

# Oklahoma's National Water Quality Initiative Pilot Project

Assessment and Outreach Planning in  
the Little Beaver Creek Watershed

Greg Kloxin, Assistant Director  
Water Quality Division

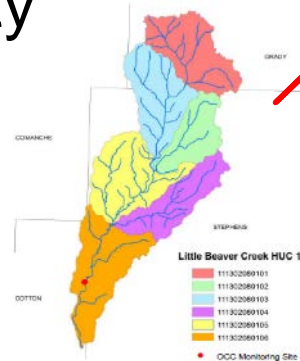
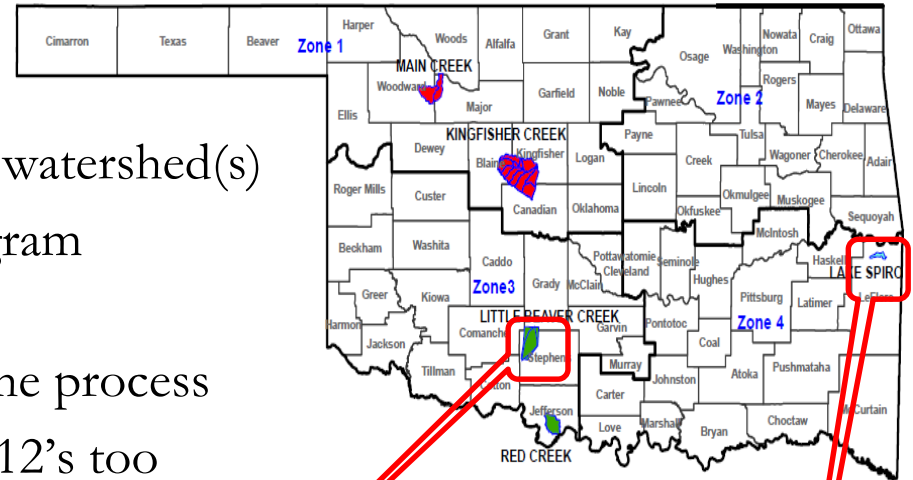
# National Water Quality Initiative (NWQI)

- USDA program to facilitate partnership of NRCS, EPA, and state water agencies in addressing NPS impaired watershed(s)
- Initiated in 2012, NRCS state office collaborated with OCC to select candidates
- Commitments
  - NRCS – FA (5% EQIP allocation); TA (planning)
  - OCC – recommend priority HUC(s); monitoring
  - EPA – 319 funding; tech support



# National Water Quality Initiative

- A great idea, but...
  - ❑ No time to effectively screen best watershed(s)
  - ❑ Rollout preempted release of program guidance
  - ❑ FA commitment/timeline drove the process
  - ❑ Conservation planners find HUC 12's too restrictive
- Switched to two priority watersheds
  - ❑ Little Beaver Creek
  - ❑ New Spiro Lake



# Little Beaver Creek (LBC)

- Major trib to SWS and local recreation resource (Lake Waurika) impaired by nutrients and turbidity
- Impaired for pathogens, turbidity, TDS
- NPS Watershed Priority Rank 1 (Western OK)



Table 3. TMDL Percent Reductions Required to Meet Water Quality Targets for Enterococcus, E. coli, and total suspended solids (ODEQ 2012).

Waterbody ID	Waterbody Name	<u>Enterococcus</u>	<i>E. coli</i>	Total Suspended Solids*
OK311210000050_00	Little Beaver Creek	31%	86%	75%

\*TSS is used as a surrogate parameter for turbidity which cannot be expressed (and thus modeled) as a mass load

# NWQI Pilot (“Readiness Phase”)

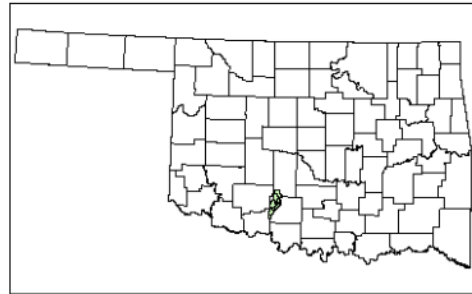
- Focus on preemptive watershed assessment and outreach planning  
Two deliverables:
  - ❑ Watershed Assessment plan
  - ❑ Outreach plan
- OK’s end game – develop repeatable model to deliver WQ focused conservation in priority NPS watersheds across the state



# NWQI Pilot – Project Approach

- Hire a shared FTE (WQ Liaison)
- Conduct watershed assessment (USDA guidance)
  - Research/vet various tools toward efficient characterization (e.g., PTMapp, ACPF, SWAT)
  - Employ tools to characterize hydrology, conduct resource analysis/source assessment, determine relative loads and vulnerable acres
- Conduct outreach planning
  - Build GIS tool to give to local conservation planners

