

Water Quality Monitoring for Selected Watersheds in Arkansas: Poteau, Strawberry and Upper Saline



Brian Haggard

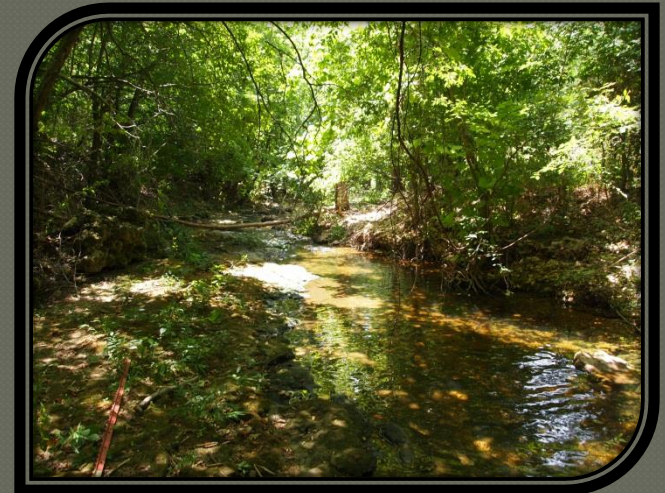
Arkansas Water Resources Center



**ARKANSAS WATER
RESOURCES CENTER**

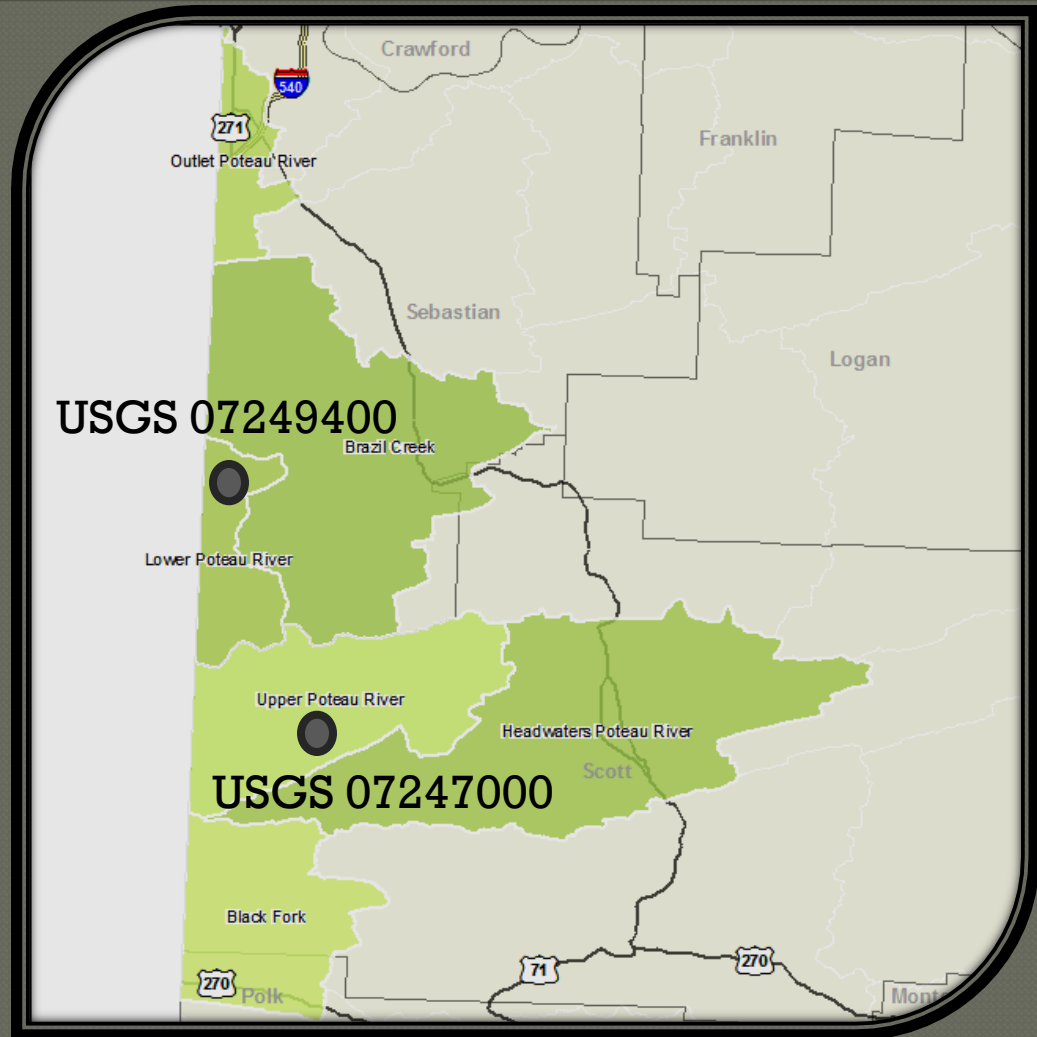
Why monitor these select watersheds?

- To support modeling efforts in basins with little water quality information.
 1. Monitoring sites with USGS gages to estimate nutrient and sediment loads.
 2. Monitoring HUC-12 outlets to better understand how water quality changes across sub-watersheds draining different land uses



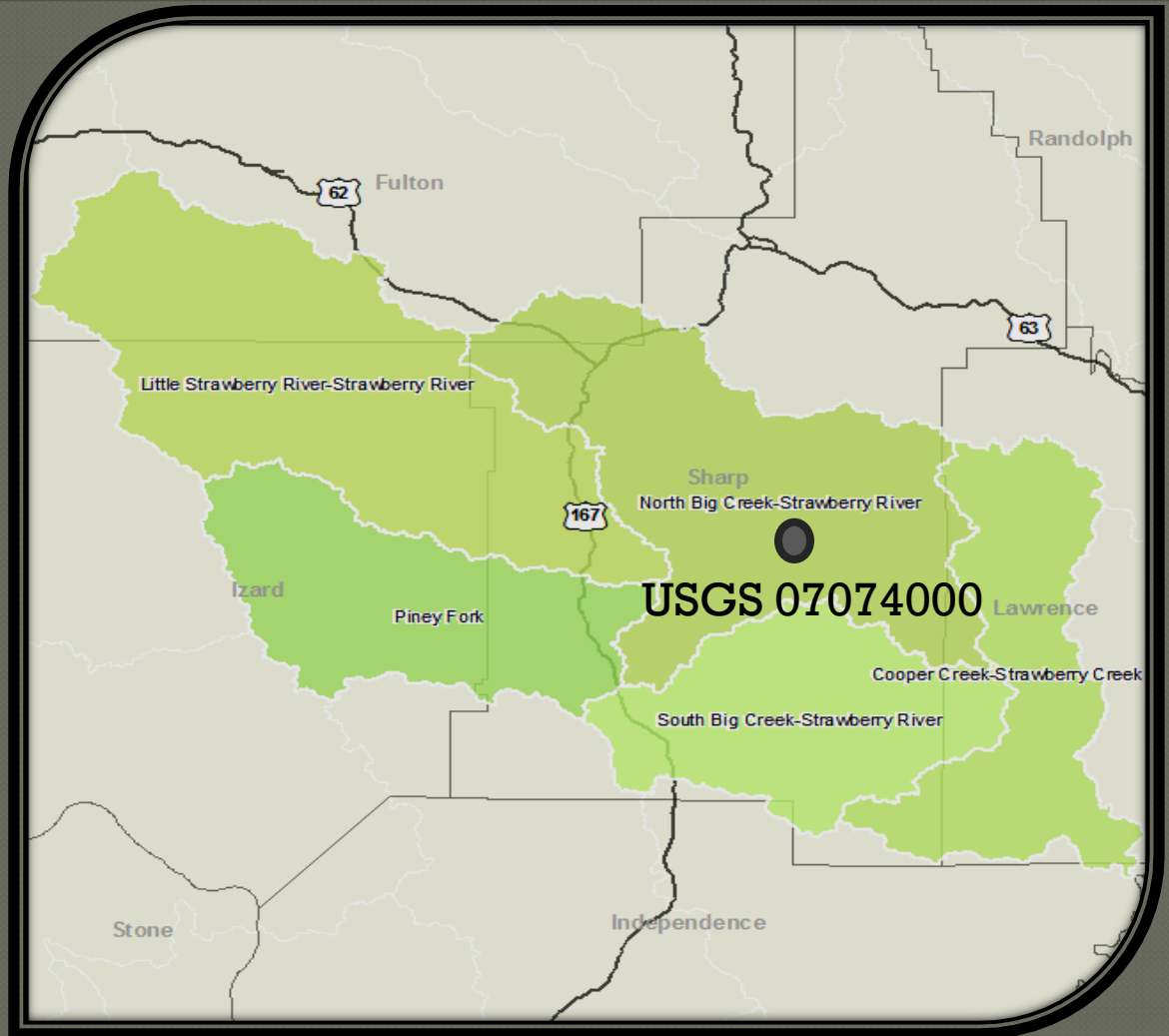
Our estimated loads will help validate the load estimations made by the model.

