Habitat use by nekton assemblages in natural versus altered wetlands: Establishing baseline community conditions for wetland restoration in Tampa Bay, Florida

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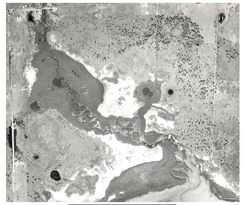
INTRODUCTION

- Little is known of composition and structure of Tampa Bay nekton communities (fishes, pink shrimp, blue crabs) in natural (**creek**) or altered (**ditched**) wetland habitats
- Current wetland-restoration plans in the Tampa Bay estuary seek to restore areas that have been ditched for mosquito control (**mosquito ditches**) and water conveyance (**linear ditches**)
- Hydrological changes induced by restoration may affect biotic components such as fish communities
- Fish-community data will assist resource managers in pre-restoration planning and post-restoration assessment

NATURAL



Mobbly Bayou 1952

ALTERED

Mobbly Bayou 2002

QUESTION AND HYPOTHESIS

Are there differences in nekton communities between natural and altered wetlands in Tampa Bay?

H_0: There is no difference in fish community structure between natural and altered wetlands.

OBJECTIVES

- To describe species composition and structure of wetland nekton communities with a focus on three assemblages: marsh residents (spend entire life in wetland), transients (spawned offshore, young reared in wetland), and recreational species
- To determine spatiotemporal use of natural and altered habitats by nekton communities

SAMPLE PROCEDURES

- Seasonal sampling (2004) of nekton communities in natural and altered habitats at three wetland regions of Tampa Bay (right)
- Isolated 9.1-m segments of creeks and ditches with block nets and sampled with a 3-mm mesh bag seine (below)
- Collected nekton with three consecutive seine hauls to estimate relative abundance and gear efficiency
- Identified, measured (20/species), enumerated, and released nekton

Setting block seines to isolate fixed site

Seining fixed site to sample fish community

Collecting fish sample from bag seine

RESULTS

First level - Description of Tampa Bay Wetland Nekton Communities

- 73 species collected in natural (creek) and altered (ditch) habitats in Tampa Bay wetlands
- 33 taxa used in analysis composed 99.6% of the total sampled community
- Total of 72,792 fishes, pink shrimp, and blue crabs
- Wetland resident species composed 86% of the total community
- Six of top 10 most abundant species were marsh residents (table below left)

Mean Abundance of Top 10 Species

Most Abundant Species

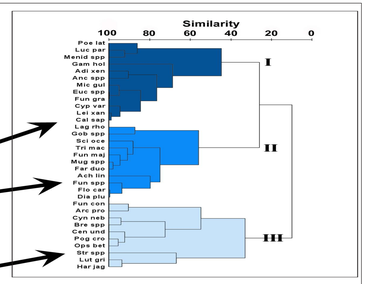
	Common name	Short name	Fish/100m^2
	Sailfin molly	Poe lat	83.2
	Rainwater killifish	Luc par	71.9
	Silverside	Menid spp	59.4
	Mosquitofish	Gam hol	38.8
	Gulf killifish	Fun gra	26.8
	Mojarra	Euc spp	33.0
	Clown goby	Mic gul	24.3
	Bay anchovy	Anc spp	22.6
	Sheepshead minnow	Cyp var	20.9
	Spot	Lei xan	18.9

Recreational Species

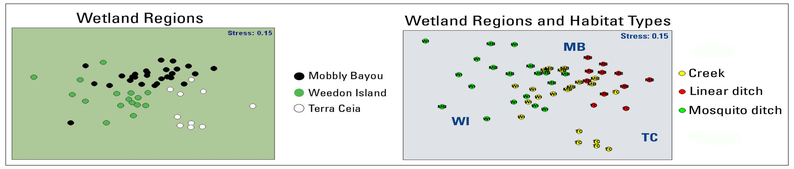
	Common name	Shortname	Fish/100m^2
	Spot	Lei xan	18.9
	Blue crab	Cal sap	16.4
	Mullet	Mug spp	5.8
	Red drum	Sci oce	5.0
	Pink shrimp	Far duo	4.7
	Sheepshead	Arc pro	1.3
	Spotted seatrout	Cyn neb	0.7
	Black drum	Pog cro	0.6
	Snook	Cen und	0.6
	Gray snapper	Lut gri	0.3

