

An Update on GRDA's Lake Water Quality Monitoring Program and Watershed Projects

Stephen J. Nikolai

GRDA-WQRL Lab Director



Outline

- GRDA at a Glance (*Who We are...What we do*)
- *Past Projects*
- *Current Projects*
- *Watershed Projects*

GRDA AT A GLANCE

Enabling Legislation

(Title 82 Chapter 8 Section 861)

- Establishes GRDA as a conservation and reclamation district for the waters of the Grand River.
 - “...including the control, storing, **preservation** and distribution of the waters of the Grand River and its tributaries, for irrigation, power and other useful purposes and **reclamation** and irrigation of arid, semiarid and other lands needing irrigation, and the **conservation and development of the forests, minerals, land, water, and other resources** and the conservation and development of hydroelectric power and other electrical energy, from whatever source derived, of the State of Oklahoma.”
 - (d) To forest and reforest and to aid in the foresting and reforesting of the **watershed area of the Grand River and its tributaries**;

Policy Manual 2014

GRAND RIVER DAM AUTHORITY BOARD OF DIRECTORS POLICY MANUAL 2014

The purpose of the Board of Directors Policy Manual is to provide under one cover all Board policies, the GRDA enabling statutes and the Bylaws of the Authority.

The Board of Directors encourages the customers and employees of GRDA to suggest recommendations for policies, or amendments thereto, for Board consideration.

POLICY NO. 1-2

AIMS, PURPOSES, AND OBJECTIVES

- i. **OBJECTIVE:** To further the Authority's mission to provide low-cost, reliable electric power and related services to its customers and to be responsive to the interests and concerns of public power users, the communities the Authority affects, and the people of the State of Oklahoma. The Authority pledges to assist in area economic development and help its customers adapt to changes in their business environments, as well as supporting environmental awareness, recreational development, and good safety practices on and around the Authority's lakes, to ensure the continued improvement of the quality of life for all those who utilize these resources.
- ii. **POLICY:** The following objectives of the Grand River Dam Authority are established to focus attention on the need to initiate, develop and promote active programs designed to serve the needs of the Authority's customers, its employees, and the general public who utilize our resources; to conserve, preserve, and protect the environmental health and welfare of the lakes and lands within the Authority's district; and to utilize effectively the Authority's lakes for recreational purposes. The Authority, its Board Members, Management, and Employees, in accomplishing these goals, will act only in accord with the highest ethical and legal standards, acknowledging the duty owed to the Authority's customers, its bondholders, and the citizens of the State of Oklahoma, to refrain from violating those standards.

The Aims, Purposes and Objectives of the Authority are set forth as follows:

- A. To provide an adequate and reliable supply of power at the lowest possible cost, consistent with sound business and environmental principles.
- B. To encourage conservation of electric power to meet the total energy requirements of its customers.
- C. To strive to achieve and maintain widespread understanding, participation, and involvement of customers in the affairs of the Authority.
- D. To protect the quality of the water in the Authority's lakes and streams.
- E. To conduct the Authority's business to maintain its good reputation and ensure adequate low-cost capital, including funded reserves, sufficient to enable the Authority to assume its full financial responsibility.
- F. To encourage and support the management and employees in the development and improvement of their full capabilities and performance.
- G. To attain maximum use of manpower, physical, and financial resources through sound organizational structure, coordination, and integration of activities.

Aims, Purposes, and Objectives

- D. To protect the quality of the water in the Authorities lakes and streams.

GRDA at a glance ...



Coal-Fired
Plant
(812 MW)

Redbud
Gas Plant
(443 MW)



