

Oklahoma's Large River Sampling Program

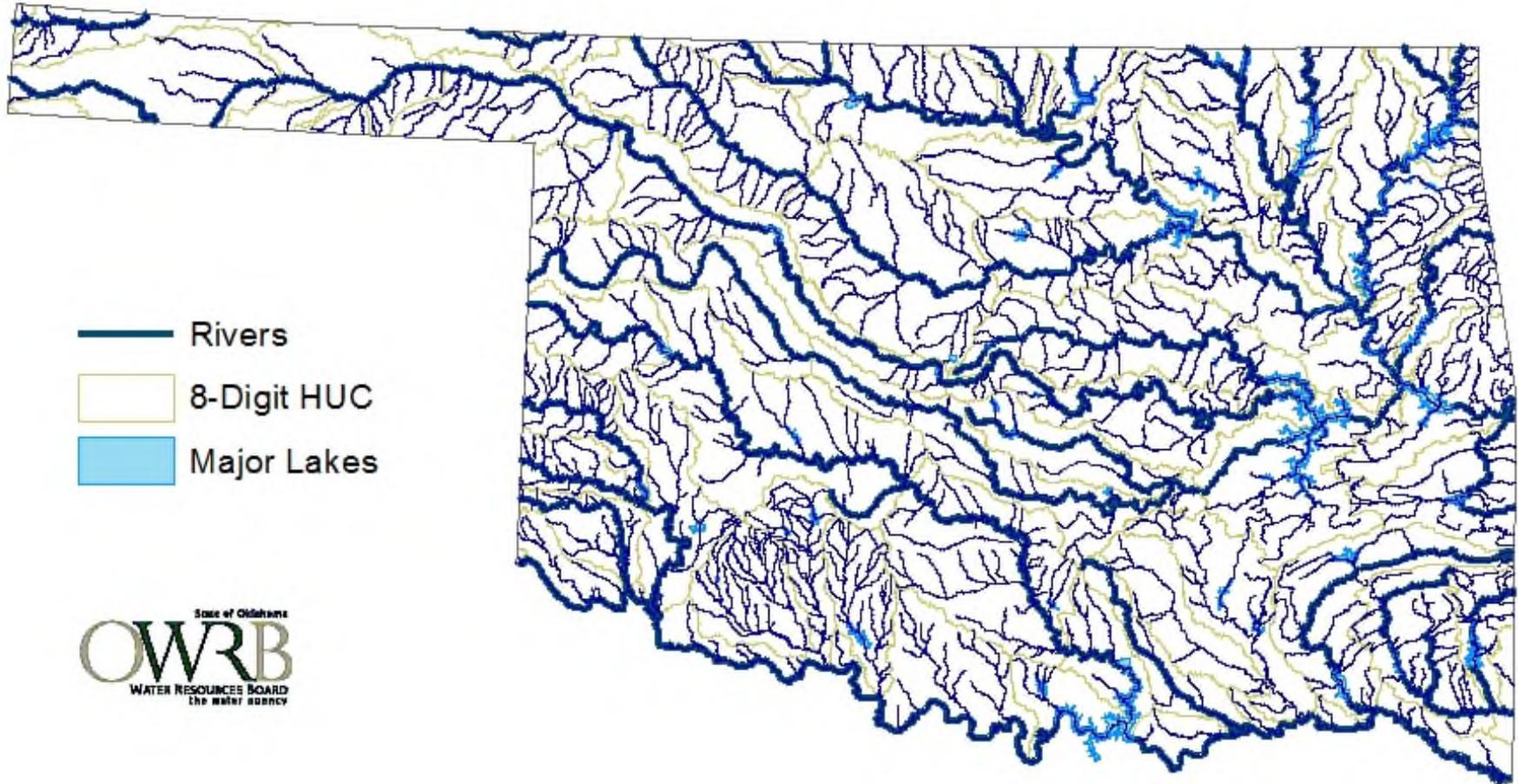
National Water Quality Monitoring Conference