○ Poteau Watershed (HUC 11110105)



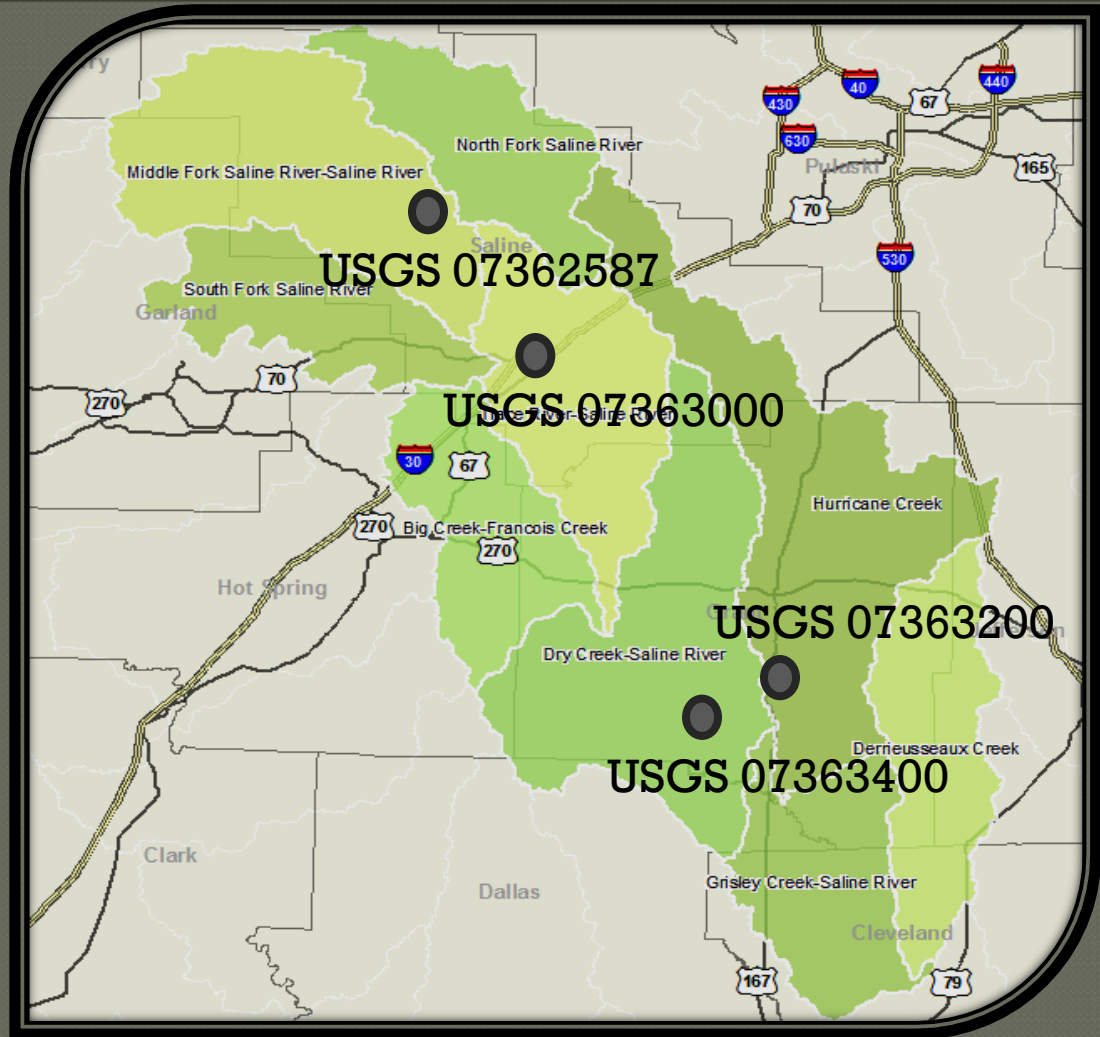
Our estimated loads will help validate the load estimations made by the model.

○ Strawberry Watershed (HUC 11010012)



Our estimated loads will help validate the load estimations made by the model.

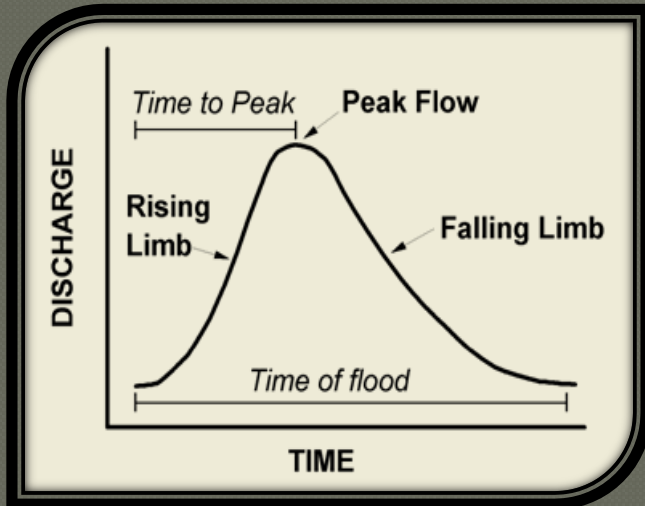
○ Upper Saline Watershed (HUC 0804203)



Water samples were collected at seven USGS gage sites across the selected watersheds.



- Water samples were collected once a month during base flow conditions.
 - Samples were collected from a single vertical point in the stream
- Rising, peak and falling flows were targeted during each storm events.



Water samples were collected at seven USGS gage sites across the selected watersheds.

- Stage recorded in 30 minute intervals by USGS to estimate discharge.
- Water samples were analyzed at the AWRC WQL for:
 - Soluble Reactive P
 - Total P
 - Nitrate-N
 - Total N
 - Total Suspended Solids
 - Conductivity
 - Turbidity



Loads will be calculated after all samples are collected.

