Western Everglades Restoration Project

Virtual Project Delivery Team Meeting and Listening Session

Sanibel-Captiva Conservation Foundation

Conservancy of Southwest Florida

December 09, 2022
(Updated: January 06, 2023)

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Use cursor keys for navigation, press "O" for a slide Overview

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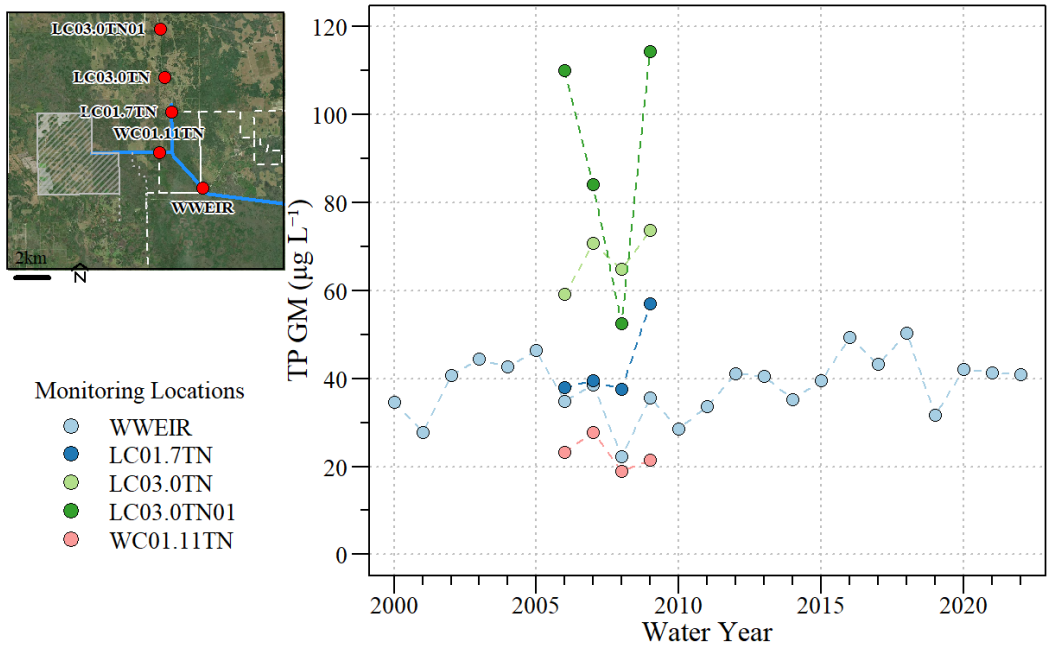
West Feeder WQ Information



Annual (FLWY) Geometric Mean TP concentrations.

- Since 2008 WWEIR AGM Concentrations have been significantly increasing (τ=0.41; ρ-value<0.05).
- Based on limited data Wingate Canal Concentrations < Lard can Canal.
- Lard Can AGM TP concentrations increase from south to north (based on limited data).

Downstream WQ Limits

- As detailed in *"Numeric Interpretation of Narrative Standards for the L-28 Interceptor Canal and Big Cypress National Preserve."* [1] a numeric interpretation of the narrative water quality standard was developed for WERP to be protective of the downstream OFW (Big Cypress National Preserve).

	Total Phosphorus ($\mu g\ L^{-1}$)	Total Nitrogen ($mg\ L^{-1}$)
Long-term (5-Year) [1]	13	1.00
Annual	21	1.24

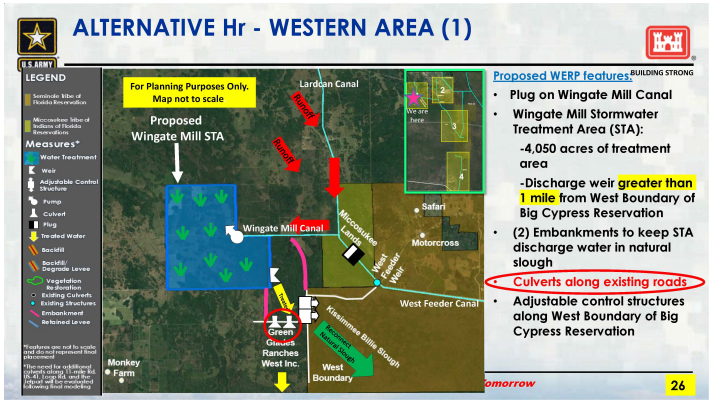
[1] Long Term = Five (5) Florida Water Years (May - April).; Average geomtric mean concentraion.

