Phosphorus in Oklahoma's Scenic Rivers

Justification for 0.037 mg/L

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Oklahoma Water Resources Board

Oklahoma's Water Quality Standards

- Designed to fulfill 1972 Clean Water Act objective of "restoring and maintaining the chemical, physical, and biological integrity of Oklahoma's waters."
- Define water quality goals for a waterbody by:
  - designating uses and establishing criteria necessary to protect those uses; and
  - providing added protection for special waters (Scenic Rivers, High Quality Waters) through an Anti-Degradation Policy.
- Establish water quality targets:
  - industrial discharge limits,
  - municipal discharge limits,
  - nonpoint source Best Management Practices (BMPs).

Adopted Rule

First-Ever Numerical Water Quality Standard for Phosphorus

- The thirty (30) day geometric mean total phosphorus concentration in waters designated "Scenic River"... shall not exceed 0.037 mg/L.
- The criterion... shall be fully implemented within 10 years as provided in a separate rule promulgated by the Board.
- Effective July 1, 2002 (anticipated)
- Part of 2001 agency rules revision:
  - WQS updated by staff and approved by the nine-member Water Board in March 2002.

Rationale for OWRB Rule

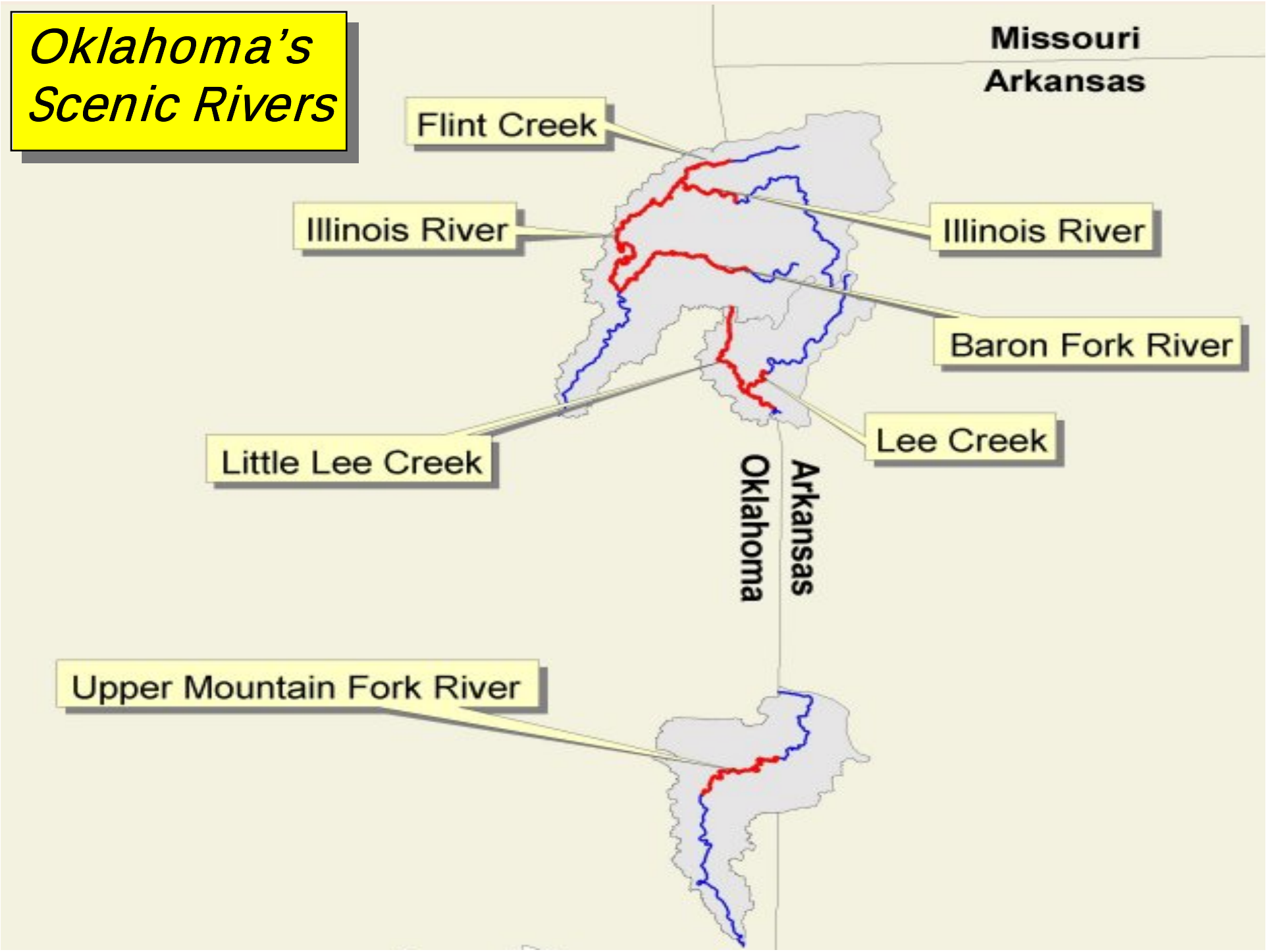
- The OWRB is charged with protecting state waters through development of Water Quality Standards.
- Evidence indicates deterioration of water quality in Oklahoma's Scenic Rivers, especially in the Illinois River Basin.
- Beneficial Use Monitoring Program (BUMP) data (1999-present) confirms water quality degradation in the Illinois River Basin.
- (1998) Federal Clean Water Action Plan requires EPA and/or states to establish numerical nutrient criteria for <u>all</u> waters by December 2004.

The Over-Riding Questions

- Do Oklahomans want to have statutorily-protected Scenic Rivers?
  - If "yes," the 0.037 phosphorus standard is the necessary first-step in accomplishing that objective.
- How do we implement the phosphorus standard and bring Oklahoma and Arkansas into compliance with this new regulation?

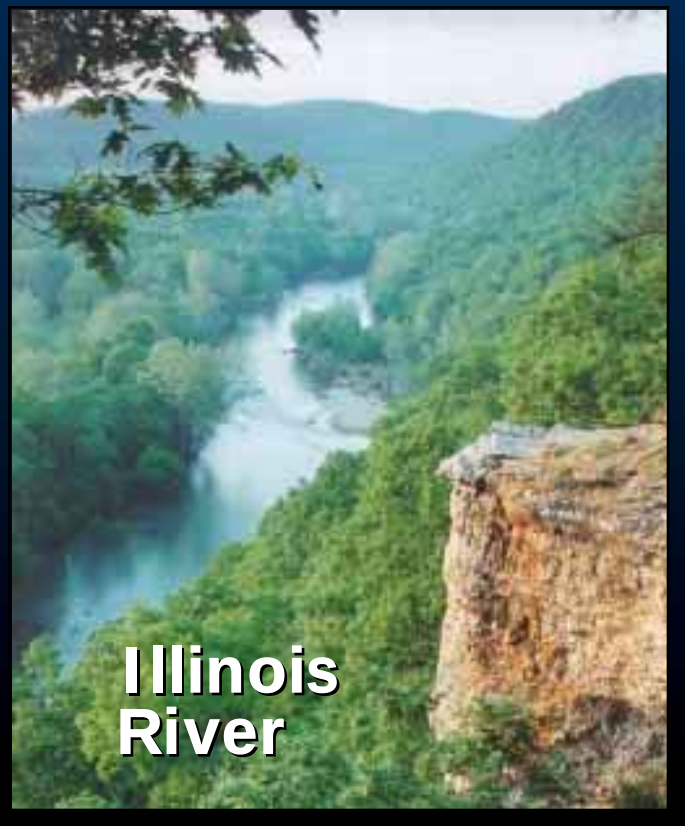
Oklahoma's Scenic Rivers

- Receive special protection under State law due to their exceptional ecological and recreational characteristics.
- Existing protection provided through Water Quality Standards (Anti-Degradation Policy):
  - Prohibit any condition caused by the activities of man which results in the prolonged impairment of waters.
  - "Outstanding Resource Waters" -- best management practices (BMPs) should be implemented for nonpoint source discharges or runoff.
  - No new or increased point source load of any pollutant.