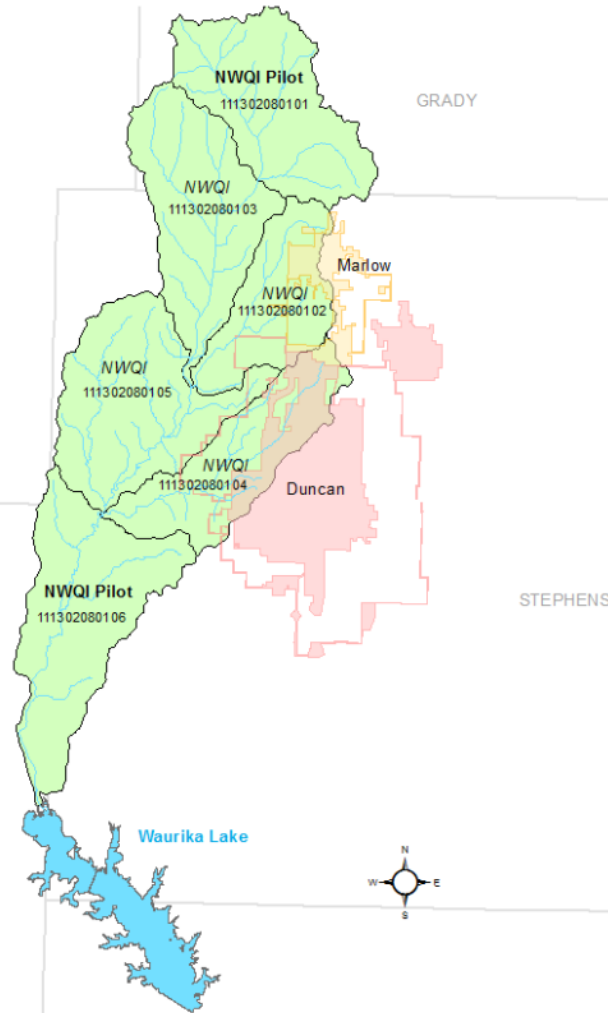
# Assessment Phase - Characterization



COMANCHE

COTTON

0 2.5 5 10 Miles



- 157 sq miles
- MLRA/ecoregions
  - Central Rolling Red Prairies
    - Native vegetation: Tall and mid prairie grasses, forbs, legumes and woody species
  - Northern Cross Timbers
    - Native vegetation: Open stand oak forest (Blackjack, Post Oak) with herbaceous understory (Big bluestem, little bluestem, Indiangrass, sunflower, and lespedezas)
- Landuse (101, 106)
  - Range 63%
  - Crop 22%
  - Forest 10%
  - Urban/Dev 5%
- Soils
  - App. 60 soils, mostly well drained, comprised of silt, loam and fine sand



# Assessment Process

## ■ Visual Based

- Riparian assessment
  - “Fly over” via aerial imagery
- Window surveys

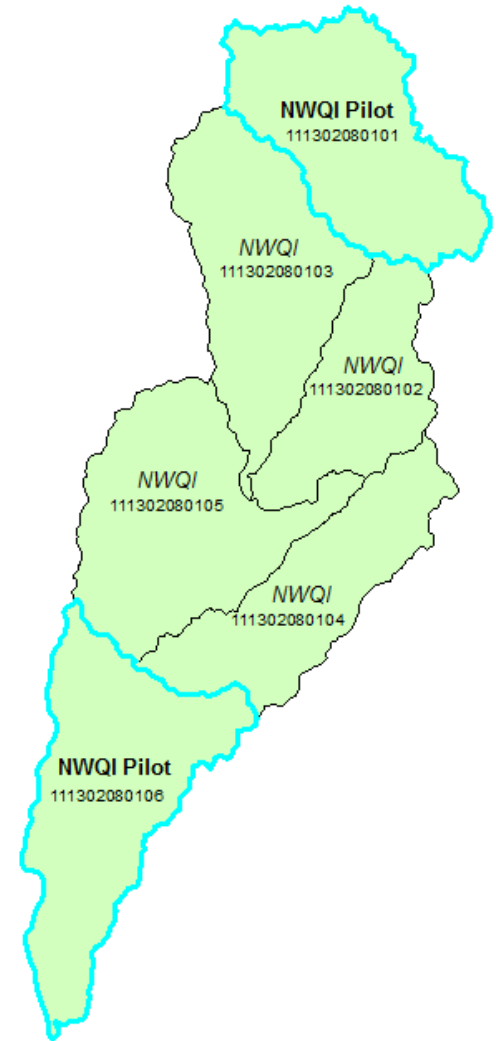
## ■ Model Based

- Soil and Watershed Assessment Tool (SWAT)

- Data/inputs

- High Resolution DEM's
- Landuse/Landcover
  - NLCD, CDL, NASS, user defined
- Digital Soil Maps