Three Nekton Assemblages

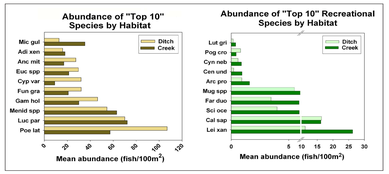
- Delineated assemblages based on index of dominance (abundance X frequency of occurrence)
- Identified, with cluster analysis, assemblages along a gradient of abundance and frequency (right)
- **Assemblage I** - composed primarily of marsh residents in high abundance and frequency
- **Assemblage II** - composed of resident species in lower abundance than Assemblage I and seasonally occurring recreational species in high abundance and low frequency
- **Assemblage III** - composed primarily of less abundant, seasonally occurring recreational species



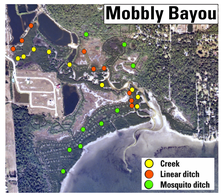
Second level - Comparison of Nekton from Natural versus Altered Wetlands



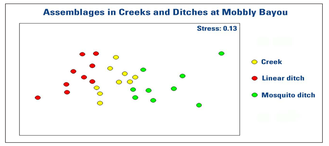
- Nekton communities differed among three wetland regions (ANOSIM, $p<0.05$; multidimensional scaling (MDS) plot above left) as well as habitat types within regions ($p<0.05$; MDS above right)
- Nekton communities were more similar within a tidal creek than among several creeks ($p<0.05$; above right)
- Top 12 most abundant species (mostly marsh residents) were the same between creek and ditch habitats with minor rank differences
- Mean abundances for 6 of 10 resident species were higher in ditches than in creeks (near right)
- Mean abundances of recreational species (table left, right panel) were about twice as high in creeks as in ditches, indicating greater use of natural wetland habitats by many recreational species (far right)
- Snook (*Centropomus undecimalis*) were five times as abundant in creeks, while black drum (*Pogonias cromis*) were two times as abundant in ditches; blue crabs (*Callinectes sapidus*) and mullet (*Mugil* spp.) were equally abundant in both habitats (far right)

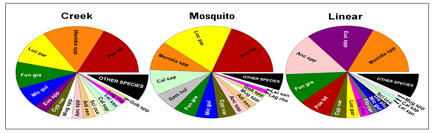


Third level - Comparison of Nekton Communities from Natural versus Altered Wetlands within a Region



- Within a single location, habitat use of creeks, mosquito ditches, and linear ditches were compared when all habitats were available
- Sample design included nine randomly distributed sites/habitat at the Mobbly Bayou region (at left)
- Within Mobbly Bayou, community composition differed (ANOSIM, $p<0.05$) between creek, mosquito ditch, and linear ditch sites (MDS below left)
- Eight of 10 dominant species (residents and schooling transients) were similar in creek, mosquito and linear ditch habitats at Mobbly Bayou (below right)
- Despite similarities, species proportions differed greatly between creek and ditch habitats (below right)





Poe lat=*Poecilia latipinna*, **Luc par**=*Lucania parva*, **Fun gra**=*Fundulus grandis*, **Mic gul**=*Microgobius gulosus*, **Euc spp**=*Eucinostomus*, **Cyp var**=*Cyprinodon variegatus*, **Mug spp**=*Mugil*, **Anc spp**=*Anchoa*, **Adi xen**=*Adinia xenica*, **Sci oce**=*Sciaenops ocellatus*, **Cal sap**=*Callinectes sapidus*, **Lei xan**=*Leiostomus xanthurus*, **Lag rho**=*Lagodon rhomboides*, **Gob spp**=*Gobiosoma*, **Gam hol**=*Gambusia holbrooki*, **Flo car**=*Floridichthys carpio*, **Dia plu**=*Diapterus plumieri*, **Far duo**=*Farfantepenaeus duorarum*, **Arc pro**=*Archosargus probatocephalus*, **Cyn neb**=*Cynoscion nebulosus*, **Pog cro**=*Pogonias cromis*, **Cen und**=*Centropomus undecimalis*, **Lut gri**=*Lutjanus griseus*, **Tri mac**=*Trinectes maculatus*, **Fun maj**=*Fundulus majalis*, **Ach lin**=*Achirus lineatus*, **Fun spp**=*Fundulus*, **Fun con**=*Fundulus confluentus*, **Bre spp**=*Brevoortia*, **Ops bet**=*Opsanus beta*, **Str spp**=*Strongylura*, **Har jag**=*Harengula jaguana*

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