-Making the Everglades Work-

The current Everglades phosphorus standard may hinder the optimal combination of water quantity and quality for ecosystem health.

(Literature review proposal)

Quinn Zacharias and Dr. David Kaplan
UF Watershed Ecology Lab

UF UNIVERSITY of FLORIDA UNIVERSITY SCHOLARS PROGRAM

Background

The Florida Everglades is a wetland of international significance (Neary, N., 2016) but has undergone a century of drainage and pollution degradation (See figure 1). Currently, a multi-decade environmental restoration project called the Comprehensive Everglades Restoration Plan (CERP) is underway. One of its largest hurdles is managing phosphorus pollution, which is a nutrient capable of altering the ecosystem's natural structure. To control phosphorus concentrations, additional stormwater treatment areas (STAs) and a flow equalization basin (FEB) will be built in upcoming years (see Figure 2). These projects aim to stabilize water levels and reduce phosphorus.

The current goal, 10 parts per billion (ppb), for Everglades phosphorus levels was established 27 years ago and based upon conflicting information (Rizzardi, K., 2001). Many including the South Florida Water Management District continue to scrutinize the standards practicality and current relevance (Malinoski, 2004) (Treadway, T., 2019). In particular, this ultra low water quality standard ignored the ecosystem health metric of water quantity. Inadvertently, it created a tradeoff of improved quality at the expense of quantity due to STA residence time requirements (See figure 3 and 4). In addition, less water entering the Everglades results in more phosphorus-laden water entering the estuaries and thus more severe estuary algal blooms (See Fig. 1). To understand the current state of knowledge on this issue, a literature review will be conducted.

Objectives

1. Compile and synthesize relevant research on tradeoffs of improving water quality at the expense of quantity and other water budget concerns stemming from the current Everglades phosphorus standard.

2. Suggest current gaps in the literature that could serve as future subjects of scientific investigation.

Literature review outline

- Part 1: How has the science behind the standard and its implications developed over time?
  - Section 1: Everglades phosphorus threshold studies before and after 2003
  - Section 2: Unintended consequences of the standard
- Part 2: What are the most current findings and research trends?
- Part 3: What should be the future course of research?
  - Section 1: Areas of research
  - Section 2: Alternate theories for achieving restoration success
  - Section 3: Considering the dynamic future of the Everglades

References

Malinoski, R. (2004). The phosphorous standard and Everglades restoration: Will this standard lower phosphorous in the Everglades or is the proposed standard a hollow promise. U. Miami bus. L. Rev., 12, 35.

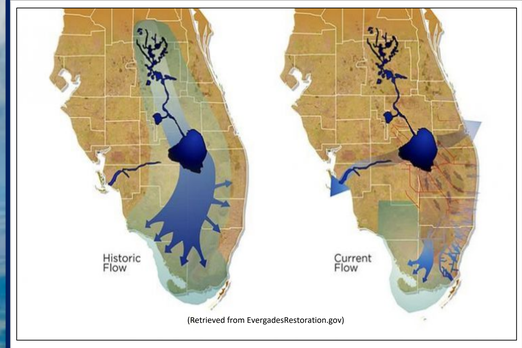
National Research Council (2010). Challenges in Restoring Water Quality. Progress Toward Restoring the Everglades: The Third Biennial Review - 2010. Washington, DC: The National Academies Press. Doi: 10.1722?12988.

Neary, N. (2016). Restoration Refocused: An Evaluation of the Central Everglades Planning Project. Massachusetts Institute of Technology

Rizzardi, K. (2001). Translating science into law: Phosphorus standards in the everglades. J. Land Use & envtl. L., 17, 149

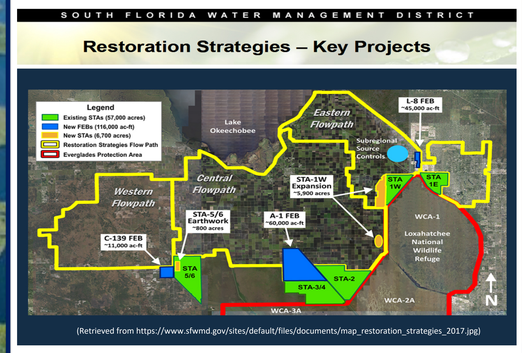
Treadway, T. (2019). SFWMD effort to end mandated Everglades pollution limits in consent decree subject of motions. Treasure Coast Newspaper

Follow:
https://www.researchgate.net/profile/Quinn_Zacharias2



(Retrieved from EvergadesRestoration.gov)

Fig. 1. Historic and current water flow regimes in the Everglades and South Florida. Current withheld and phosphorus-polluted water is now directed into Florida's estuaries and igniting algal blooms.



(Retrieved from https://www.sfwmd.gov/sites/default/files/documents/map_restoration_strategies_2017.jpg)

Fig. 2. CERPs plan for flow equalization basins (FEBs) and stormwater treatments areas (STAs).

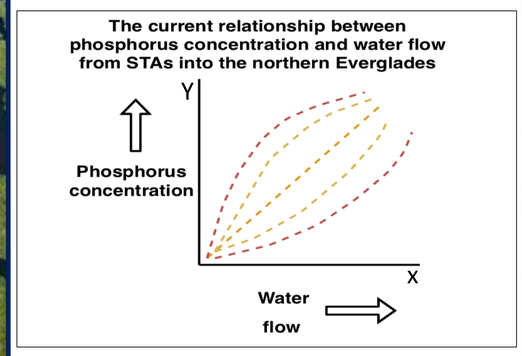


Fig. 3. As STAs improve water quality by reducing phosphorus concentrations, required residence time adversely impacts the quantity of water able to be released (National Resource Council, 2010).

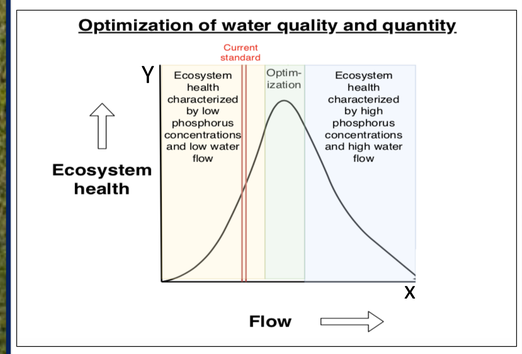


Fig. 4. is a conceptual model that demonstrates the hypothesis that water quantity and quality are not optimized in the current Everglades Phosphorus standard.