Oklahoma's Scenic Rivers
Missouri
Arkansas
Flint Creek
Illinois River
Illinois River
Baron Fork River
Little Lee Creek
Lee Creek
Oklahoma
Arkansas
Upper Mountain Fork River

The Illinois River

- **Significant Recreation Benefits:**
  - 350,000 visitors/year;
  - 180,000 persons/year spend an average of $56 per float trip on the Illinois River;
  - $9 million/year direct economic impact on region;
  - additional benefits provided by Lake Tenkiller.



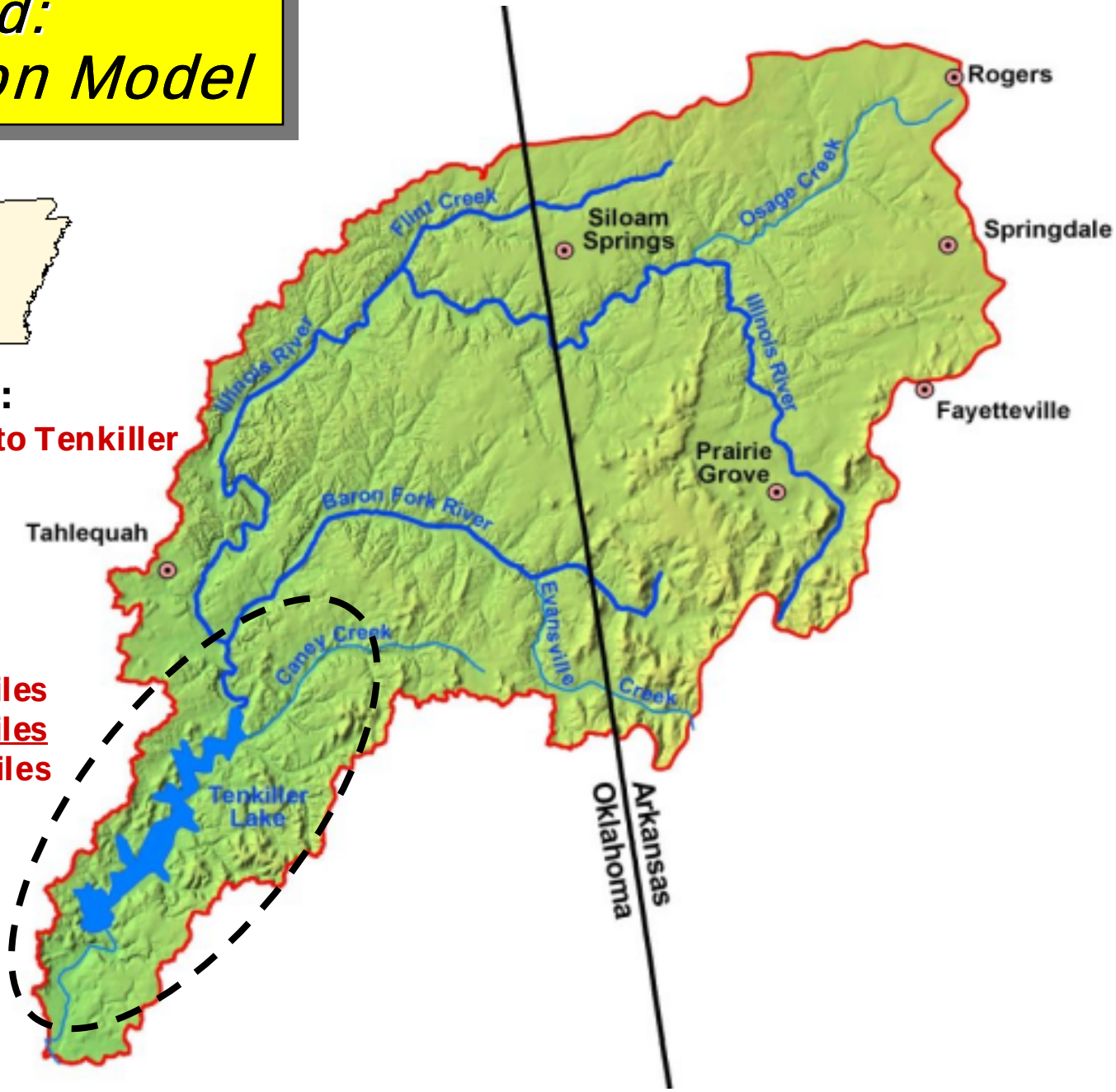
Illinois River Basin/Watershed: Digital Elevation Model

Length of Illinois River:

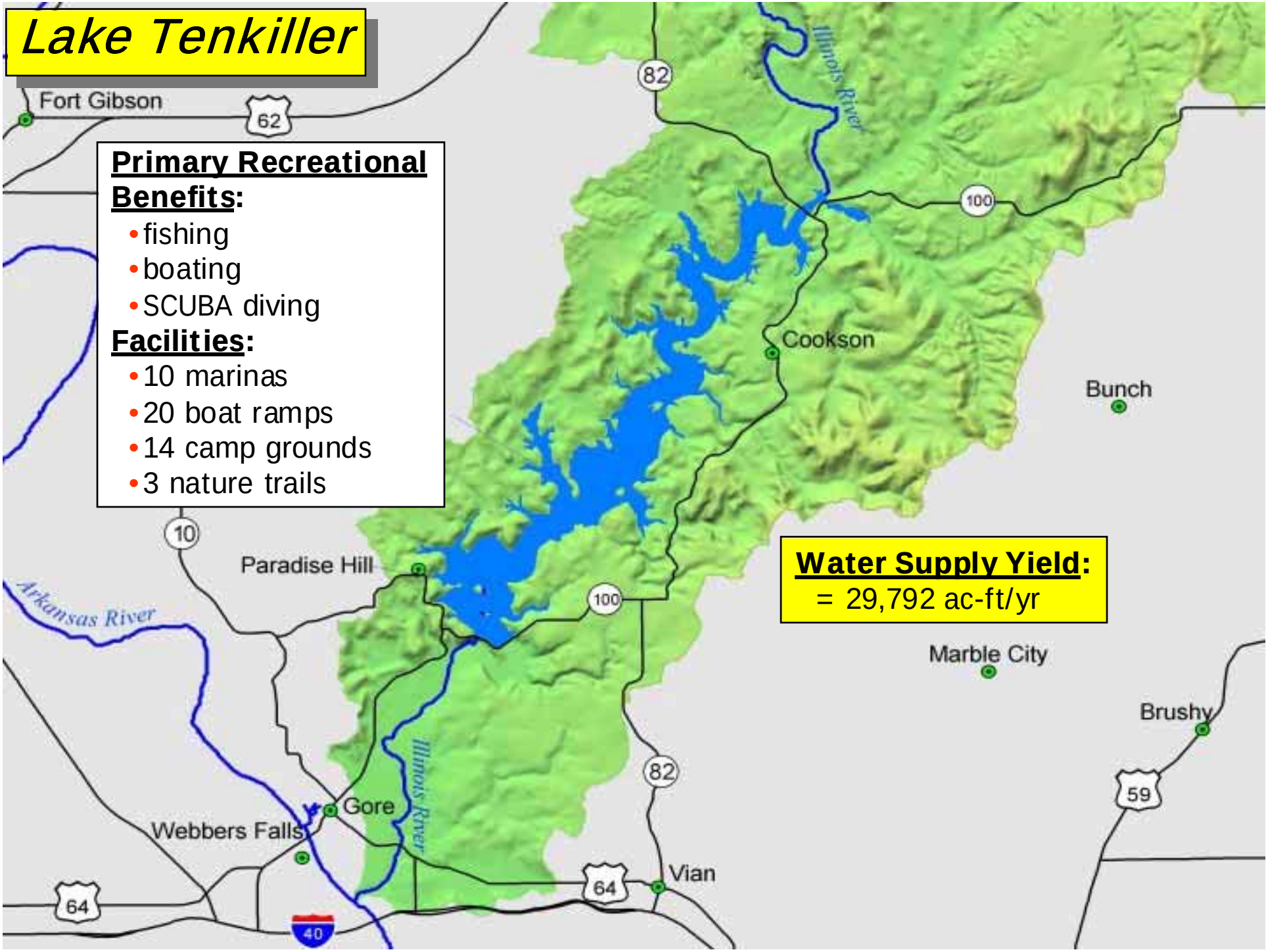
Oklahoma	= 56.3 miles to Tenkiller
Arkansas	= 42.5 miles
Total	= 98.8 miles