April 30, 2014, Cincinnati, OH

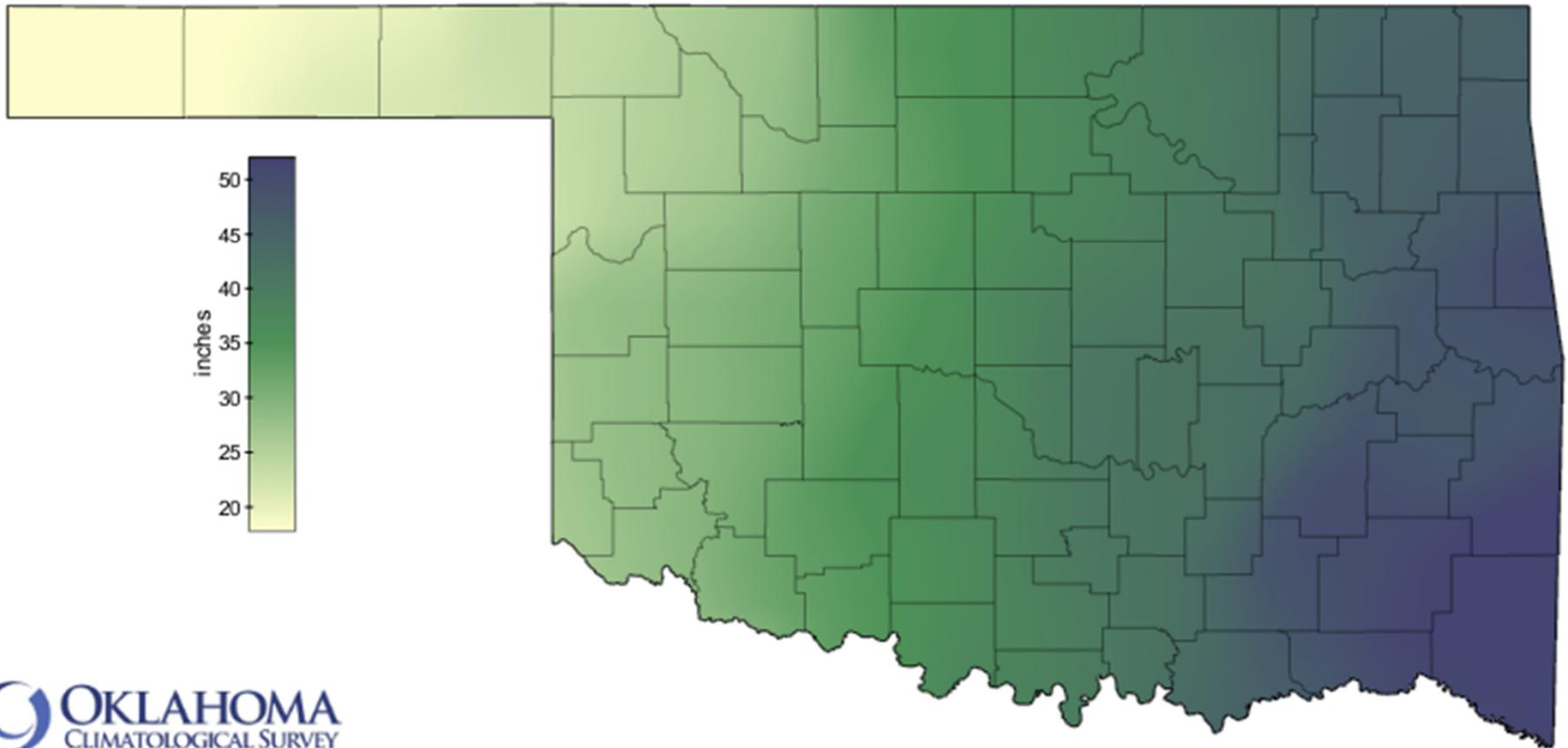
Monty Porter, Technical and Quality Manager
OWRB Water Quality Programs Division

