

Bugs, Fish, People

Why monitoring matters

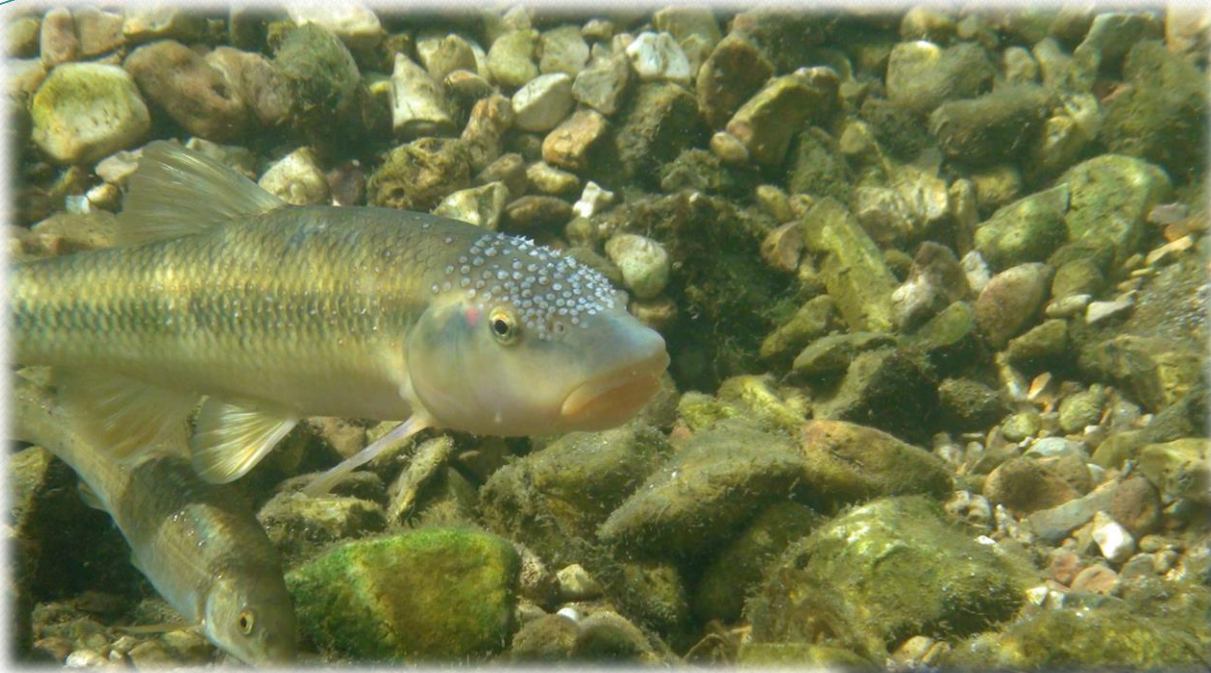
Jeri Fleming and Kim Shaw

Oklahoma Conservation Commission





Clean Water Act -