Watershed Area:

Oklahoma	= 897 sq miles
Arkansas	= 748 sq miles
Total	= 1,645 sq miles



Lake Tenkiller



Primary Recreational Benefits:

- fishing
- boating
- SCUBA diving

Facilities:

- 10 marinas
- 20 boat ramps
- 14 camp grounds
- 3 nature trails

Water Supply Yield:
= 29,792 ac-ft/yr

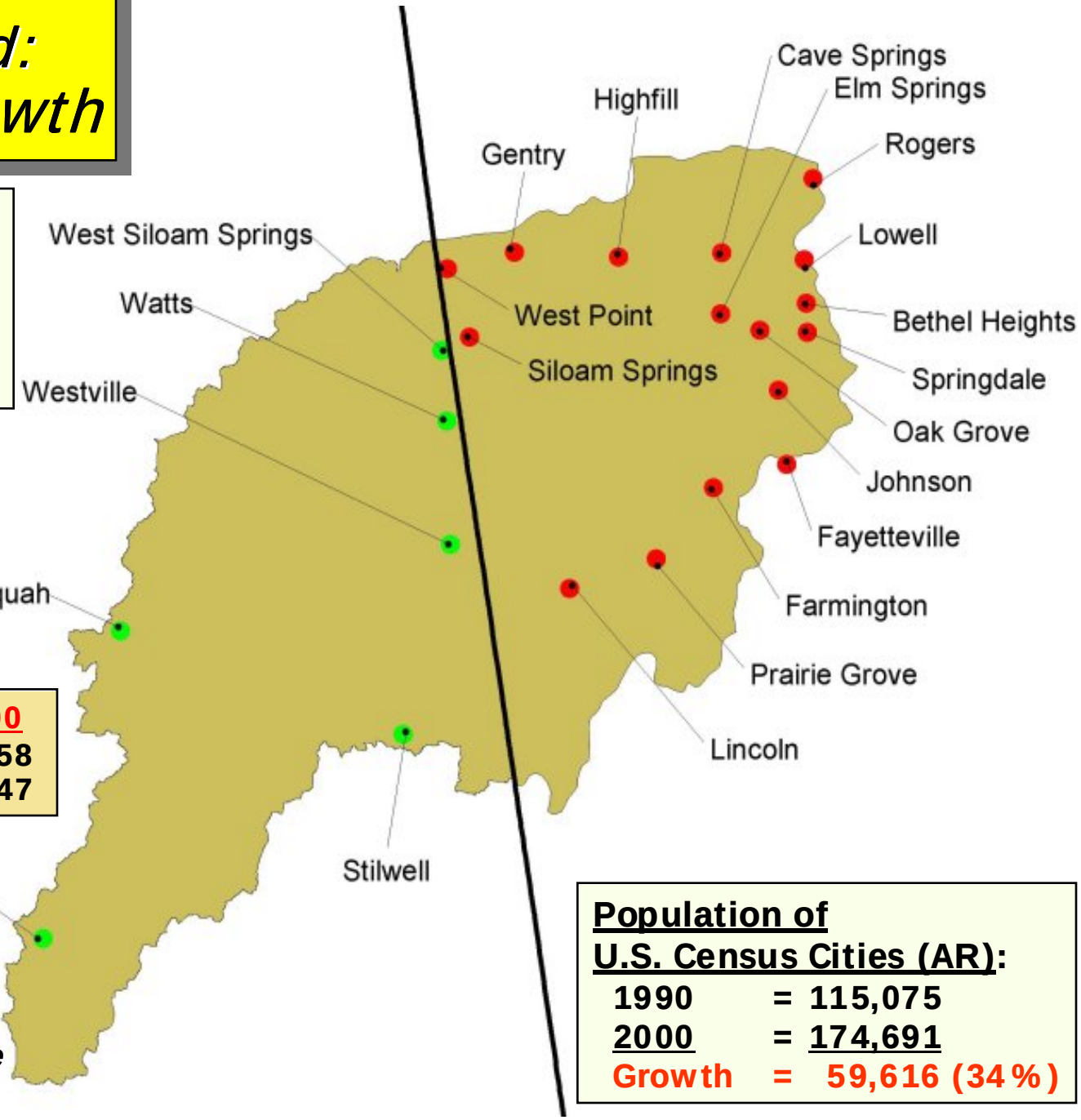
Lake Tenkiller

Animation: fly-over from Tenkiller, up Illinois River to State Line

Illinois River Basin/Watershed: Population Growth

Population of U.S. Census Cities (OK):

1990	=	15,365
2000	=	20,623
Growth	=	5,258 (25%)



Population:		1990	2000
Tahlequah	=	10,398	14,458
Fayetteville	=	42,099	58,047

Population of U.S. Census Cities (AR):

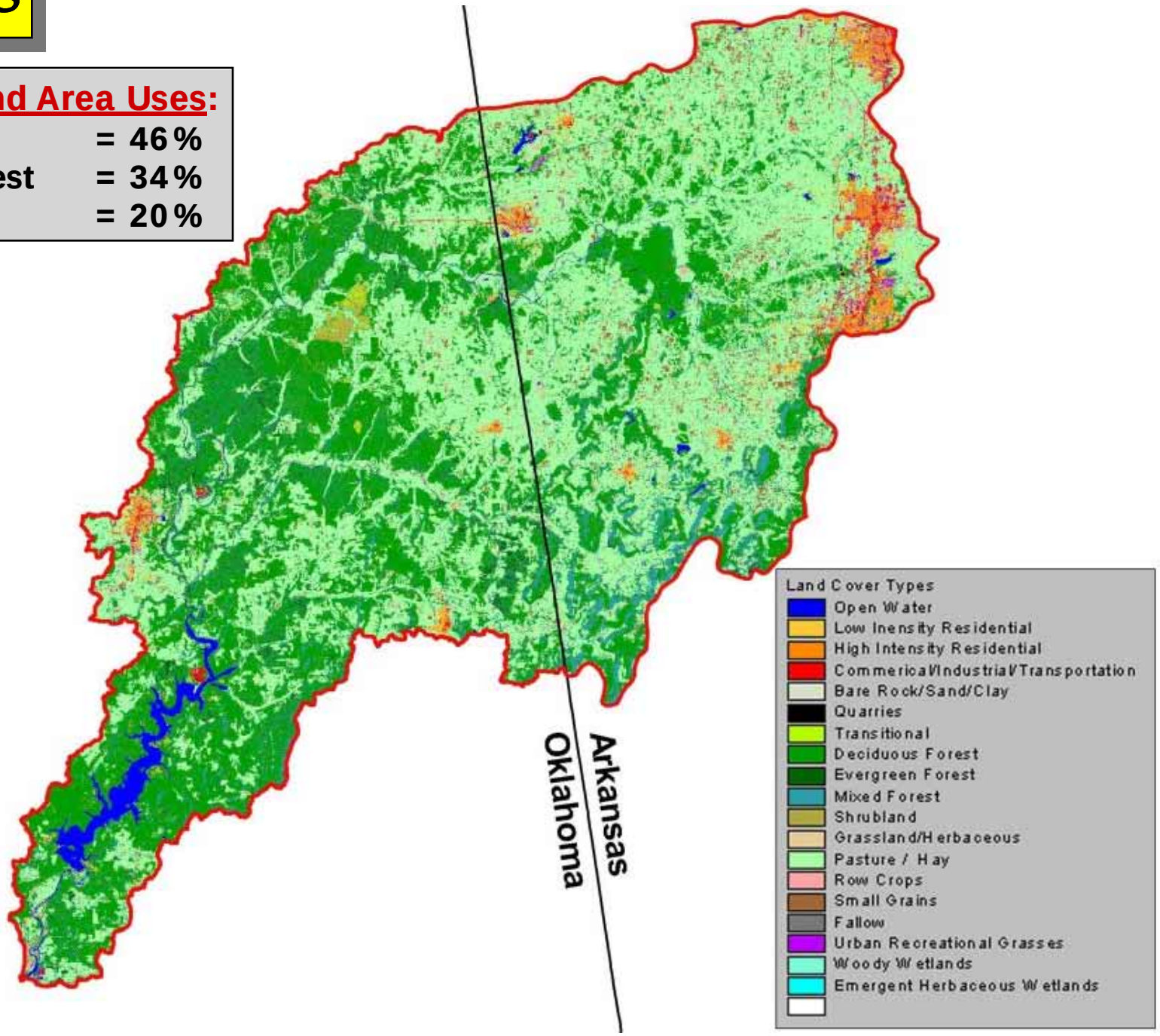
1990	=	115,075
2000	=	174,691
Growth	=	59,616 (34%)

population figures include indicated cities only

Land Uses

Percent of Land Area Uses:

Pasture / Hay	**= 46 %**
Deciduous Forest	**= 34 %**
All other uses	**= 20 %**



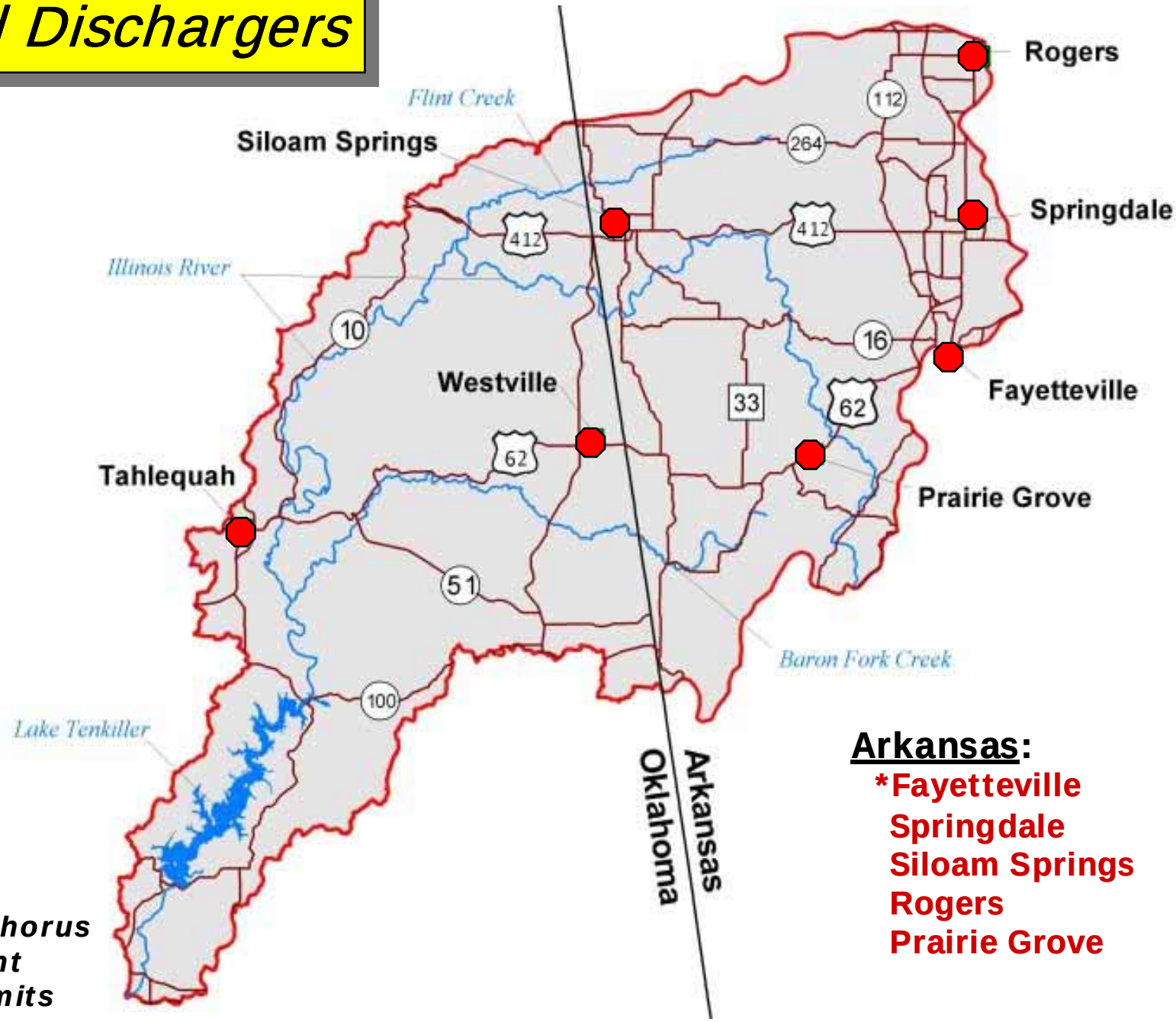
The Illinois River Water Quality Problem

- **The Illinois River:**
  - Significant data indicates that the Illinois River's Scenic River status is seriously threatened by excess nutrients, including phosphorus.
  - Based on available data, nutrient loads are increasing.
  - Phosphorus:
    - contributed to streams through sewage treatment plant discharges and agricultural and urban/residential runoff;
    - excess phosphorus promotes the growth of algae;
    - too much algae can limit fish/wildlife uses and aesthetic benefits of state waters.

Major Point Source Municipal Dischargers

Oklahoma:

***Tahlequah**
Westville



Arkansas:

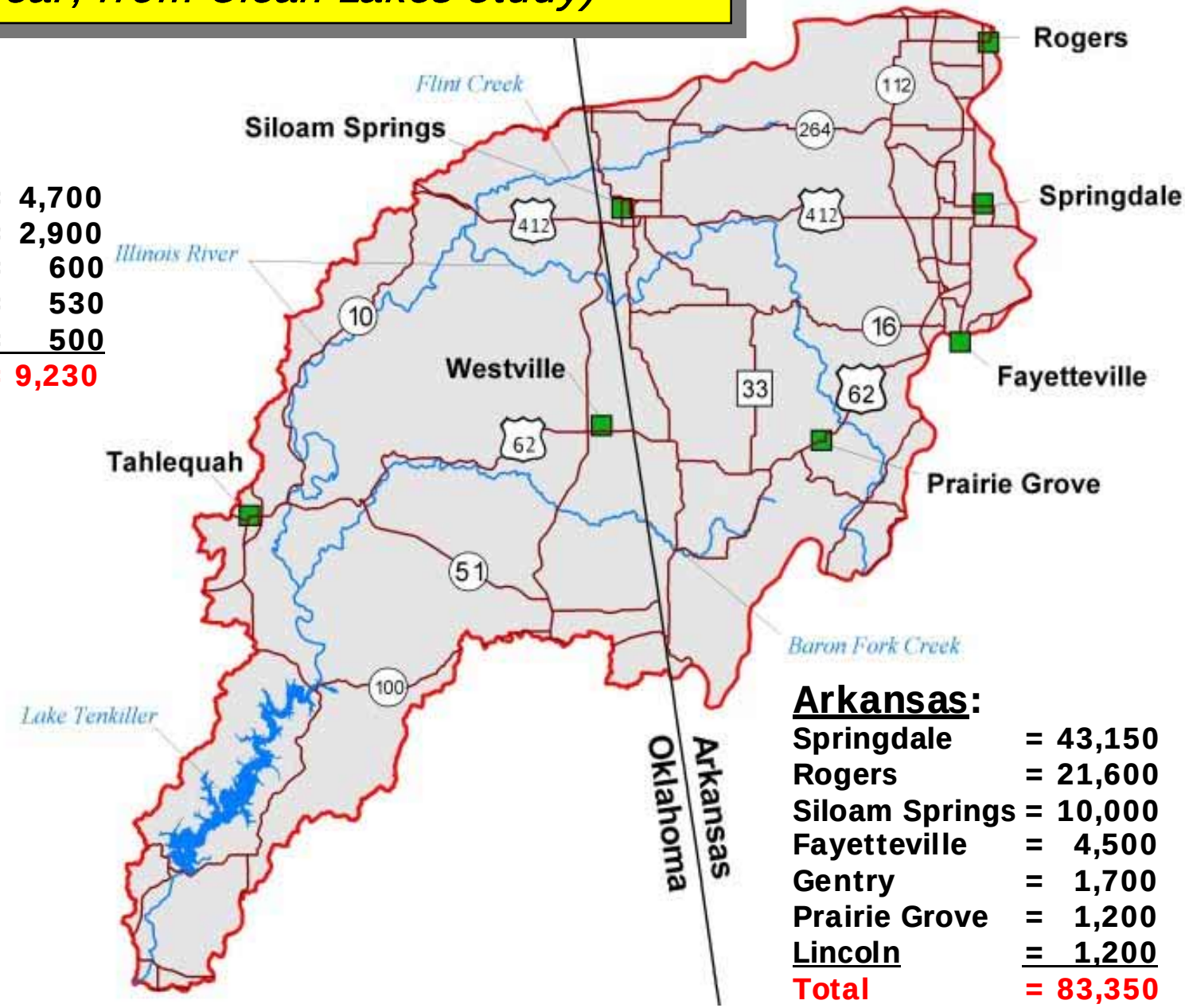
***Fayetteville**
Springdale
Siloam Springs
Rogers
Prairie Grove

