

A.R.M Loxahatchee National Wildlife Refuge Enhanced Water Quality Monitoring and Modeling

Interim Report

**Prepared by¹: Matt Harwell, Donatto Surratt, Mike Waldon,
Bill Walker, Laura Brandt**

Executive Summary

Congress appropriated funds to the U.S. Fish and Wildlife Service in 2004 to develop an enhanced water quality monitoring network and hydrodynamic and water quality models to improve the scientific understanding of water quality in the Arthur R. Marshall Loxahatchee National Wildlife Refuge and provides information that can be utilized in management decisions to better protect Refuge resources². The enhanced water quality monitoring network complements the existing water quality compliance network created under the 1992 Federal Consent Decree by characterizing the water quality of a larger Refuge area, particularly the fringe area potentially impacted by canal water intrusions. The expanded monitoring network, initiated in June, 2004, consists of monthly grab samples collected at 39 canal and marsh stations, and continuous measurements of conductivity along 7 transects from the canal to the interior. This Interim Report covers the period of June 2004, through February 2005.

Data collected as part of this report show that intrusion of rim canal water into the Refuge interior is occurring. Intrusion of nutrient-rich and high conductivity water from the canal has the potential to negatively impact Refuge plants and animals. Therefore, analysis of these and future data from the Enhanced Monitoring Network will be important to recommend management practices that minimize such intrusion.

In general, conductivity values decrease with distance from canal stations toward the marsh interior, with the most interior marsh stations having values ten times lower than the canal. Sulfate values also decrease with distance toward the marsh interior, but total phosphorus values did not always show such a pattern.

Canal water intrusion probably is influenced by the relative water levels in the canal and adjacent marsh. When water levels in the canal are higher than in the marsh, intrusion of canal water is encouraged. The reverse also may be true – canal water levels lower than the marsh water levels probably discourages intrusion, although the results show that

¹ Other contributors include: Nick Aumen, Joffre Castro, Bob Kadlec, Kevin Kotun, Leslie MacGregor, Ehab Meselhe, Sara O'Connell, Paul Teague

² Public Law 108-108; see House Report No. 108-195, p. 39-41 (2004)

some intrusion may occur even under these conditions. The period of record for this *Interim Report* was characterized by unusually dry conditions, except for the two hurricanes and their associated rainfall in September 2004. Intrusion occurred in August, September and October; the latter two were presumably related to the hurricanes.

Data collected thus far is in agreement with previous studies that have suggested intrusion. Conductivity values collected nearly simultaneously at numerous stations within the Refuge in March and September, 2004 suggest intrusion is occurring, particularly along the west side of the Refuge. Sediment total phosphorus data collected from the Refuge interior in 1991 illustrate elevated sediment total phosphorus concentrations that generally coincide with the location of canal water intrusion.

Model selection is underway for the hydrodynamic and water quality modeling effort, with final model selection and initial model development to begin this summer, 2005. The models will predict water movement and water quality within the Refuge, in support of management decision. Characterization of the rim canal around the Refuge will continue with initiation of the canal water quality monitoring and further canal profile work.

Future reports will be produced on an annual basis, analyzing data from the previous water year (May 1 through April 30). The next report will be produced in August, 2006, in order to shift to the water year reporting period. Data from the monthly grab samples will be continually updated on DBHYDRO. The Refuge will continue to make quarterly updates to the Technical Oversight Committee.