



A Comparison of Consumer Dynamics and the Influence of Hydrology Across Multiple Everglades Habitats

JS Rehage¹, SE Liston², JJ Lorenz³, WF Loftus⁴, and JC Trexler⁵

¹Nova Southeastern University, Oceanographic Center, 8000 N. Ocean Drive, Dania, FL; rehage@nova.edu
²Audubon of Florida, Corkscrew Swamp Sanctuary, 375 Sanctuary Road West, Naples, FL; sliston@audubon.org
³Audubon of Florida, Tavernier Science Center, 115 Indian Mound Trail, Tavernier, FL; jllorenz@audubon.org
⁴US Geological Survey, Florida Integrated Science Center, Everglades National Park Field Station, Homestead, FL; bill_loftus@usgs.gov
⁵Florida International University, Department of Biological Sciences, Miami, FL; trexlerj@fiu.edu



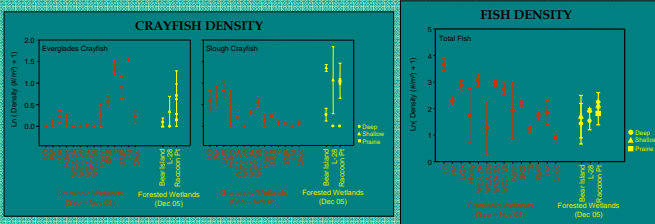
FRESHWATER COMMUNITIES



Aquatic faunal communities in Big Cypress forested wetlands and Greater Everglades graminoid wetlands are sampled by 1-m² throw trap. Despite the dramatically different physical structure of these freshwater habitats, remarkably similar assemblages of fish were collected in the 2005 wet season (see below). The same four species (eastern mosquitofish, least killifish, bluefin killifish, and flagfish) comprised >80% of fish density in both habitats, and relative abundances of these species were similar.



Fish species found in freshwater Everglades habitats in the 2005 wet season. Seventeen species were found in both habitats (black), six species were found only in graminoid wetlands (red) and six species were found only in forested wetlands (blue). Non-indigenous species are indicated (†).



Densities of common aquatic fauna (crayfishes, riverine grass shrimp, and fishes) spanned similar ranges in forested and graminoid wetlands. In the 2005 wet season, average crayfish density was relatively high in forested wetlands (especially slough crayfish), and fish density was relatively low compared to graminoid wetlands. Forested-wetland fish density later in the season likely exceeded that measured in graminoid wetlands, because of the marked concentrations of fishes in dry-season refuges. We continue to sample and compare these two communities.

OVERVIEW

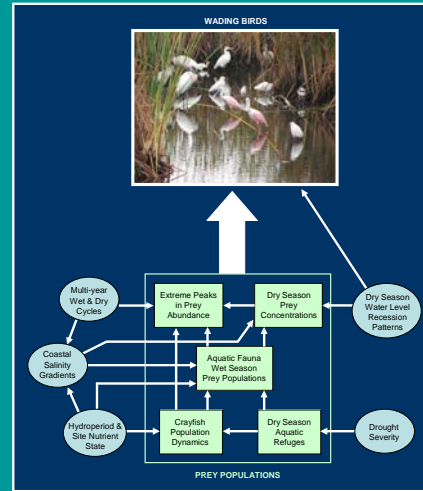
Cross-habitat comparisons offer a landscape-level understanding of the responses by consumers to seasonal variation in hydrology and may provide insight into potential responses to long-term variation in hydrological conditions resulting from restoration.

Aquatic animals in seasonal wetlands are subjected to widely variable environmental conditions during the annual hydrological cycle.

They face mortality from desiccation, starvation, stress-related disease, hypoxia, predation, and in the case of introduced tropical species, cold temperatures.

Which habitats in the ecosystem provide protection from these conditions?

How do these habitats function as prey sources for wading birds, and how will they change as a result of restoration actions?

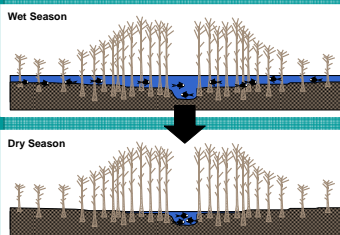


Conceptual ecological model of predator-prey interactions of wading birds and aquatic fauna forage base in the Greater Everglades (adapted from Monitoring and Assessment Plan Part 2, RECOVER 2006).



IMPORTANCE OF DRY-SEASON REFUGES

Depressions on the marsh surface and at the center of cypress domes provide critical habitat for fish communities during the dry season, and serve as critical foraging sites for nesting wading birds.



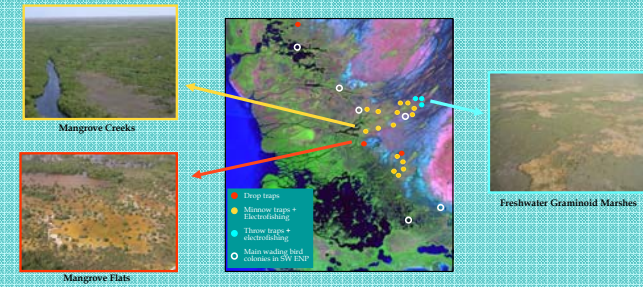
Mangrove creeks may provide dry-season refuge for aquatic fauna from surrounding wetlands.

However, declining water levels in marshes forces small fishes into the channels where they are vulnerable to a myriad of piscine predators and no longer available to avian predators.

Their survival in remnant dry-season pools and creeks is inversely related to the length of time confined to these habitats.

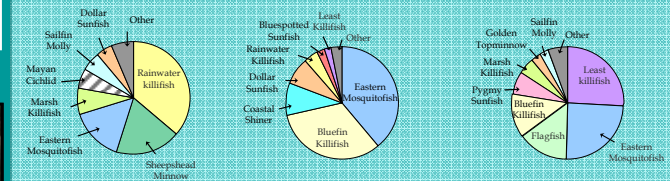


ESTUARINE COMMUNITIES



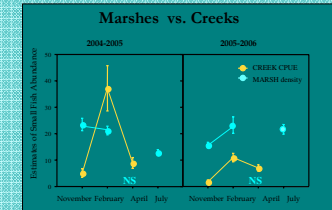
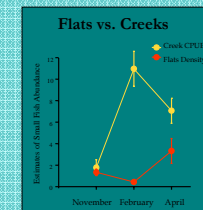
Seasonal patterns of fish abundance and species composition were compared across multiple habitat types along the marsh-mangrove ecotone in Shark Slough, including freshwater marshes, shallow mangrove flats, and deep mangrove creeks. Habitats were sampled with drop traps, minnow traps, and throw traps in 2004-2006 & 2005-2006.

Mangrove Flats Mangrove creeks Freshwater marshes



Small fish assemblages differed markedly among habitats. Prey communities in mangrove flats were dominated by rainwater killifish and sheephead minnow, whereas mosquitofish and bluefin killifish and mosquitofish and least killifish dominated the small fish community in mangrove creeks and freshwater marshes respectively.

HABITAT LINKAGES



Early in the dry season, comparisons of mangrove flats and creeks showed that as prey density decreased on shallow flats, fish numbers increased in mangrove creeks. Upon reflooding, densities of small fishes in freshwater marshes were significantly greater in 2005-2006, suggesting better recovery from the less-severe dry-down.