

Everglades Project - Microbial Responses to Hydrologic Modification

Management Issue:

Everglades National Park (ENP) lies at the southern part of the Everglades system and receives surface water through its northern boundary from the Tamiami Canal (mostly through the S12 structures), which feeds the Shark Slough, and through its eastern boundary from the L-31 Canal (mostly through S-332), which feeds the Taylor Slough. The current water management system and its operation have greatly altered the natural hydrological regime of the ENP, changing the quantity, distribution, and timing of surface flow and the seasonal pattern of water depth. These hydrological changes are generally recognized to have had widespread and adverse impacts on the ecological structure and function of ENP, including the drying of short hydroperiod marshes in northeast Shark Slough and Taylor Slough, the flooding of short hydroperiod marshes downstream of the S12 structures, and the disruption of freshwater flow to Florida Bay.

Because of concerns about these impacts, a series of structural and operational modifications of the water management system are being implemented with the cooperation of the District, the U.S. Army Corps of Engineers (USACE), and ENP. These modifications began in 1983, when Congress authorized the Experimental Program of Water Deliveries to Everglades National Park. Test Iteration 7 of this Program began November 1, 1995. Both Modified Water Deliveries to ENP (ModWaters) and the C-111 Project evolved out of the work begun under the Experimental Deliveries Program. ModWaters is designed to redistribute the inflow of water to ENP to its more natural course, with more water flowing into northeast Shark Slough from WCA 3B and less water flowing from WCA 3A through the S-12 structures. The C-111 Project is being designed to minimize seepage from the northeast Shark Slough toward the east, restore more natural hydrological conditions to Taylor Slough and the ENP panhandle, and increase water deliveries to Florida Bay in a manner consistent with the Bay's restoration.

Project Overview:

Hydrologic restoration efforts in the southern Everglades entail an expensive and massive engineering and construction effort. In the absence of sufficient information on historical conditions in the Everglades, the goals and targets for these various restoration efforts are based on best professional judgement. Furthermore, while hydropattern restoration has been carefully considered by the agencies involved in this effort, the approved plan for the C-111 and ModWaters projects do not include water quality protection features. Thus, there is uncertainty concerning the effects that hydrological manipulations will have on water quality and on the ecological structure and function of the ecosystem. It is these ecological aspects of the Everglades that are the true targets of the restoration effort.

Biological monitoring is focused on marsh primary production. Periphyton and plant photosynthesis serve as the base for marsh foodwebs and are sensitive to changes in marsh

hydrology and water quality. The Everglades was historically characterized by a mosaic of vegetation communities that was largely determined by differences in hydropattern. Relatively small changes in hydropattern can produce rapid and dramatic shifts in macrophyte species composition.

The focus on periphyton reflects our desire to support cooperative interagency agreements. Other agencies (e.g. ENP, USACE, and U.S. Fish and Wildlife Service) are currently engaged in or funding monitoring and research efforts to assess the response of vertebrate (e.g., fish, wading birds) to hydrologic changes in the southern Everglades. The ENP staff are also engaged in long-term research and monitoring of macrophyte changes in Taylor Slough and Shark River Slough.

Project Objective:

1. establish baseline ecological conditions in areas of the southern Everglades that will be affected by hydrologic restoration plans (e.g., Shark Slough, Taylor Slough, and WCA 3B)
2. quantify the ecological impacts and benefits associated with hydrologic restoration efforts in the southern Everglades, as indicated by changes in the periphyton and plant communities
3. document water quality changes and associated ecological impacts produced by hydrologic restoration efforts in the Everglades

Application of Results:

This study will provide vital information to assess the impacts and benefits resulting from hydrologic restoration efforts in the southern Everglades (ENP, WCA 3B) and to help distinguish the effects of changing hydropatterns and water quality on the marsh.