Oklahoma's Diversity

General Hydrology of Oklahoma



Oklahoma Rainfall



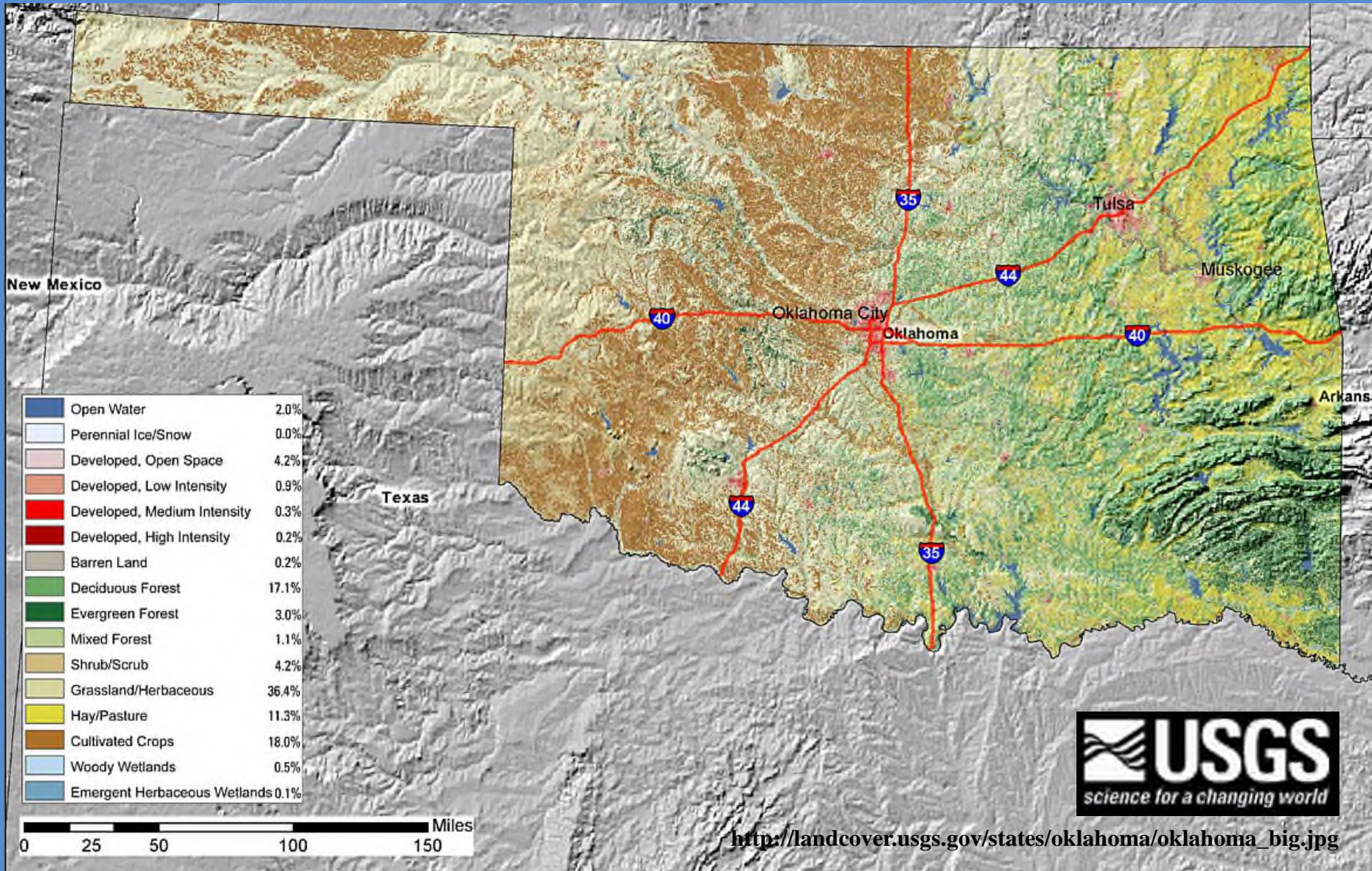
 **OKLAHOMA**
CLIMATOLOGICAL SURVEY

Normal Annual Precipitation

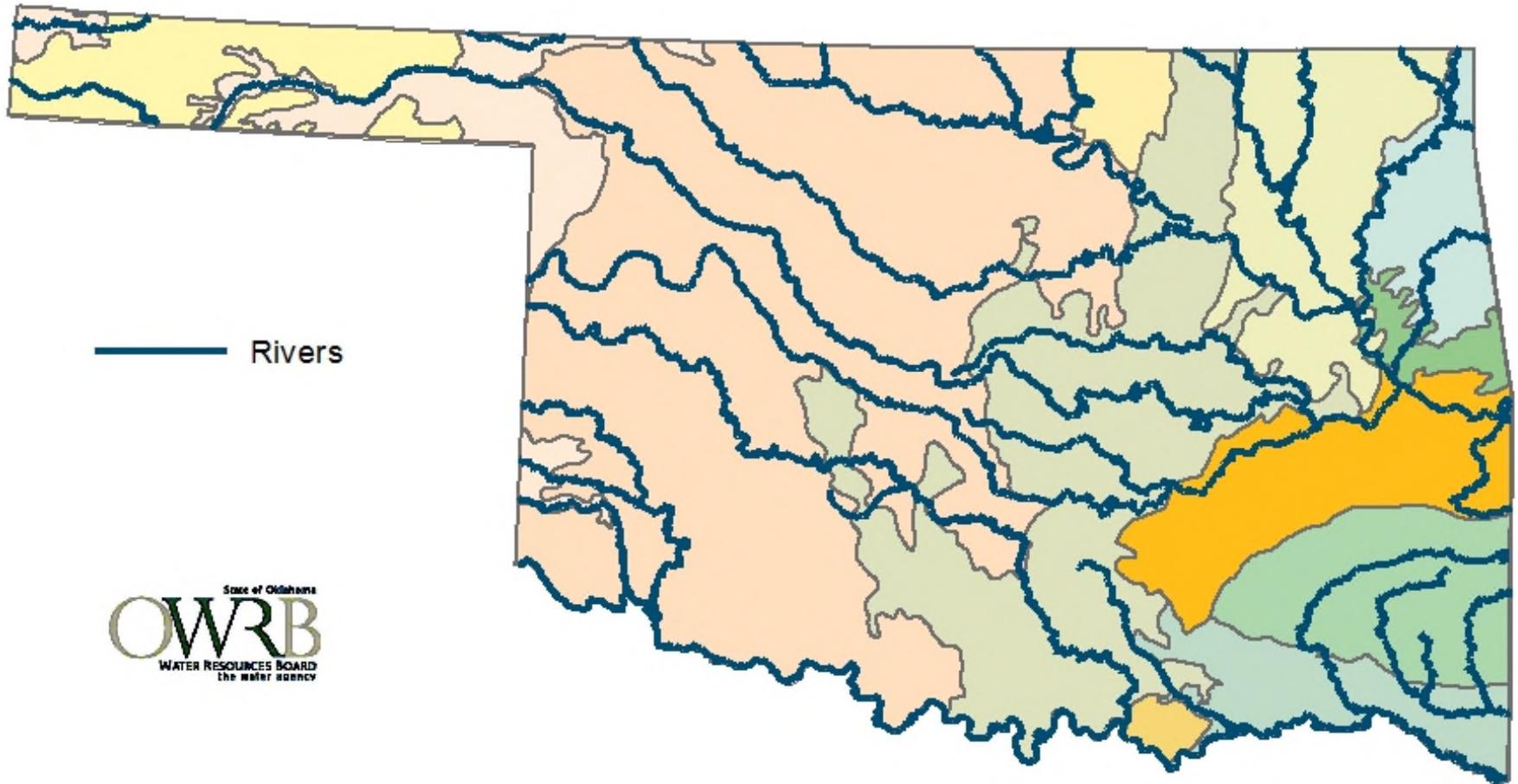
1981-2010

Calculated using normal data provided by NCDC. Created 4:59:26 PM July 26, 2011 CDT. © Copyright 2011