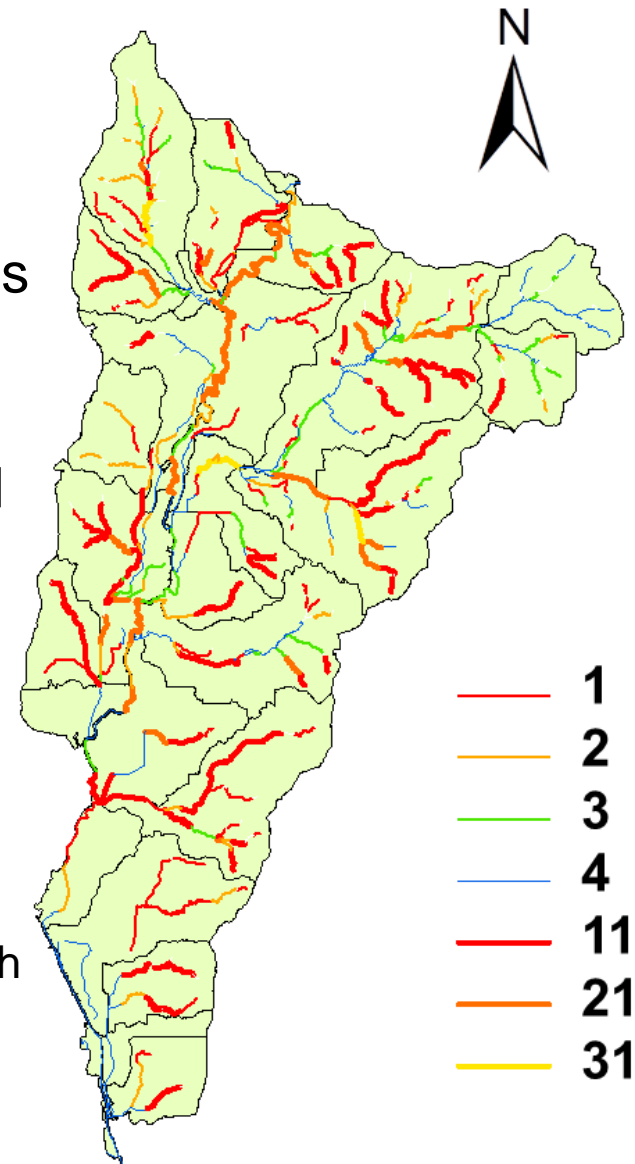
## ■ Input from local conservation districts and NRCS





# Riparian Assessment

- GIS project – latest data available
  - Imposed 15m buffer “screen” on NHD Hi-res “flowline to estimate riparian cover/stability
  - Using high resolution ortho-imagery at 1:3000 scale, subsegmented and attributed reaches to reflect buffer conditions for:
    - Perennial, woody vegetative cover
      - 1 - None apparent
      - 2 – Some apparent
      - 3 – Mostly fills buffer
      - 4 – Exceeds buffer
    - Active erosion, gullyng, and/or trailing
- Significant presence of either/both is indicated with a “1” after the riparian condition number (e.g., 11, 21, 31).



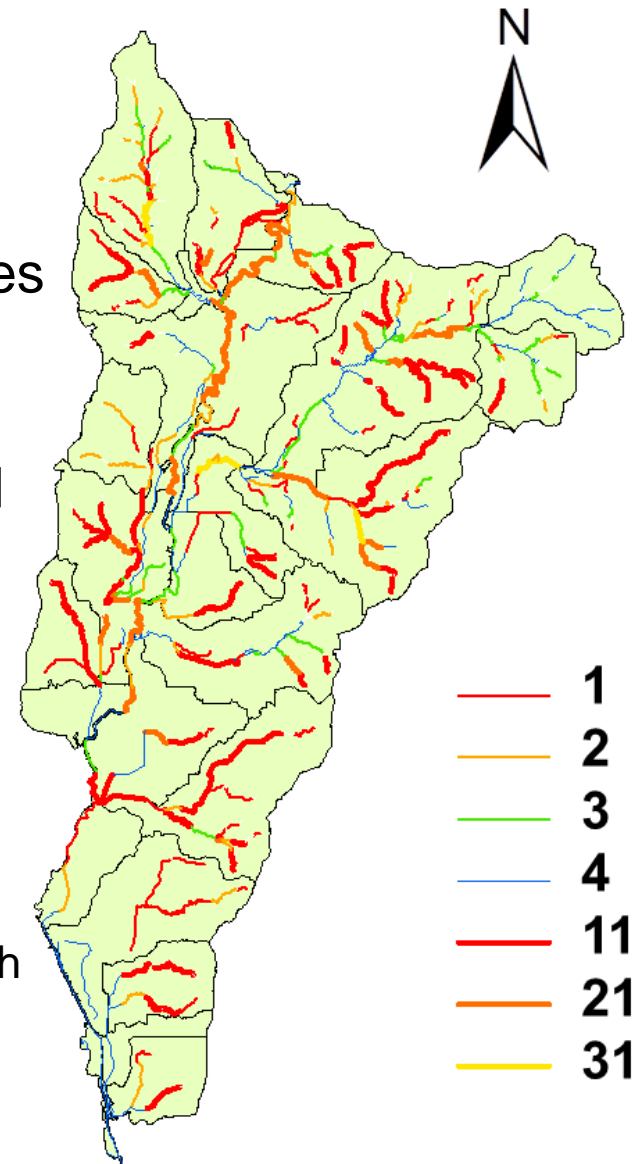
# Riparian Assessment



**Figure 13** Number 1. Road through creek, 2. Cattle tracks, 3. Gullies, 4. Lack of Riparian Vegetation, image B is a zoomed in image of A.