Safe for Humans

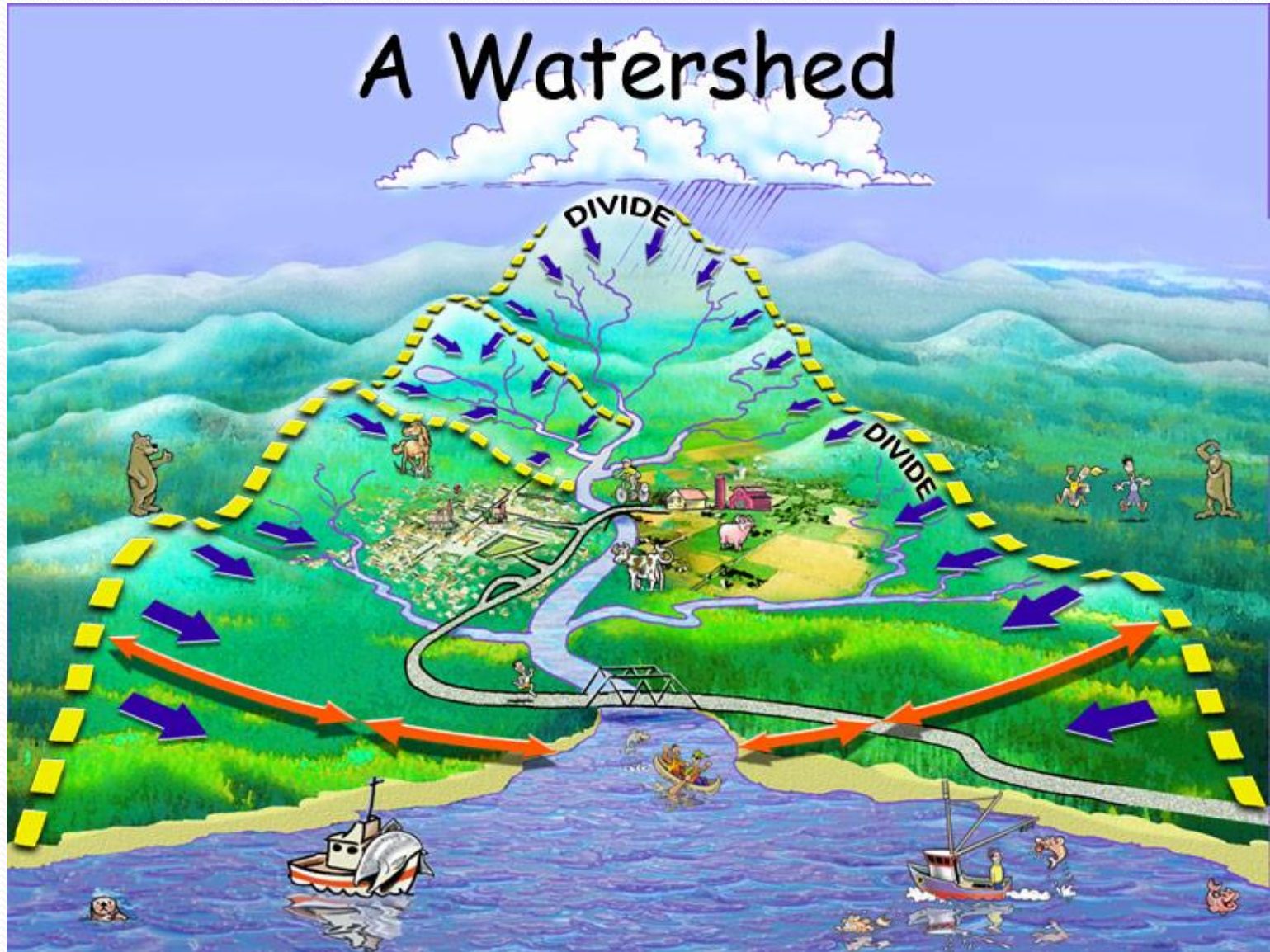


Home for Fish

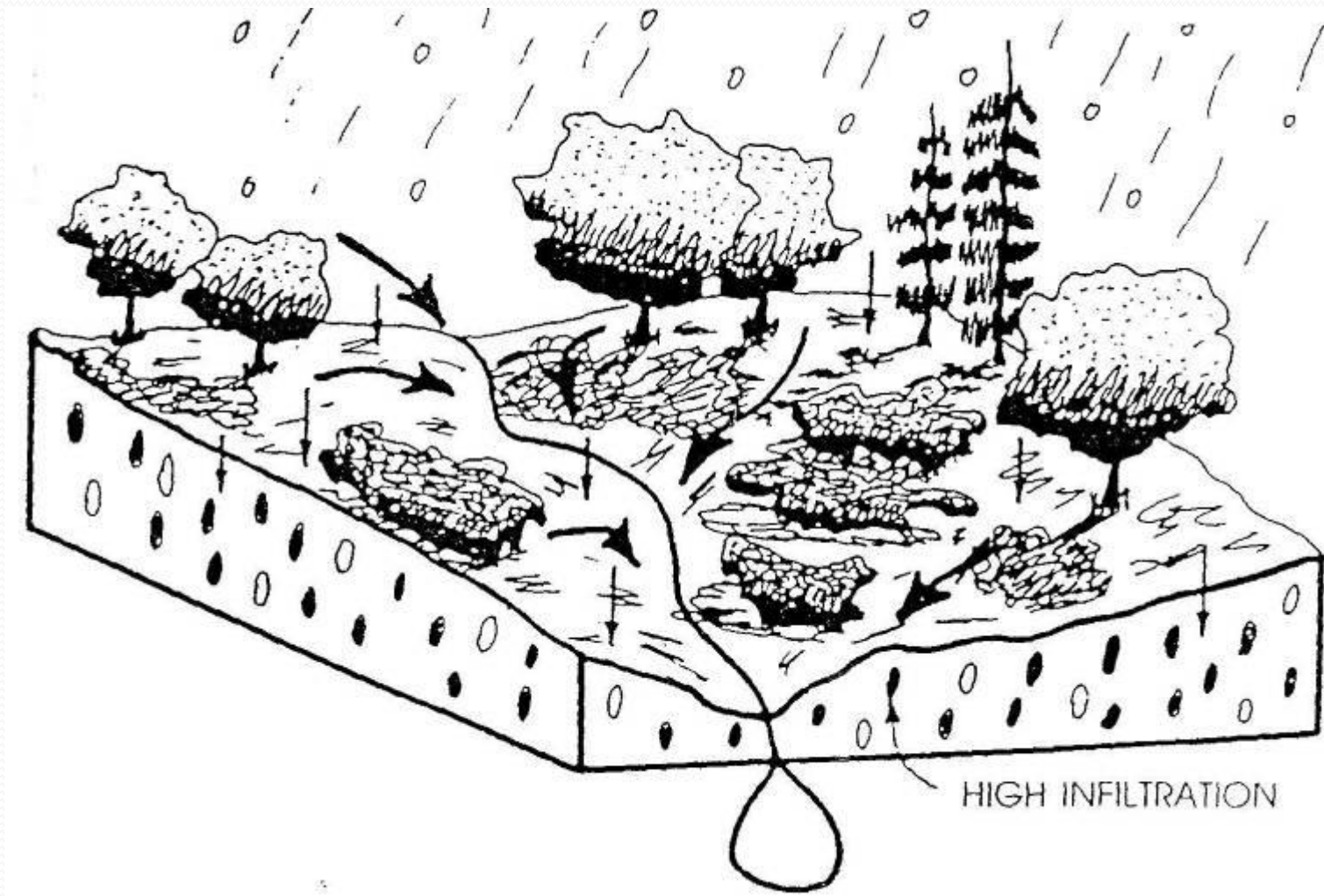
We love science
just not in our
streams!