- Linear regression will be used to determine the relationship between daily load and daily flow:
 - $\ln(L_d) = \beta_0 + \beta_1 \ln(Q_d)$ —or—
 - $\ln(L_d) = \beta_0 + \beta_1 \ln(Q_d) + \beta_2 \sin(2\pi T) + \beta_3 \cos(2\pi T)$
- BCF will be used to remove bias from log transformations:

$$\text{BCF} = \frac{\sum e^r}{n}$$

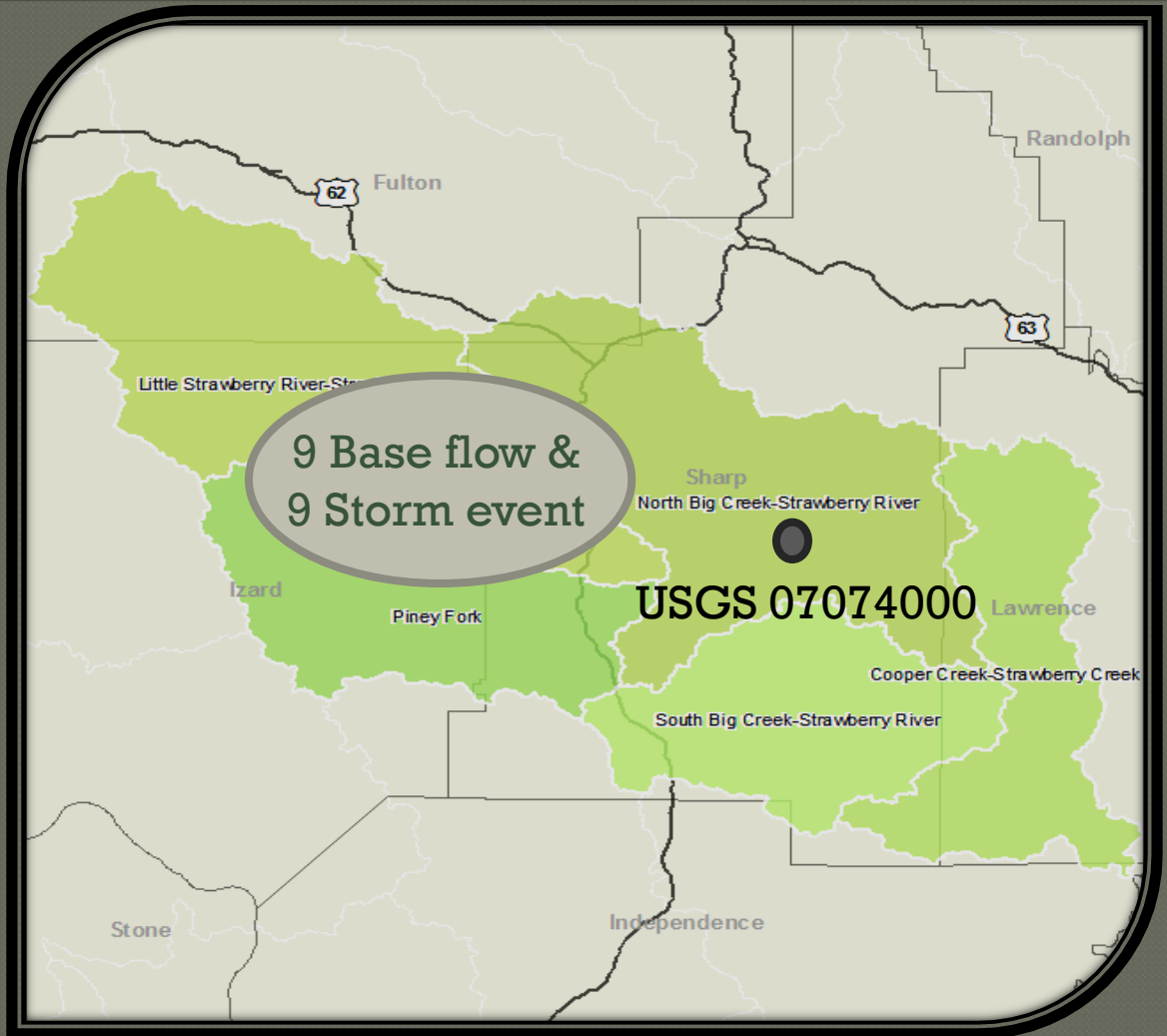
Where are we with data collection in the Poteau Watershed?

- Sampling began in October 2011.
- Monthly base flow and several storm events were collected through project year (June 2012).



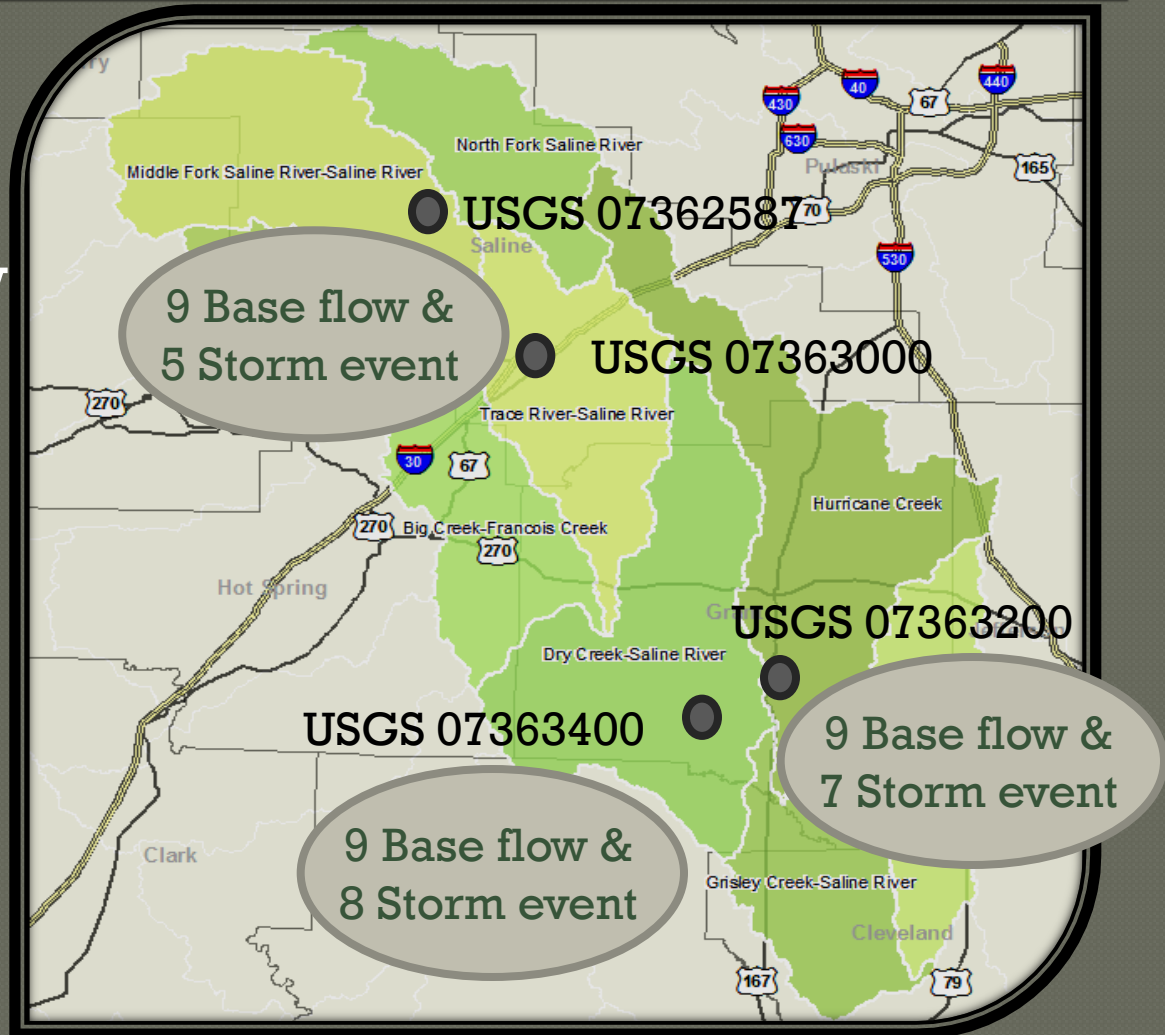
Where are we with data collection in the Strawberry Watershed?

- Sampling began in October 2011.
- Monthly base flow and several storm events were collected through project year (June 2012).



Where are we with data collection in the Upper Saline Watershed?

- Sampling began in October 2011.
- Monthly base flow and several storm events were collected through project year (June 2012).



We have less storm samples to date than anticipated...