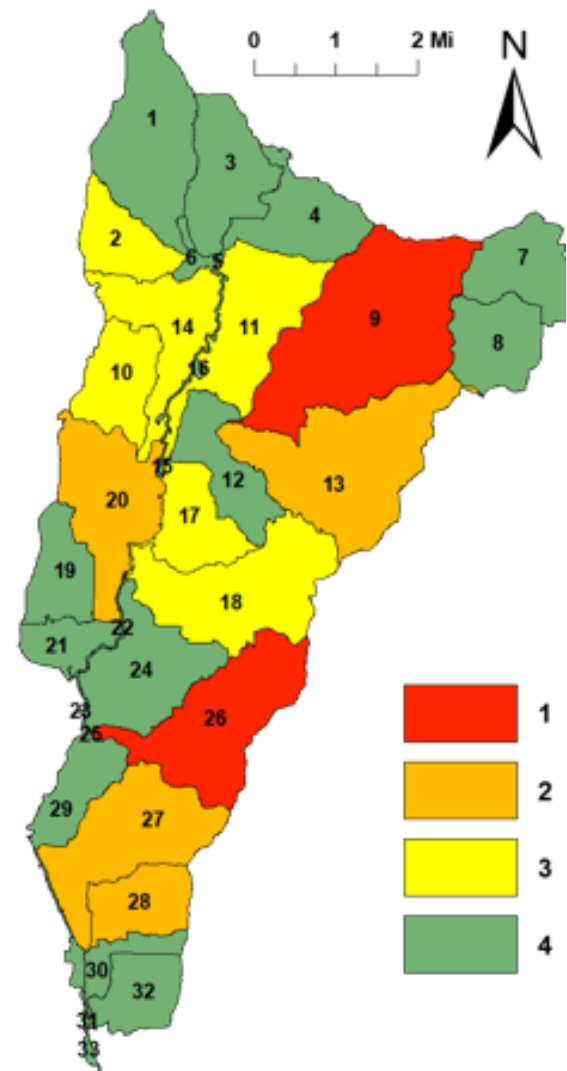
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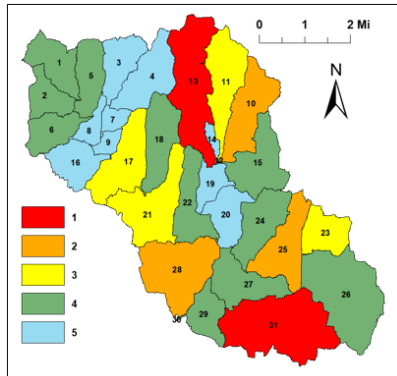


# Modeled Assessment - SWAT

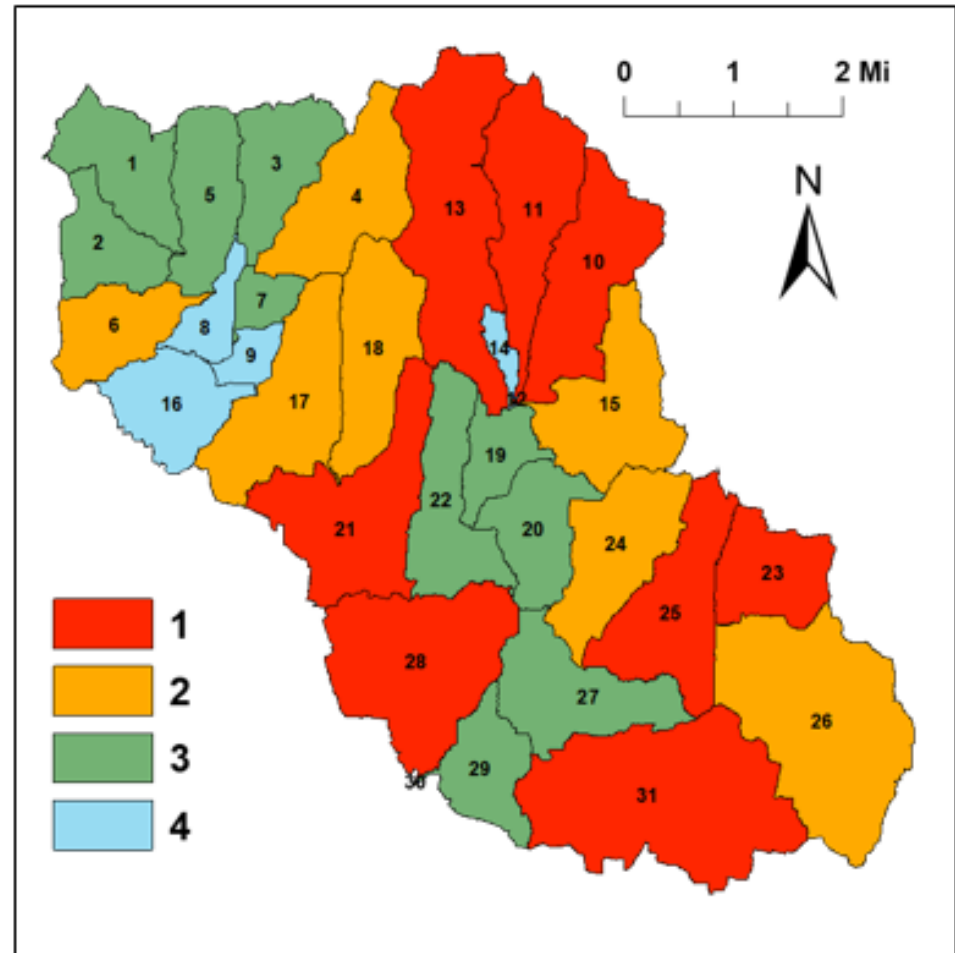
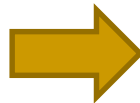
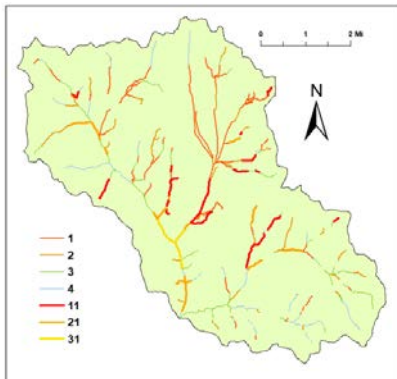
- 30 year simulation (5 year warmup)
- 5 meter DEM
- SSURGO soil layer
- NLCD 2011 Land Use
  - Generalized to remove minor contributors
  - All crops added to default SWAT designation (general agriculture)
- Input tolerance set to 10% for all inputs (LU, Soils, and slope)
- Ranked by total annual predicted sediment output (Tons)