****indicates phosphorus limits in current discharge permits***

Phosphorus Loads to Lake Tenkiller
(in kilograms/year, from Clean Lakes Study)

Oklahoma:

Tahlequah	=	4,700
Westville	=	2,900
Midwestern Nursery	=	600
Cherokee Nation	=	530
Watts	=	500
Total	=	9,230



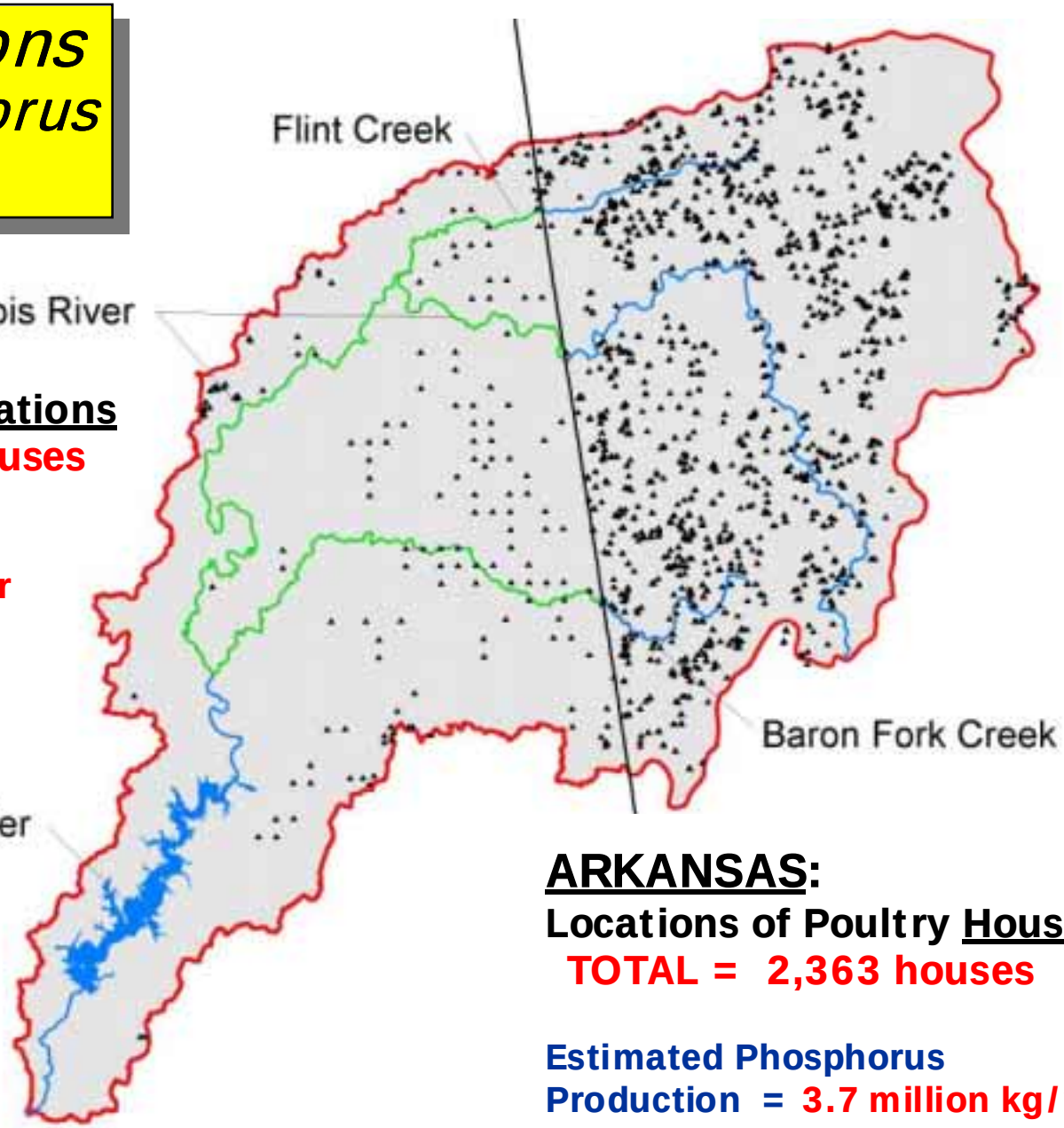
Arkansas:

Springdale	=	43,150
Rogers	=	21,600
Siloam Springs	=	10,000
Fayetteville	=	4,500
Gentry	=	1,700
Prairie Grove	=	1,200
Lincoln	=	1,200
Total	=	83,350

EPA vs. City of Fayetteville (AR) U.S. Supreme Court Case

- (1986) Oklahoma sues EPA to stop City of Fayetteville's municipal discharge into Illinois River.
- (1992) U.S. Supreme Court decides:
  - Fayetteville must meet Oklahoma's Water Quality Standards at state line.
  - Evidence did not prove that City of Fayetteville violated narrative Oklahoma WQS.

Poultry Operations
Estimated Phosphorus Production



OKLAHOMA:

Locations of Poultry Operations

TOTAL = 508 poultry houses

Estimated Phosphorus Production = 770,000 kg/yr

equivalent to the annual phosphorus production of 1.9 million people

ARKANSAS:

Locations of Poultry Houses

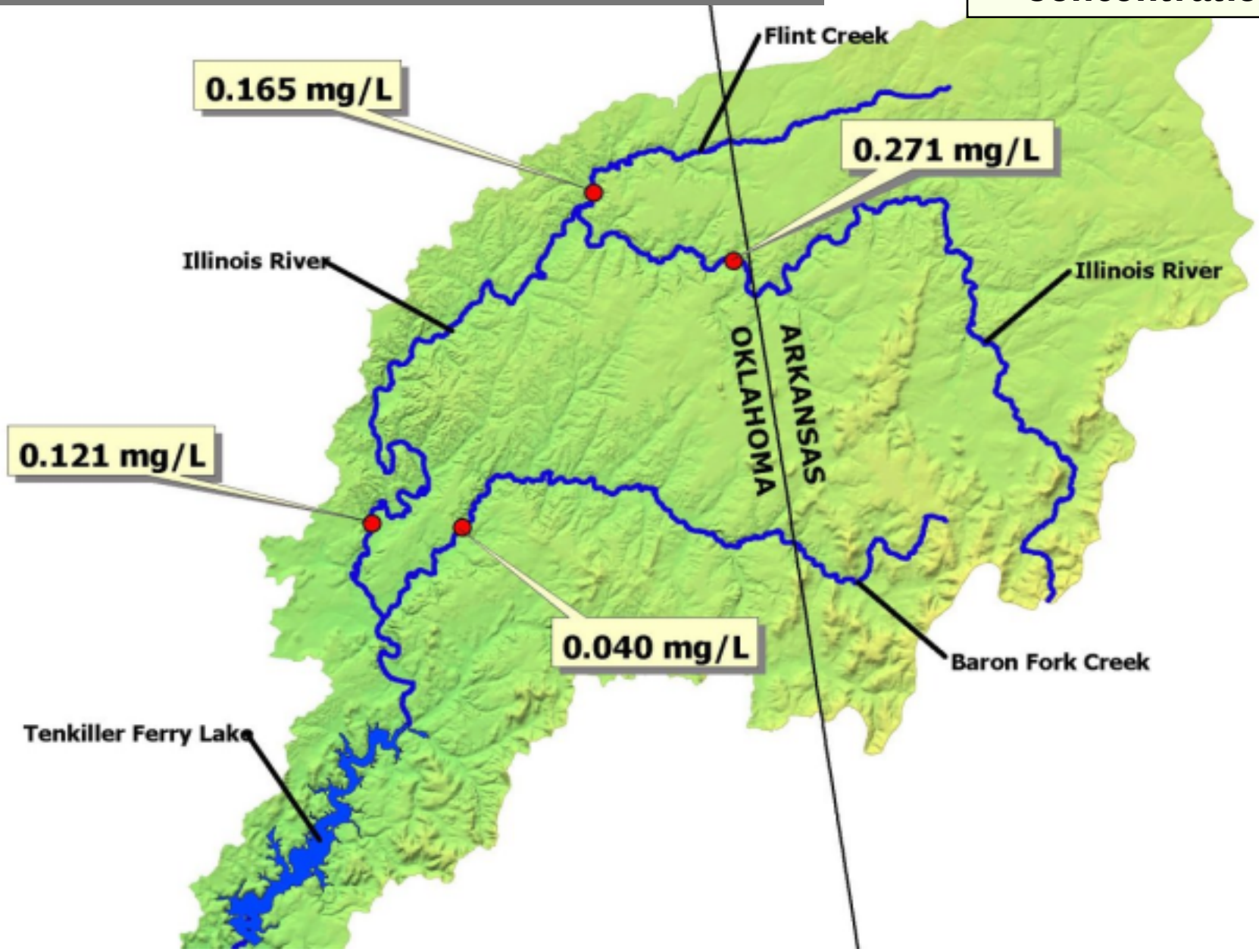
TOTAL = 2,363 houses

Estimated Phosphorus Production = 3.7 million kg/yr

equivalent to the annual phosphorus production of 8.8 million people

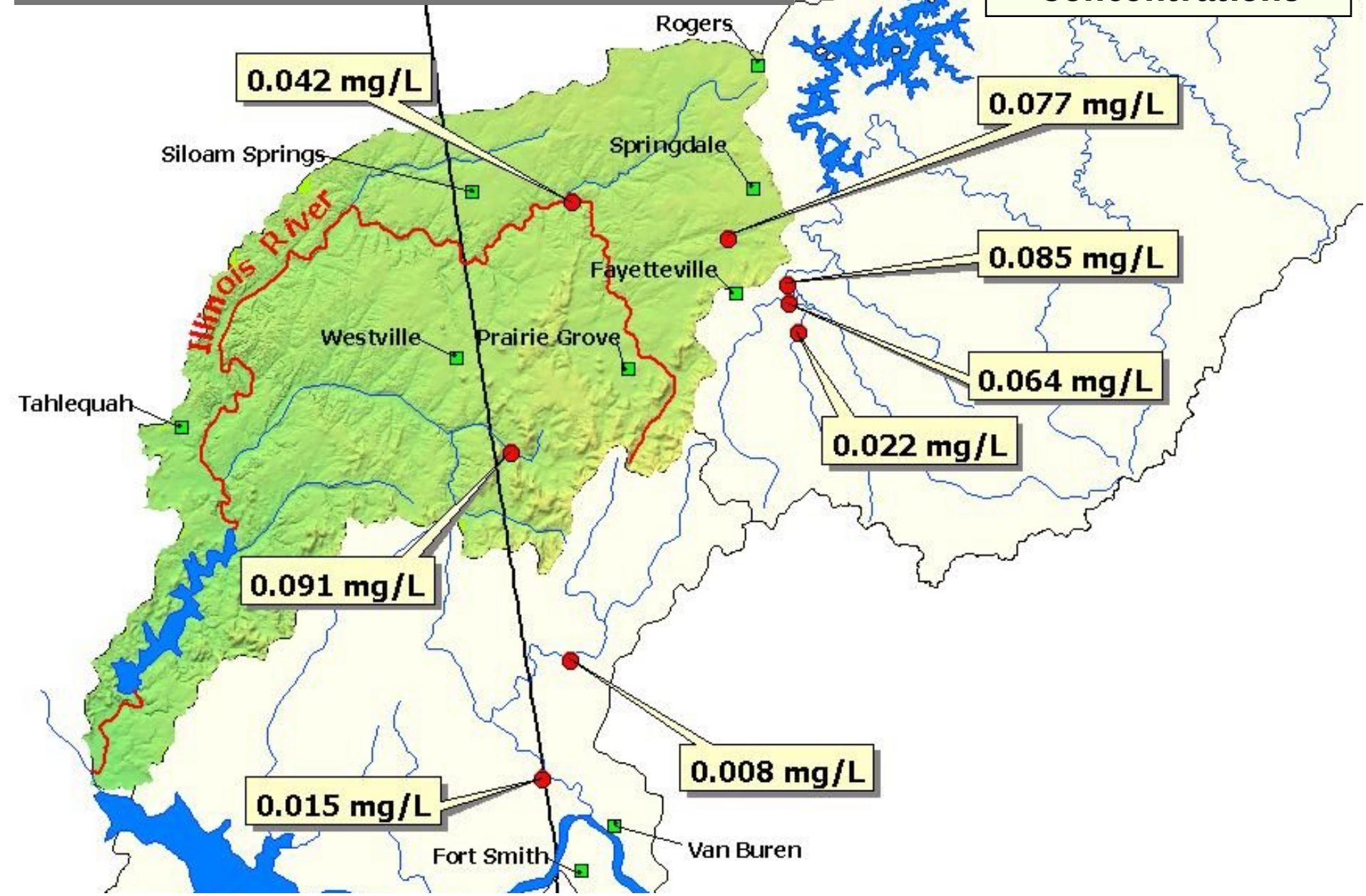
Phosphorus Data: Oklahoma
(Beneficial Use Monitoring Program)

Geometric Mean of Total Phosphorus Concentrations



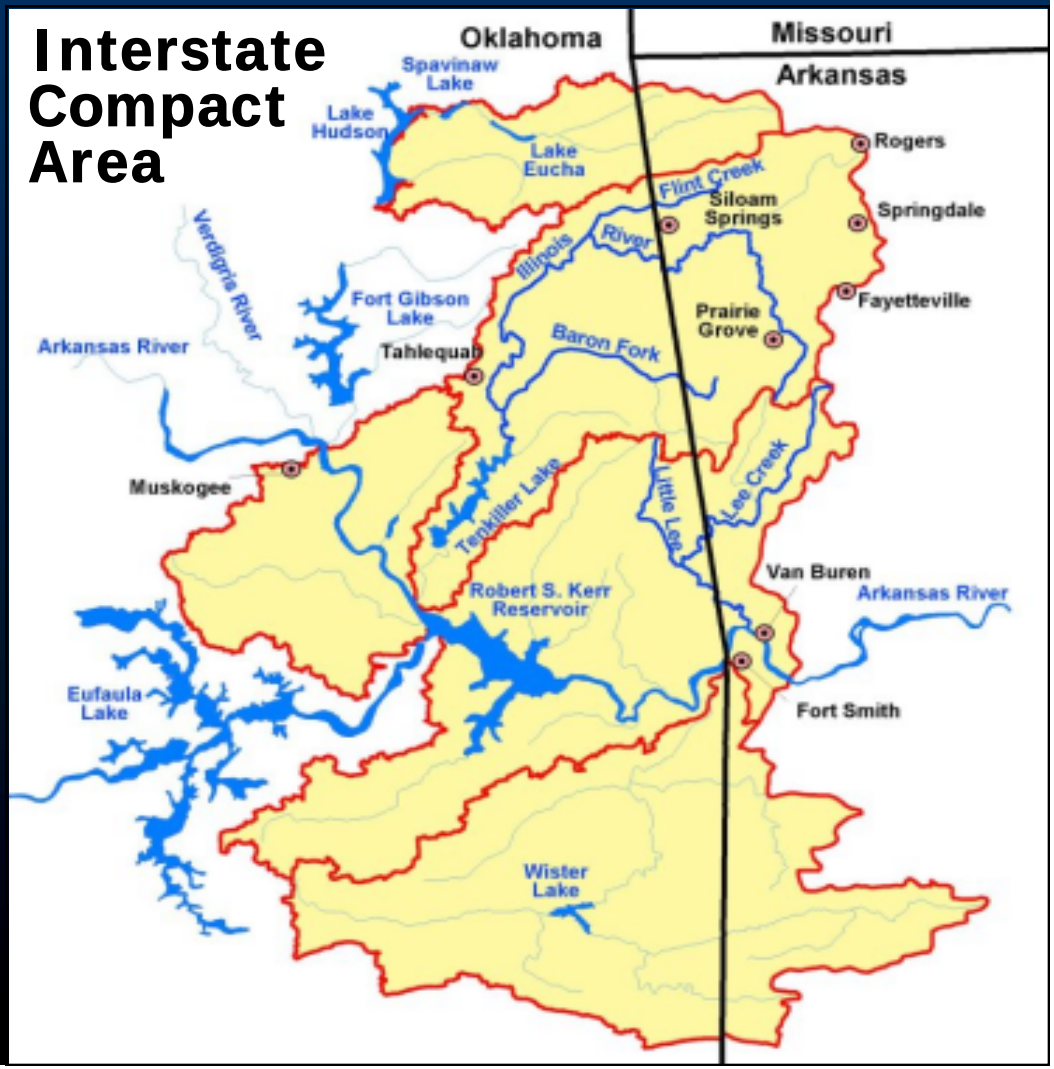
Phosphorus Data: Arkansas
(U.S. Geological Survey)