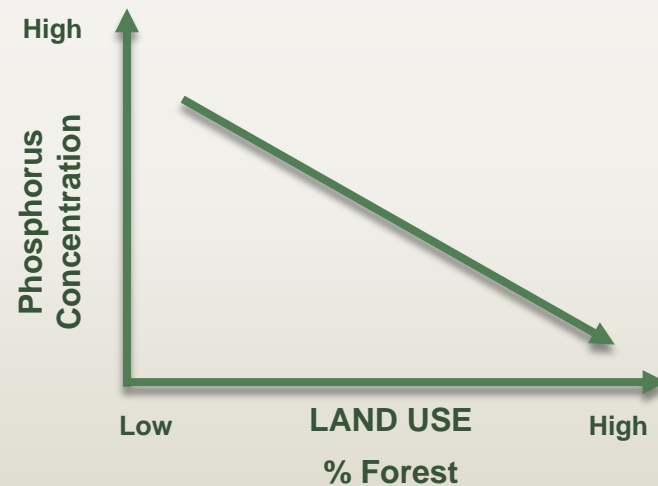
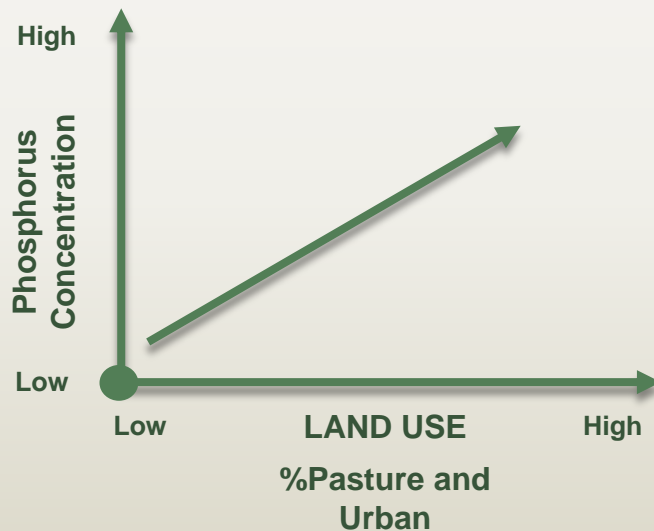
Sampling Limitations:

- Less rainfall in 2012.
- Proximity of locations.
 - We've missed a few storms because we didn't know it was going to rain in other parts of the state!

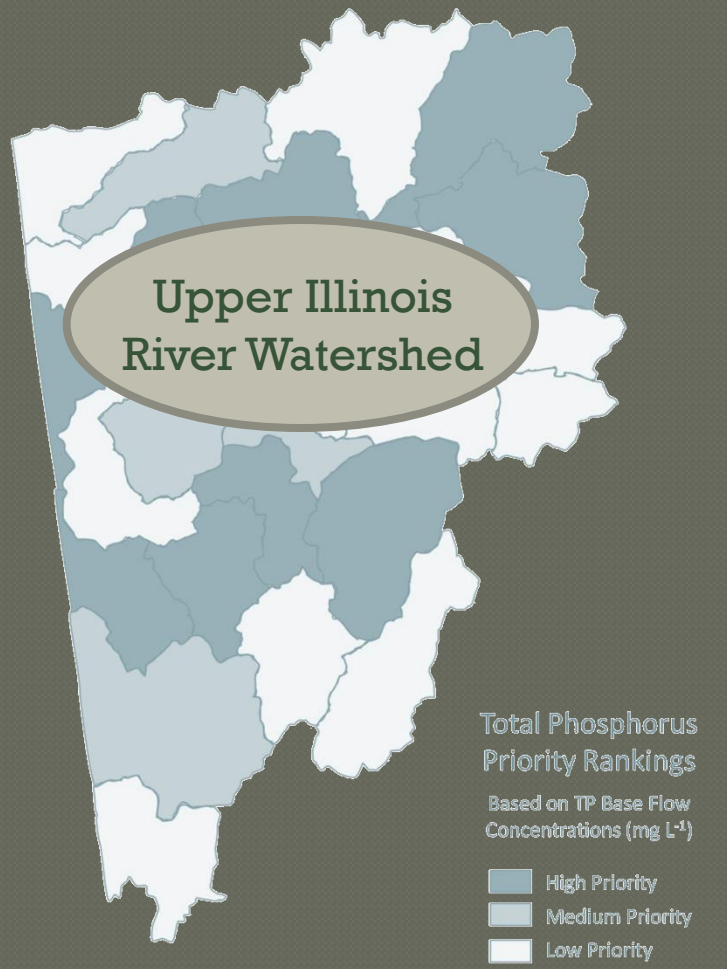


What will we do with the data?

- We can use HUC 12 data to compare measured concentrations to land use.



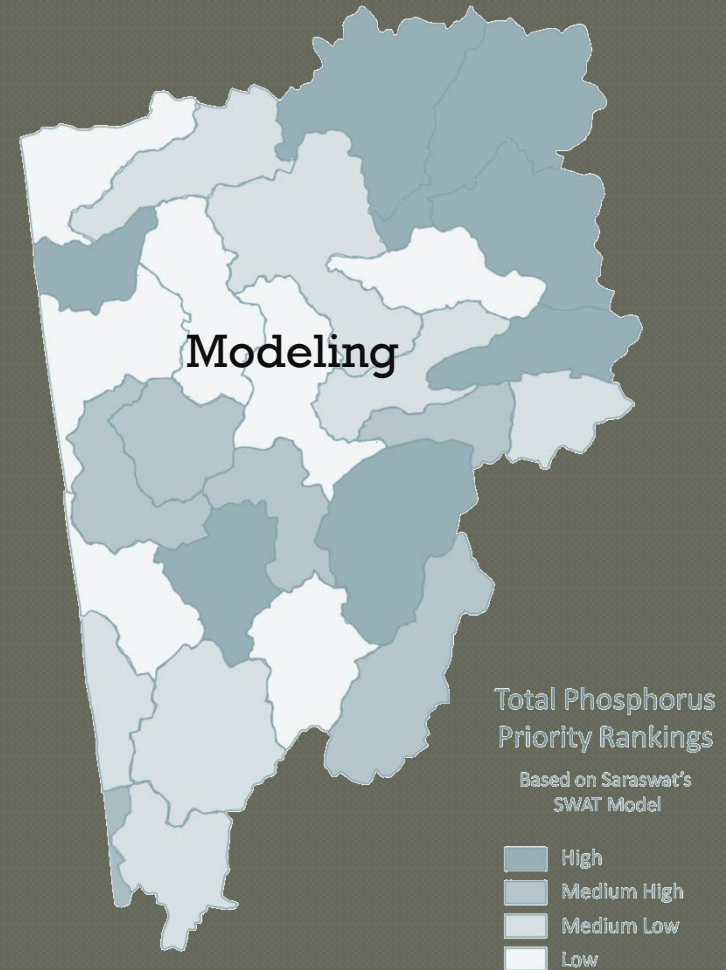
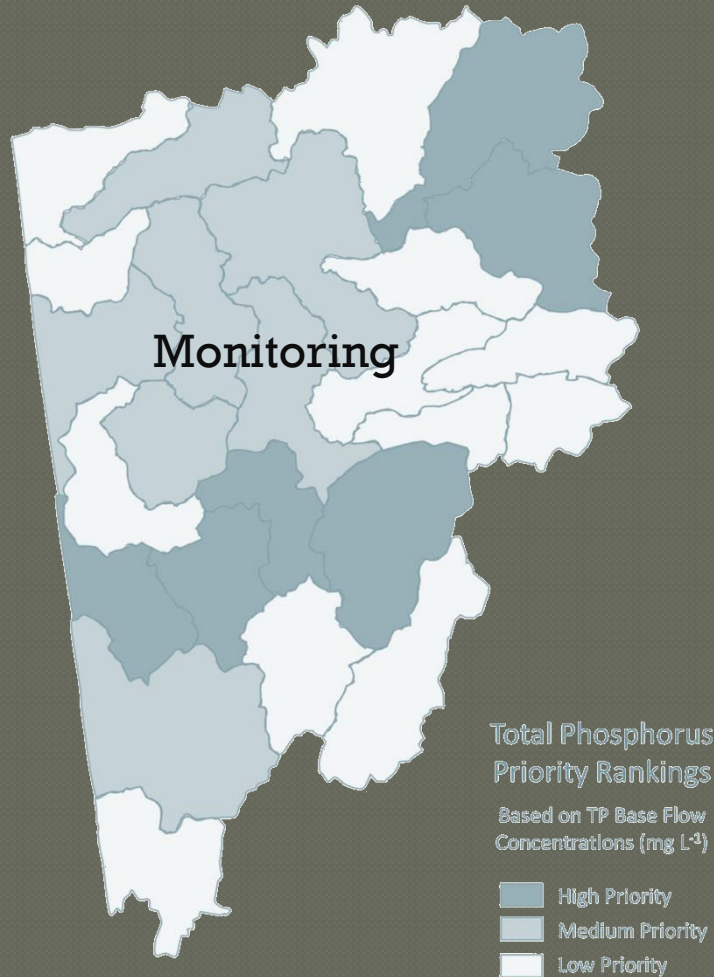
We can also help support the development HUC-12 priorities.