# Combined Assessments – Final Subbasin Rank



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# Analysis of Treatment & Opportunities

- Reviewed past conservation efforts (2003-2018) to determine historical coverage in 101 and 106
  - >19,000 acres or app. 40% of both HUCs
  - Most common CPs
    - Crop land - residue management (no till, reduced till), cover crops, cropland conversion, forage and biomass plantings
    - Range/pasture – grazing management, livestock watering systems
  - Marginal coincidence in currently identified critical areas
- Future conservation efforts informed by NWQI-P
  - Target priority subbasins/producers
  - Focus practices and ranking to emphasize riparian health/stability
    - Range - Access control, watering systems, grazing management
    - Crop -Cover crops, cropland conversion, nutrient management

# Proposed Implementation – Ex.

BMP & Efficiency	Practice code	101	106	total units	unit	\$/unit	total cost	Assumed Participation / Adoption Rate	NWQI
		unit	unit						
Range and Pasture									
Prescribed Grazing	528	6838	7941	14779	acres	\$11	\$162,569	50%	\$81,284.50
Watering Systems for Livestock	614, 561, 642, 516	41	100	141	each	\$5,000	\$705,000	50%	\$352,500.00
Nutrient Management (pasture)	590	3670	3670	7340	acres	\$17	\$124,780	40%	\$49,912.00
Grade Stabilization Structures	410	5	3	8	each	\$12,000	\$96,000	40%	\$38,400.00
Diversion Terrace	362	10750	6616	17366	<del>acres</del>	\$2	\$34,732	40%	\$13,892.80
Critical Area Planting	342	16	10	26	acres	\$275	\$7,150	40%	\$2,860.00
Access Control	472	45	260	305	acres	\$24	\$7,320	50%	\$3,660.00
Fencing	382	215339	529387	744726	feet	\$2	\$1,489,452	50%	\$744,726.00
Range & Pasture Total							\$2,627,003	\$1,287,235.30	

# Predicted Impact on Priority NPS

BMP	Watershed	101			106			Total Predicted Reduction		
		N Reduction	P Reduction	Sediment Reduction	N Reduction	P Reduction	Sediment Reduction	N Reduction	P Reduction	Sediment Reduction
Range (landuse)	% total	lb/year	lb/year	t/year	lb/year	lb/year	t/year	lb/year	lb/year	t/year
Prescribed Grazing	31.47	7713	571	227	9753	703	269	17466.0	1273.8	496.1
Livestock Exclusion Fencing	1.78	289	20	15	786	50	36	1054.9	69.6	51.0
Alternative Water Supply	8.12	16	2	1	1709	189	76	1725.0	191.0	77.2
Nutrient Management 1 (Determined Rate)	12.08	1415	310	0	872	0	0	2287.2	310.2	0.0
Grade Stabilization Structures	2.13	9	1	0	2439	263	81	2448.0	264.2	81.2
Diversion Terrace	12.08	1246	342	120	823	224	76	2068.6	565.5	195.5
Critical Area Planting	0.06	9	1	1	6	1	0	15.0	2.3	1.1
Crop (landuse)										
Residue Management	8.50	1085	277	126	2950	787	496	4034.7	1084.3	622.2
Convert Crops to Grass	5.58	3005	791	262	271	69	35	3276.2	859.4	287.4
Nutrient Management	8.50	191	122	0	382	176	0	572.3	297.8	0.0
Cover Crops	8.50	360	82	34	929	222	132	1289.0	303.7	165.9
Critical Area Planting	0.02	3	1	1	0	0	0	3.3	1.2	0.6
Buffer Practices	0.69	122	39	16	105	32	19	227.3	71.8	34.4
Summed predicted reductions (watersheds combined)								45,643	7,801	3,089

