

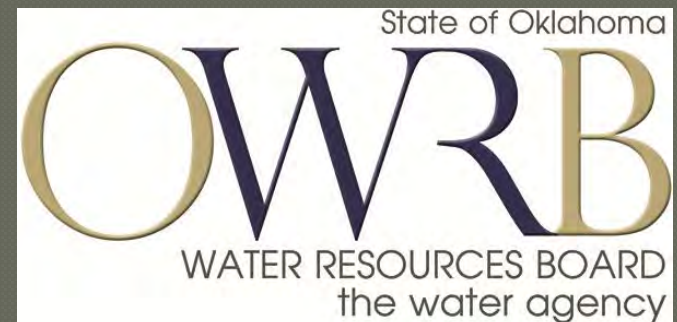
Investigating Potential Nutrient Impairment in a Central Great Plains Reservoir

A Pilot study on Crowder Lake, a
Nutrient Limited Watershed

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Outline

- ◉ Water Quality Standards
- ◉ Nutrient Limited Watersheds
- ◉ Nutrient Impairment Study
 - Monitoring Efforts
 - Outcomes



Oklahoma Water Quality Standards

1. Beneficial Uses
2. Criteria to protect Beneficial Uses
3. Anti-degradation Policy
4. Implementation

Nutrient Limited Watersheds

- 21 reservoirs in OK
- When a beneficial use is potentially being adversely affected by excess nutrients
- Deemed threatened when $TSI(chl) > 62$



Only considered
threatened until a
nutrient impairment
study is performed

OWQS and NLWs

- § 785:46-15-10(d-g)
 - Demonstration that nutrients impact a use
 - Consequence of identification as NLW
 - Consequence of assessment that use is threatened by nutrients
 - Result of impairment study
 - Impaired
 - Not Impaired

Effects of a NLW Designation

- Requires an annual soil test for feeding operations
- May lead to stricter guidelines on waste applications for feed operations

Effects of a NLW Designation

- NRCS uses the designation in the development of Technical Guidance Reports
- Impairment Study



Nutrient Impairment Study



- Are the beneficial uses impaired, and if so caused by excess nutrients
- Requires consistent, recent data; emphasizing Summer sampling

Nutrient Impairment Study

- Surface and at Depth Samples
- Water Column Profiles



Where to Start?

- Pilot Study
- Location/Accessibility
- SWS Designation
- Historical BUMP data



Crowder Lake



- Washita County
- 158 acres
- Owned by SWOSU
- Sensitive Water Supply

Has many University related recreational activities such as horseback riding and a ropes course. Utilized by the University for classes, trainings and field trips.

Beneficial Uses

Beneficial Uses		Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Entero. & E. coli	Chlor-a
	Fish & Wildlife Propagation	NS	S	NEI*	S							
	Aesthetics					NEI*	S					
	Agriculture							S	S	S		
	Primary Body Contact Recreation										S	
	Public & Private Water Supply											NS

*NEI = Not Enough Information

Monitoring

- July 2014 – September 2016
- Growing season (May-September) 2x a month
- Non-Growing season (September-April) 1x a month



Monitoring



- Temperature, pH, Dissolved Oxygen, SpC, Salinity, ORP, TDS and Barometric Pressure
- TKN, TP, ortho-P, NO_2/NO_3 hardness, alkalinity, turbidity, chlorophyll, and pheophytin