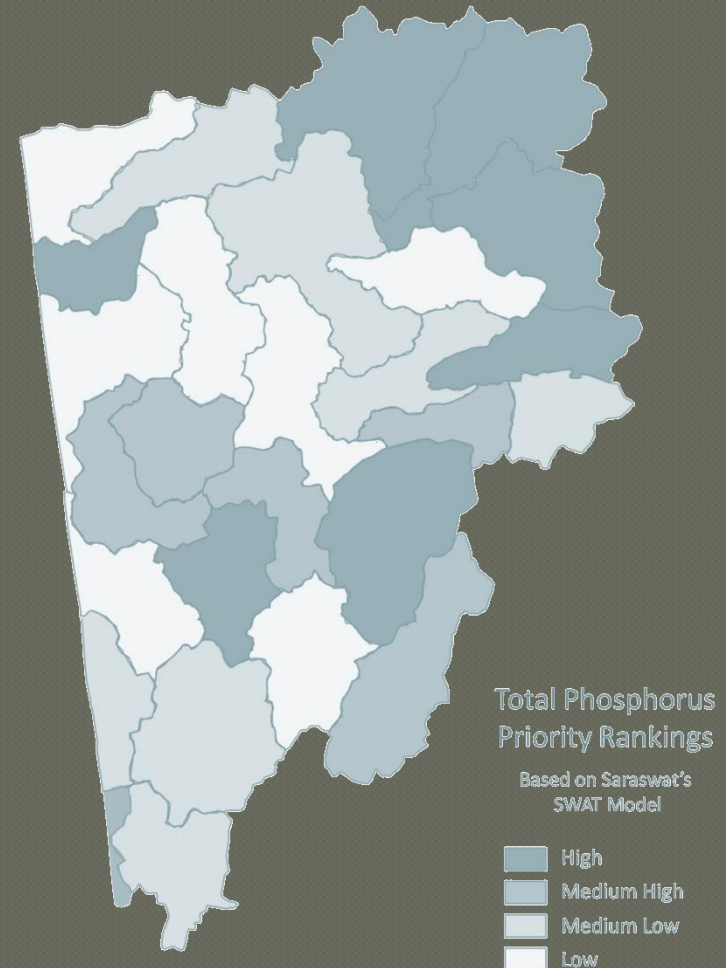
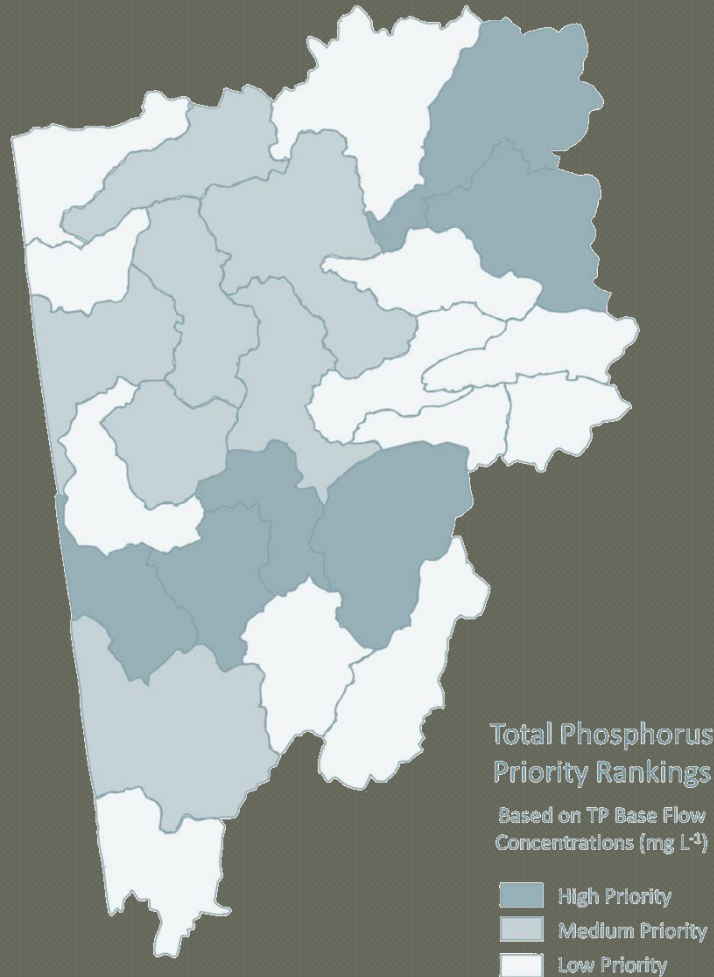
- Specific HUCs where management actions can be focused.