Therefore, some level of treatment is needed to improve water quality in the Wingate-Lard Can-West Feeder Canal system.

[1] FDEP, 2017, Numeric Interpretation of Narrative Standards for the L-28 Interceptor Canal and Big Cypress National Preserve. Tallahassee, FL. LINK to Document

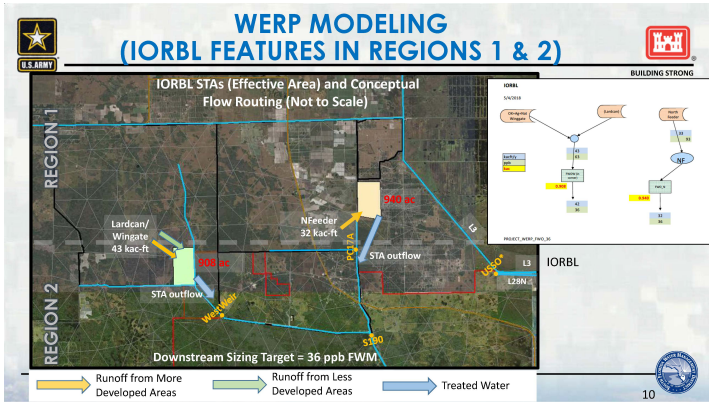
Current WQ treatment Projects

- Land and sizing issues with current proposed Wingate Mill STA.
  - Current stakeholder concerns
  - Concerns regarding ability to effectively operate (maintain target stages).



From 28 Feb 2022 PDT

- FWO Wingate/Lardcan STA?
  - 908 Acres
  - Sized to achieve L-28 Interceptor Canal baseline concentrations



From 21 Sept 2020 PDT

Conceptual WQ treatment projects

Improved/Advanced BMPs

- **Low hanging fruit**, implement watershed/basin BMPs
  - Include Canal cleaning and improvement
- Identify areas of concern (i.e. old culverts) and implement site specific nutrient and sediment reduction BMPs.
  - Proof of concept - EAA BMP program

Pros	Cons
• Cost effective • Leverage state funding programs for BMP development and implementation	• Willing participation • Not going to provide complete level of treatment needed (additional projects needed)

Conceptual WQ treatment projects

Concept #1 - Filter marsh

- Lard Can and Wingate Mill canal filter marsh(es)
  - Utilize land next to canals to build a filter marsh (long linear STA) along the canal.
  - Provide WQ treatment with minimal land
  - Utilized in urban environments - Example Lee County Florida, 10-Mile Canal.
- Lard Can canal filter marsh
  - ~ 2.4 km (~1.5 mi) between junction to Roberts/Sherrods property boundry gate
- Wingate Mill canal filter marsh
  - ~ 2.6 km (~1.6 mi) between junction to WC034TN (Inactive WQ site).

Conceptual WQ treatment projects

Concept #1 - Filter marsh

Simple Plug and Flow Equation

$$C_O = \frac{C_i - C^*}{(1 + \frac{k}{Pq})^P} + C^*$$

C_O = Outflow Conc (mg/L); C_i = Inflow Conc (mg/L);

