma's Comprehensive Water Plan

- Five years in development including technical & public input meetings to establish a Water Plan to 2060.
- Adoption by the Oklahoma Legislature in February 2012.
- The OCWP recommended \$2,235,000 in new annual funding for water quality and water quantity Monitoring.



OCWP Recommendation

OCWP Made 8 Priority
Recommendations

OCWP Priority Recommendation

- **Dedicate funding for Ground and Surface Water Quality & Quantity Monitoring**

The State Legislature should provide a dedicated source of funding to enable the State of Oklahoma to accurately assess the quality and quantity of its water resources, thereby ensuring improved water quality protection, accurate appropriation and allocation, and long-term collection of data to make informed water management decisions. Such funding should be directed toward development and maintenance of a permanent statewide water quality and quantity monitoring program(s), specifically allowing for the following:

- Integration of all state surface and groundwater quality monitoring programs into one holistic, coordinated effort.
- Stable and dedicated appropriations for critical statewide monitoring programs, such as Oklahoma's Cooperative Stream Gaging Program, Beneficial Use Monitoring Program, and Nonpoint Source Monitoring Program, as well as other agency efforts to monitor point source, agriculture, mining, and oil and gas impacts.
- Creation of an ambient groundwater quality monitoring program.
- Full implementation of a statewide program for the collection of biological data to provide a better indication of long-term water quality trends in Oklahoma.

OCWP Monitoring

Ultimately received an
ADDITIONAL \$1.5 MILLION
To Implement OCWP
Recommendations

Recommended Program Changes - Streams and Rivers

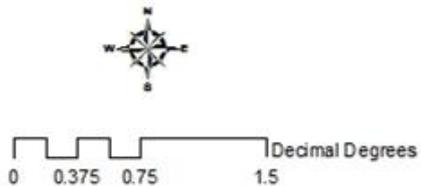
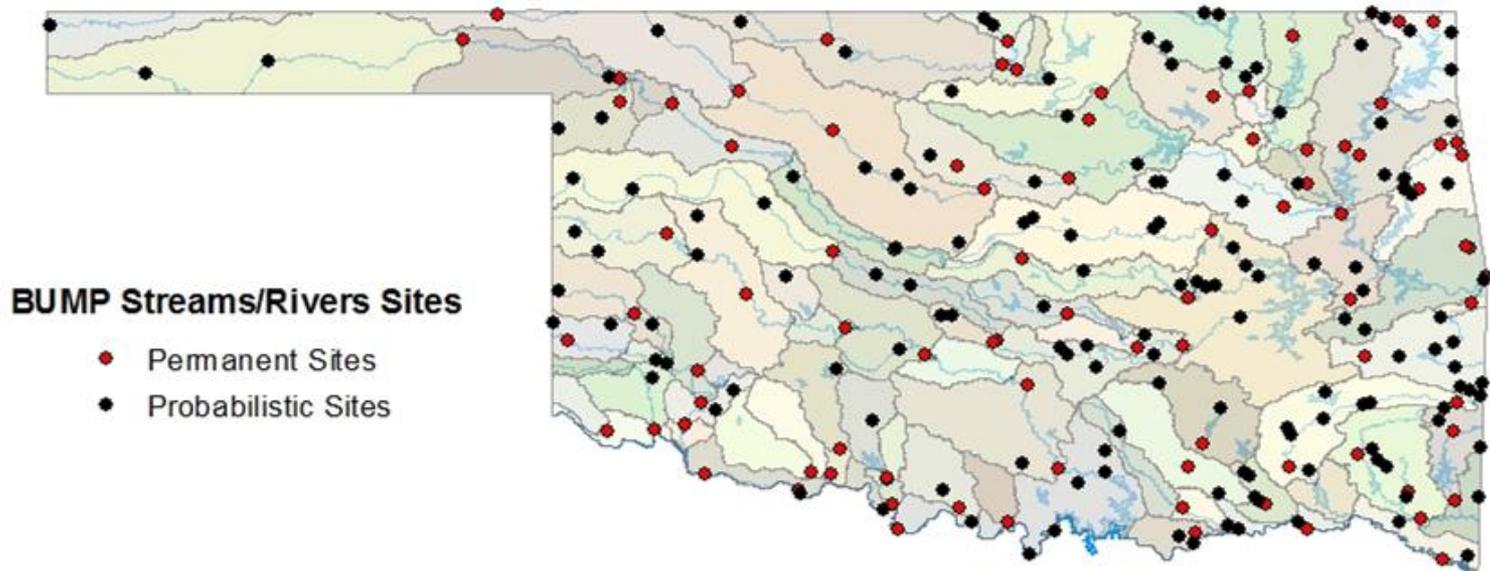
Overall Objective: More closely align surface water sampling with OCWP and collect more robust dataset to aid assessment and decision making