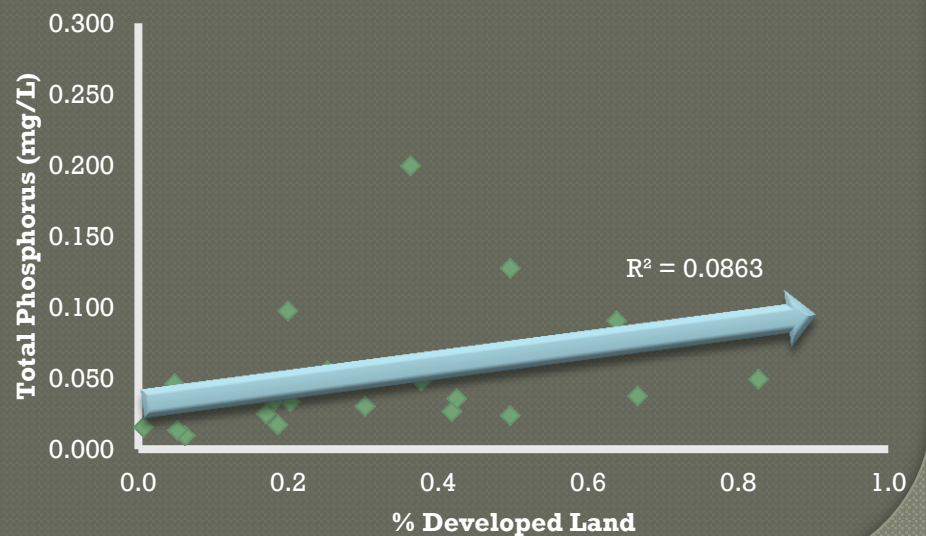
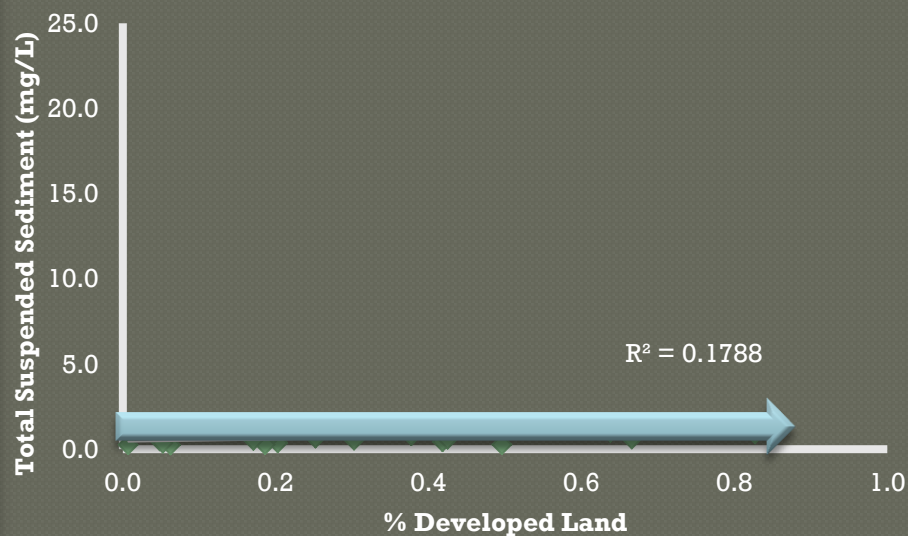
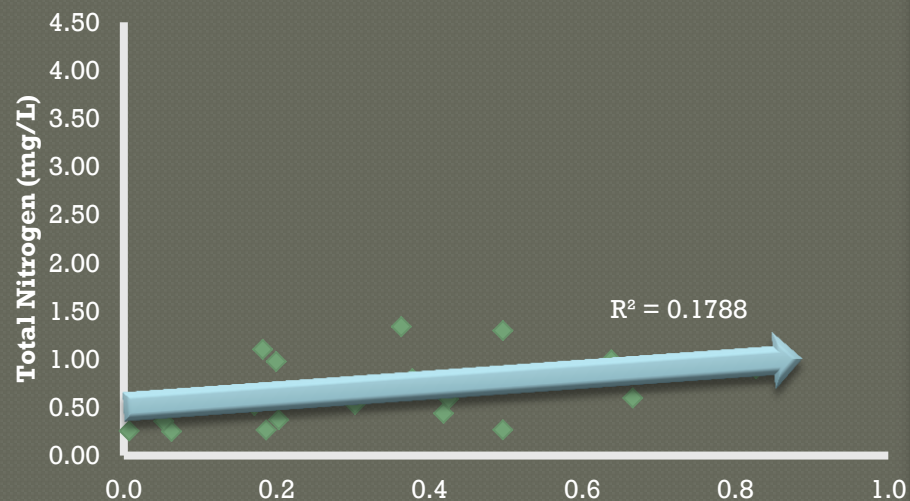
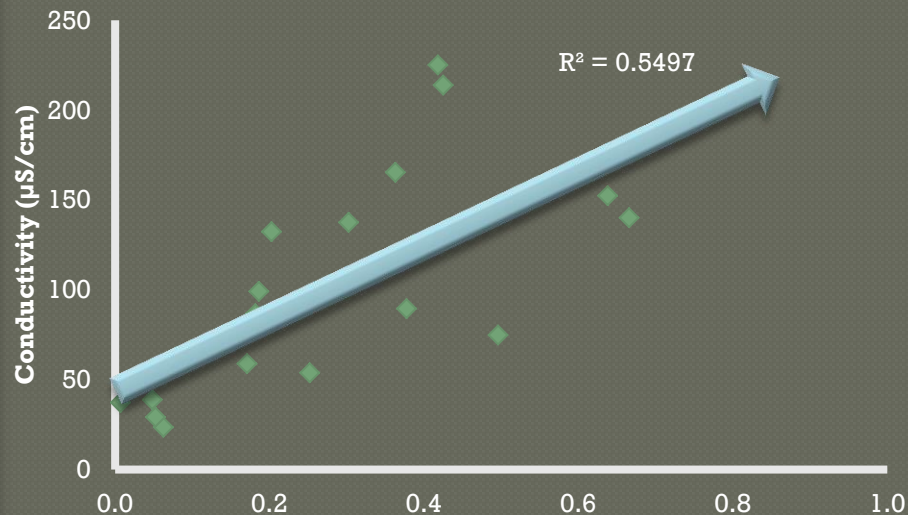
And compare these priorities to the SWAT Model priorities.