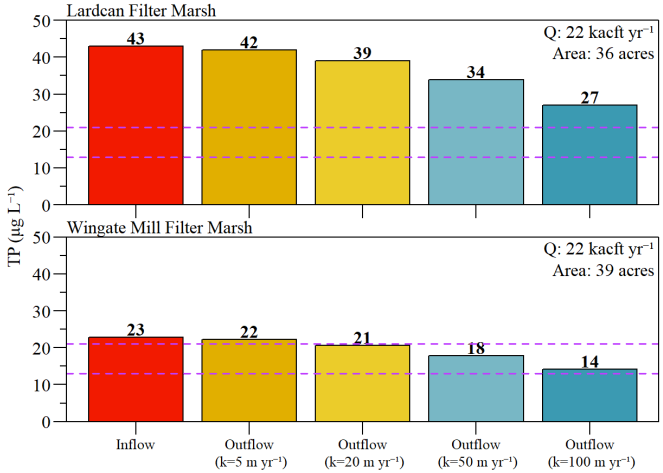
C^* = Background Conc (mg/L); k = areal rate coef (m/d);

P = TIS (assume 5 for this analysis);

q = HLR (m/d)

k-values within range of current STAs - summary

Average Q based on difference between WECB and ALTHR (summary) and a 50:50 split between Lardcan and Wingate mill canals



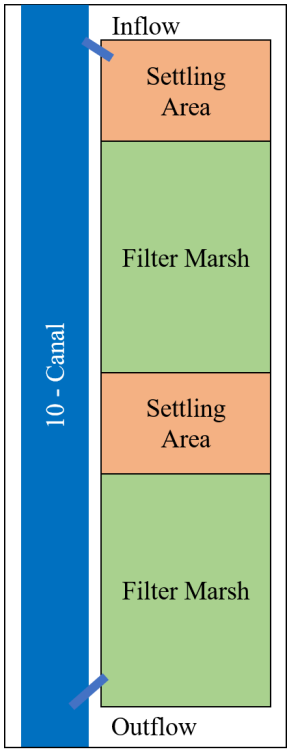
Plug and Flow sensitivity analysis for Lardcan and Wingate Mill Filter marsh.

- Assumes plug-and-flow conditions applicable to long-linear filter marsh. Some refinement may be needed.
- Some uncertainty in an appropriate k value to apply.

Conceptual WQ treatment projects

Filter Marsh - Proof of Concept

- 10-Mile Canal Filter Marsh
  - ~2 km (~1.21 mi) long project
  - ~30 meters (~ 100 ft) wide
  - Over the last 9 years 66% and ~20% reduction in TP and TN, respectively (based on annual GM Conc.)



Generalized diagram of 10-mile Canal filter marsh

Conceptual WQ treatment projects

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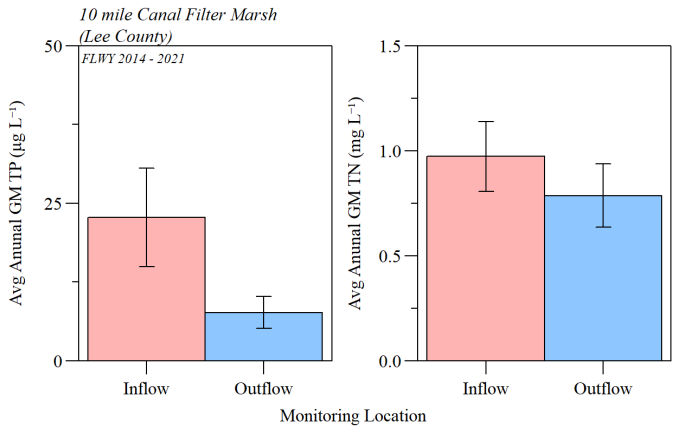
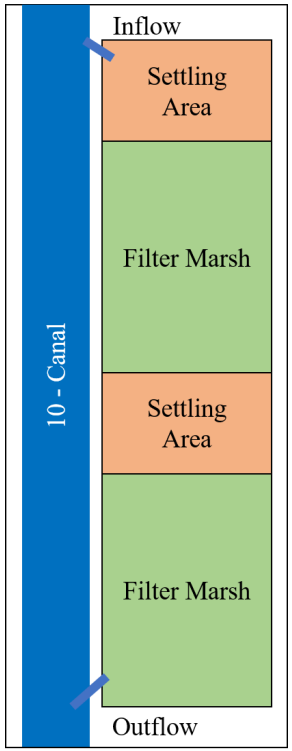


