## Nutrient Screening Procedures for Wastewater Permitting

PETER SCHAEFER

STANDARDS IMPLEMENTATION
TEAM LEADER

WATER QUALITY DIVISION
TCEQ

Screening procedures found in TCEQ's

Procedures to Implement the Texas Surface Water

Quality Standards

aka IPs

# Two methods of screening: Numeric and Narrative

- Numeric Screening(aka Main Pool Screening) Steady state, completely mixed model. Used for select reservoirs that have numeric chlorophyll a (Chl-a) criteria in Appendix F of the Texas Surface Water Quality Standards (TSWQS)
  - ▶ Load-based limits
- Narrative Screening- used for streams and local effects screenings in reservoirs
  - Concentration-based limits

# Main Pool Screening Model variables

- Permitted flow from wastewater facility
- Total phosphorus expected from wastewater facility
- Reservoir surface acres
- Reservoir volume (acre-feet)
- Ambient total phosphorus (TP)in reservoir
- Retention time of reservoir (how long does it take water to flow through)
- Chlorophyll-a criterion

## Model outputs

- Percent change in reservoir total phosphorus
  - ▶ If > 10%, then estimate the change in Chl-a. If < 10%, limits are not likely needed
- Estimate change in chlorophyll-a
  - ▶ If > 20%, then nutrient limits are needed. (based on regression equation for Texas reservoirs)

## Narrative Criteria Screening Procedure: General Overview

- Looks at various site-specific characteristics of the waterbody (metrics) to determine sensitivity to nutrients
- Metrics are scored low, moderate, or high
- All scores are added, then averaged
- ▶ If screening score indicates limits are needed, a weight of evidence approach is used to determine the limit

## Site-specific Characteristics Examined

- Proposed effluent flow volume
- Instream dilution
- Sensitivity to growth of attached algae type of bottom
- Sensitivity to growth of attached vegetation depth
- Sensitivity to nutrient enrichment water clarity
- Sensitivity to growth of aquatic vegetation observations
- Sensitivity to growth of aquatic vegetation shading and sunlight
- Streamflow sustainability (flow status- perennial or intermittent with pools)
- Impoundments and pools
- Consistency with other permits
- Listed concerns for nutrients in the Texas Integrated Report



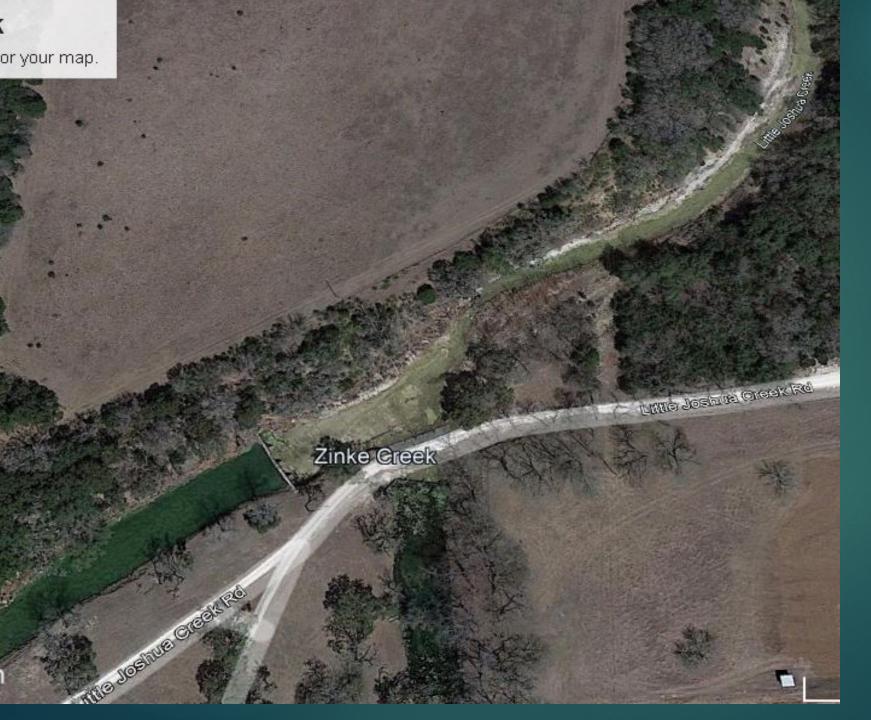
## Minimal tree canopy



## Heavy tree canopy



Impounded creek



# Impoundment and shallow, bedrock



Attached algae and aquatic Vegetation



Attached and and floating algae

#### Downstream Evaluation Distance

Proposed Permitted Flow (MGD*)	Evaluation Distance (stream miles)
< 0.25	< 3
0.25 – <1.0	< 7
<u>≥</u> 1.0	<15

<sup>\*</sup>million gallons per day (MGD)

Very large dischargers may be evaluated on a case-bycase basis.

#### General TP Limit Guidance from IPs

Proposed Permitted flow (MGD)	Typical TP Limit (milligrams per liter)*
< 0.5	1.0
0.5 - 3	1.0 to 0.5
>3	0.5

\*Higher or lower limits may be recommended based on site-specific mitigating factors.

### Weight of evidence

- ▶ If narrative screening scores high, TP limit will be low
- If narrative screening scores low, then higher TP limit or TP monitoring
- Consider things like effluent flow and streamflow (dilution)
- Shallow bedrock vs. deep cobble
- Consider permitted discharges to similar streams

# Alternatives to Discharging to Sensitive Waterbodies

- TLAP (Texas Land Application Permit) encouraged (for all or portion of discharge volume)
- ► Reduction in flow
- Regionalization
- ► Chapter 210 re-use
- Moving outfall location to less sensitive waterbody

Questions?

Contact info: peter.schaefer@tceq.Texas.gov

512-239-4372