A Watershed

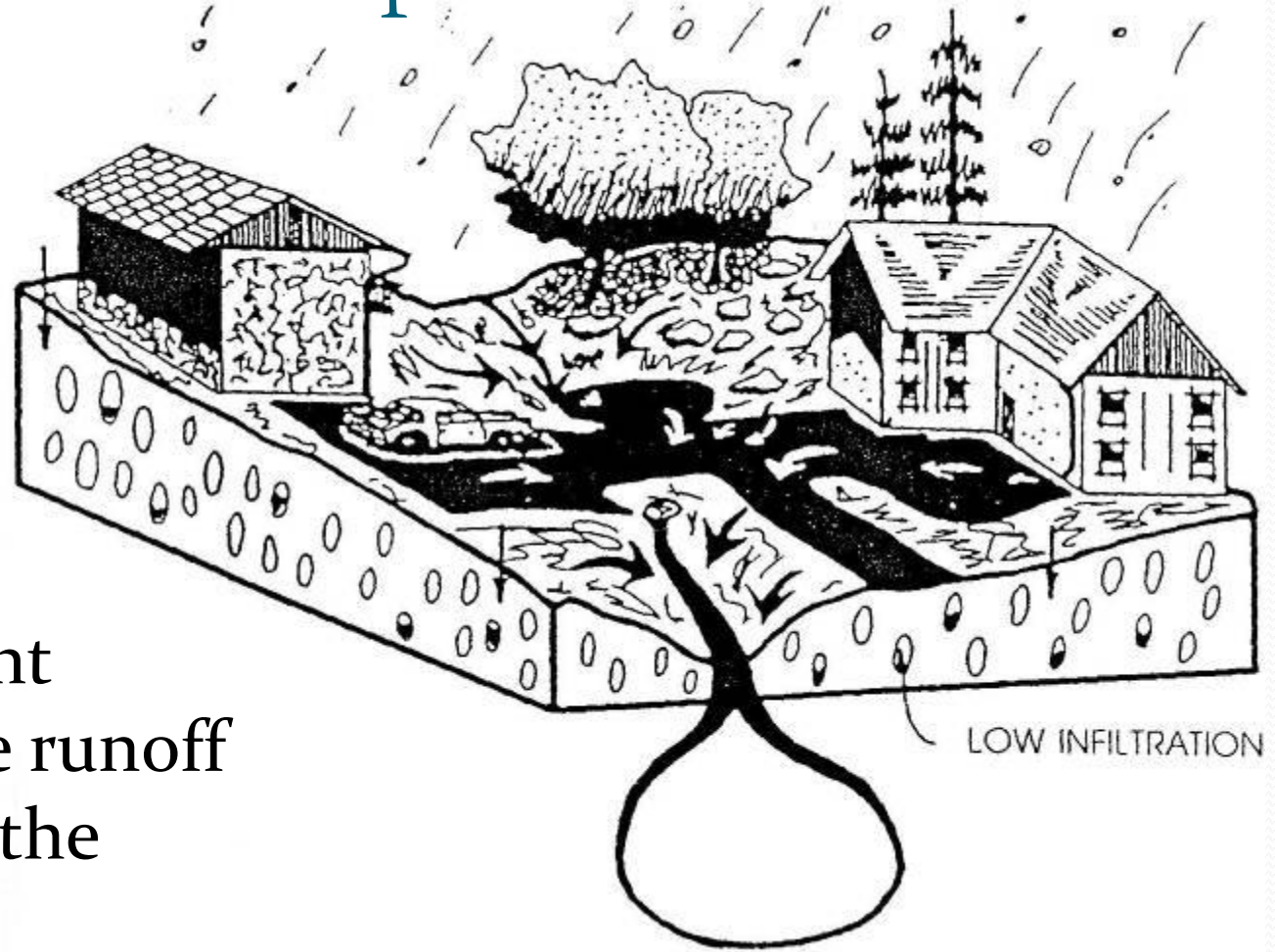


Natural Watershed





Effects of Development



Only 8%
development
changes the runoff
patterns in the
watershed.

WELCOME TO
ORANGE COUNTRY



Point Source Pollution



Nonpoint Source Pollution



OCC WQ Division History

- OCC Water Quality Division Established in 1980
- Section 208 CWA funding allowed OCC WQ to purchase equipment and begin water sampling in 1982
- 1987 - CWA amended and Section 319 established