Geometric Mean of Total Phosphorus Concentrations



Development of the Phosphorus Standard

- **Background:**
  - (1996) Tenkiller Lake report (OWRB/OSU) recommends phosphorus reductions in Illinois River Basin.
  - (1997) Arkansas River Compact Commission sets goal to reduce phosphorus in basin by 40 percent.



Development of the Phosphorus Standard

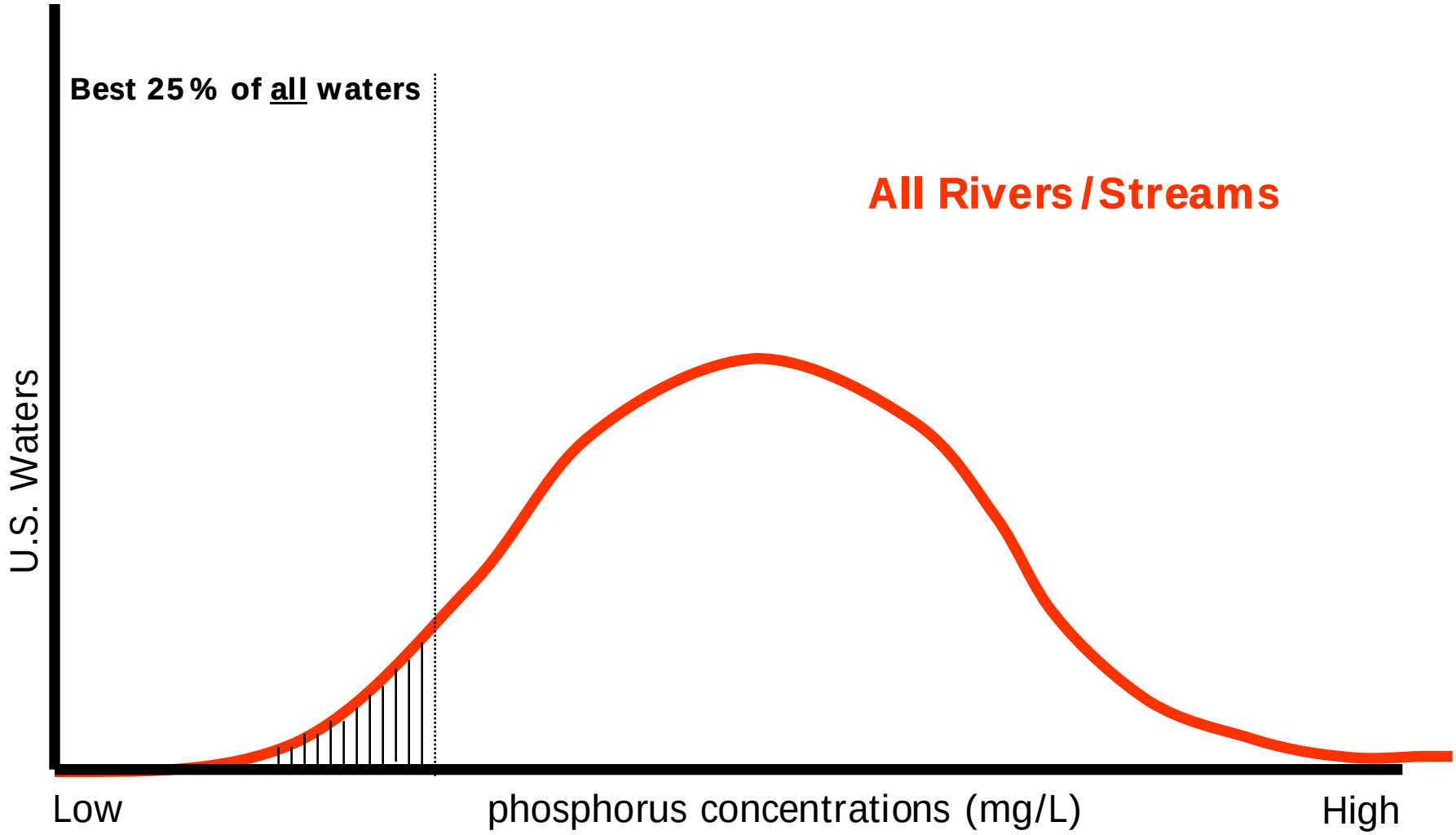
- **Where Did the Number (0.037) Come From?**
  - Designed to protect the aesthetic quality of Oklahoma's Scenic Rivers.
  - Utilizes EPA-recommended methodologies.
  - Utilizes historical water quality data and extensive research.

Development of the Phosphorus Standard

- ***Selected Staff Research:**
  - EPA-recommended criterion = 0.010 mg/L
  - Dr. Riley Needham level to control algal growth = 0.035 mg/L
  - Clark Study median concentration ("high quality waters") = 0.022 mg/L
    - 1997 U.S. Geological Survey report;
    - evaluated phosphorus concentrations in U.S. streams and rivers exhibiting the highest water quality.

**refer to OWRB handout*

The Clark Study:
Utilizing National Stream Water Quality Data to Develop a Phosphorus Standard for Oklahoma's Scenic Rivers



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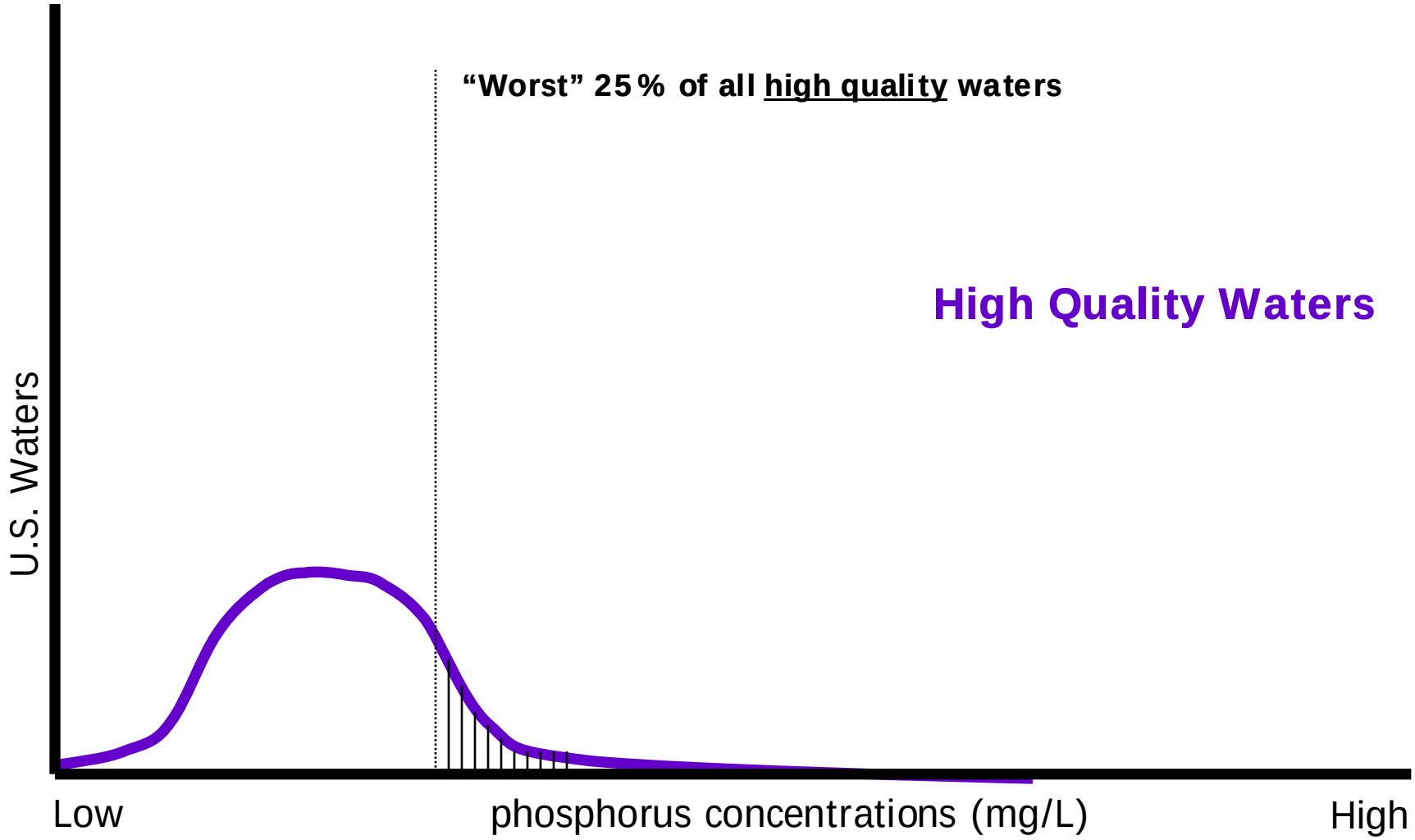

