Groundwater Management in Oklahoma

Julie Cunningham

Water Planning & Mgmt. Division Chief

Oklahoma Water Resources Board

Association of Western State Engineers
October 18-22, 2015

OWRB
the water agency

Holistic Groundwater Management

- GMAP-Water quality and quantity monitoring
- Max. Yield Studies- basin-wide investigation and availability modeling
- Well drillers licensing and enforcement
- Missing pieces…

OWRB
the water agency

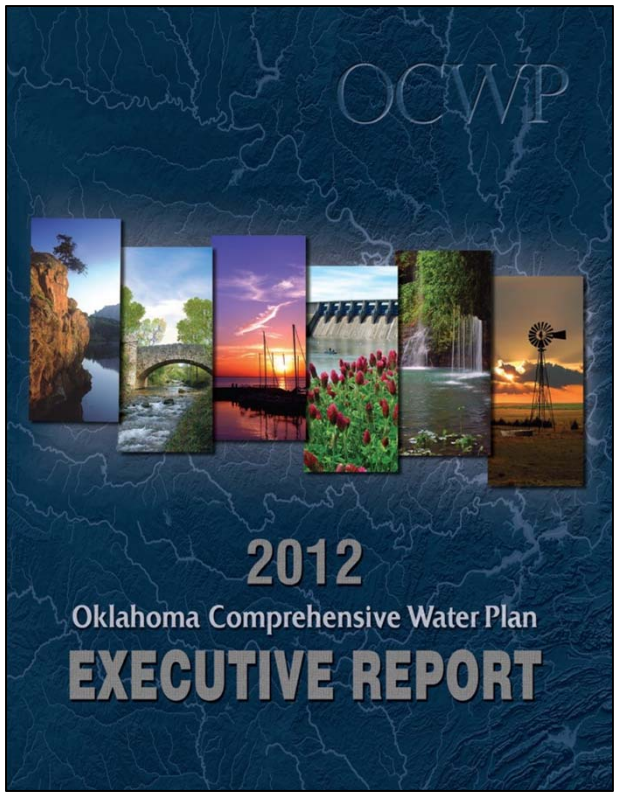
2012 Oklahoma Comprehensive Water Plan Update

5 years of coordinated technical and public input meetings to develop the plan for the next 50 years.

- Adopted by the Oklahoma Legislature in May 2012

Priority Recommendations

1. Water Project & Infrastructure Funding
2. Regional Planning Groups
3. Excess & Surplus Water
4. Instream/Environmental Flows
5. State/Tribal Water Consultation & Resolution
6. Water Conservation, Efficiency, Recycling & Reuse
7. **Water Supply Reliability-Yield Studies**
8. **Water Quality & Quantity Monitoring**



Critical Evaluation Lessons

2012 Oklahoma Comprehensive Water Plan assessed water supply reliability in terms of: Wet water availability, permit availability, and water quality availability

"Although groundwater quality can be a significant factor in water supply analysis, the lack of an adequate groundwater quality data base precluded the use of groundwater quality as a criterion for the statewide evaluation"

2012 OCWP Executive Report, pgs. 109-100

- Data is not required for decision-making, BUT it is required to make GOOD decisions!

2012 Legislative Support

Idea of good data for good decision-making resonated with the 2012 Oklahoma Legislature

- Added $1.5M annually to the OWRB GR specifically for monitoring
  - bring funding levels back to historic levels for existing Beneficial Use Monitoring Program to launch a new groundwater monitoring network and
  - Launch a new groundwater monitoring network
- Added $1.3M annually for OCWP implementation
  - currently being used, in part, to complete GW Yield studies used to appropriate gw on all unstudied groundwater basins.

Previous OWRB Groundwater Monitoring

- Long-term depth to water measurement
  - 500 sites measured annually
  - Many sites have over 50 years of data
  - Spatial representation focused in west
- Maximum Annual Yield: hydrologic investigation and modeling effort to appropriate water rights
- No comprehensive groundwater quality monitoring

No dedicated funding source. GR and occasional legislative mandate for study

Other Programs in Oklahoma

ODEQ: Clean Water Act monitoring; Public Water Supply systems and Source Water Assessment for Safe Drinking Water Act; Wellhead Protection program

ODAFF: Pesticide protection; Fertilizer protection; Livestock and Animal Feeding Operations

OCC: monitoring mineral activities

USGS: Groundwater modeling, hydrogeologic investigations; water use reports (cooperative with OWRB)

EPA: remediation through GWERD & Superfund Sites

New Groundwater Monitoring & Assessment Program (GMAP)