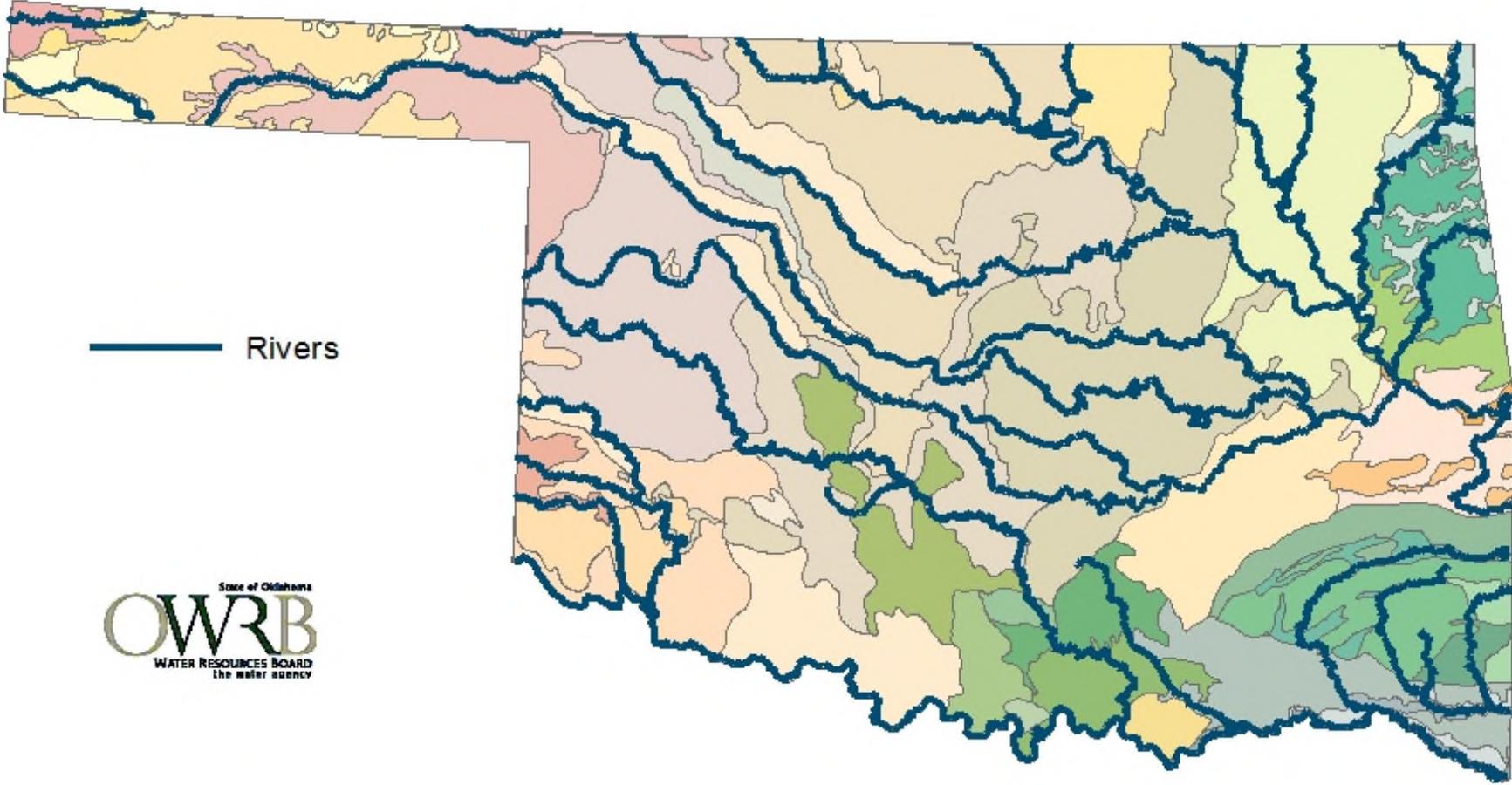
Oklahoma Land Cover



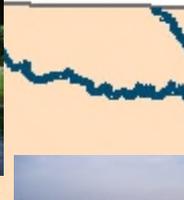
Ecological Diversity (12 Omernik III Ecoregions)



Ecological Diversity (46 Omernik IV Ecoregions)