- 1993 - OCC designated as lead NPS technical agency by State statute.

OCC Monitoring History

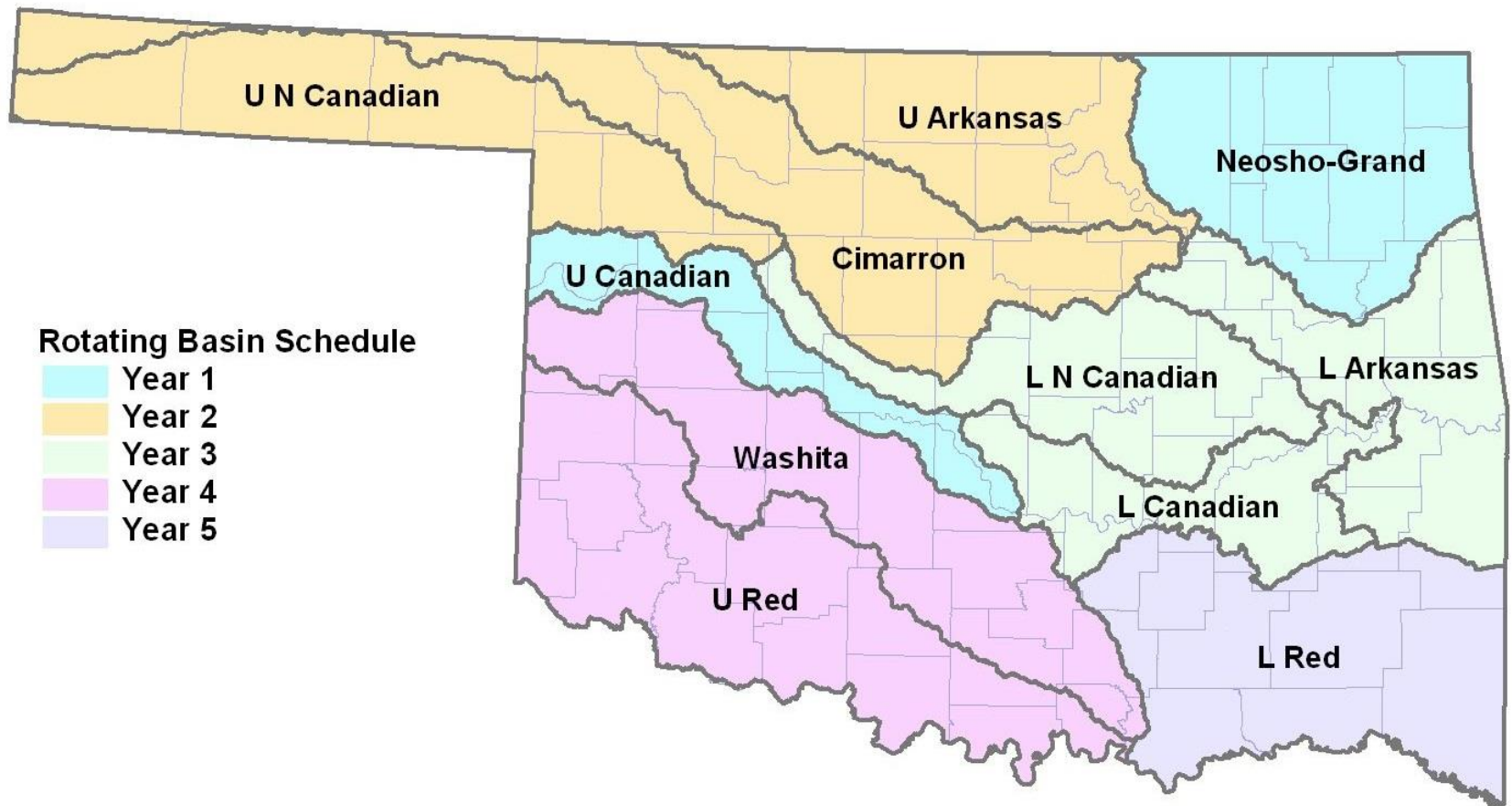
- Limited sampling from 1982-1992
- 1992 – Full-time monitoring employee hired and biological program began to develop
- 1995 – Began extensive biological program
- 1997 – Agency began intensive data gaps projects including water quality, habitat, and biological assessments
- 2000 – Began Small Watershed Rotating Basin Monitoring Program (fixed sites)(collections began in 2001)