Avg GM concs WYs 2014 - 2022



Generalized diagram of 10-mile Canal filter marsh

Conceptual WQ treatment projects

Concept #1 - Filter marsh

Pros

- Smaller footprint
- If 60 meters wide (~164 ft) total area ~74 acres
- less intrusive than Wingate Mill STA
- Provides some level of treatment

Cons

- Not going to provide complete level of treatment needed
- Some management is needed (maintenance and monitoring)
- Additional infrastructure (gates on canal for diversions if needed)
- Still requires land

Conceptual WQ treatment projects

- Combine chemical and wetland treatment to reduce nutrients
  - Utilized flocculents such as Alum, Polyaluminium chloride (PAC), Ferrous Chloride to reduce nutrient concentrations
  - Wetland treatment to provide additional treatment prior to discharge
  - Proof of Concept - Grassy Island HWTT and Lemkin Creek/Wolff Ditch HWTT

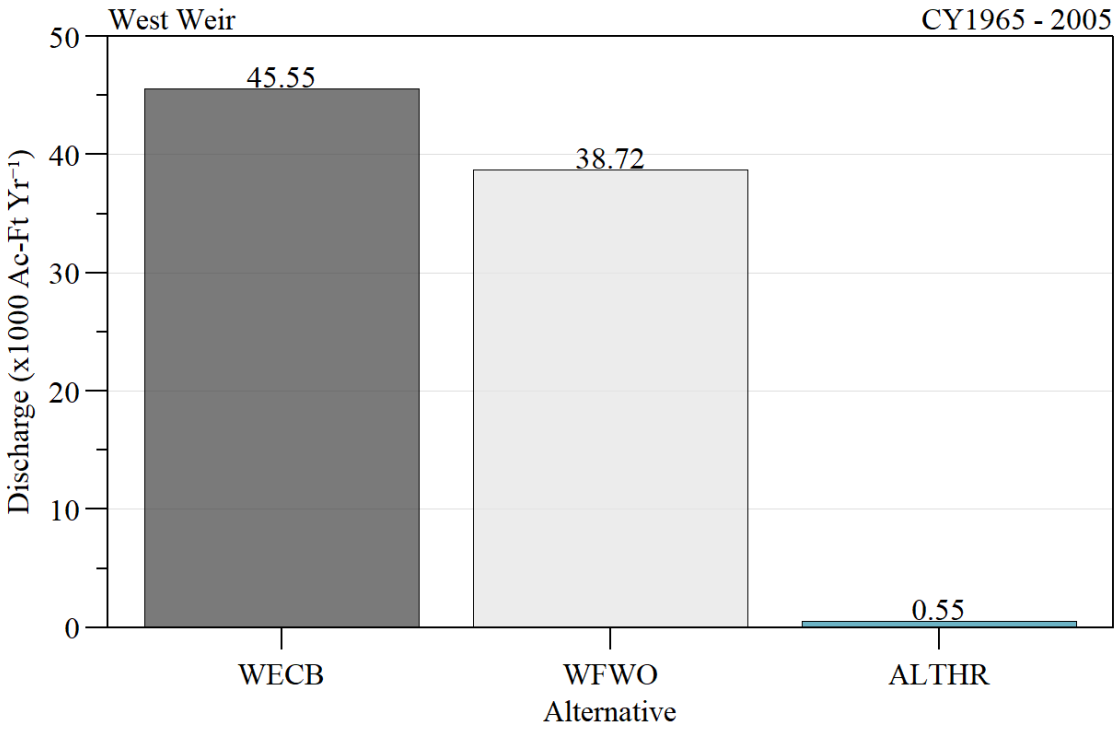
Pros

- Smaller footprint when compared to traditional STAs
- Potential for high level of treatment efficiency