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Lakes Monitoring



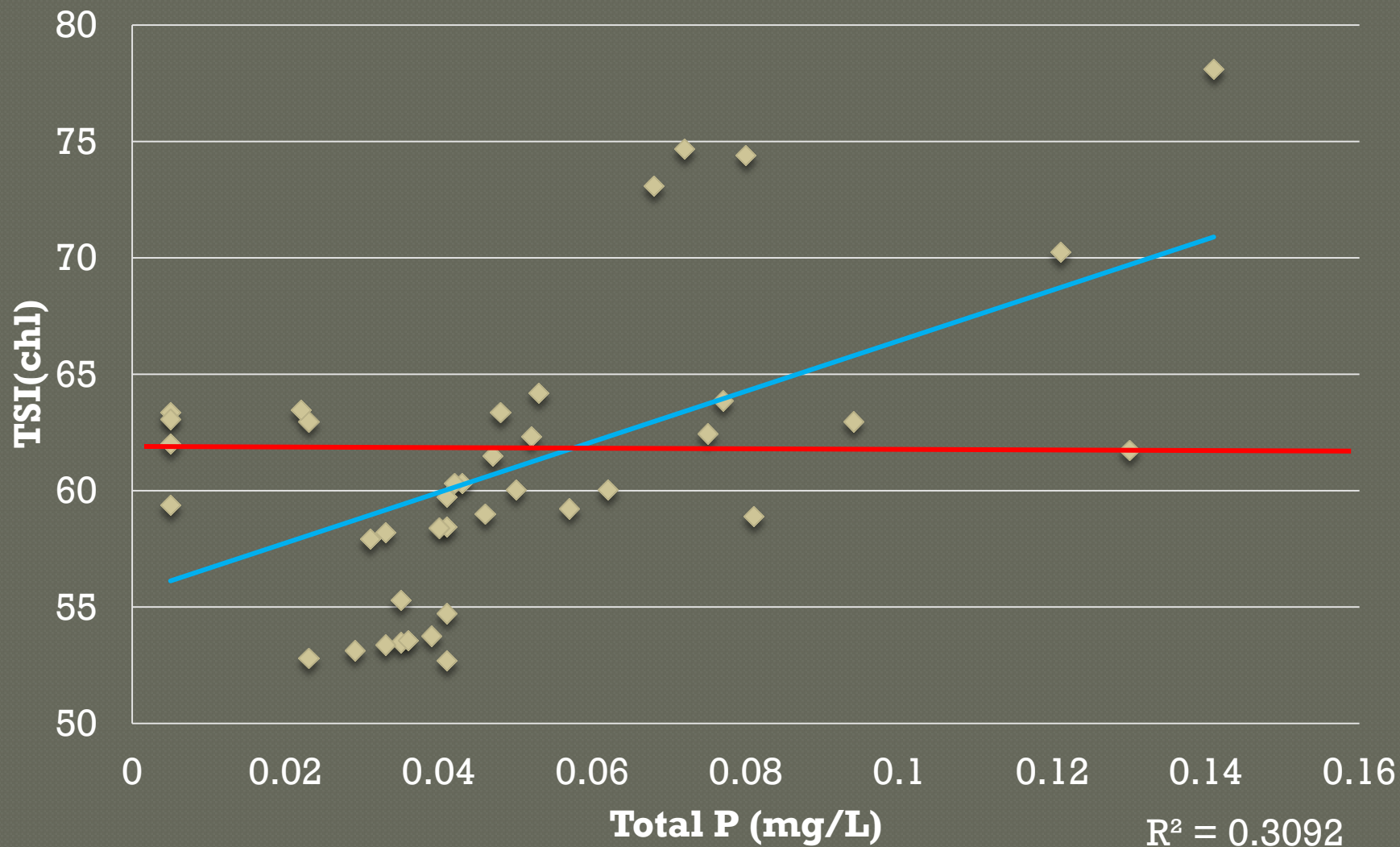
- Stratification
- Zoo- and Phyto-plankton
- Field observations
- Habitat assessment

Streams Monitoring

- ◉ Same parameters as in-lake samples
- ◉ Stream Flow
- ◉ Habitat assessment to be done next Summer



TP and TSI(chl)



Outcomes

- Definite determination of Beneficial Use impairment status
- *Threatened* to either Impaired or Not Impaired

Outcomes

● Endpoints

- What % of samples need to be >62 to be definite or is there gray area?

● Template

● More data for Volumetric DO assessment

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