GRDA at a glance...2017

Unit 3 (495 MW)
Combined Cycle Natural Gas

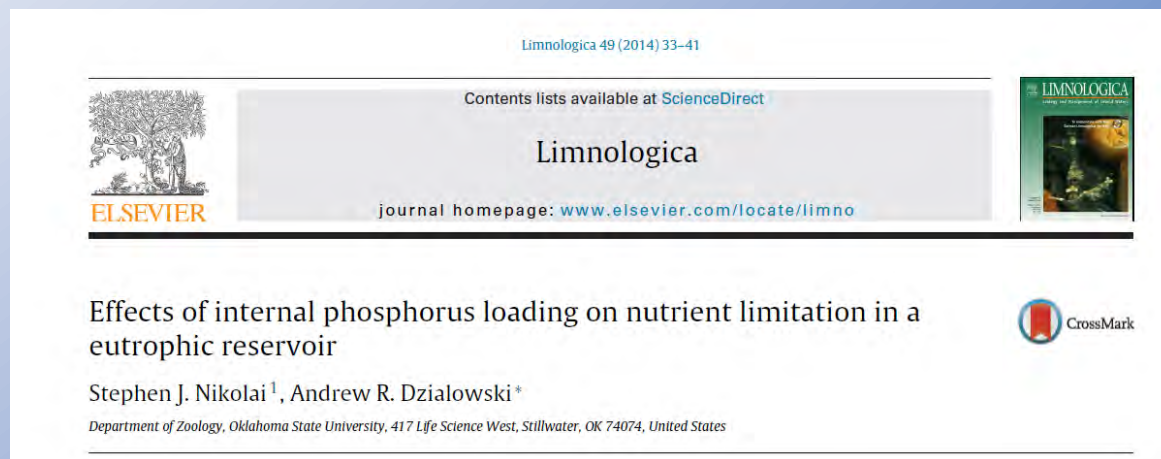


Complete shutdown of Coal Unit 1,
Environmental Retrofit of Coal Unit 2

PAST PROJECTS

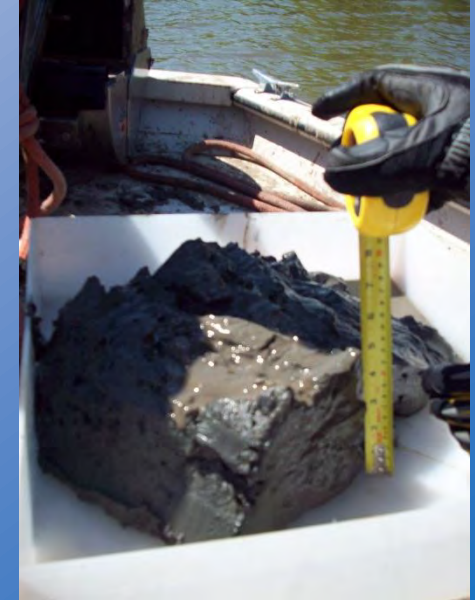
Past Projects

- Internal Phosphorus Loading and Nutrient Limitation in Grand Lake (2010-2012).
 - Estimate 7.1 mg P/m²/day release rate
 - TN:TP ratios should be used with caution when attempting to predict limitation



Past Projects

- Sediment assessment north of Sailboat Bridge (GRDA and OSU)
 - Testing Metals Concentrations in sediments
 - Toxicity & Bioaccumulations under aerobic and aerobic conditions.



