

Oklahoma Scenic Rivers Joint Phosphorus Study: Interim Report, 2 October 2015

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Study Framework

"to determine the total phosphorus threshold response level....at which any statistically significant shift occurs in

- 1. algal species composition OR
- 2. algal biomass production

...resulting in undesirable

- 1. aesthetic OR
- 2. water quality

... conditions in the Designated Scenic Rivers."





Sampling Frequency

Sampling scheduled bimonthly. <u>Eight events have been completed.</u> <u>The ninth is currently in progress.</u>

Proposed sampling will result in 12 events in 2 years.

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------|-----|-----|-----|----------------|-----|---------------------------------|-----|-----|-----|------------|-----|-----|
| 2014 | | | | Site select | ion | X | | X | | X | | X |
| 2015 | | X | | X | | Х | | Х | | In prog | | Х |
| 2016 | | Х | | Х | | Final analyses & report writing | | | | | | |

Sample status report

| Event | ТР | TN, DOC, DNP | Benthic CHLA/ AFDM | Sestonic CHLA/ TSS | Ben- thic CNP | Soft spp. | Dia- tom spp. | Hess | Diel DO |
|--------|----|--------------------|--------------------------|--------------------------|---------------------|--------------|---------------------|------|------------|
| Jun-14 | Х | Х | Х | Х | Х | Х | Х | Х | N/A |
| Aug-14 | Х | Х | Х | Х | Х | N/A | N/A | Х | Х |
| Oct-14 | Х | Х | Х | Х | Х | Х | Х | Х | N/A |
| Dec-14 | Х | Х | Х | Х | Х | N/A | N/A | Х | N/A |
| Feb-15 | Х | Х | Х | Х | Х | N/A | N/A | Х | N/A |
| Apr-15 | Х | Х | Х | Х | Х | Х | Х | Х | N/A |
| Jun-15 | Х | Х | Х | Х | Х | N/A | N/A | Х | N/A |
| Aug-15 | Х | Х | Х | Х | In prog | N/A | N/A | Х | Х |
| | | | | | | | | | |

Disclaimer

- The following slides are intended only to illustrate PRELIMINARY relationships between total phosphorus (TP) and select biological response variables.
- No statistical analyses have been conducted on these data. It is too early to draw inferences about a threshold level of TP for the Scenic Rivers.
- Please refrain from drawing conclusions from these data. This is a 2-year study for a reason.

Sestonic Chlorophyll-a (µg/L) vs. TP (mg/L)

Mean, June 2014 through Aug 2015



Benthic (Periphyton) Chlorophyll-a





June 2015



August 2015





Mean, June 2014 through Aug 2015



Mean (y=log scale), June 2014 through Aug 2015



Maximum, June 2014 through Aug 2015



Benthic (Periphyton) AFDM:CHLA ratio vs TP

Mean, June 2014 through Aug 2015





Cladophora glomerata biovolume (um³/cm²) vs TP









Nuisance filamentous green algae % of Total Non-Diatom Biovolume (um³/cm²) vs TP



Taxa included: Cladophora, Hydrodictyon, Oedegonium, Rhizoclonium, Spirogyra



Calothrix fusca biovolume (um³/cm²) vs TP



Data analysis



Data analysis

- Questions should guide the analysis. For example:
 - "What concentration TP corresponds to the largest increase in benthic CHLA over the 2 year study period." (change point question)
 - Each event analyzed separately? If so, use single TP measurement corresponding to that event?
 - Means of TP and CHLA over the full study period?
 - "What concentration of TP corresponds to an increase that significantly exceeds *** mg/m2." (generalized linear or additive model question).

Data analysis

Statistical methods

- Change-point analysis (nCPA): single predictor, threshold
- GAM/GLM: single/multiple predictors, no threshold
- TITAN: single predictor, multiple responses, species and community thresholds
- nCPA and TITAN generate potential TP threshold values with uncertainty
- GAM/GLM useful for TP threshold if we have an a priori threshold value of y (e.g., 200 mg/m² CHLA)

Change point approach



x12

Reference value approach



x12

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