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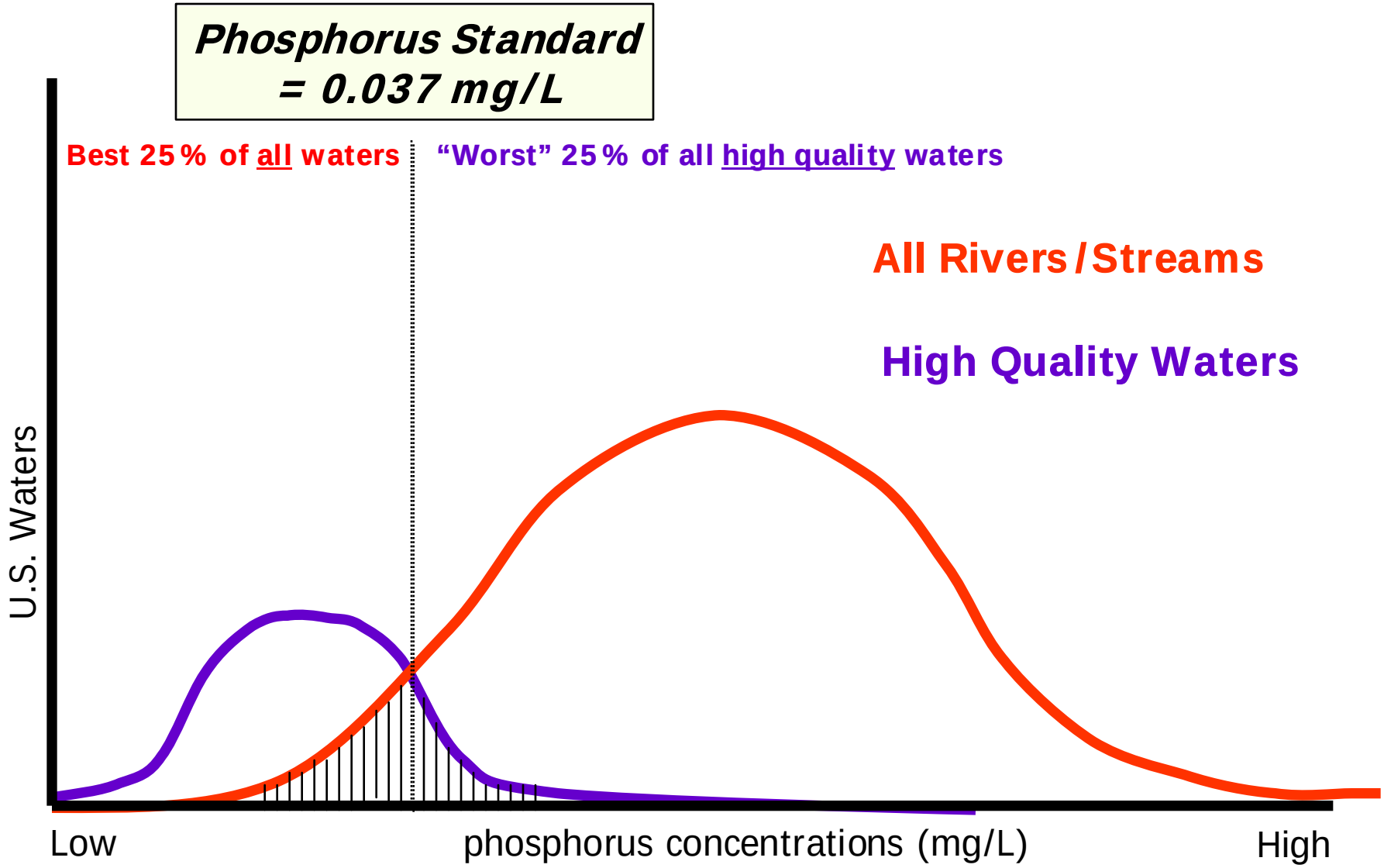

Development of the Phosphorus Standard

- **Phosphorus Criteria Options:**
  - OK Scenic Rivers Commission Recommendation (resolution) = 0.020 mg/L
  - EPA-Recommended Ecoregion Nutrient Criterion (by 2004) = 0.010 mg/L
  - **Adopted Phosphorus Criterion = 0.037 mg/L**

Development of the Phosphorus Standard

- **Meetings/Hearings Process (2001-02):**
  - **Initiated August 10, 2001:**
    - approximately 400 letters sent to stakeholders announcing OWQS revision process;
    - 3 informal meetings.
  - **Notice of Rulemaking Intent published and mailed to approximately 2,300 individuals and organizations:**
    - formal hearing.
  - **Formal comment period closed February 4, 2002:**
    - 701 individual comments received, including 625 advocating 0.020 mg/L phosphorus standard.
  - **March 12, 2002 -- Board adopts WQS, including proposed 0.037 mg/L phosphorus standard.**

Implementation of the Phosphorus Standard

- **<u>Future Implementation Options/Activities</u>:**
  - Cooperation/partnership with Arkansas through the Arkansas-Oklahoma Arkansas River Compact Commission.
  - Implementation of best management practices (BMPs) through the Oklahoma Conservation Commission and state conservation districts.
  - Utilize future Total Maximum Discharge Load (TMDLs) requirements to obtain compliance from point source dischargers (e.g., Tahlequah).

Implementation of the Phosphorus Standard

- **<u>Future Implementation Options/Activities</u>:**
  - Obtain funding through federal Clean Water Act (Section 319) appropriations.
  - Pursue funding for wastewater treatment facility/system upgrades through State Financial Assistance Program and other financial assistance opportunities.
  - Monitor water quality improvements through Beneficial Use Monitoring Program and other monitoring efforts.

Recommended Nutrient (Phosphorus) Control Activities

- **Recommended by OCC, NRCS, and Conservation Districts:**

Point Source Controls:

- Upgrade Wastewater Treatment Facilities:
  - Tahlequah (completed)
  - Sequoyah Schools (completed)
  - Stilwell (ongoing)
  - Westville
- Replace/Improve Toilet Facilities at Canoe Access Points

Non-Point Source Controls:

- Streambank Stabilization/Dredging at Former Lake Francis Site
- BMPs to Reduce Animal Waste Impacts
- Septic System Upgrades
- Reduce Impacts of Gravel Mining/Nurseries
- Riparian Management and Restoration
- Buffer Zones
- Stream Bank Stabilization
- Animal Waste Storage Facilities
- Pasture Establishment
- Annual Soil and Litter Tests

Summary/Recommendations

- Identify sufficient future funding for required nutrient control activities (point/non-point).
- Work cooperatively to bring Arkansas and Oklahoma into compliance with the new phosphorus standard.
- Oklahoma state agencies update Water Quality Standards Implementation Plans.
- The TMDL process outlined in SB 972 provides relief for Oklahoma point sources already treating to best available technology levels.

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