- Adjust spatial coverage to align with the OCWP planning basins
 - Goal is to have a station at the terminal end of all the planning basins
 - Maintain a set of reference stations across the state
- Adjust temporal coverage to 8 visits annually (once every 6 weeks) at most of the sites

Recommended Program Changes - Streams and Rivers

- Coordinate with Oklahoma Conservation Commission, Oklahoma Scenic Rivers Commission, United States Geological Survey, etc. to minimize work overlap
- Increase parametric coverage across the state
- Install additional 10 real-time river stage gages
- Assure adequate flow gage coverage across the state

BUMP Streams/Rivers Sites



Recommended Program Changes - Lakes

- Change temporal coverage from 4 visits per year to 6 per year
- Increase parametric coverage at sample lakes to collect additional critical data
- Pursue conducting Nutrient-Limited Watershed (NLW) studies to document presence or absence of impairment

New Program - Groundwater Monitoring Network

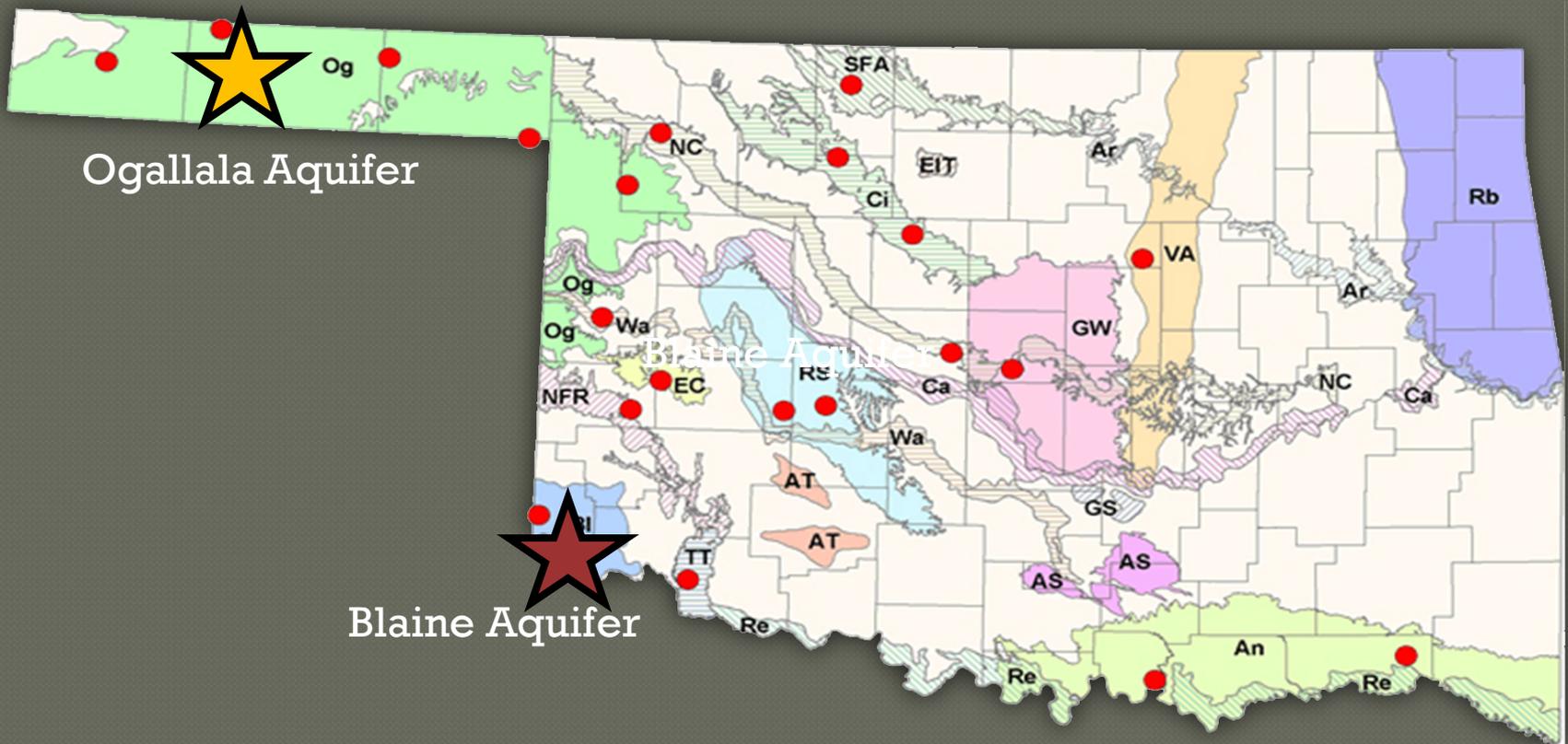
Primary Objectives:

- ① Establish/delineate baseline conditions.
- ① Assess the spatial distribution, occurrence and magnitude (of chemical constituents and water levels).
- ① Analyze water quality and quantity data trends.
- ① Identify water quality hot spots.
- ① Document groundwater level changes.

Stakeholder Involvement

- ◎ Stakeholders were provided a White Paper Groundwater Monitoring Proposal for feedback and comment in the fall of 2012
- ◎ Comment period still open but finalization of monitoring approach is at hand
- ◎ Initial groundwater sampling scheduled to begin in early 2013

Major Aquifers of Oklahoma

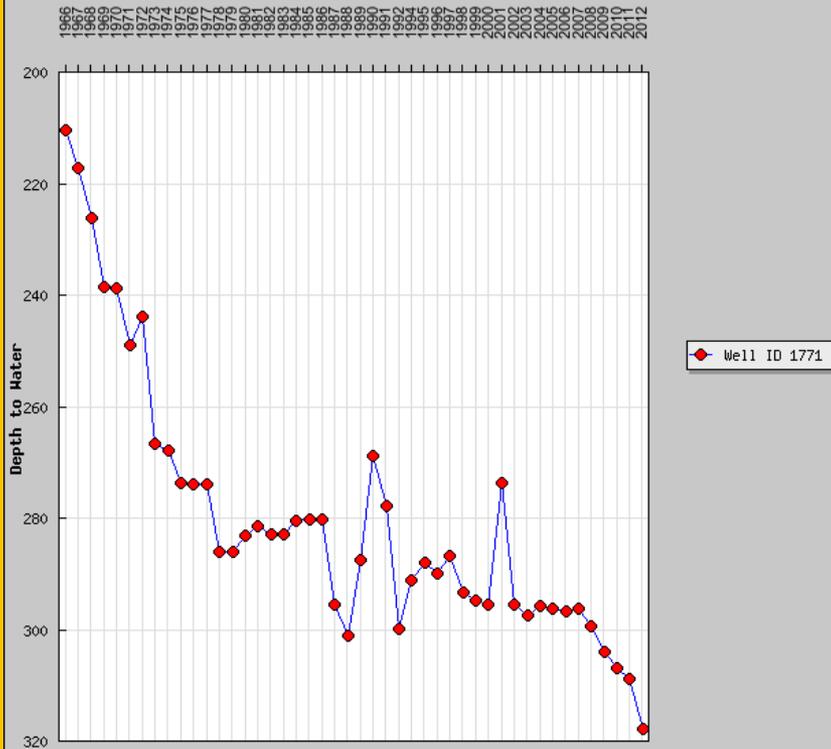


Ogallala Aquifer

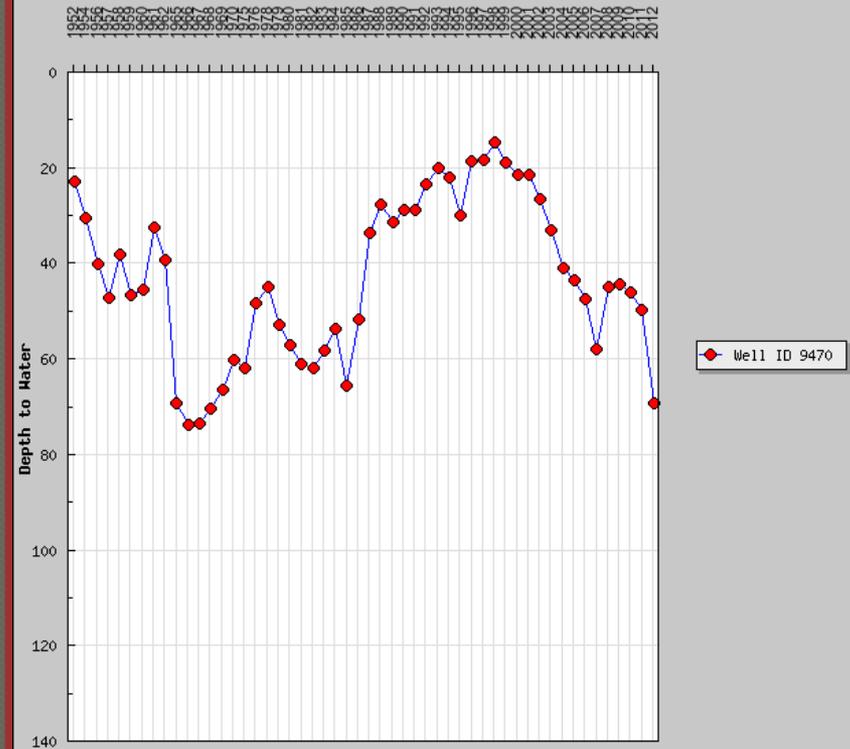
Blaine Aquifer

Hydrograph of Irrigation Wells

Ogallala, Panhandle Well (1966-2012)