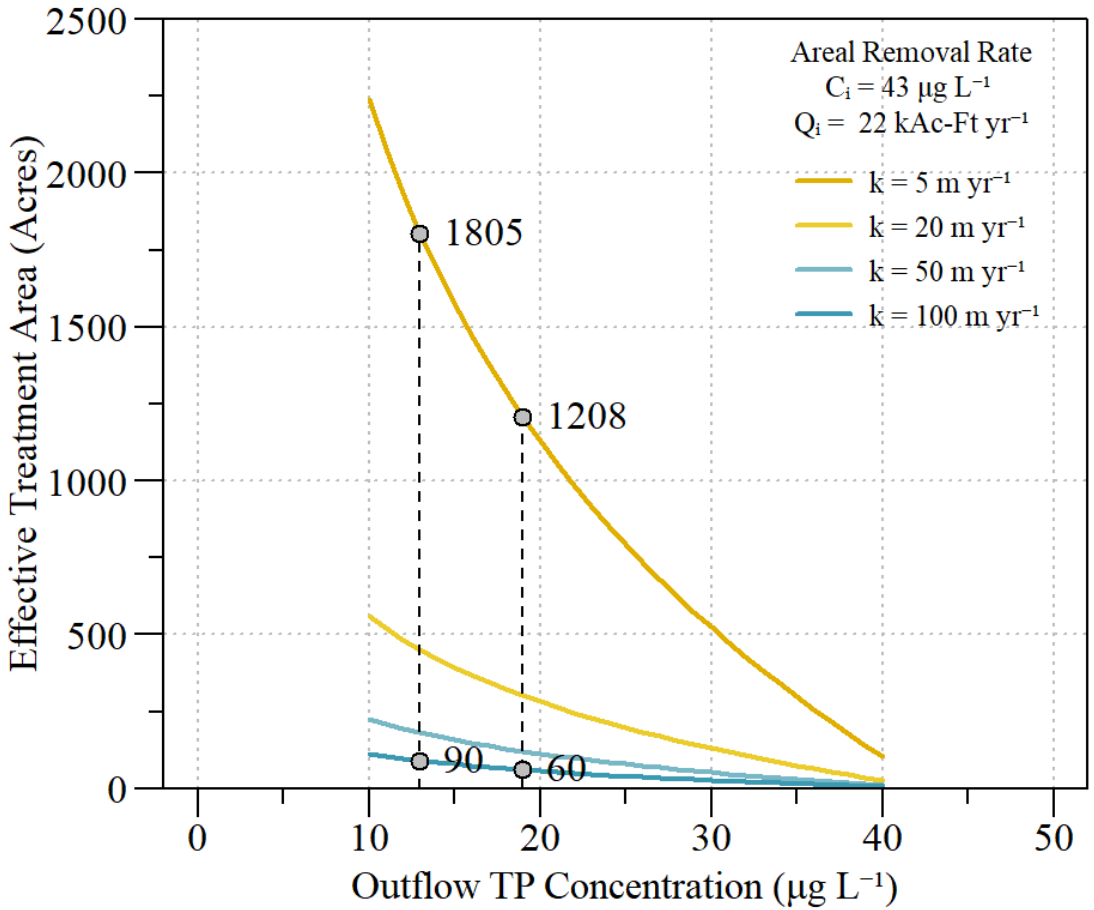
Cons

- Costly to run (i.e. pumps, flocculent, etc) and maintain (i.e. drying and disposal of flocculent material)
- Must understand water chemistry to optimize treatment without exporting flocculent material (i.e. sulfate, aluminum, etc.)
- Regional concern regarding mercury methylation (and other ecological and biogeochemical effects) due to increases sulfate load
- If treatment is not optimized, particulate aluminum (if Alum is used) can be discharged and cause downstream pH specific toxicity concerns
- Arsenic accumulation in biotia
- Still requires land

