

Tidal Creeks in Southwest Collier County as Developmental Habitat for Juvenile Marine Game Fish

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Introduction

Florida's sport fisheries for snook, redfish, and other marine game fish are estimated to be worth several billion dollars annually. The mangrove shoreline is the principal developmental habitat for game fish in southern Florida, but large portions of this vital habitat have been destroyed by coastal development or the estuarine characteristics have been modified by hydrologic alterations in upland areas. Population declines for game fish species are more likely due to habitat alterations, than to fishing pressure. Information on juvenile game fish and their developmental environment is needed to conserve the remaining habitat of these economically-important species and to guide hydrologic restoration efforts. The purpose of this study is to assess mangrove tidal creeks in southwest Collier County as developmental habitat for game fish species and to identify the factors influencing their habitat use, particularly with respect to watershed alterations from human activities.

Study Area



The study area is located in the Big Cypress subregion of the South Florida Ecosystem. The southwestern portion of the Big Cypress watershed was drastically altered in the 1960's and 70's with the construction of the Golden

Gate canal system in western Collier County. The historic sheetflow of freshwater in the watershed has been diverted to single point sources in coastal estuaries (e.g., Golden Gate Canal in Naples Bay, Henderson Creek Canal in Rookery Bay, and Faka Union Canal in the Ten Thousand Islands). As a result, tidal creeks in this region are impacted by the canal system and the Rookery and Naples Bay estuaries are subject to increasing effects of urban development in and around Naples. Efforts are underway to restore the hydrology in the Picayune Strand State Forest and there are also plans for restoration to the tributaries to Rookery and Naples Bay.

Materials and Methods

Monthly sampling was conducted using a 50 X 4 ft seine to collect fish at each site. Two hauls were made at a given site during each sampling event and captured fish were kept in containers between hauls. All fish were identified to lowest taxonomic level and enumerated. Standard length (tip of the snout to the base of the caudal fin) was measured for all game fish species and the first 30 specimens of other fish species. All fish were released on site after data collection.



Results

Sample Site Selection

Initial surveys for sampling sites were at selected culverts along U.S. 41 but these proved problematic because of deep water, numerous snags, and large alligators. Study sites from earlier restoration monitoring efforts were then selected as likely locales for juvenile fish sampling. These remote sites are located south of Picayune and Fakahatchee Strands and are accessed via canoe. Seine hauls at these sites did not result in capture of juvenile game fish and we encountered logistical difficulties with tidal predictions and hauling a seine through soft mud and leaf litter.



In January 2009, 2 small (2-3 in) juvenile snook were collected from the mouth of the drainage ditch bisecting the Conservancy grounds and connecting to the Gordon River. Construction of a filter marsh to treat the stormwater flowing through the ditch was completed in June 2009. Exploratory sampling of this new water feature resulted in the capture of numerous juvenile snook and monthly sampling was initiated in September 2009. Study sites were also selected for the upper reaches of Haldeman and Rock Creeks.



Juvenile Game Fish Captures by Sample Site

Site	Snook	Tarpon	Redfish
Filter Marsh	394	6	0
Rock Creek	68	0	2
Haldeman Creek	24	0	2

Snook Size Range (in) by Sample Site

Site	Min.	Max.
Filter Marsh	1.3	11.4
Rock Creek	0.9	7.0
Haldeman Creek	1.0	6.1

Snook begin maturing at 11.8 in.



Snook Captures by Month and Sample Site

Site	2009				2010								
	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Filter Marsh	54	33	109	29	20	28	13	6	7	18	3	41	33
Rock Creek	-	-	-	2	4	11	1	4	7	1	11	19	8
Haldeman Creek	-	-	-	5	0	1	1	0	-	0	6	2	9



December 2009 – an adult (21.5 in) snook captured in filter marsh. Adults have been documented cannibalizing juveniles in nursery habitats.



January 2010 – freezing temperatures result in fish kills in South Florida. Nonetheless, juvenile snook were collected within a week after freeze.



July 2010 – smallest (1 in) snook captured in creek sites. Indicates adult survival and spawning after the freeze and future recruits to the fishery.

Discussion and Preliminary Conclusions

Research with snook in the 1950s focused on southwest Collier County and dealt with adults collected from the commercial fishery. The Ten Thousand Islands region was considered the principal snook habitat in the State and supported the main spawning grounds, but the distribution and habitat use by juveniles was unknown at this time. A landmark report in 1973 identified brackish tidal creeks and dredged canals in the Ten Thousand Islands region as developmental habitat for juvenile snook. However, three of the 5 sample sites from this former study were located on Henderson Creek, a Rookery Bay tributary, and these were the most productive sites for collecting juvenile snook. Our reconnaissance of this area found that urbanization during the last 30 years had modified or eliminated these nursery habitats.



Nonetheless, we collected juvenile game fish in the highly urbanized tributaries to Naples Bay, indicating these impacted waterways still function as nursery areas provided suitable habitat (i.e., fringing mangroves) is available. The relatively high abundance of juvenile snook in the Conservancy's filter marsh also suggests that stormwater systems can be modified to produce favorable developmental habitat where none had previously existed. Our sampling efforts will continue to document juvenile game fish habitat use in the urban landscape and we plan to revisit remote sites in the Ten Thousand Islands.



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