- 21 major aquifers
- Random, spatially distributed network
- Baseline of water quality **and** quantity
- Characterize aquifers and identify concerns
  - Major ions, nutrients, trace metals & elements
- Water quality trends

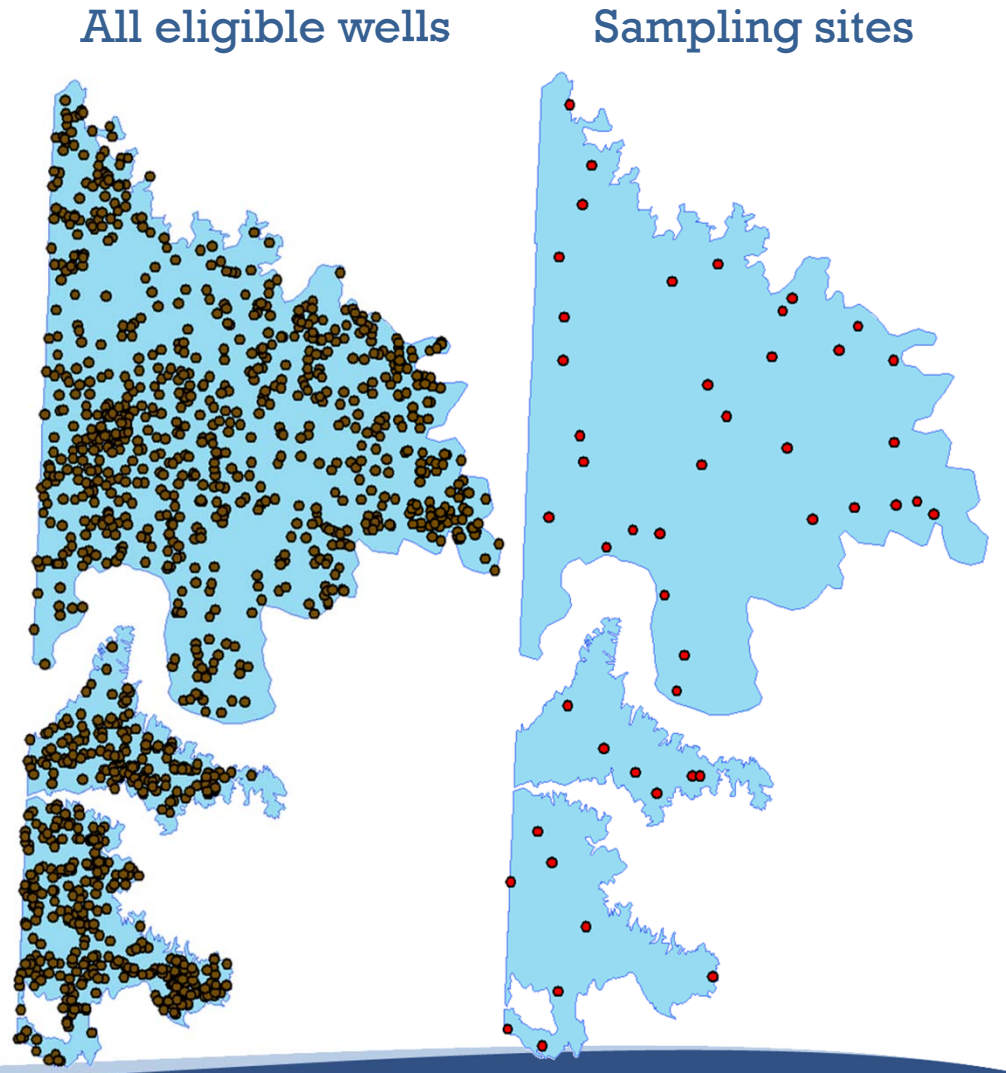
Critical Funding & Design Lessons

- Funding is directed toward what is perceived as valuable.
- A **public** outcry for data in decision making – it really does carry weight.
- Don't design a program to spend every dollar in year one.
  - Make it solvent for at least 5 years.
- Thoroughly research, prepare, and train staff so they are confident and reliable in the field.
- Coordinate with the contract laboratory.
- Adapt - Improvise - Overcome

Site Selection

Spatially balanced, randomized draw for each aquifer:

- Western Ecology Division of the US EPA
- Sites are initially selected from the OWRB well record database



OWRB
the water agency

Site Selection

- Landowner contact
  - Request permission for each well location
  - Mailouts
  - Brochures
  - Phone calls
- An initial site visit to evaluate and verify the correct well
- Determine the best sample collection methodology