Past Projects

- **University of Oklahoma**

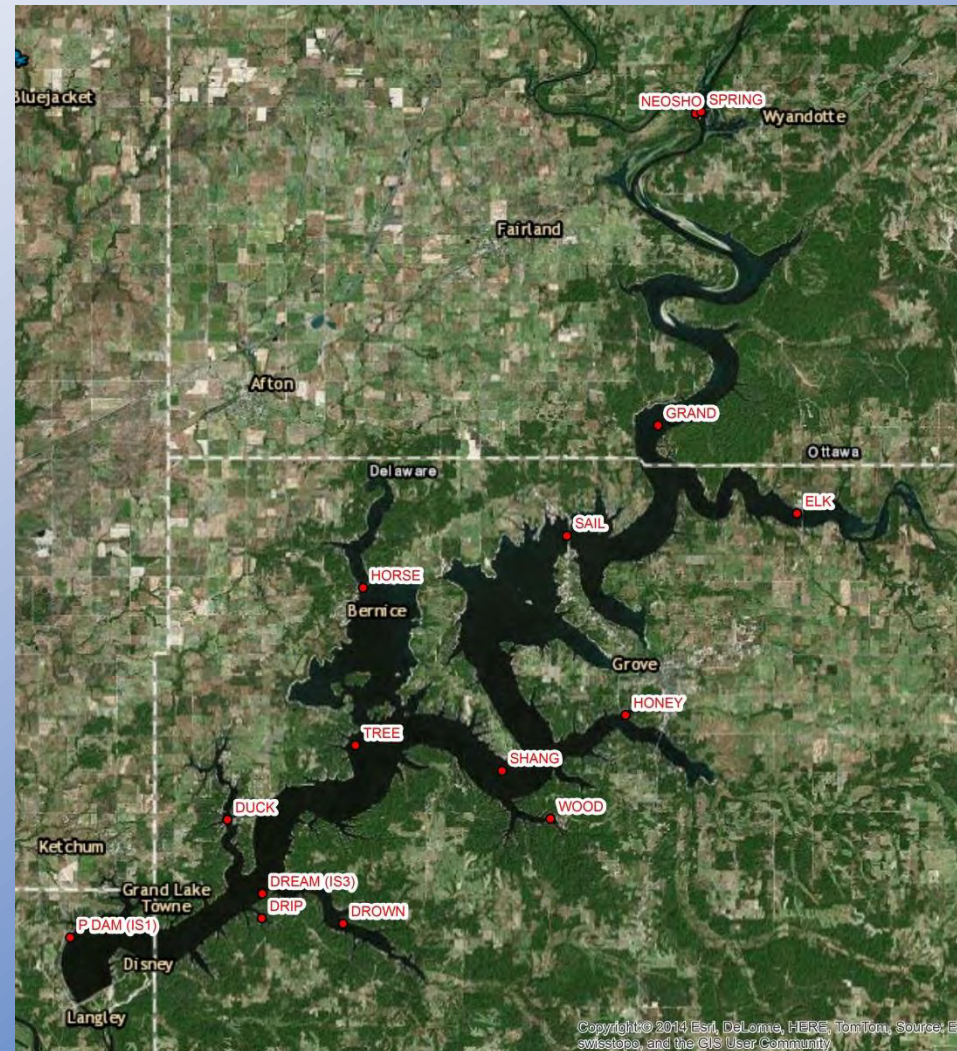
- Habitable structures (Grand Lake)
- Environmental remediation (Tri-State Mining District)
- Water quality improvement (Tar Creek and other streams)
- Storm water runoff quality (Langley and Grove)
- Sediment metals risk/toxicity (Grand Lake)
- Wetland restoration (Neosho Bottoms/Elm Creek)
- Hydrologic modeling (Miami)



2015 PROJECTS

General Water Quality Monitoring Program

- Established 2011-present
 - Physiochemical Profiles
 - General Water Quality
 - Algal Communities (BGA)
 - NEW (2015)
 - Microbial Source Tracking