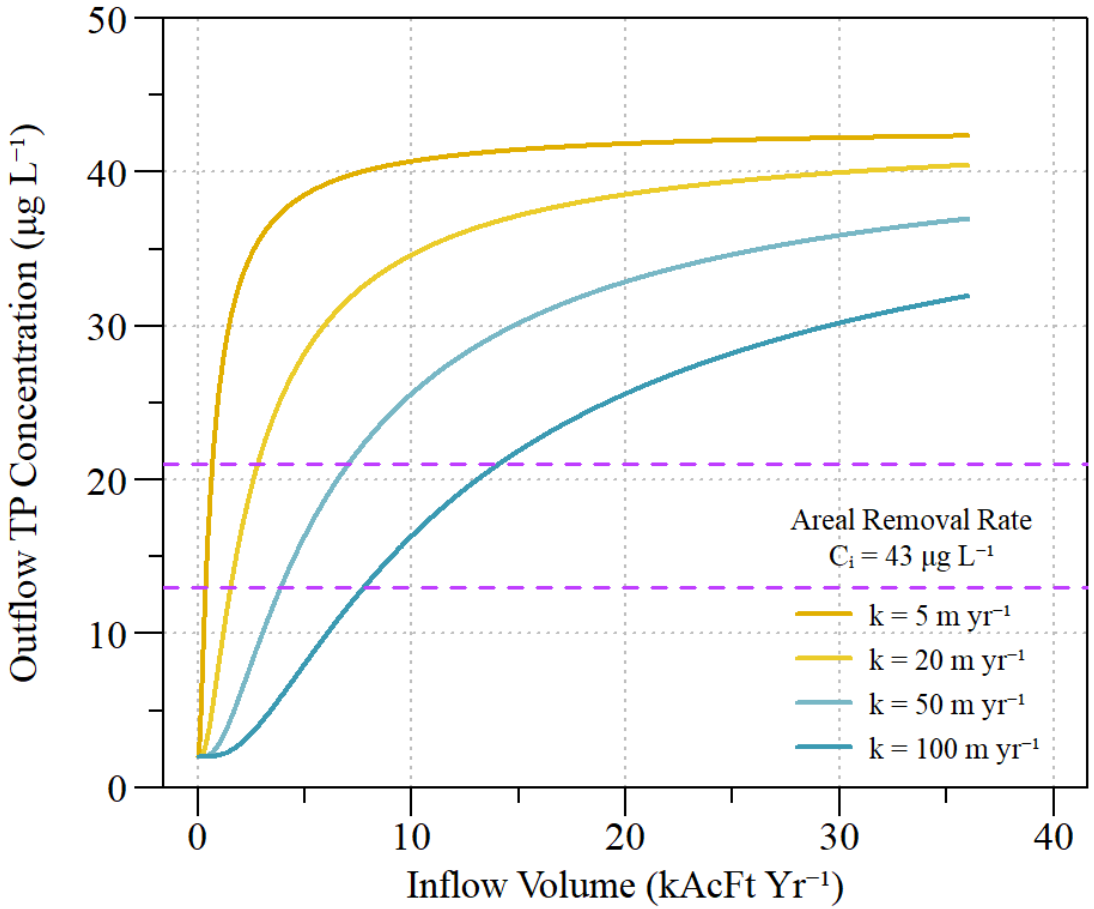
Based on evaluation of past and ongoing pilot projects, the **cons** outweighs the pros for HWTT or chemical treatment and therefore it is NOT supported/recommended by SCCF and CoSWFL.