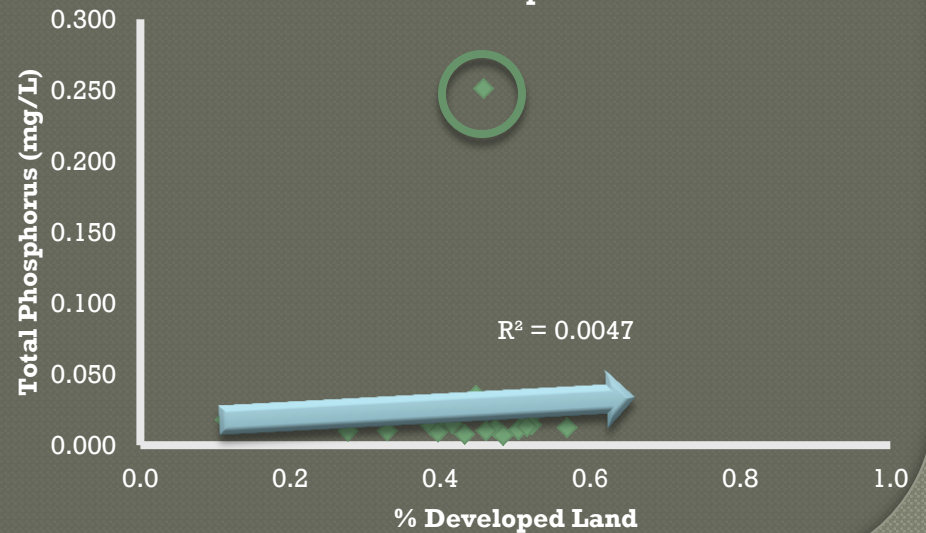
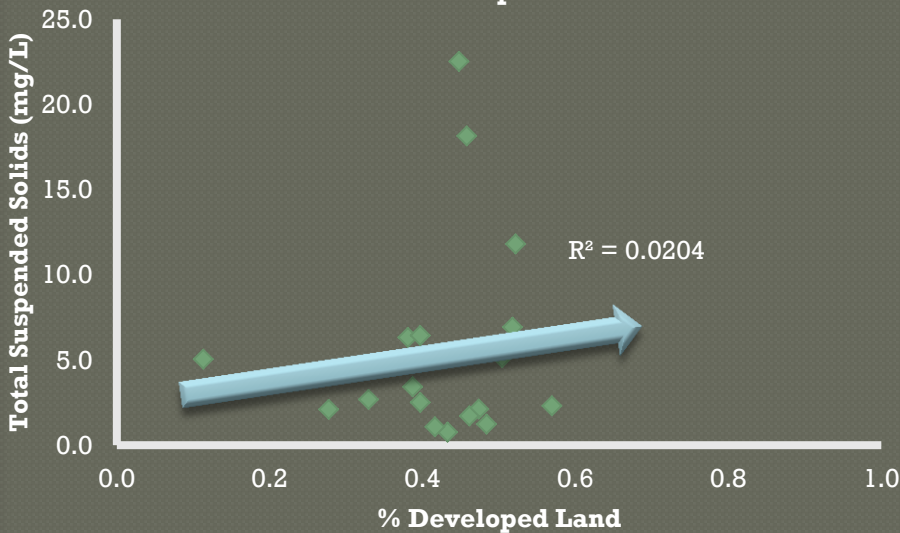
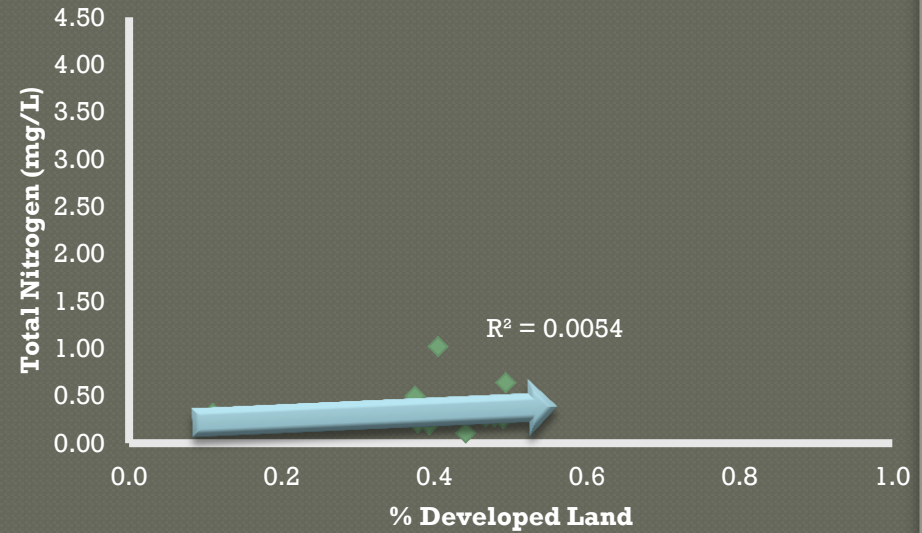
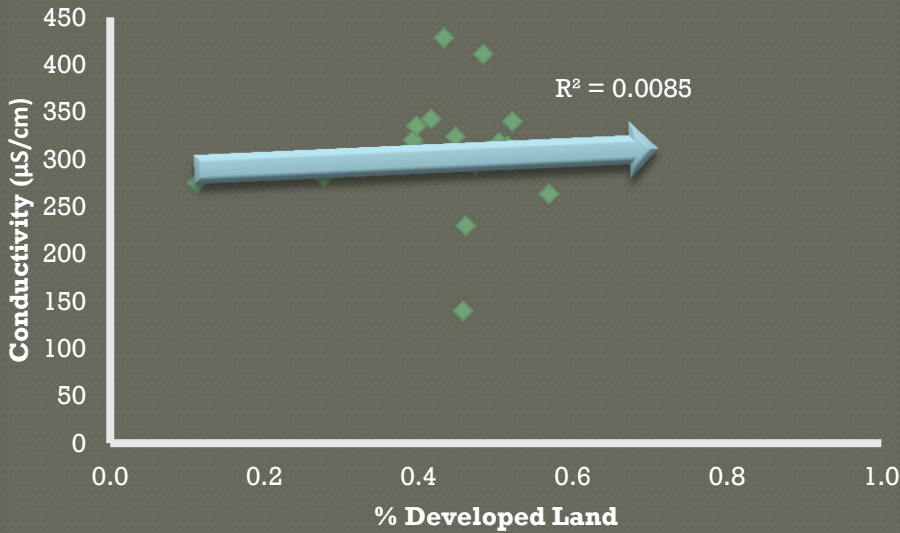
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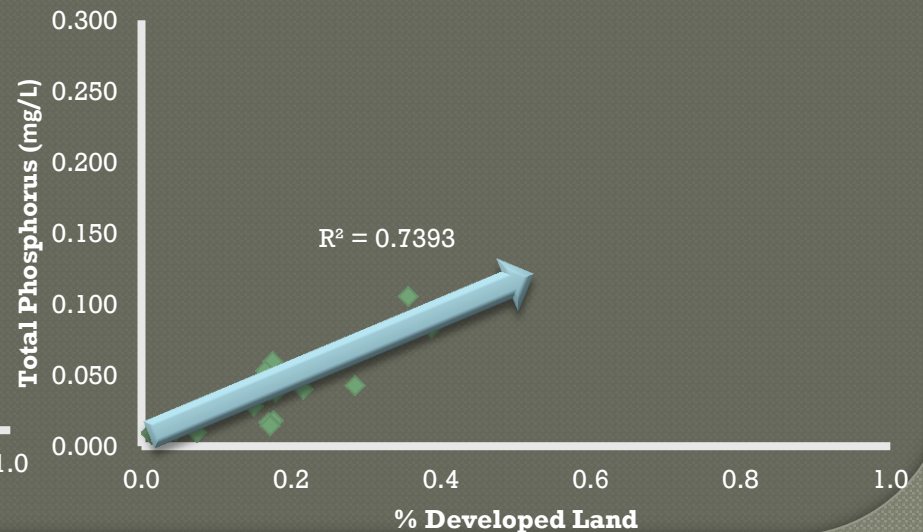
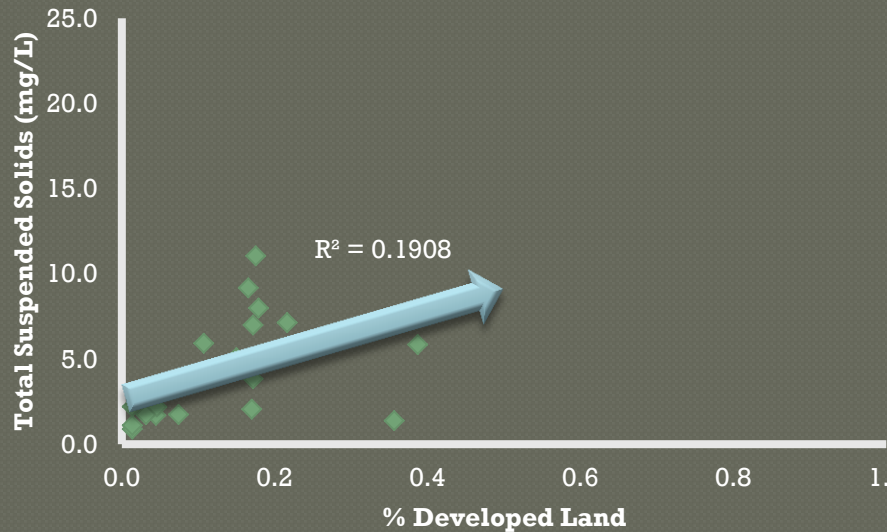
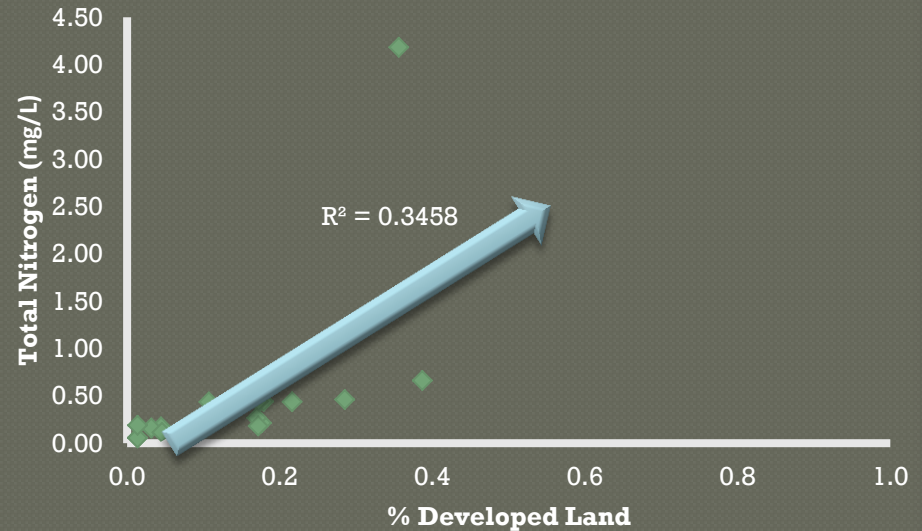
Data to date for the Poteau...



Data to date for the Strawberry...



Data to date for Upper Saline...



Mississippi River Basin Healthy Watershed Initiative

“To improve the health of the Mississippi River Basin, including water quality and wildlife habitat, the USDA and its partners will help producers in selected watersheds in the Mississippi River Basin voluntarily implement conservation practices and systems that avoid, control, and trap nutrient runoff; improve wildlife habitat; and maintain agricultural productivity.”