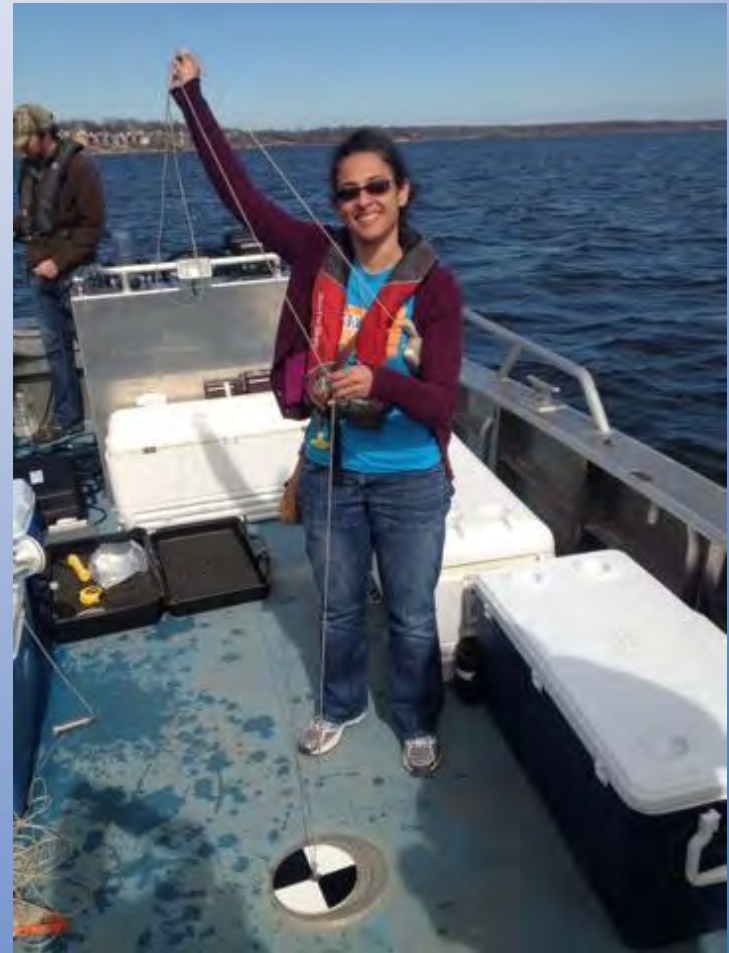


Copyright© 2014 Esri, DeLorme, HERE, TomTom, Swisstopo, and the GIS User Community

Microbial Communities (2015)

Dr. Noha Youssef (OSU)

- Objectives (2015)
 - Identify and track microbial community's spatially and temporally in Grand Lake using DNA
 - Study Changes in algal cell wall composition as it relates to community composition.



Party Cove Monitoring (2015)

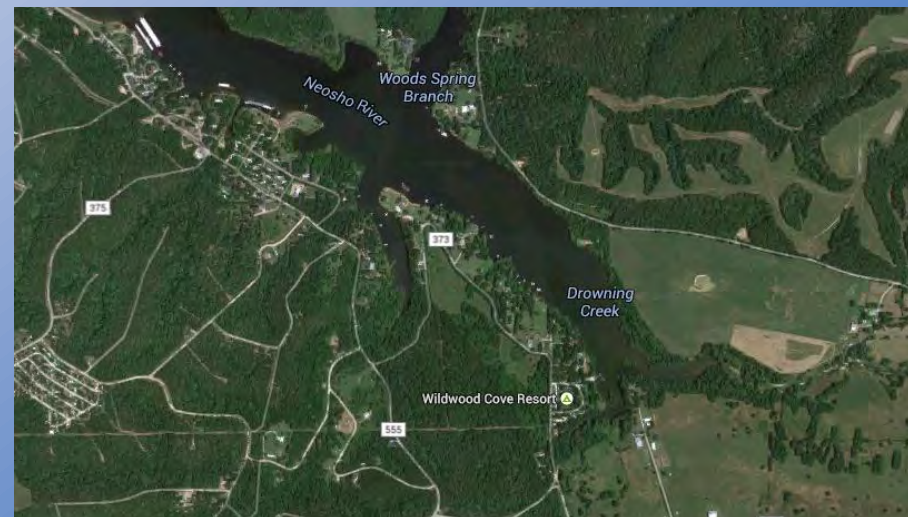
- Objective:
 - Determine if human activity in high use coves induce changes in:
 - Water Quality
 - Algal Communities
 - Fecal Indicator Bacteria Concentrations
 - Preliminary Data suggests “no” however more powerful techniques and intensive, well timed sampling may tease out changes.



Grey Bat Foraging (2015)

Dr. Keith Martin (RSU)

- Drowning Creek Contains bat caves frequented by endangered Grey Bats
 - One Cave on the lake (Beaver Cave)
 - Maternity Cave Inland (Twin Cave)
- GRDA is collaborating with Rogers State University to determine if shoreline development effects the foraging habits of the colony.



Lake Hudson

- Working with OSU to assess the effects of P-rich hypolimnetic water released from grand lake on algal communities.



