THE RESPONSE OF SPECIFIC CONDUCTANCE TO ENVIRONMENTAL CONDITIONS IN THE EVERGLADES NATIONAL PARK, FLORIDA

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Abstract. The specific conductance of surface delivery waters to the Shark River Slough (Everglades National Park, Florida) has increased significantly since the completion of Levee 29 (L-29) and the S-12 water delivery system in the early 1960's. In order to document the response of specific conductance in the slough to changing environmental conditions, it was monitored continuously for a period of 12 mo at a location in central Shark approximately 17 km south of the water delivery site. In addition, variability in isoconductivity patterns throughout the slough was assessed by conducting biweekly surveys at 97 locations.

Specific conductance was found to respond to a variety of natural and manmade environmental changes and proved to be an important management tool serving as an early indicator of potentially broad changes in water quality.

Factors important in determining overall isoconductivity patterns in Shark Slough include:
(1) the ionic composition of surface delivered to Shark Slough via the S-12 delivery structures.
(2) the quantitative relationship between the amount of surface water delivered to the slough and the amount of precipitation falling directly upon the slough.
(3) the effects of evapotranspiration and concentration of biological organisms during seasonal periods of extreme drawdown.

1. Introduction

The Shark River Slough, located at the southern end of the historic Everglades, comprises the largest freshwater flow system in Everglades National Park (993 km²). Extensive man-made alterations to the natural flow pattern of the Everglades have greatly altered the hydrological regime north of Everglades National Park. The once unregulated sheet flow regime has been transformed into a complex system of levees, canals, water storage impoundments, and water control structures (Figure 1) which influence both the quantity and the quality of water throughout the Everglades.

While many changes had previously altered the flow to Shark Slough, the construction of L-29 and its associated canal in 1962 completely severed the slough from marsh water input via overland sheet flow. The resulting damage to the natural system of Everglades National Park prompted the United States Congress to guarantee a minimum annual surface water delivery equalling 260 000 acre feet yr⁻¹ (10.19 m³ s⁻¹) to the Shark River Slough (U.S. Senate, 1970). While water quality standards have been developed for these delivery waters (Rosendahl and Rose, 1979), the change from natural sheet flow to waters delivered via canals has caused long term changes in both the specific conductance and ionic composition (Flora and Rosendahl, 1981). Prior to the completion of the L-29 canal, mean wet season specific conductance at station P-33 averaged