Ecological Diversity



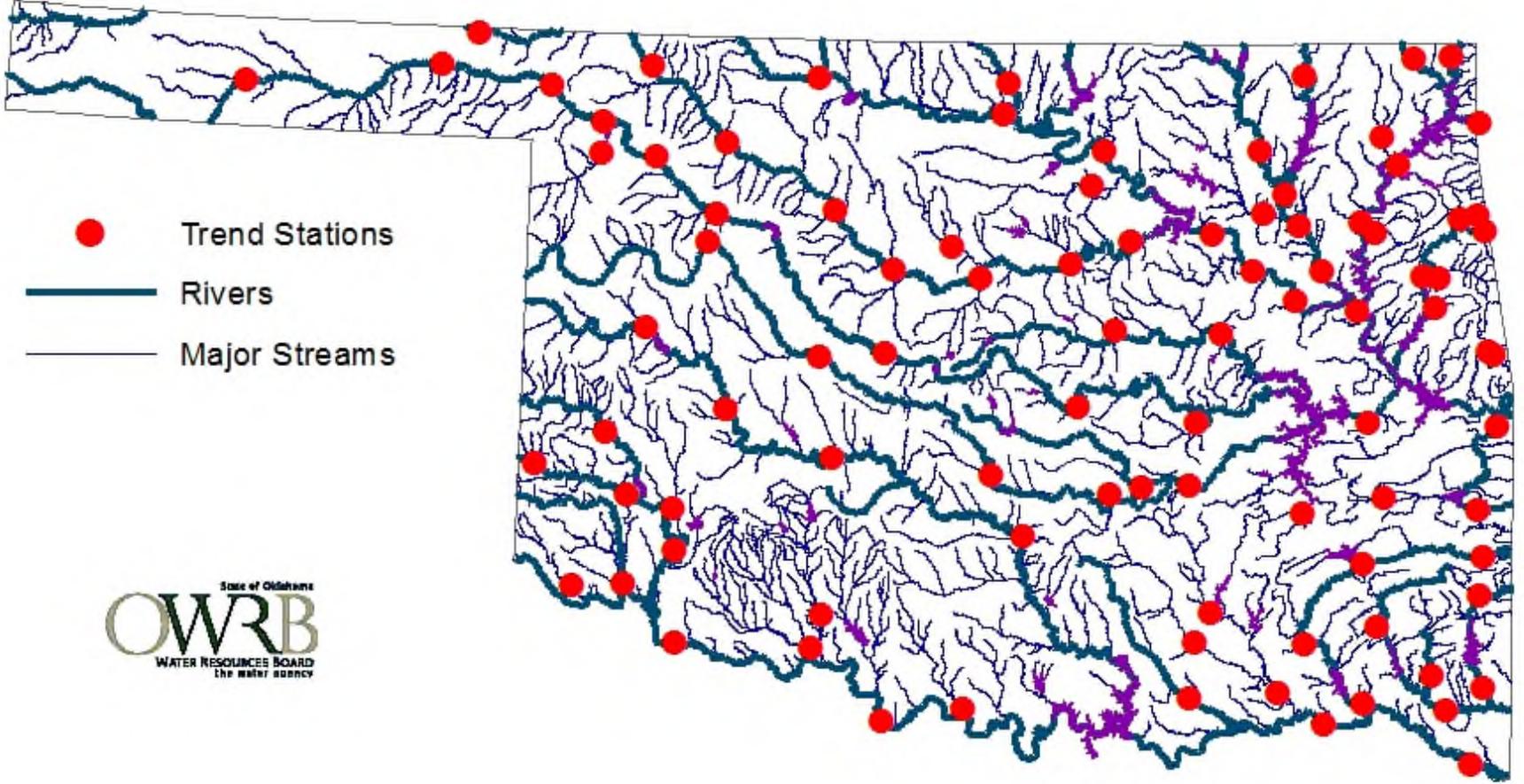
— Rivers



Waterbody Categorization

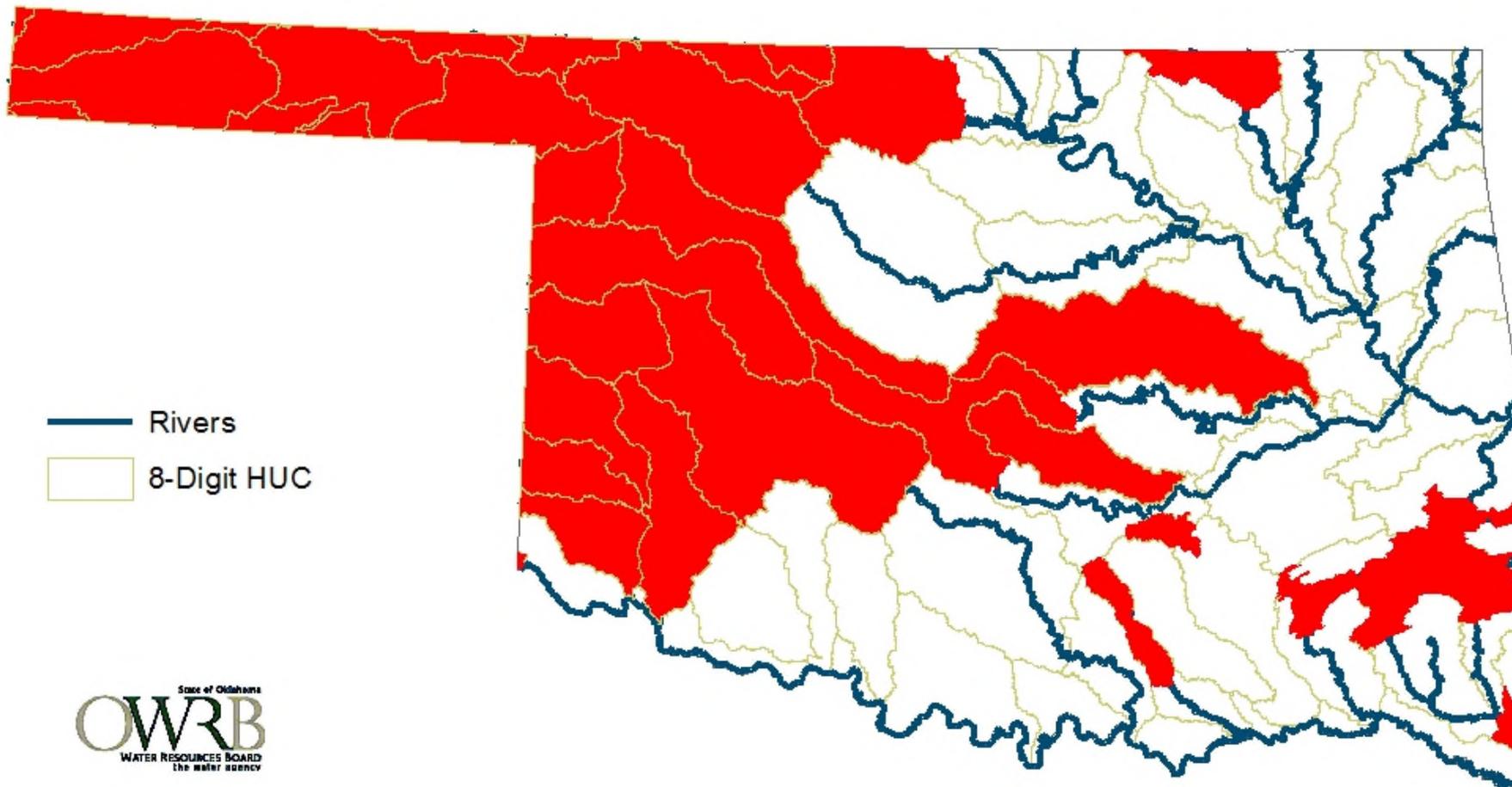
| Category | Average Wetted Width | Fishable by Pram |
|---|----------------------|------------------|
| Wadeable  | < 20 meters | $> 50\%$ |
| Small Boatable  | | $< 50\%$ |
| Large Wadeable  | > 25 meters | $> 50\%$ |
| Boatable  | | $< 50\%$ |