WATERSHED PROJECTS

UNITED
STATES

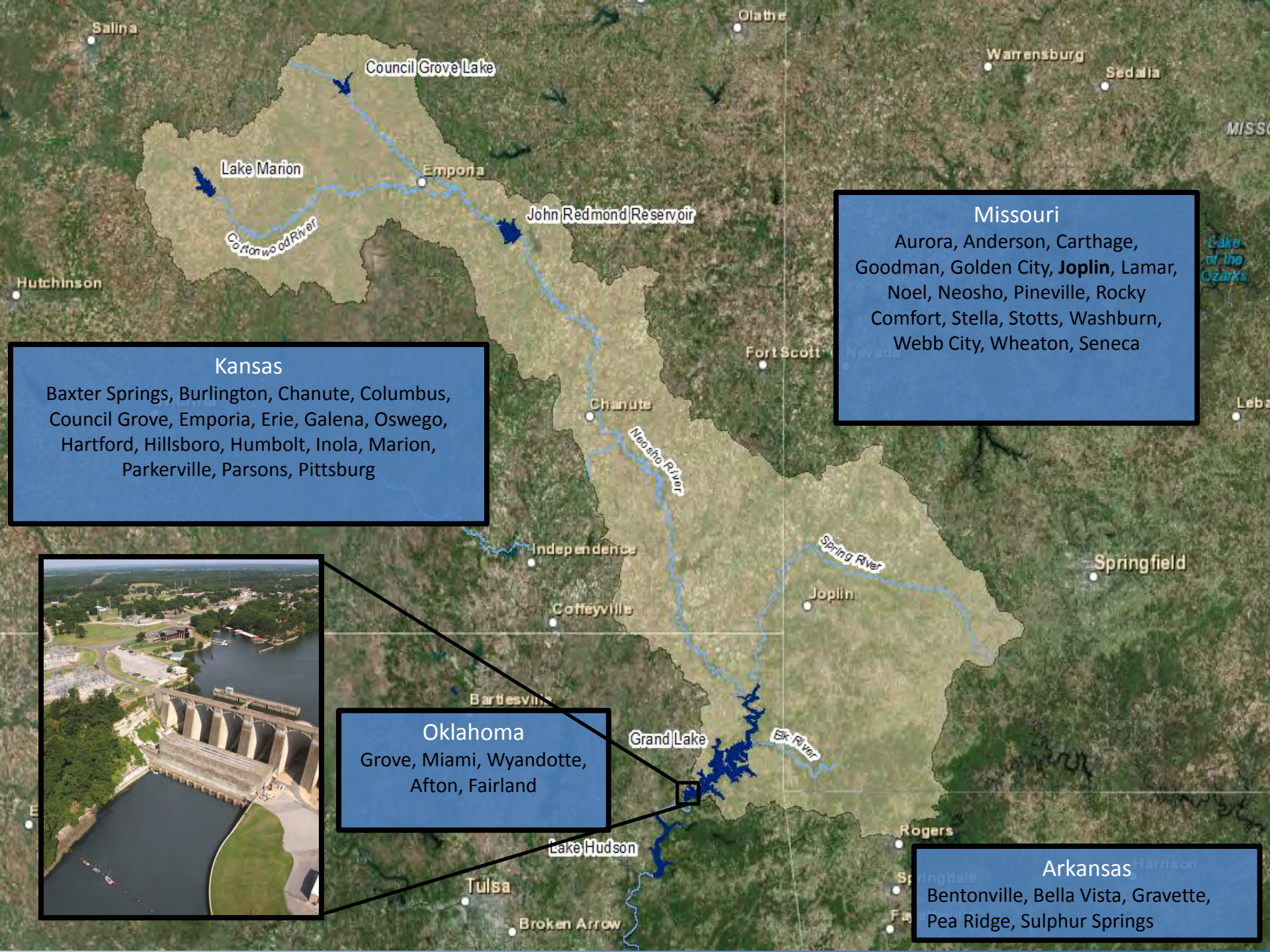
Grand Lake Watershed

- 10,000 Square Miles
- Covers 4-states
- 2 EPA Regions

GRAND LAKE WATERSHED



Grand Lake Watershed



Missouri

Aurora, Anderson, Carthage,
Goodman, Golden City, **Joplin**, Lamar,
Noel, Neosho, Pineville, Rocky
Comfort, Stella, Stotts, Washburn,
Webb City, Wheaton, Seneca