Critical Implementation Lessons

- Landowner access can be difficult and time consuming
  - especially when people are suspicious of government!
  - extensive communication and cooperation required
- Need complete & accurate well drilling records
- GIS & GPS technologies are crucial
- Learn from the past and be adaptable
  - Continue to evolve the program for best practices, quality, and efficiency

Sampling

Sampling is two-part:

Water Quantity Measurement

- consists of measuring the water level in the well with an electric or steel tape

Water Quality Sampling

- Wells purged of standing water to ensure that the sample water is fresh from the aquifer
- Samples are collected, preserved, and stored on ice
- All sampling equipment is decontaminated after every site

GMAP To Date

3,500+ citizen/entity contacts

Water Quantity
1,068 wells – Baseline Goal
- 746 measured
- 6 aquifers added summer 2015

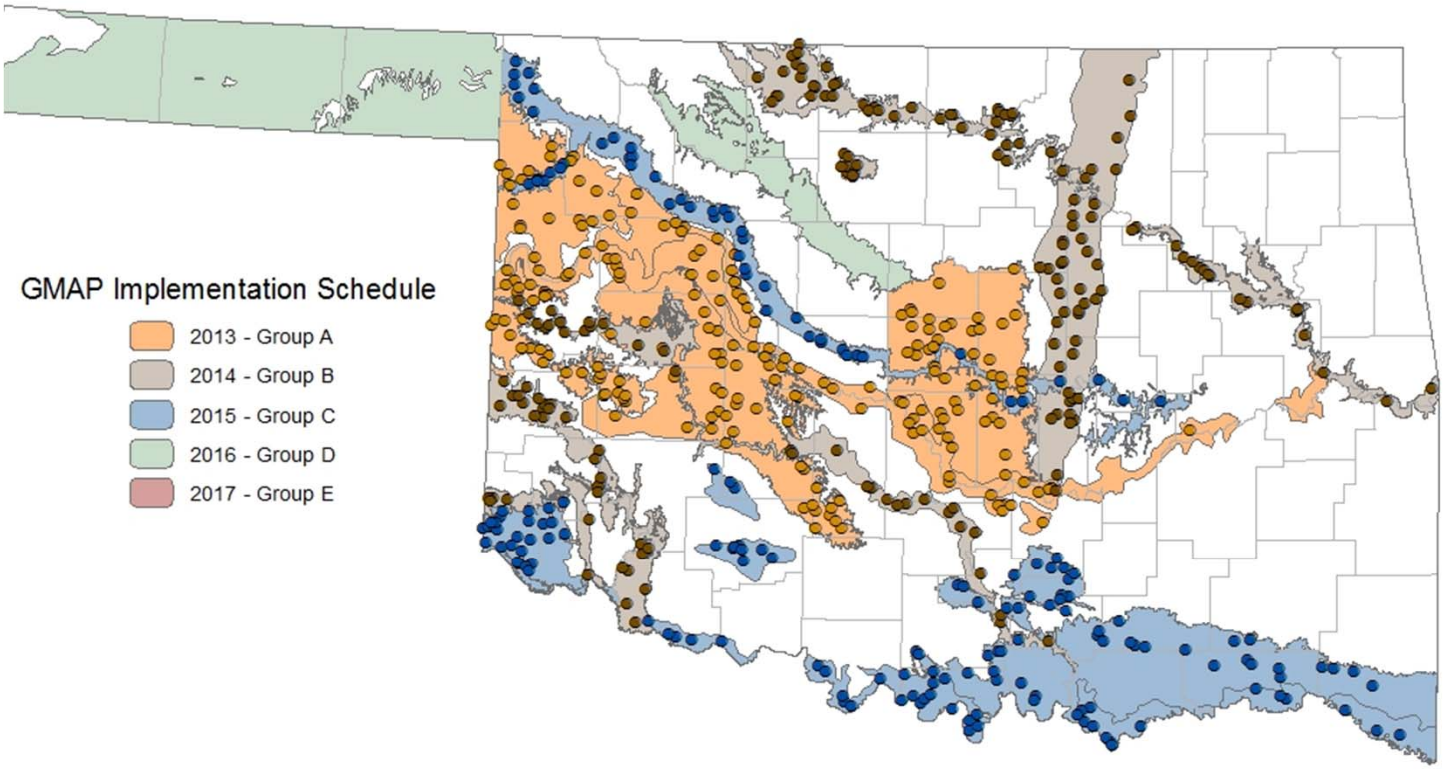
530 wells – Trend Monitoring Goal
- 201 wells measured tri-annually 2015

Water Quality
700 wells – Baseline Goal
- 380 wells sampled in 14 aquifers
- 5 major aquifers measured 2015