- 
- 2006 – Began probabilistic component as joint effort with OWRB (sites were divided between current basin and statewide sites)
 - 2008-2012 Concentrated probabilistic efforts in current Rotating Basin Program planning basins
 - 1998 – Priority watershed projects took root and have included intensive water quality, habitat and biological monitoring components

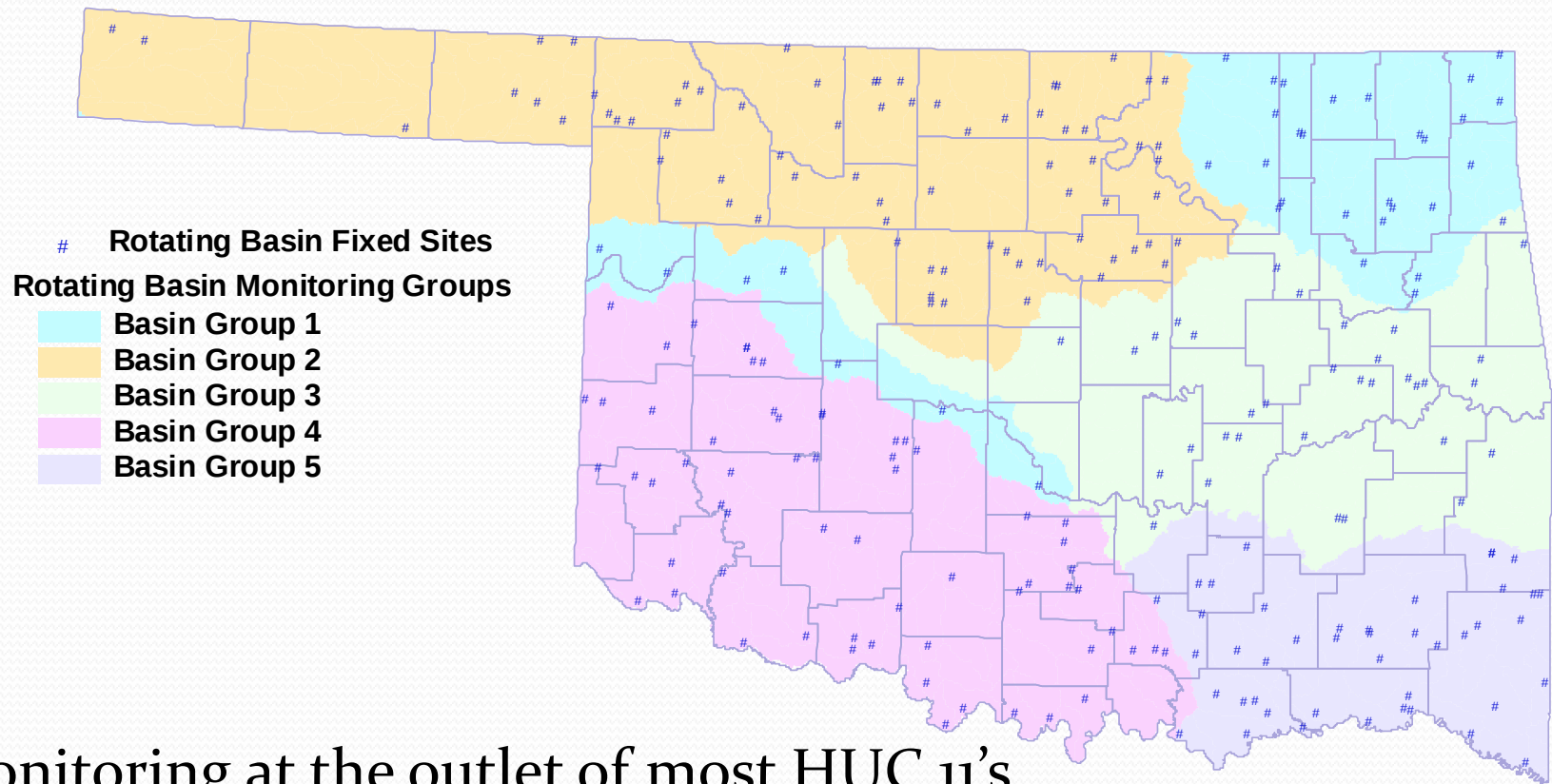
OCC WQ Monitoring Staff



Rotating Basin Monitoring Program

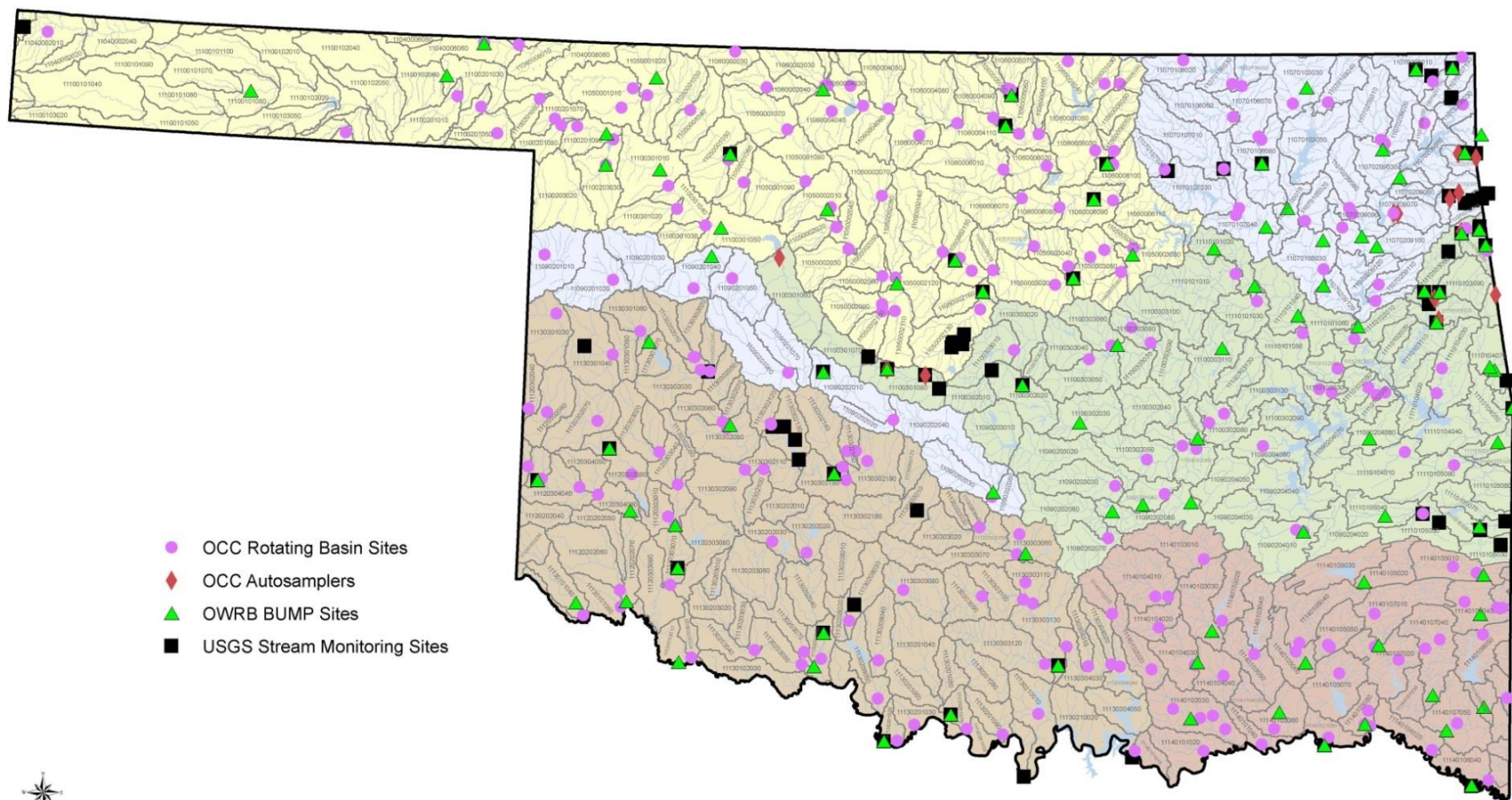


Rotating Basin Monitoring Program



- Monitoring at the outlet of most HUC 11's
- Collect data every 5 weeks for 2 years
- Approx. 245 fixed sites every 5 years on staggered rotational schedule

Stream Monitoring Sites in Oklahoma



Fixed Site Monitoring Protocol: Physico-chemical Parameters

- In-situ parameters:
 - water temperature
 - dissolved oxygen
 - pH
 - specific conductance
 - alkalinity
 - hardness
 - turbidity
 - flow

Every five weeks (ten times a year)



Fixed Site Monitoring Protocol: Physico-chemical Parameters

- **Total P**
- **ortho-P**
- **Ammonia**
- **Nitrite-N**
- **Nitrate-N**