Surface Water Monitoring Stations

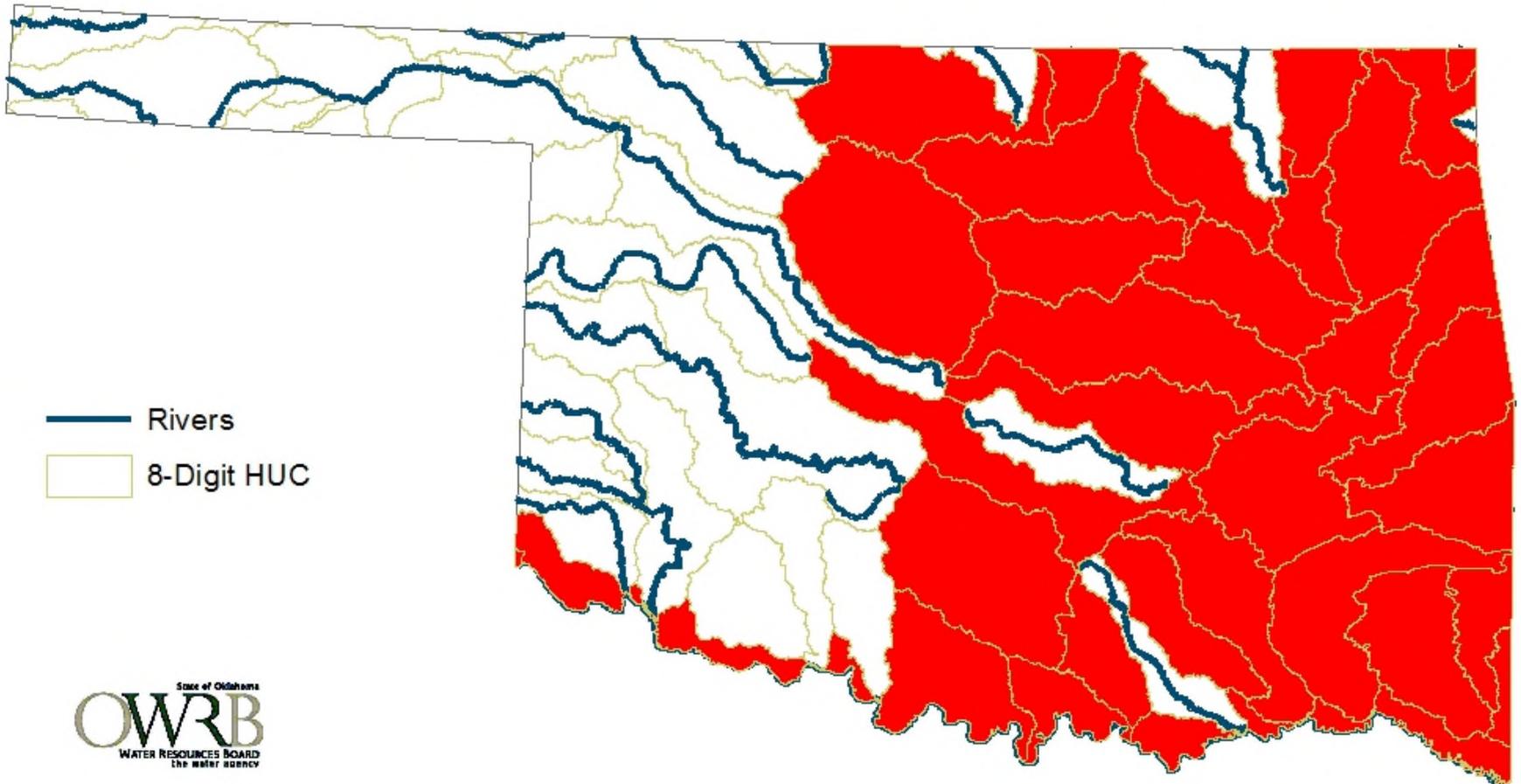


State of Oklahoma
OWRB
WATER RESOURCES BOARD
the water agency

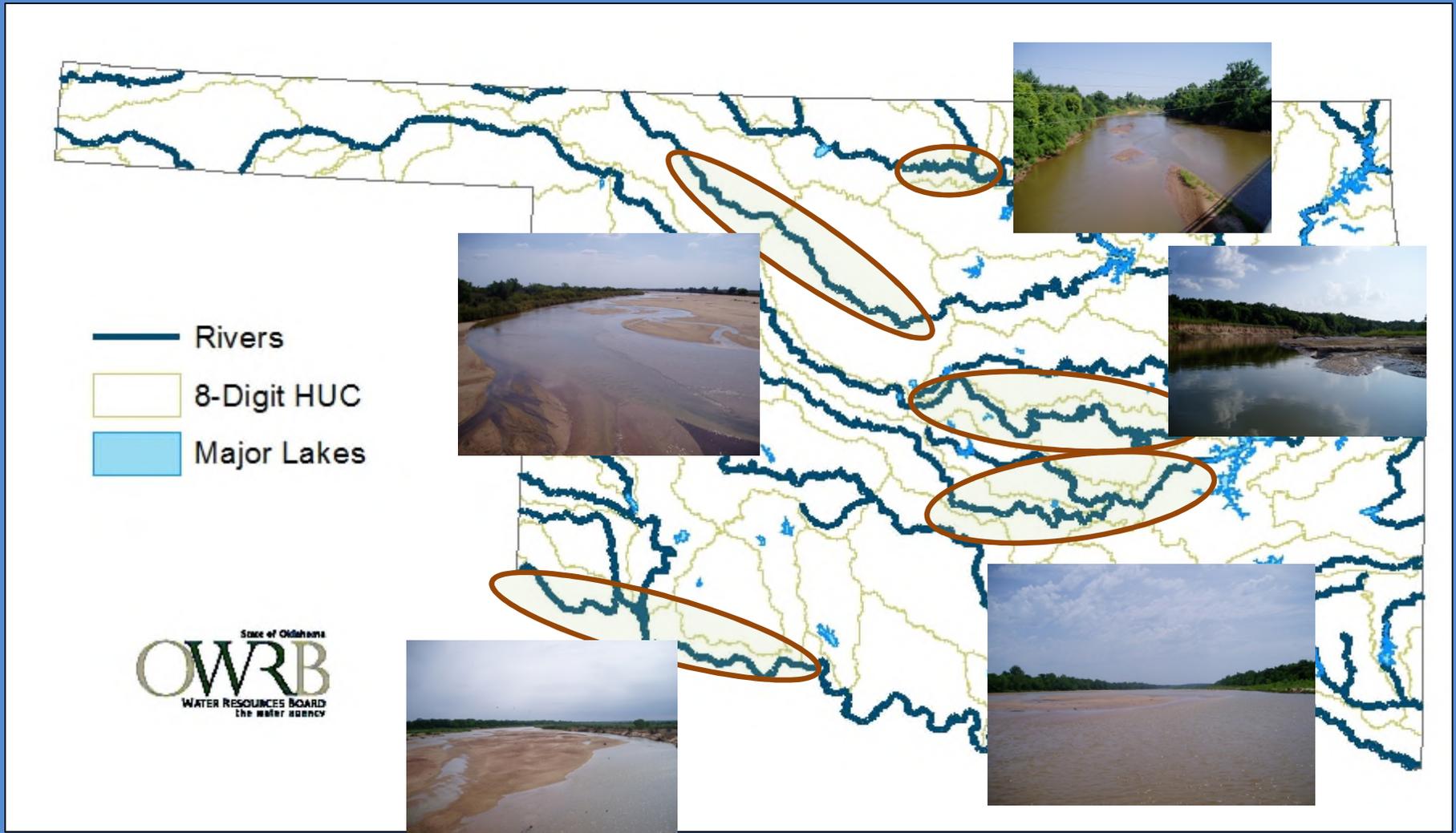
Generally Wadeable Protocols Used



Generally Large Boatable Protocols Used



Large Wadeable River Protocols Used









General Considerations

| | Wadeable | Small Boatable | Large Wadeable | Boatable |
|---|---|----------------|----------------|----------------|
| Reach Length--General | 40x Average Wetted Width Wadeable vs. Boatable = Major Electrofishing Method (Pram vs. Boat) | | | |
| Reach Length--Minimum | > 150 m | > 150 m | > 800 m (BPJ) | > 800 m (BPJ) |
| Reach Length--Maximum | < 1000 m (BPJ) | < 1000 m (BPJ) | < 2000 m | < 4000 m |
| | | | | |
| Habitat--Quantitative (EMAP) | Yes (Wadeable) | Yes (Wadeable) | Yes (Wadeable) | Yes (Boatable) |
| Habitat--Qualitative (OK RBP) | Yes | Yes | Yes | No |
| Have Integrated Habitat Assessment Forms to Avoid Collecting Duplicate Data | | | | |

Fish Indicator Collection

Effort – Electrofishing

- Minimum Units of Effort are 150 meters and 500 seconds
- Site fished until one of the following occurs:
 - End of pre-designated reach
 - Expend 4000 units for wadeable/7500 units for boatable
- Total Units Expended Should Positively Correlate Reach Length and Habitat Diversity
 - Care should be taken not to over or under fish a reach or sub-reach
 - Document occurrences of digression
- Deep Pools May be Re-fished by Working Concentric Circles



Effort – Seining

- Work reach as if electrofishing using various seine techniques depending on habitat structure and complexity
- BPJ should be used to determine if community is adequately characterized
- Generally lower natural diversity



| | Wadeable @ 150 m RL (minimum) | All Other Wadeables | Boatable |
|--------------------------|---|----------------------------|---|
| Equipment – Primary | Backpack Electrofisher | 2.5 GPP Pram Electrofisher | 9.0 GPP Boat Electrofisher |
| Equipment – Alternate | Seine <ul style="list-style-type: none"> • as primary in conductivity > 4500 μS • as secondary for inaccessible deep pools | | <ul style="list-style-type: none"> • 2.5 GPP Pram Electrofisher in shallow or inaccessible areas • Seine when conductivity precludes electrofishing |