140 wells – Trend Monitoring Goal
- Pending baseline completion

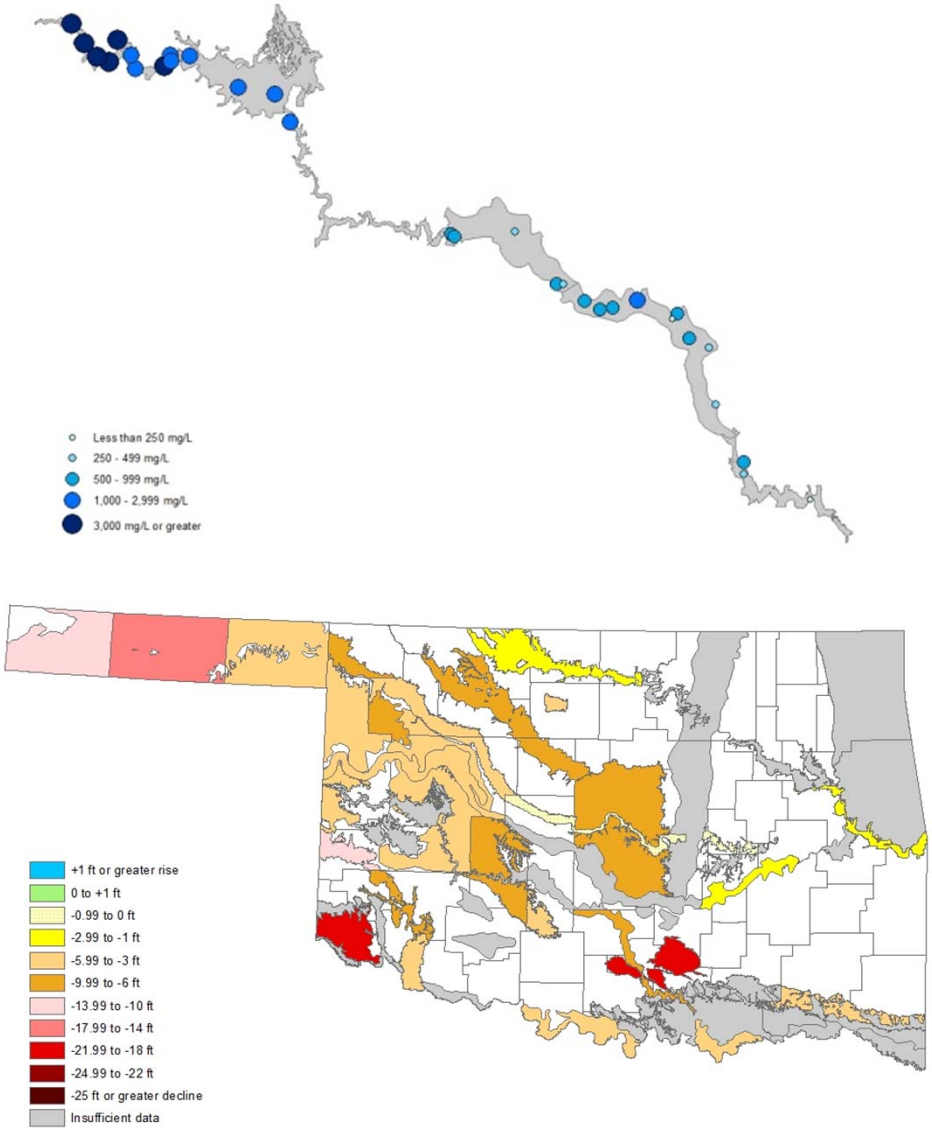
The OWRB looked at design concepts from current national/state programs: USGS National Framework; Arizona ; Florida; EPA guidelines

GMAP Sampling Sites to Date



Data & Reporting

- Water quality is looked at on the scale of the entire aquifer
  - spatial trends
  - areas with higher/lower than average concentrations
- Water levels are looked at on multiple scales
  - the entire aquifer
  - climate divisions
  - time scale
    - 1-year changes
    - 5-year
    - 10-year