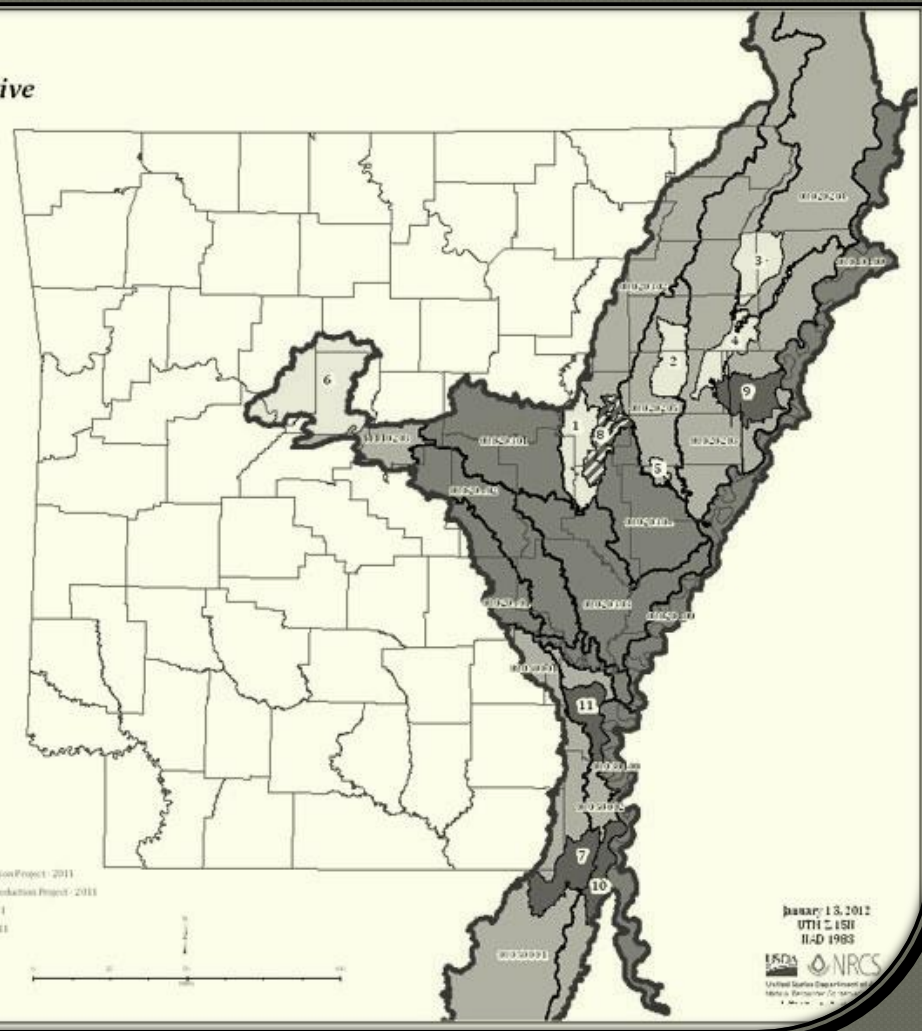
Where is the focus of MRBI?

Mississippi River Basin Initiative Focus Areas, 2012 Arkansas

- 2012 Focus Areas**
- 8020301 - Lower White-Bayou Des Arc
 - 8020303 - Lower White
 - 8020304 - Big Creek
 - 8020401 - Lower Arkansas
 - 8020402 - Bayou Meto
- Batture Lands**
- 08010100 - Lower Mississippi-Memphis
 - 08020100 - Lower Mississippi-Helena
 - 08030100 - Lower Mississippi-Greenville

- Existing Focus Areas**
- 08020203 - Lower St. Francis
 - 08020204 - Little River Ditches
 - 08020205 - L'Anguille
 - 08020302 - Cadee
 - 08050001 - Boeuf River
 - 08050002 - Bayou Macon
 - 11110203 - Lake Conway-Point Remove
- Comprehensive MRBI Focus Area**

- Project Areas**
- | | |
|--|--|
| 1 Little River WDFW Project - 2010 | 7 Bayou Meto Project - 2011 |
| 2 L'Anguille Project - 2010 | 8 Cadee River Nutrient Loss Reduction Project - 2011 |
| 3 Little River Ditches Project - 2009 | 9 Lower St. Francis Nutrient Loss Reduction Project - 2011 |
| 4 Lower St. Francis Project - 2010 | 10 Lower Bayou Macon Project - 2011 |
| 5 Grand Junction Creek Project - 2010 | 11 Middle Bayou Macon Project - 2011 |
| 6 Point Remove Wetlands Project - 2010 | |



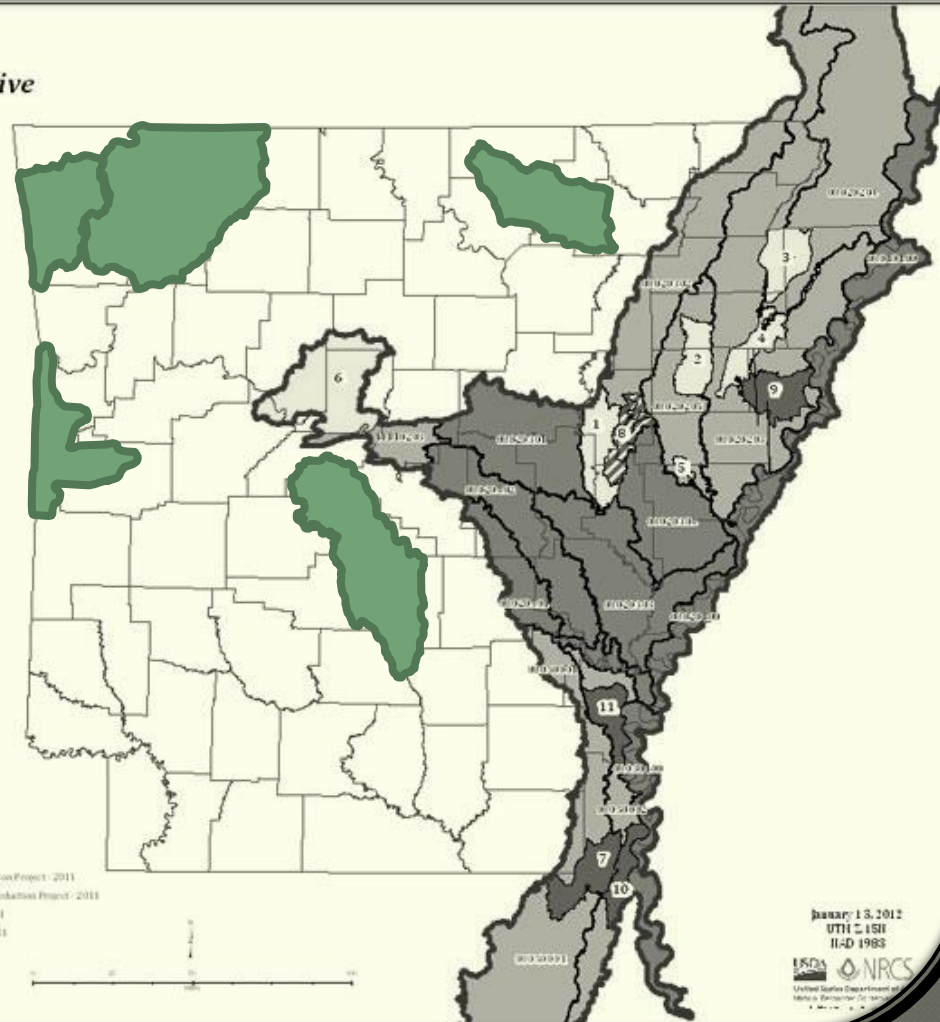
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USDA NRCS
United States Department of
Agriculture

The areas where we are sampling all drain to the Mississippi River Basin.

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 - 08050001 - Bouff River
 - 08050002 - Bayou Nacoo
 - 11110203 - Lake Conway-Point Remove
- Comprehensive MRBI Focus Area**
- Project Areas**
- | | |
|--|---|
| 1. Cade River WRP Project - 2010 | 8. Bayou Boeuf Project - 2011 |
| 2. C. Anguille Project - 2010 | 9. Cade River Natural Loss Reduction Project - 2011 |
| 3. Little River Ditches Project - 2010 | 10. Lower St. Francis Natural Loss Reduction Project - 2011 |
| 4. Lower St. Francis Project - 2010 | 11. Lower Bayou Macon Project - 2011 |
| 5. Daniel Jackson Creek Project - 2010 | 12. N. & S. Bayou Macon Project - 2011 |
| 6. Pt. Remove Wetlands Project - 2010 | |



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QUESTIONS?