- **Total Kjeldahl Nitrogen**
- **Chloride**
- **Sulfate**
- **Total Dissolved Solids**
- **Total Suspended Solids**
- ***E. coli* bacteria**
(only during May through Sept.)

Monitoring Protocol: Biological Parameters

Macroinvertebrates

- Twice a year (winter & summer)
- All available habitats: riffle, vegetation, woody



Monitoring Protocol: Biological Parameters

Fish / Instream Habitat

- Once every cycle (~5 years)
- Electroshock and seine
- 400 meters, total (wadeables)
- 20 meter transects for habitat assessment



Implementation Projects

- Ambient monitoring (Rotating Basin) data helps determine project areas
- Watershed must have an approved watershed-based plan
- Watershed “issues” must be addressable by NPS BMPs
- Improvements must be likely
- Project must be accepted by local districts

Implementation Monitoring

- Designed to detect changes in stream quality (typically water quality)
- Often require a control or reference stream
- Monitoring usually covers pre- and post-implementation activities
- “Automatic” water samplers are utilized
- Macroinvertebrate collections twice a year
- Fish surveys every other year

Internal QA

- **Water Quality**

- Initial intense employee training
- Field review by QA Officer prior to independent monitoring
- Quarterly meter calibration exercise (documented)
- Annual field audit by QA Office accompanied by Monitoring Coordinator (Documented and part of employee annual evaluation)

- **Habitat**

- Completed only under direction of Crew Leader
- Annual calibration exercise where employees must score within 10% of the average of the experienced employees scores to perform assessments

- **Biological (fish)**

- All collections made under the supervision of a crew leader
- Multiple seasons of training as a crew member prior to attaining crew leader role
- Must pass a combined lab and field fish identification test with a score of 98% on fish deemed necessary for release (large, commonly abundant or endangered)
- Must pass field audit by Monitoring Coordinator who judges if the employee is efficient and effective at all aspects of fish collection (gear maintenance and prep., gear use, collection technique, safety, fish identification, specimen documentation etc.)

