Everglades Phosphorus Criterion and Ecosystem Restoration

For an ecosystem contracted by man, does designated use protection require water quality criteria intended to restore all remaining areas to pristine conditions? Or, may water quality criteria envision preservation of more than 90% of the ecosystem and restoration of the rest to conditions that were naturally part of the historically larger ecosystem? This paper argues that (a) designated uses for the Florida Everglades will benefit from a bifurcated nutrient criterion that promotes restoration of highly nutrient enriched areas to moderately enriched conditions that naturally existed in the historically larger ecosystem, while protecting the pristine 90+%, and (b) although adoption of this bifurcated criterion should not require use subcategorization, if it does, "preservation" and "restoration" would be appropriate subcategories.

The freshwater part of the Florida Everglades historically exceeded 2.6 million acres. Research of historical material and computer simulation modeling show that ~90% of the pristine ecosystem was oligotrophic (nutrient starved), and ~10% of the ecosystem was moderately enriched with phosphorus. The enriched area served as highly valuable habitat and forage for wading birds. Over the past century, state and federal policies promoted drainage, water management, agriculture and development that reduced the freshwater part of the Everglades to about 1.7 million acres. The historical moderately enriched area was entirely lost.

The remaining Everglades is currently the subject of extensive hydrological and water quality restoration initiatives, including the ~$8 billion Comprehensive Everglades Restoration Project (CERP) and Florida's ~$800 million Everglades Construction Project (ECP). Also, Florida's Environmental Regulation Commission is tasked with adopting a numeric water quality criterion for phosphorus that will serve to limit phosphorus inputs to the Everglades.

The Everglades freshwater is classified as Class III, with designated uses of "recreation, and propagation and maintenance of a healthy, well-balanced population of fish and wildlife." Currently, Florida Class III water quality standards contain a narrative nutrient criterion intended to protect these uses by preventing nutrient induced imbalances of natural populations of aquatic flora and fauna. Although the historical ecosystem contained a productive phosphorus enriched area, research to set a numeric phosphorus criterion has focused exclusively on finding a maximum concentration limit for phosphorus that would prevent significant changes to populations of aquatic flora and fauna observed at reference sites in oligotrophic areas of the remaining system.

Oligotrophic conditions prevail in 94% of the remaining Everglades, and 6% of it is highly enriched by phosphorus inputs. A peer-reviewed computer simulation model predicts that the ECP will maintain oligotrophic conditions in the existing oligotrophic area. Early data also indicate that the ECP will successfully lower phosphorus concentrations in the highly enriched areas to the moderately enriched values once found in the historical ecosystem. After reaching moderately enriched conditions, these areas may replace some of the lost ecological diversity and functionality with substantial benefits to the designated uses. Also, analyses of Everglades mercury data indicate that allowing moderate enrichment of the nutrient impacted areas will significantly lower the risk of mercury contamination in Everglades wading birds that forage there.

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