

# *Charlotte Harbor Conference*



***“Sound Science in 2004”***

*October 5-6, 2004*

***Mote Marine Laboratory***

*Keating Marine Education Center*

*1599 Ken Thompson Parkway ~ Sarasota FL 34236*

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## *"Sound Science in 2003-2004" Program*

*E.D. Estevez, Organizer*

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## **Analyses of Long-Term Relationships between Riparian Vegetation Patterns and Freshwater Inflows in the Lower Peace River Estuary, 1976-2002**

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The primary objective the conducted analyses were to determine the efficacy and effectiveness of long-term investigations designed to identify potential adverse affects to emergent lower Peace River vegetation and riverine wetlands that might potentially be associated with freshwater withdrawals by the Peace River/Manasota Regional Water Supply Authority's water treatment facility. Over twenty-seven years of monitoring, the vegetation studies have sought to determine the magnitude of vegetative community's spatial and temporal responses to natural variations resulting from extended periods of both drought and flood along the lower Peace River. The primary goal of these investigations has been to provide a basis for assessing potential methodologies by which to differentiate between long-term natural changes in riverine vegetative patterns and those that might potentially be induced by Facility withdrawals. The overall objective of the vegetative monitoring HBMP study elements has been to provide a basis for determining the relationships between vegetation patterns and freshwater flows by observing the relative spatial positions and community structure of the freshwater and salt-tolerant plant communities in the salinity transitional zone of the lower river. The basic assumption has been that a permanent shift of more salt-tolerant plants upriver could be an indication that withdrawals were impacting lower river corridor wetlands, assuming that the effects of natural variability (drought) or other anthropogenic causes could be isolated in the analysis.

Since 1976, at approximately two-year intervals, the spatial first and last occurrences of indicator plant taxa have been recorded along the banks of the Peace River downstream of the Facility. Analyses of these long-term data indicate that this information has not been highly effective in determining the potential influences that might be associated with withdrawals. Some species had shown very little variation even following extended periods of high and low flows, while the spatial locations of other taxa have varied considerably as the result of the creation or destruction of shallow shoals along the edges of the river during periods of high flow. The causes of other observed changes were found to be less obvious and clearly indicated the difficulty in determining meaningful relationships between freshwater inflows and the long-term distributions of many of the riparian taxa that characterize the lower river.

GIS based photointerpretation was further used to conduct change comparing and assessing differences in the spatial extent of dominant vegetation groupings along the lower Peace River following both extended periods of high freshwater inflow (1998) and the recent extend period of drought (2002). Although fairly substantial differences in the salinity structure characterized the two preceding periods, analyses showed little differences in the weighted centers of abundances of either the saltwater marsh or hardwood forest communities along the lower river. These results probably reflect the extensive period of time needed to substantially change the distributions of these communities. While visual observations noted some signs of stress in the hardwood forest community immediately near the river during the driest periods of the extended drought, seasonal periods of higher inflows maintained the relative long-term spatial distributions.



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Small upstream movements in the weighted centers of abundances were, however, observed between the two periods in the distributions of mangrove and freshwater marsh vegetation along the lower river. To some extent, the upstream movement of mangroves may simply reflect the lack of the occurrence of any sustained hard freezes between the time periods rather than the occurrence of higher salinities during the drought. Historically, the mangroves in this region of the river have been subject to extensive natural die offs resulting from periodic freezes.

The observed net upstream movement of the weighted center of abundance of freshwater marsh communities following extended wet and dry periods may more directly reflect the influences of increased salinities along the lower river during the extended drought that preceded the 2002 vegetation mapping.

In summary, a comparison of 1998 and 2002 aerial photography using GIS based forward-dating procedures indicates some small changes in the weighted centers of abundances of only two of the major riparian vegetation communities along the lower Peace River. The measured changes, however, were small in comparison to the differences in the spatial salinity patterns during the extended wet and dry periods that preceded the two selected vegetation surveys. Given these results, it is extremely doubtful whether any quantifiable changes in long-term vegetation patterns along the lower Peace River will ever be attributable to Facility withdrawals, since the magnitude of the predicted influences of Facility withdrawal are small relative to the normal ranges of daily and seasonal salinity variations that influences the spatial distributions of these riparian vegetation communities.