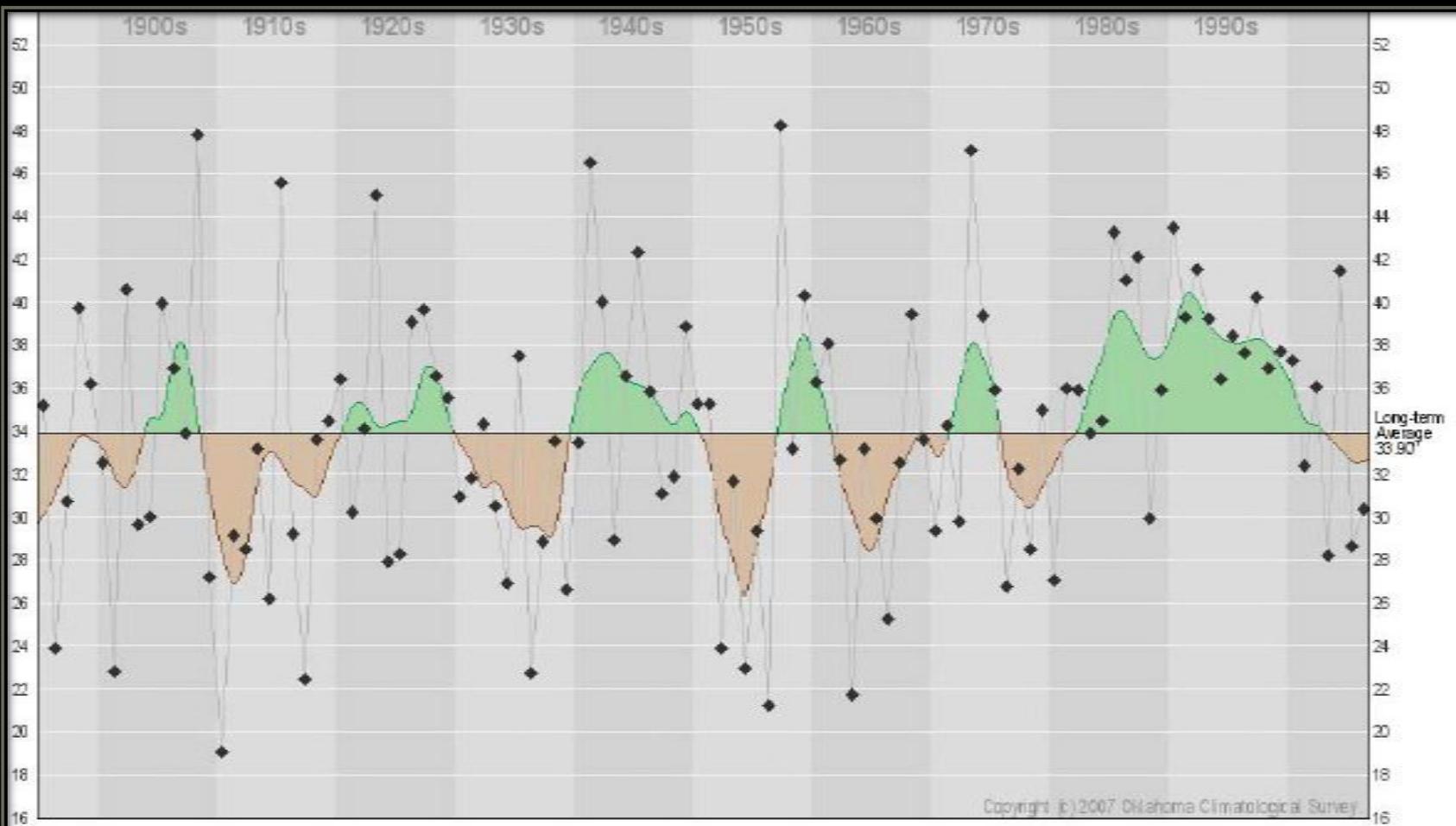


Blaine Well (1952-2012)



Ogallala Panhandle aquifer reflects long-term declines as result of high groundwater withdrawals and low recharge rates; whereas the Blaine aquifer reflects year-year changes in water level tied to variable precipitation.

Wet/Dry Periods in Oklahoma 1895-2006



OKLAHOMA
CLIMATOLOGICAL SURVEY

Annual Rainfall History with 5-yr Weighted Trends
Climate Division OK-ST (Oklahoma Statewide): 1895-2006