Water Level Networks

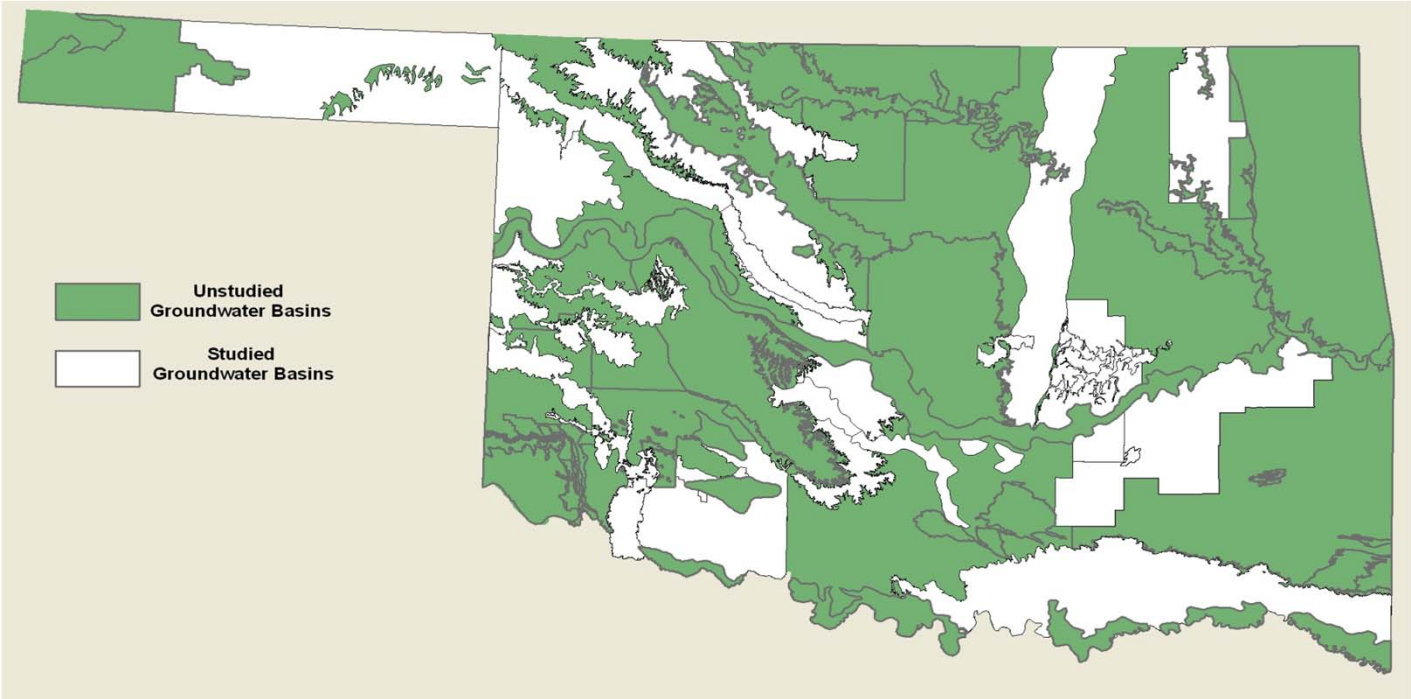
- This is **an enhancement** of the existing water level program
  - more wells in major aquifers
  - some wells measured more than once a year
- Continuous monitoring probes installed statewide
  - record water levels on the order of hours
  - several in conjunction with Oklahoma Mesonet

Funding- Water Supply Reliability through Water Availability Studies

Ensure water availability for future growth through fair and sustainable water allocation.

- **Surface and groundwater yield and allocation studies** on all basins
- **Permitting policy analysis—** GW-SW interactions, seasonal permitting, storage yield protection "triggers", conservation-oriented permitting approaches

Unstudied Major & Minor Groundwater Basins



- 36 basins unstudied or 20-year updates overdue
- 8 major basins located in OCWP-priority "hot spot" areas
- 10-year study completion schedule