Kansas

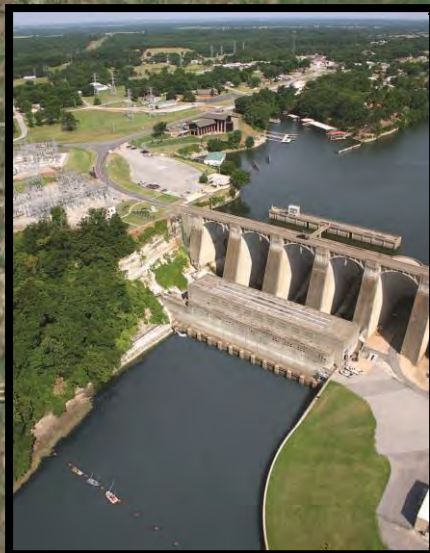
Baxter Springs, Burlington, Chanute, Columbus,
Council Grove, Emporia, Erie, Galena, Oswego,
Hartford, Hillsboro, Humbolt, Inola, Marion,
Parkerville, Parsons, Pittsburg

Oklahoma

Grove, Miami, Wyandotte,
Afton, Fairland

Arkansas

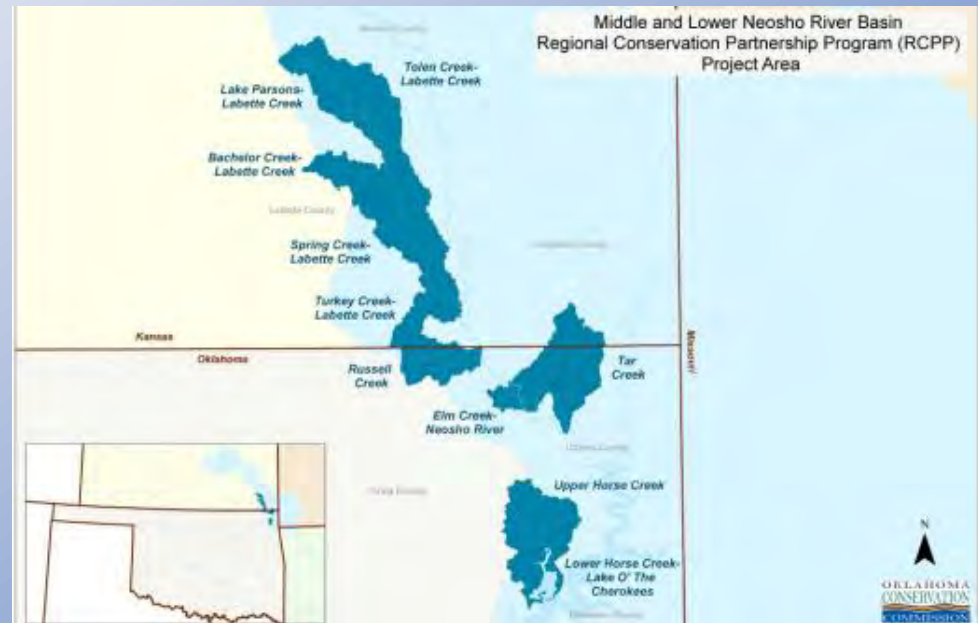
Bentonville, Bella Vista, Gravette,
Pea Ridge, Sulphur Springs



Regional Conservation Partnership Planning (RCPP)

Objectives:

- Work with landowners to reduce the input of nutrients, bacteria, and sediments in the middle lower Neosho river basin.
- Conduct water quality monitoring with partners to assess effectiveness
- Assess riparian forests for health and identify areas for restoration.



GRDA and Grand Lake Watershed Alliance Branding Campaign

- Objectives
 - Place signage along major roadways denoting the Grand Lake Watershed.
 - Education and outreach to the general public regarding water quality and what they can do to help.



GRDA and OU Partnership

- 5 year partnership
- Objectives:
 - Create a multidipiniary team.
 - Compile and enhance public access to data.
 - Expand Modeling Activities
 - Provide Study Support for Re-lisencing
 - Microbial Source Tracking
 - Conduct economic and public perception surveys.



Questions?