Wetter historical periods
Drier historical periods

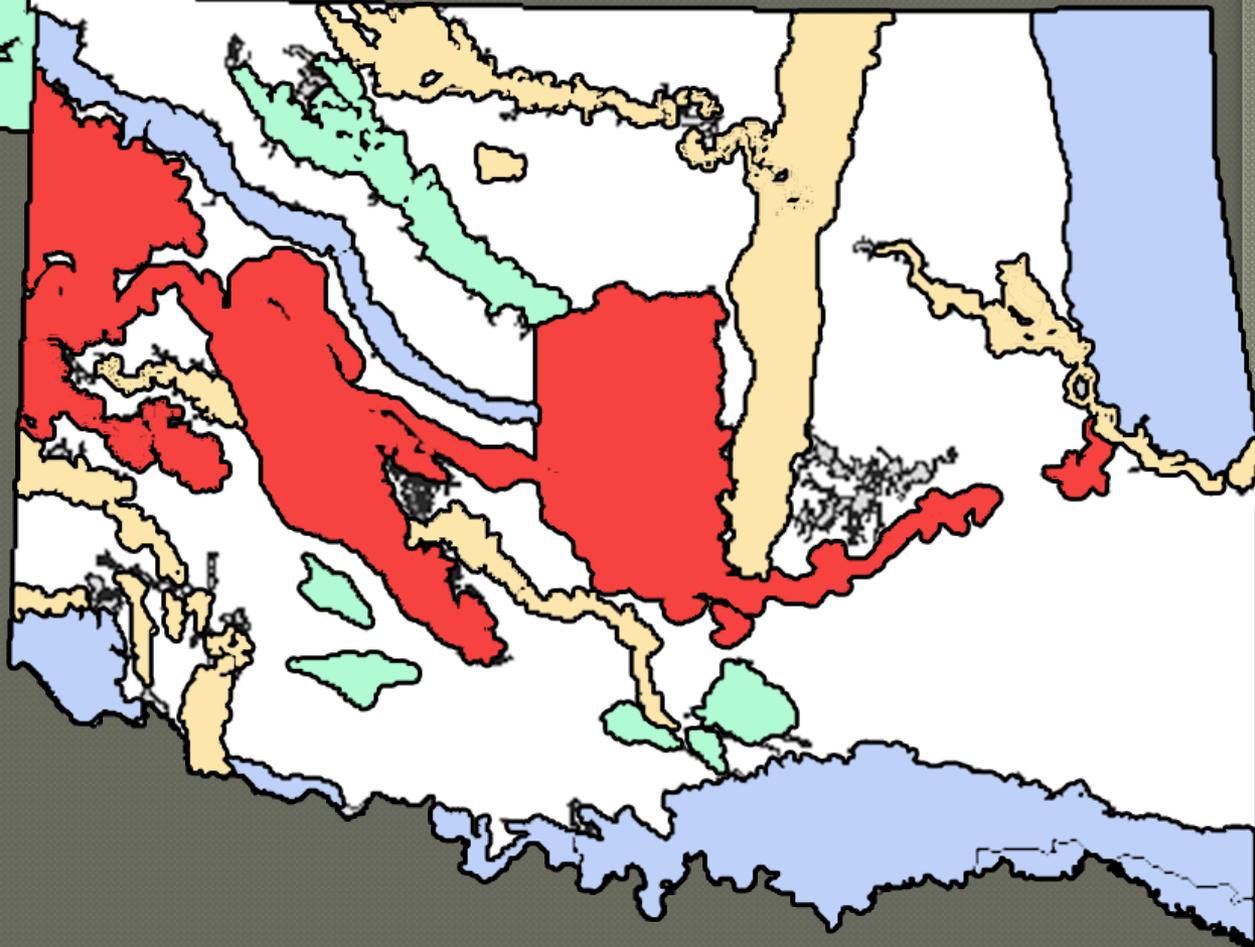
Network Implementation Schedule

 Year 1 200 WQ
300 WL

 Year 2 185 WQ
270 WL

 Year 3 190 WQ
305 WL

 Year 4 160 WQ
225 WL



Groundwater Monitoring Program

Long-term holistic monitoring for 21 major aquifers throughout the state

Water Quality

- ◎ 700 wells in the main Baseline Network
- ◎ 140 of those wells in the long-term Trend Network

Water Quantity

- ◎ 1068 wells in the main Baseline Network
- ◎ 530 of those wells in the long-term Trend Network

Comprehensive Information Management System

- Create a state of the art Water Quality and Quantity Data Management Network
- Multi-functional with a variety of user interfaces
- Comprehensive
 - Waterbody/Aquifer Types
 - Geospatially Integrated
 - Multiple Data Types (e.g., chemistry, physical, biological, toxicological, real-time)
 - Variety of Applications (Analytical and Reporting Formats)

Comprehensive Information Management System Timeline

- Internal Network Development Meetings (concluded November 2012)
- Phase 1 – Network Development
 - Targeted Completion Date: April 2013
- Phase 2 – Network Implementation and Data Migration
 - Targeted Completion Date: October 2013
- Phase 3 – Advanced Application Development
 - Targeted Completion Date: June 2014

Beneficial Use Monitoring Program Summary

◎ Water Quality and Quantity Monitoring

• Lakes

- Increase sampling frequency and adjust parametric coverage.

• Rivers/Streams

- Align sampling network with OCWP planning basins, increase sampling frequency and adjust parametric coverage.

• Ground Water

- Water Quality and Quantity Network Initiation.

◎ Comprehensive Information Management Network

- More accessibility to data and related products.

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