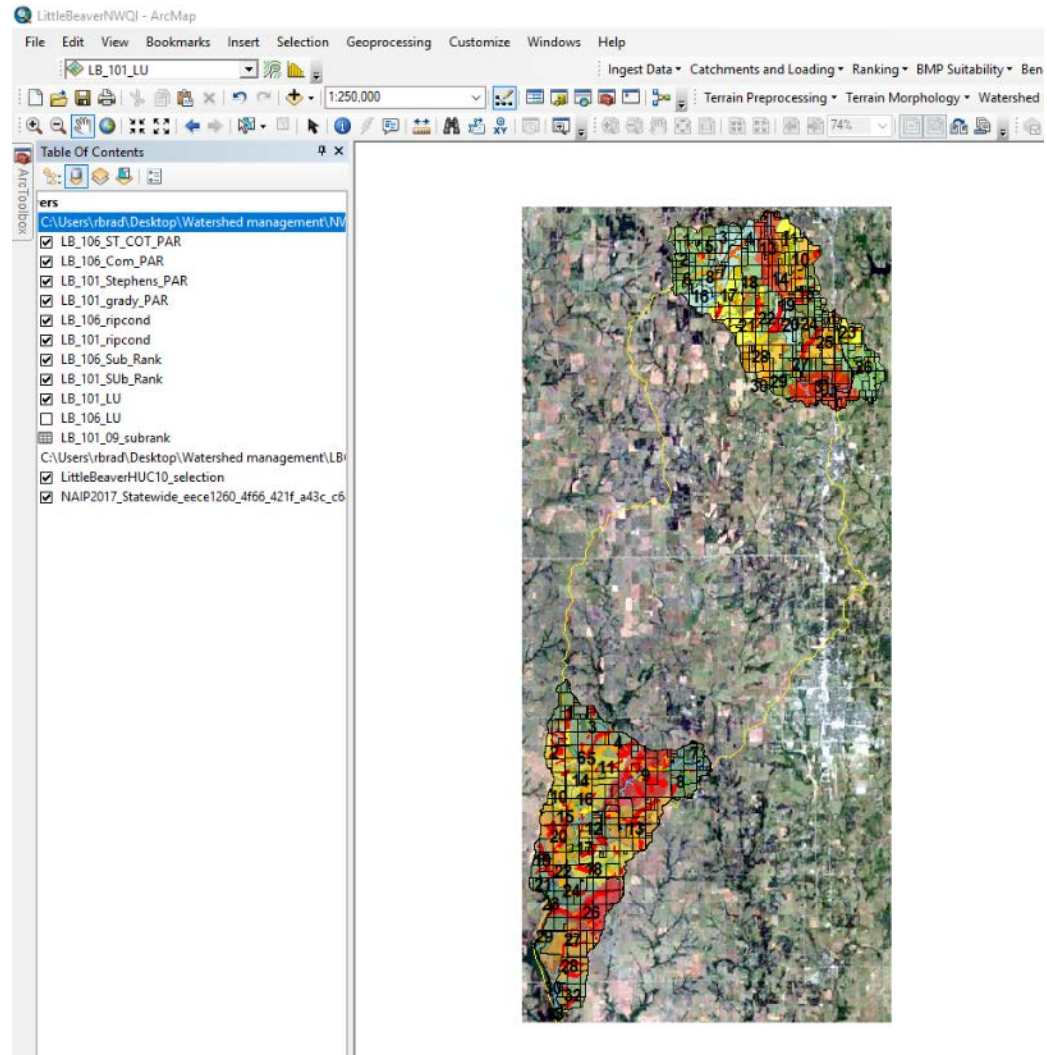
# Outreach Phase





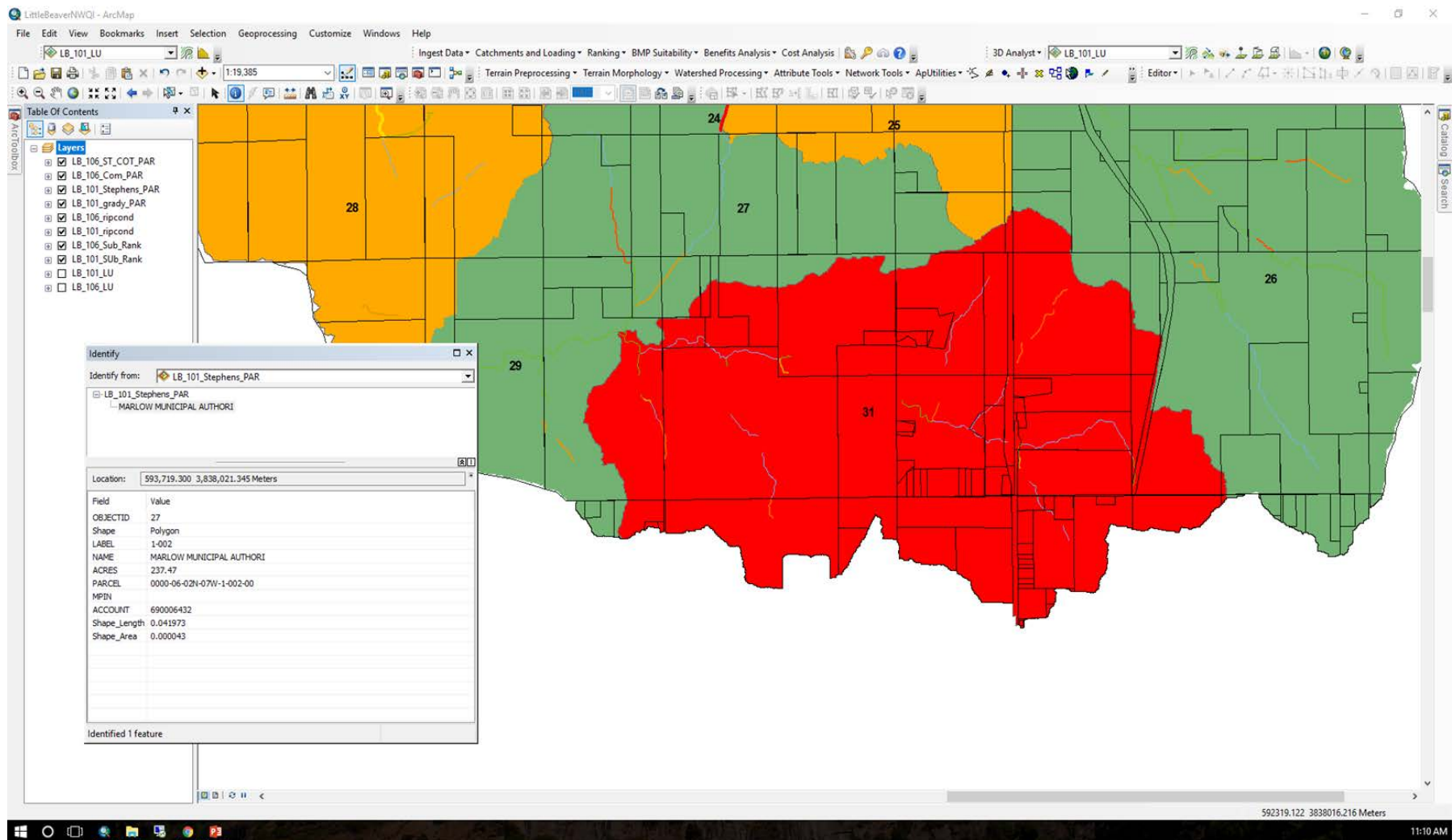
# GIS Tool

- Developed simple GIS tool
  - ❑ Watersheds
  - ❑ Riparian ratings
  - ❑ Sub basins rank
  - ❑ Parcel maps
  - ❑ Aerial images
  - ❑ Land use maps
- Excel files for each
  - ❑ Landowner
  - ❑ Sub Basin
  - ❑ Riparian Ranking
  - ❑ Sub basin rating





# GIS Tool



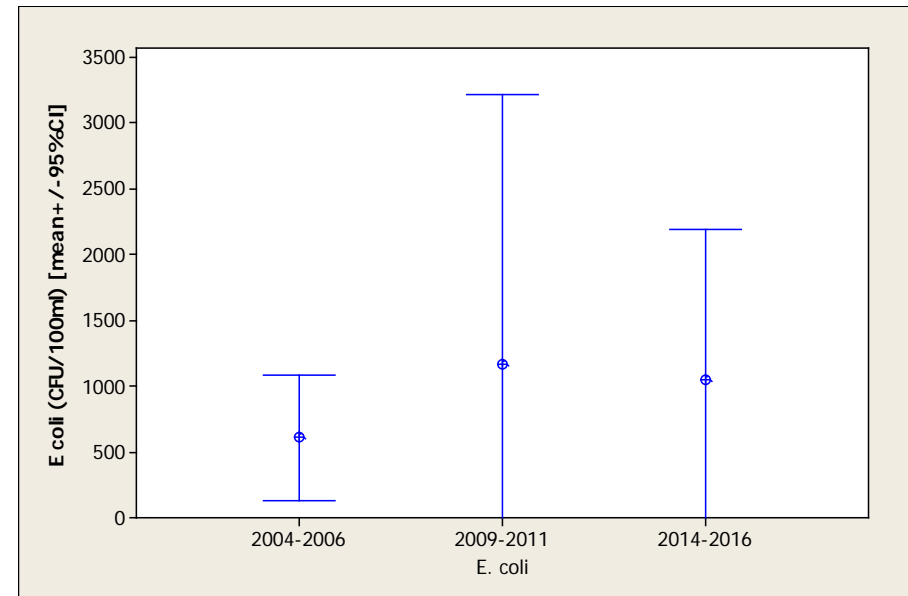
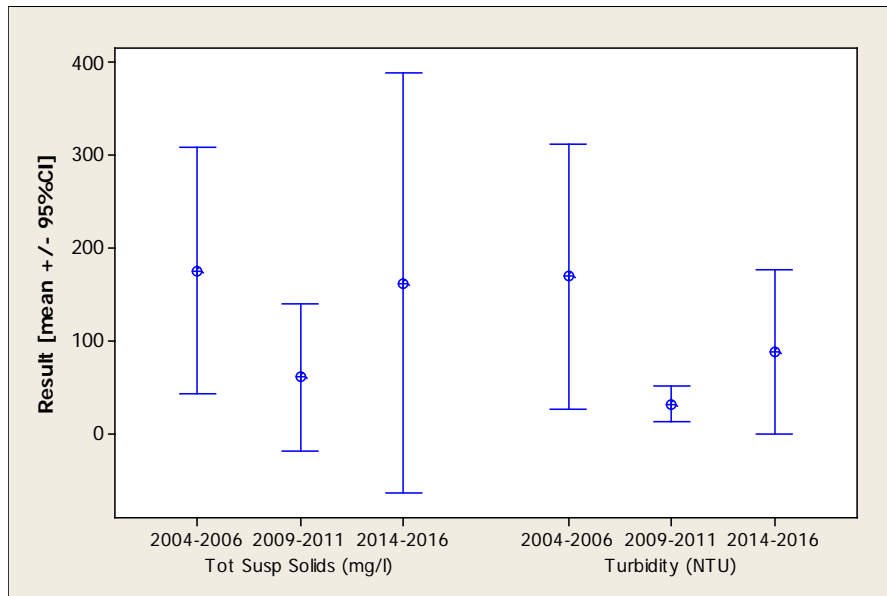
# Next Steps

- Meet with local conservation staff and equip with tool (**Done!**)
- Distill list of priority contacts for visits; mail outs to all (**Done!**)
- Hold field days/informational meetings
  - Soil Health focus
  - Grazing lands management
- Develop local watershed advisory group
- Develop application screening/ranking for EQIP rollout early summer (**Draft in progress**)
- Incentivize priority practices with 319 monies
- Expand effort into remaining watershed above the lake.