OWRB the water agency

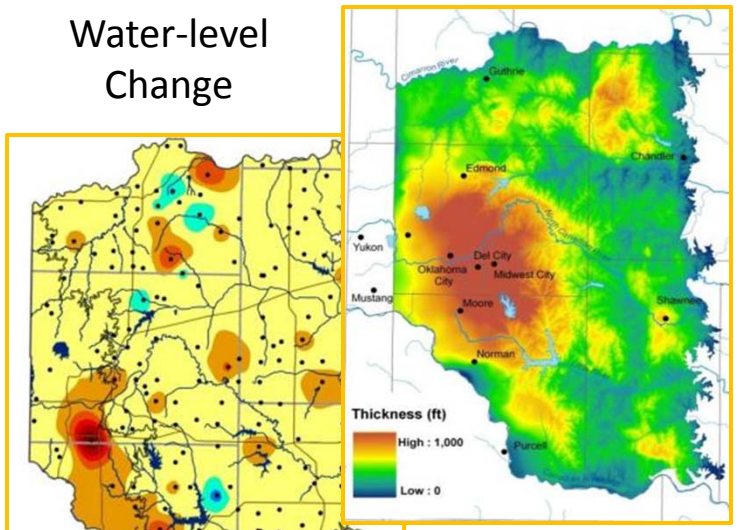
Model Analysis & GIS Mapping Products

Location-specific analysis

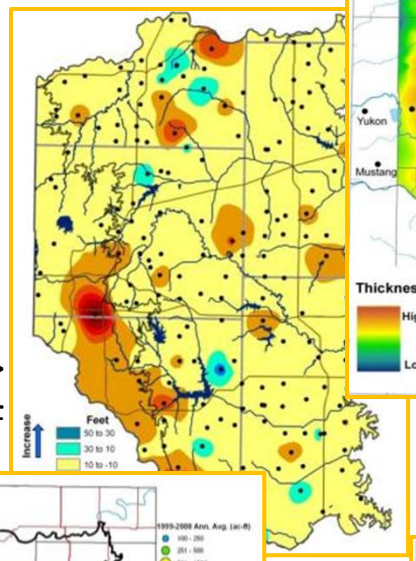
- Offer robust aquifer characterization, opportunity for forecasting and “what-if” assessment
- Well site location
- Contamination flow prediction
- Assessment of potential groundwater/stream water interactions and effects on reservoir yield
- Assessment of drought affects by locations

1987-2009 Water-level Change

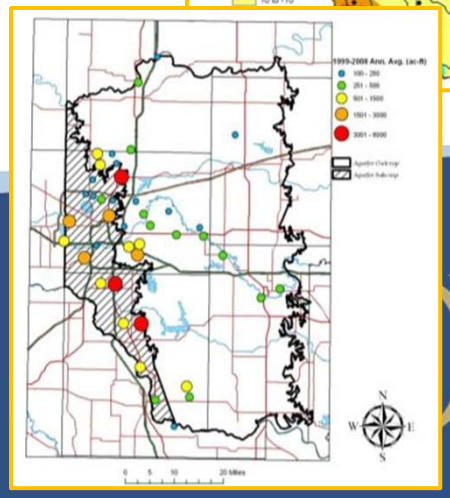
Aquifer Thickness

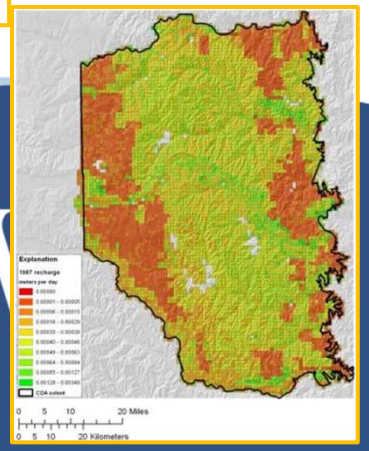


Users > 100 AF



Recharge Areas





Oklahoma Well Drillers Program

Groundwater Statutes and Oklahoma Administrative Code 785:35-1-1

- promulgated to protect the quantity and quality of the fresh groundwater from contamination and waste, and to provide public protection by enforcing proper construction, plugging and installing activities.
- Establish requirements for licensing to drill and install pumps in certain types of wells.

Oklahoma Well Drillers Program

- Establish Well Drillers Advisory Committee (of well drillers and pump installers) to make recommendations to the Board
- Set minimum requirements to be followed by any person when drilling, installing pumps, and plugging certain kinds
- Set procedures for license renewal, revocations, suspensions, and requirements licensees must meet to retain their licenses

Oklahoma's Well Drillers Program

Activities Requiring a License:

- (1) Commercial Drilling of Water Wells, Test Wells and Observation wells
- (2) Commercial Drilling of Monitoring Wells and Geotechnical Borings
- (3) Commercial Drilling of Geothermal Wells
- (4) Commercial Installation of Pumps

Oklahoma's Well Drillers Program

- 370 licensed firms; 760 licensed operators
- 8 Member Well Drillers Advisory Council
  - Make Recommendations for Rule Changes
  - Assist with Program Direction
  - Make Recommendations on Enforcement

- Indemnity Fund
  - Correct Well Problems
  - Provide Education for Licensed Operators
  - Fund Inspection Program

