

Studies Supporting Restoration of Mangrove Habitat in Everglades National Park: Faunal Component

The USGS Florida Caribbean Science Center's Restoration Ecology Branch at Florida International University is conducting research on restoration of coastal marine waters of South Florida. Critical research for restoration of the faunal support function of the mangrove zone and adjacent waters involves understanding the responses of mangrove-associated fauna to changes in the quality, quantity, timing and distribution of freshwater flows. Initial efforts will focus on fish and macrocrustaceans (shrimp and crabs). A second high priority is to link avifaunal use of mangroves and adjacent inland marshes to patterns of hydrology and secondary productivity of forage organisms.



Interface between mangroves (dark green) and brackish marsh (light green)

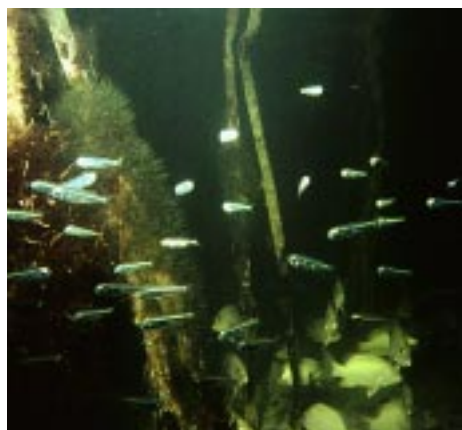
The newly initiated research asks several questions for three wetland types (fringing mangroves, high intertidal mangroves, and adjoining brackish marshes) including:

- Is mean annual primary productivity of the dominant wetland vegetation a good predictor of abundance of fish and crustaceans?
- Is fish and crustacean density more closely tied to nutrient levels in sediments or the water column?

- What are the relationships between frequency and duration of tidal flooding, freshwater inflow, hydroperiod, structural type and complexity of wetland vegetation, and secondary productivity of fish and crustaceans?
- How do the seasonal and annual densities of fish and crustaceans most frequently used by colonial wading birds vary across the various wetland types?

The most important question underlying this research relates to the effects of changes in the quantity and timing of freshwater inflow on mangrove fauna.

Data generated from this research will be fed into the ATLSS modeling process, permitting the extension of that set of models to the mangrove transition zone of the SW Florida coast. Coupling of empirical data and the ATLSS modeling process will permit predictions of fish and crustacean response to hydrological modifications as part of restoration.



Underwater view of silversides and gray snapper in mangrove prop roots

Ongoing and Proposed Research and Collaborations

Understanding and predicting global climate change impacts on the flora and fauna of mangrove forested ecosystems in Florida T.J. Smith, III and C.C. McIvor, USGS BRD.

Mangrove forested ecosystems dominate the intertidal zone of DOI lands in south Florida. This proposal asks, "What are the likely consequences of relative sea level rise and increased hurricane frequency on the extensive mangrove wetlands of the southwest Florida coast?" The broad objective for the fish and crustacean portion of this proposal is to relate fishery productivity (density, biomass/area) to a suite of parameters likely to be affected by relative sea-level rise. For the seaward ecotone, we will focus on the relative amount of edge between mangroves and open water. At the upslope ecotone, we will concentrate on net primary productivity of contigu-



Green-backed heron forages from mangrove prop roots, Everglades National Park

ous mangroves and marshes (both brackish, fresh), flooding duration (or hydroperiod), and temporal variability in salinity.

Dynamics of fish and crustaceans in mangrove and brackish marsh habitats along Shark River Slough: effects of hydrological and geomorphological variables C.C. McIvor and T.J. Smith, III

A primary goal of Everglades restoration is the recreation of historic patterns of hydroperiods and hydropatterns in both the freshwater and estuarine marshes and mangroves. Therefore, it is essential that we understand the dynamics of fish in mangrove and estuarine marsh habitats. An additional reason for immediate focused research on mangrove fish assemblages is the compelling need to understand and link both distribution and abundance, and secondary productivity of mangrove (and brackish marsh) fishes with wading bird foraging in these habitats.

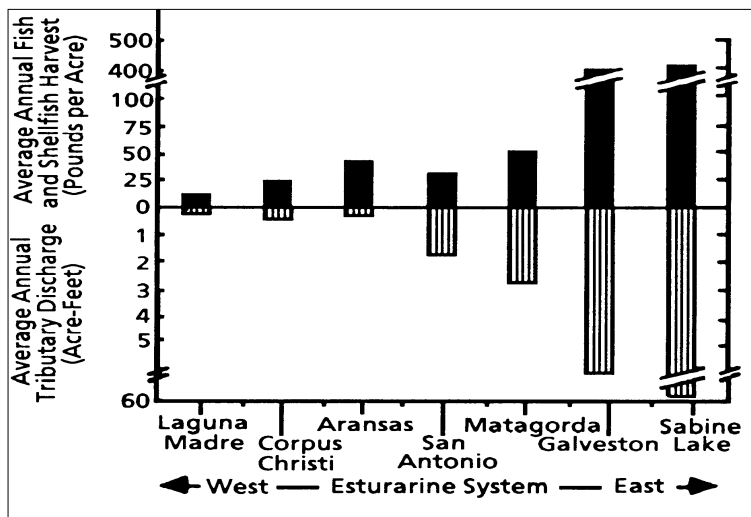
Dynamics of submerged aquatic vegetation and associated fish and crustaceans in inner bays of mangrove-lined rivers on the southwest Florida coast: correlates with environmental variables C.C. McIvor and T.J. Smith, III

Beds of submerged aquatic vegetation (SAV) often serve as nursery areas for young life history stages of fish of commercial and recreational importance. Additionally, areas of tidal rivers with SAV on the SW Florida coast

appear to be important winter feeding and resting areas for the manatees, a threatened species. However, there are no systematic surveys of SAV distribution and abundance in any of the tidal rivers and inner bays of the southwest coast. It is imperative that the dynamics of SAV in tidal rivers and bays be understood because the species composition and standing stock of SAV and macroalgae appear to be quite sensitive to salinity variation as caused by seasonal and anthropogenic changes to freshwater inflow, and because hydrological restoration in the freshwater portion of the Greater Everglades Ecosystem will modify freshwater delivery patterns.

Acknowledgments

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Relationship between freshwater inflow and fisheries harvest in seven Texas estuaries, from McIvor et al., 1994