- **Biological (Macroinvertebrate)**

- Intensive training by senior field staff prior to independent collection
- Field review and approval by Monitoring Coordinator prior to independent collection
- Annual technique review during QA activities
- Routine correction of any noticed mistakes following data and sample review

- **Data**

- Initial review by collector
- Second review by Monitoring Coordinator
- Third review during data entry
- Fourth review built into database for many parameters (range limits)
- Fifth review by Data Records Manager following entry
- Final review by Technical Writer/QA Officer during compilation and analysis process

Blue Thumb Volunteer Effort



Educate the public about Stream Protection



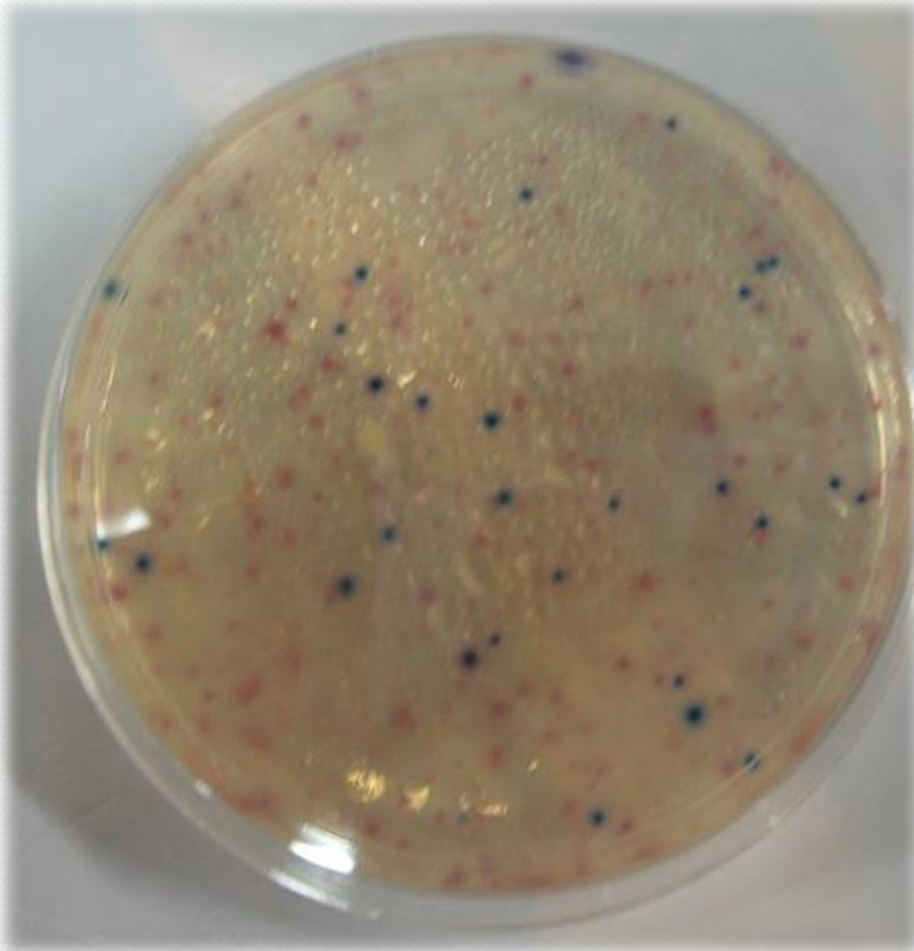
Learn about streams

Chemical Monitoring

- Dissolved Oxygen
- pH
- Temperature
- Water clarity
- Nitrate/nitrite
- Orthophosphate
- Chloride
- Ammonia nitrate



Bacterial Monitoring



Biological Collections

- Macroinvertebrate collection
 - Done twice a year
- Fish collection – Habitat assessment
 - Every 4 – 5 years based on eco-region



Habitat Assessment





Habitat is both on
the land and in the
water





January

March



May



Where the sediment comes from doesn't matter to the fish that once lived here.



BT Quality Assurance

- Quality assurance session with volunteers every quarter
- Chemical data reviewed when submitted
- Macroinvertebrate
 - BT staff goes through bug picking QA each year
 - Staff always on site for collection
- Fish
 - BT staff goes through fish ID training for in-field ID
 - Sample kept of each species and identified by prof. monitoring staff

Volunteers are encouraged to do education in their community and at conferences.



Why we do what we do!