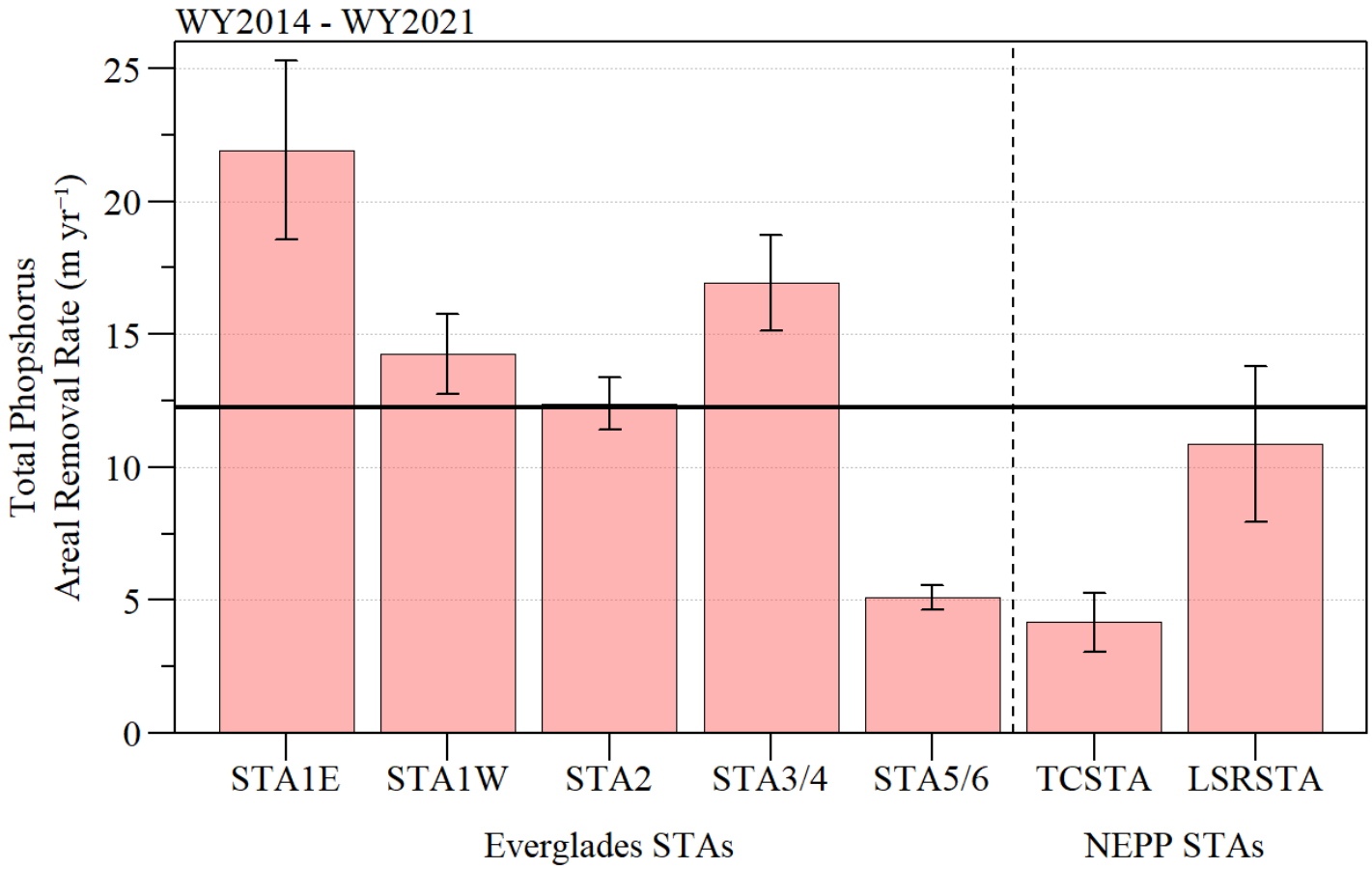
Average annual discharge volume at WestWeir



Range of area needed to treat inflow across various k rates for Lardcan canal filter marsh.



Outflow TP concentration relative inflow volume across the various k rates for Lardcan canal filter marsh.



Calculated mean (± standard error) annual total phosphorus areal removal rates for Florida water year 2014 to 2021 (May 2013 – April 2021) observed in the Everglades Stormwater Treatment Areas and Northern Estuaries Protection Program Stormwater Treatment Areas. The horizontal solid line represents the mean areal removal rate across all STAs (12.2 m/yr).