Oklahoma's Well Drillers Program

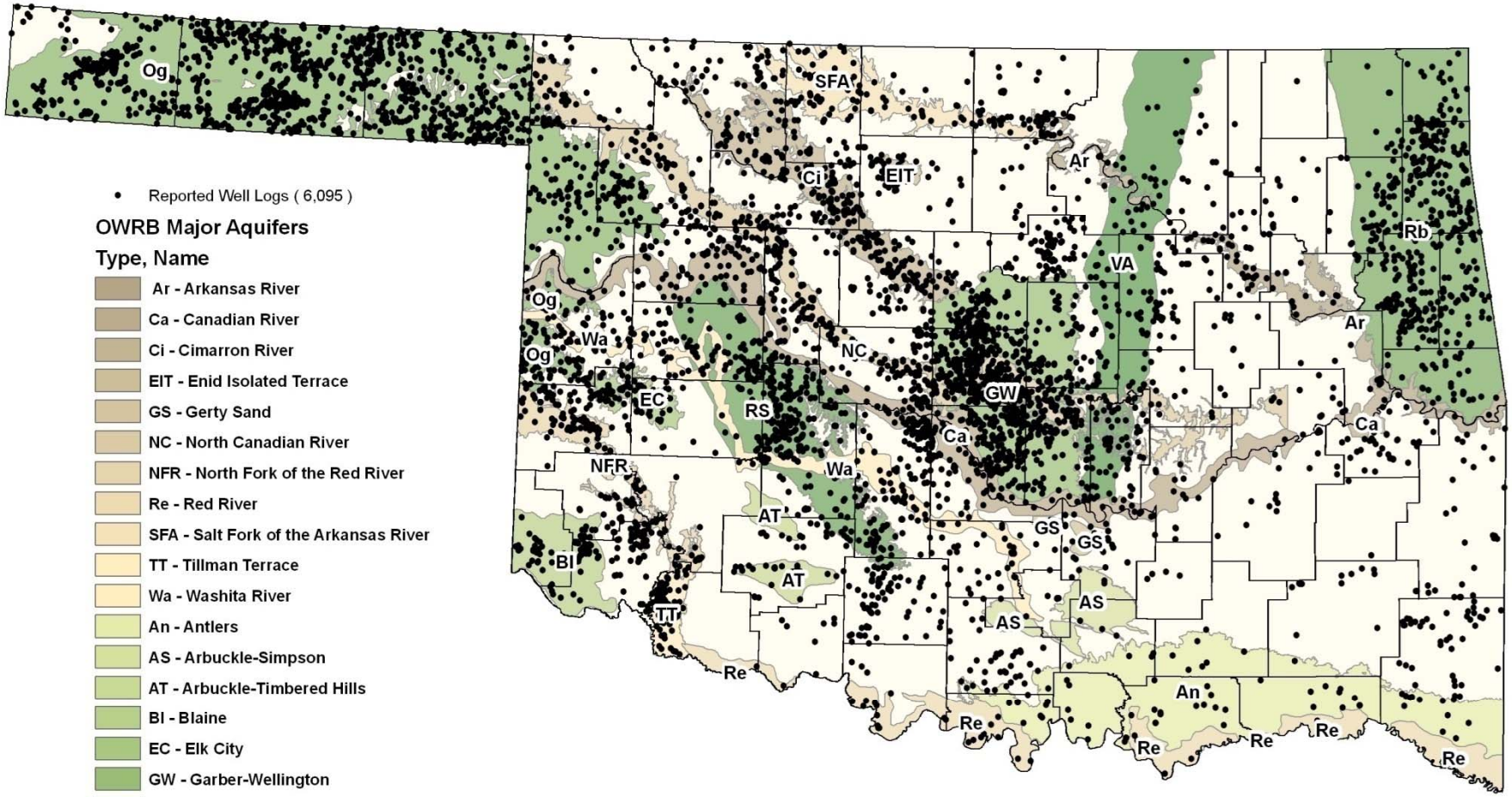
Continuing Education Requirement:

All licensees required to attend at least 4 units of approved continuing education during each year, or 8 units for a 2 year period of renewal

One unit of the 8 units must be Oklahoma Rules and Regulations

Locations of All Reported Well Logs

Prior to 1972 - (6,095 Wells)

