Seasonal Fish-Community Patterns in Upstream Reaches of Coastal Rivers in Everglades National Park, Florida

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The role of abiotic factors in the organization of communities is one of the most fundamental questions in ecology. At large temporal scales, heterogeneity of abiotic conditions affects patterns of species abundance and distribution. At smaller temporal scales, those abiotic conditions determine patterns of species movement and habitat use.

The structuring effect of abiotic conditions may be particularly important along transition zones or ecotones. In the Everglades ecosystem, mangrove-lined creeks link freshwater marshes to estuarine habitats. Previous studies have shown that these rivers are used by a diverse array of saltwater and estuarine fishes. The rivers may also represent critical habitat for freshwater-marsh fishes (including non-indigenous taxa) during seasonal dry periods. Historically, channels and pools at this ecotone served to concentrate fishes for avian predators, making this region very important for wading-bird feeding and nesting. This study examines seasonal and long-term dynamics in the fish community of the oligohaline to mesohaline reaches of rivers within the southwest region of Everglades National Park. In particular, we ask: (a) how does use of the upper river habitat by fishes change over long and short time scales; (b) how do these changes relate to variation in abiotic conditions; and (c) how do changes in the fish community relate to anthropogenic activity (previous drainage or impoundment effects and ongoing restoration)?

Sampling is conducted in two drainages: the Rookery Branch/Otter Creek sections of Shark River, and the North/Watson rivers. Those drainages differ in freshwater inflows and the degree of anthropogenic impact. Rookery Branch drains longer hydroperiod marshes than the North/Watson drainage, and has been affected by water management to a greater extent. Six rivers are sampled in each system, and all sampling is conducted in the uppermost 600 m stretch accessible to a motorboat. In each stretch, we systematically sample three 100 m-long sections by electrofishing. In addition to electrofishing, the upper 100-m reach of each river is sampled by two passive techniques: experimental gill nets that target large and mobile fishes, and minnow traps that target small fishes (SL < 10 cm). Sampling is conducted three times per year: November (wet season), February (transition), and April (dry season). Physical and chemical data are collected during each sampling event. The study began in 2004 and will continue through 2007, after which the methodology will be suggested for incorporation into the long-term monitoring for the Comprehensive Everglades Restoration Plan (CERP). Here, we report results from the 2004-2005 sampling season.

Fish catches were lower, as expected, during the wet season sampling in November, 2004, than in later samples. In November, wetlands surrounding the upper reaches of the streams were flooded, but were dry or drying when subsequent samples were taken. We assume that this forces fishes into the channels for refuge. Physicochemical changes were noted in the streams with the change in seasons. In particular, dissolved-oxygen levels were lower in the transition and dry seasons, and water clarity decreased. Salinities were higher in the North/Watson drainage than in Shark River. Large fishes included common freshwater species such as largemouth bass, bowfin, and Florida gar, and estuarine species such as snook, tarpon, striped mullet, and striped mojarras. Catch of the large freshwater species increased greatly from the November to February samples. Similarly, small fishes, particularly eastern mosquitofish, dollar sunfish, and bluefin killifish, increased in the minnow-trap samples. Catches in Shark River were much larger than in North/Watson rivers as the dry season progressed.