Fish Indicator Analysis

BIOCRITERIA

| Metric | Value | Scoring | | | Score |
|--|-------|---------|-----------|-------|-------|
| | | 5 | 3 | 1 | |
| Total # of species | | fig 1 | fig 1 | fig 1 | |
| Shannon's Diversity based upon numbers | | >2.50 | 2.49-1.50 | <1.50 | |
| # of sunfish species | | >3 | 2 to 3 | <2 | |
| # of species comprising 75% of sample | | >5 | 3 to 4 | <3 | |
| Number of intolerant species | | fig 2 | fig 2 | fig 2 | |
| Percentage of tolerant species | | fig 3 | fig 3 | fig 3 | |
| TOTAL SCORE FOR SAMPLE COMPOSITION | | | | | 0 |
| Percentage of lithophils | | >36 | 18 to 36 | <18 | |
| Percentage of DELT anomalies | | <0.1 | 0.1-1.3 | >1.3 | |
| Total individuals | | >200 | 75 to 200 | <75 | |
| TOTAL SCORE FOR FISH CONDITION | | | | | 0 |
| TOTAL SCORE | | | | | 0 |

➤ Use multiple Indices

➤ For Large Rivers, NRSA Analysis Methods/Classifications Currently Used (developing comparable methods for Oklahoma)

➤ For condition, use a weight of evidence assessment

➤ For Impairment status use biocriteria unless unavailable or scored as undetermined

| Metrics | 5 | 3 | 1 |
|--|------|--------|------|
| Number of species | >67% | 33-67% | <33% |
| Number of sensitive benthic species | >67% | 33-67% | <33% |
| Number of sunfish species | >67% | 33-67% | <33% |
| Number of intolerant species | >67% | 33-67% | <33% |
| Proportion tolerant individuals | <10% | 10-25% | >25% |
| Proportion insectivorous cyprinid individuals | >45% | 20-45% | <20% |
| Proportion individuals as lithophilic spawners | >36% | 18-36% | <18% |



ALT IBI CLASSIFICATION

OK FISH IBI



| % Comparison to the Reference Score | Integrity Class | Characteristics |
|-------------------------------------|-----------------|--|
| >97% | Excellent | Comparable to pristine conditions, exceptional species assemblage |
| 80 - 87% | Good | Decreased species richness, especially intolerant species |
| 67 - 73% | Fair | Intolerant and sensitive species rare or absent |
| 47 - 57% | Poor | Top carnivores and many expected species absent or rare; omnivores and tolerant species dominant |
| 26 - 37% | Very Poor | Few species and individuals present; tolerant species dominant; diseased fish frequent |

Macroinvertebrate Indicator Collection

Wadeables/Small Boatables

Riffles – All waterbodies where available (3-kick composite)

Wadeables and Small Boatables

- **Best Available Habitat (all sites)**
 - **Timed, reach wide methodologies**
 - **Woody Debris and Streamside Vegetation (typically root wads or emergent vegetation)**
- **NRSA Methodology on Statistical Survey Sites (additional)**
 - **Comparability for both methods and analyses**
 - **Study expectation**

Other Considerations

- **Samples sub-sampled at various rates to accommodate different purposes**
- **Metrics calculated different at taxonomic scales**
- **8 metric reports**



Macroinvertebrate Indicator Collection Boatable/Large Wadeable

- aka, Large River Protocol (LRP)
- Transect based methodology based on NRSA protocol (alternating banks)
- Sample 2 distinct zones—dominant substrate (coarse or fine) and **targeted habitat**
- 1 meter linear sweep in 10x20m plot
 - **Can move with sub-reach to find targeted habitat, if not available in plot**
 - **If chosen bank too deep, can move to other side**
- LRP—Fine Substrate
 - muck, silt, sand, and fine gravel
 - Separate substrate and targeted habitat samples
- LRP—Coarse Substrate
 - Larger than 16 mm in diameter (coarse gravel, cobble, boulder)
 - **Composite substrate and targeted habitat samples**
- **Bedrock only sampled if present across > 50% of wetted width (use other bank if not)**
- Riffle if present



Macroinvertebrate Indicator Analysis

- Use different indices for size categories
- Must have multiple samples for assessment of wadeables
- For boatables and some large wadeables use NRSA index and reference conditions
- Developing Oklahoma Boatable/Large River Indices



OK BENTHIC IBI

| B-IBI Metrics | 6 | 4 | 2 | 0 |
|--------------------------------|------|---------|---------|------|
| Taxa Richness | >80% | 60-80% | 40-60% | <40% |
| Modified HBI | >85% | 70-85% | 50-70% | <50% |
| EPT/Total | >30% | 20-30% | 10-20% | <10% |
| EPT Taxa | >90% | 80-90% | 70-80% | <70% |
| % Dominant 2 Taxa | <20% | 20-30% | 30-40% | >40% |
| Shannon-Weaver Diversity Index | >3.5 | 2.5-3.5 | 1.5-2.5 | <1.5 |

OK Benthic IBI CLASSIFICATION

| % Comparison to the Reference Score | Biological Condition | Characteristics |
|-------------------------------------|----------------------|---|
| >83% | Non-impaired | Comparable to the best situation expected in that ecoregion; balanced trophic and community structure for stream size |
| 54 - 79% | Slightly Impaired | Community structure and species richness less than expected; percent contribution of tolerant forms increased and loss of some intolerant species |
| 21 - 50% | Moderately Impaired | Fewer species due to loss of most intolerant forms; reduction in EPT index |
| <17% | Severely Impaired | Few species present; may have high densities of 1 or 2 taxa |



Algal Indicator

- Collection Methodology
 - Benthic is Reachwide/Transect Composite
 - Sestonic is Single Grab Sample
- Currently use chlorophyll-a as an indicator
- Developing Phytoplankton and Periphyton Community Indicators



Cabela's

Questions?