# Next Steps

## ■ Continue Monitoring





# Next Steps – Implementation!

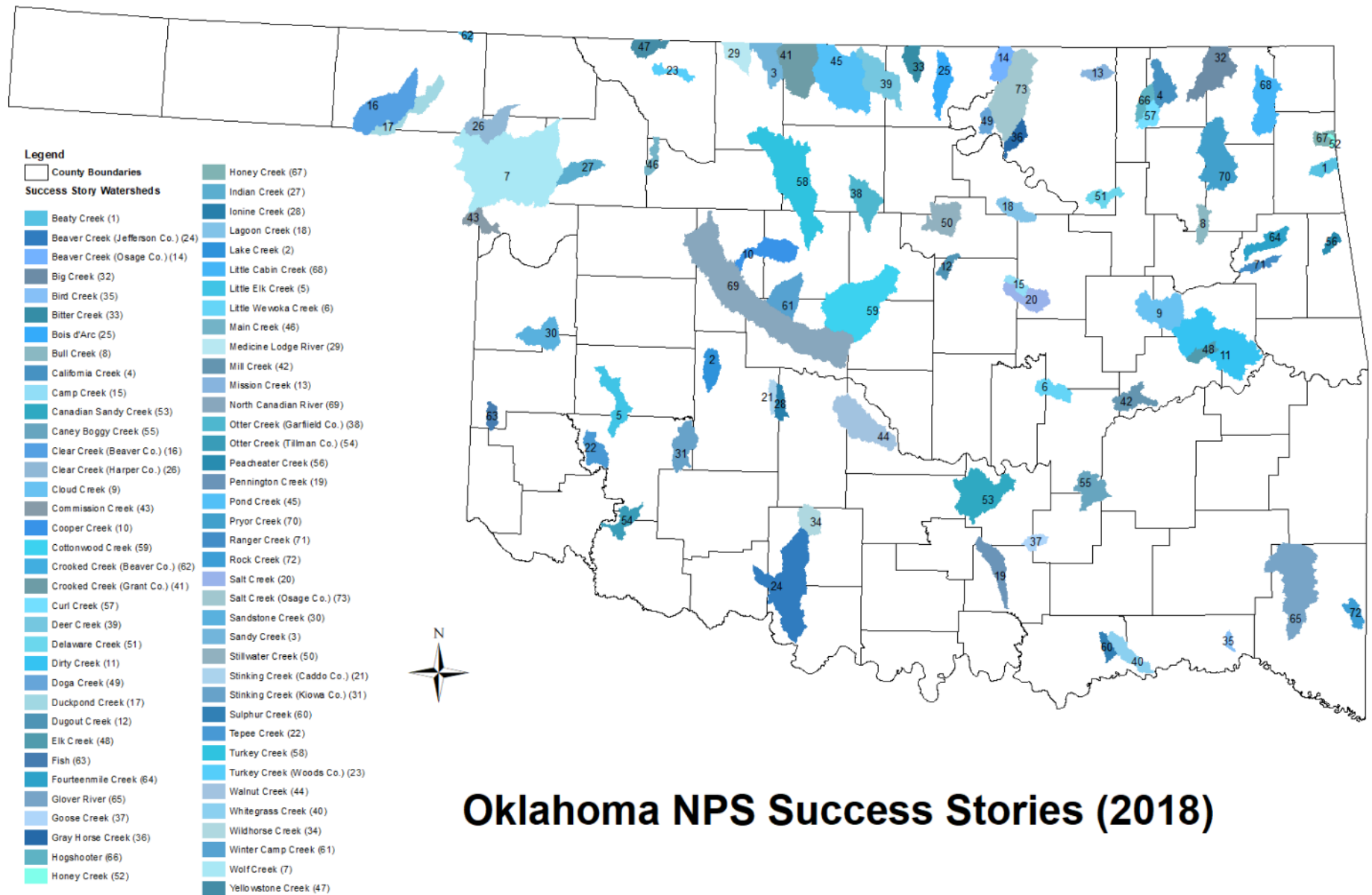


# Parting Thoughts

- We have a conservation planning model we can reproduce
- We have a shared position to accomplish the work
- We have access to conservation implementation data
- Success has bred success, opportunities, attention and...
- None of this is possible without an effective monitoring program!







## Oklahoma NPS Success Stories (2018)

See OK's 72 success stories on EPA's NPS Success Stories web page!

# Questions?



**Greg Kloxin, Assistant Director**

[greg.kloxin@conservation.ok.gov](mailto:greg.kloxin@conservation.ok.gov)

405-522-4737

Oklahoma Conservation Commission

Water Quality Division

2800 N Lincoln Blvd

Oklahoma City, OK 73105