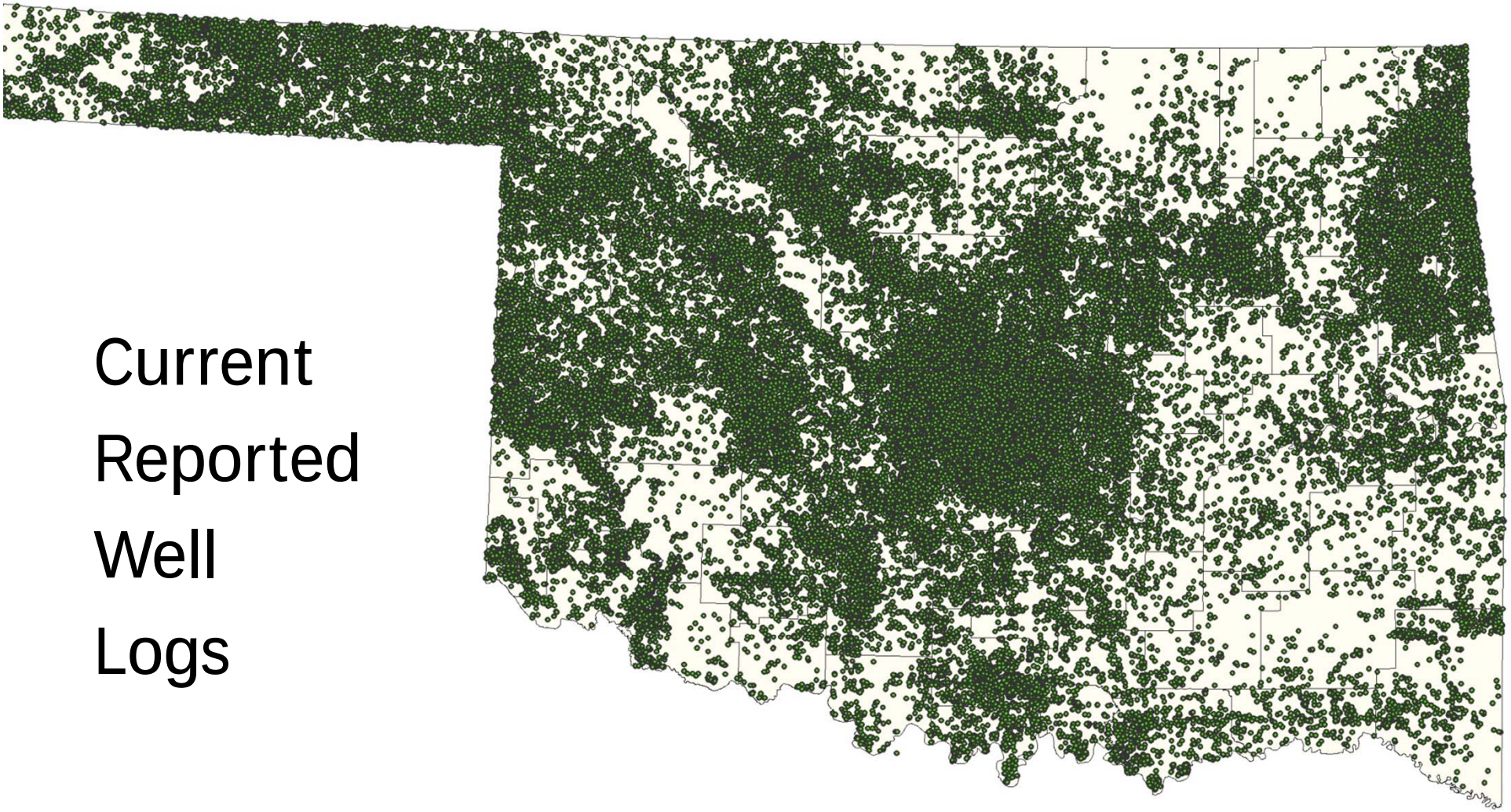


State of Oklahoma
OWRB
WATER RESOURCES BOARD
the water agency

20070227

Locations of Reported Well Logs

(>120,000 Wells)



Current Reported Well Logs

Oklahoma's Well Drillers Program

Enforcement Process:

Violations and Penalties:

Misdemeanor Violations: Any person after notice from the Board that violates, refuses, or neglects to comply with any provision of Chapter 35 shall be guilty of a misdemeanor and shall be fined not less than $25 and not more than $250 for each offense.

Administrative Penalties: The Board may, after notice and hearing, impose administrative penalties of up to $5000.00 and may revoke, suspend or deny renewal of the license for each violation.

Oklahoma's Well Drillers Program

Enforcement Update and Process:

Violations and Penalties:

Penalty for failure to submit reports: Penalties to be assessed for the failure to submit multipurpose completion reports within 60 days after completion of the activity shall be as follows:

First time penalties for failure to submit report, $50 for each report.

Second or additional time that penalties are assessed for failure to submit reports $250 for each report.

Oklahoma Water Well Drillers Program

Importance of Properly Plugging Abandoned Wells:

Prevent Physical Hazard of Open Wells Either Drilled or Hand Dug

Prevent Contamination from Surface Sources Through Open Casing, Annular Space, or from Subsurface Sources

Oklahoma Comprehensive Water Plan proposed new abandoned well plugging program, but no funding appropriated

Questions?

Julie Cunningham, Chief

Water Planning & Management Division

Julie.cunningham@owrb.ok.gov

Oklahoma Water Resources Board

3800 North Classen Boulevard

Oklahoma City, OK 73118

Phone: 405.530.8800

Fax: 405.530.8900

OWRB

the water agency