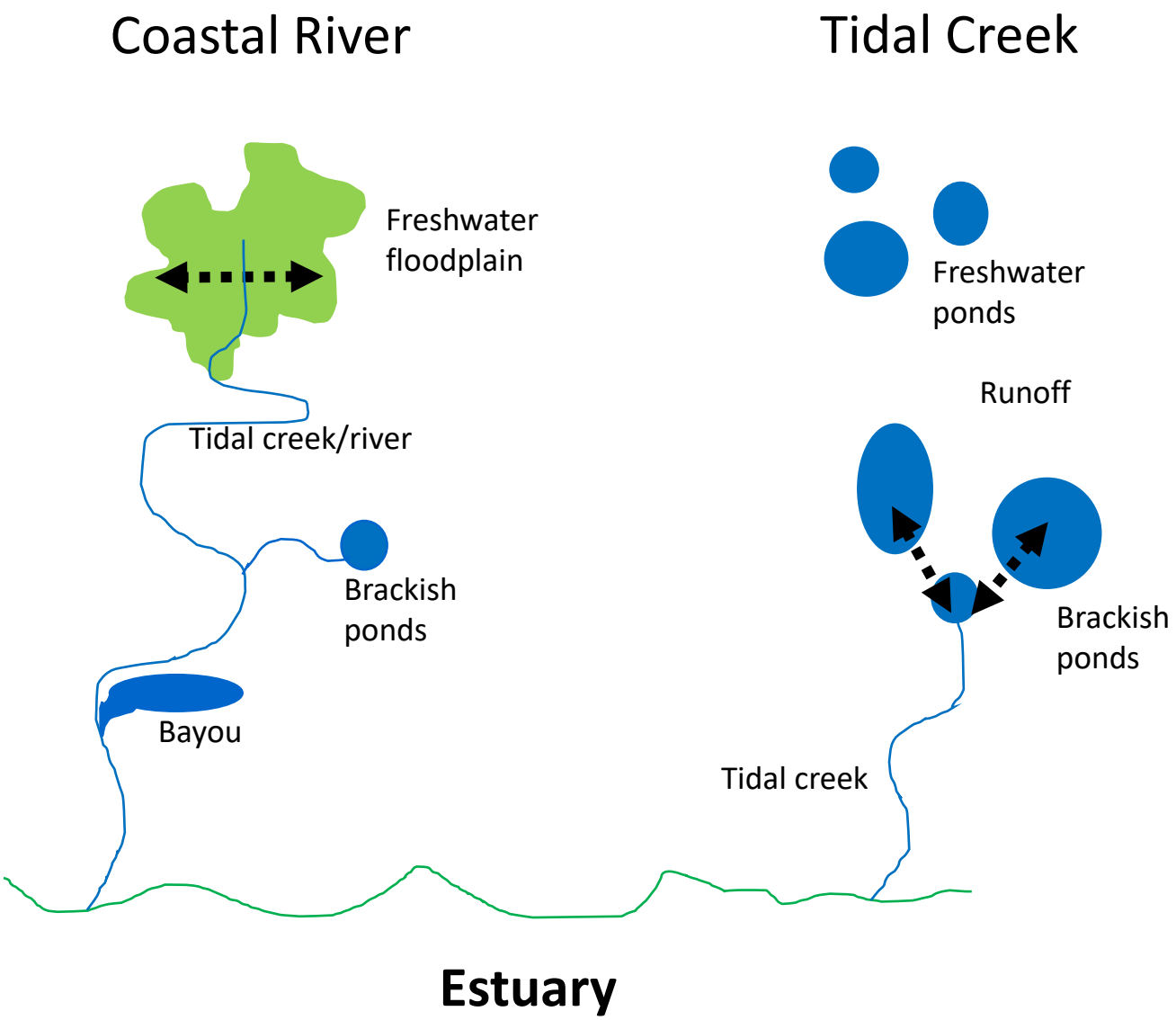
Including hydroecological connections at the land-sea interface in conservation of sportfish habitat

Philip Stevens, Courtney Saari, David Blewett, Eric Weather, and Corey Anderson

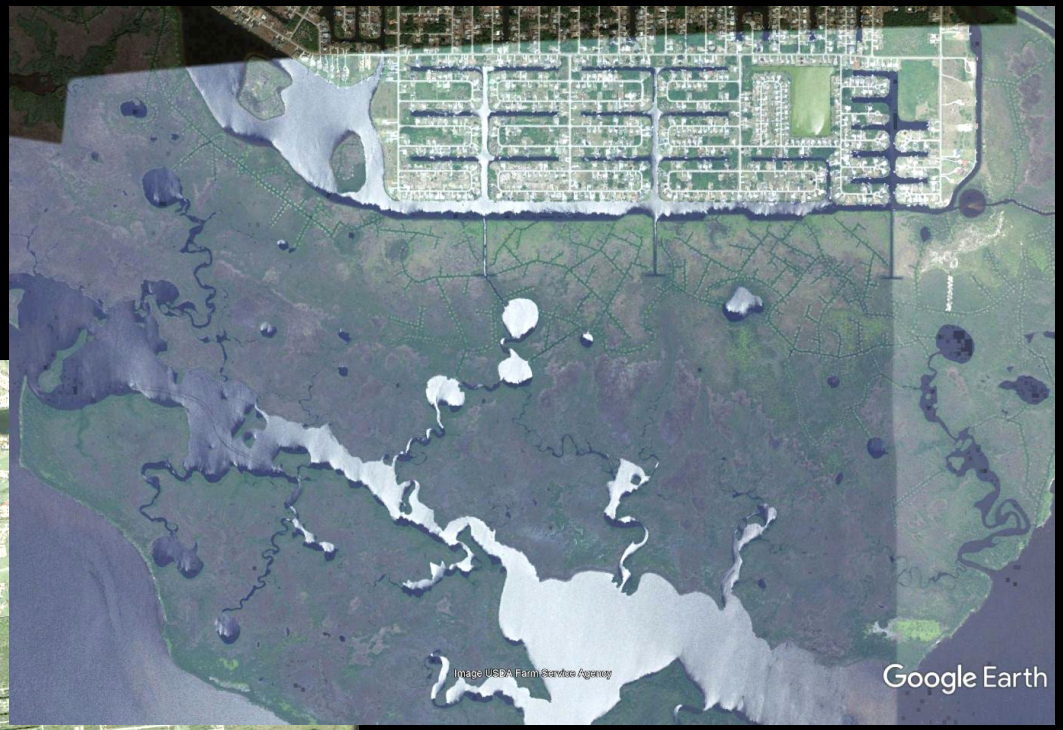
Florida's coastal morphology



Examples: Northern Florida

Examples: Tampa Bay

Examples: Charlotte Harbor



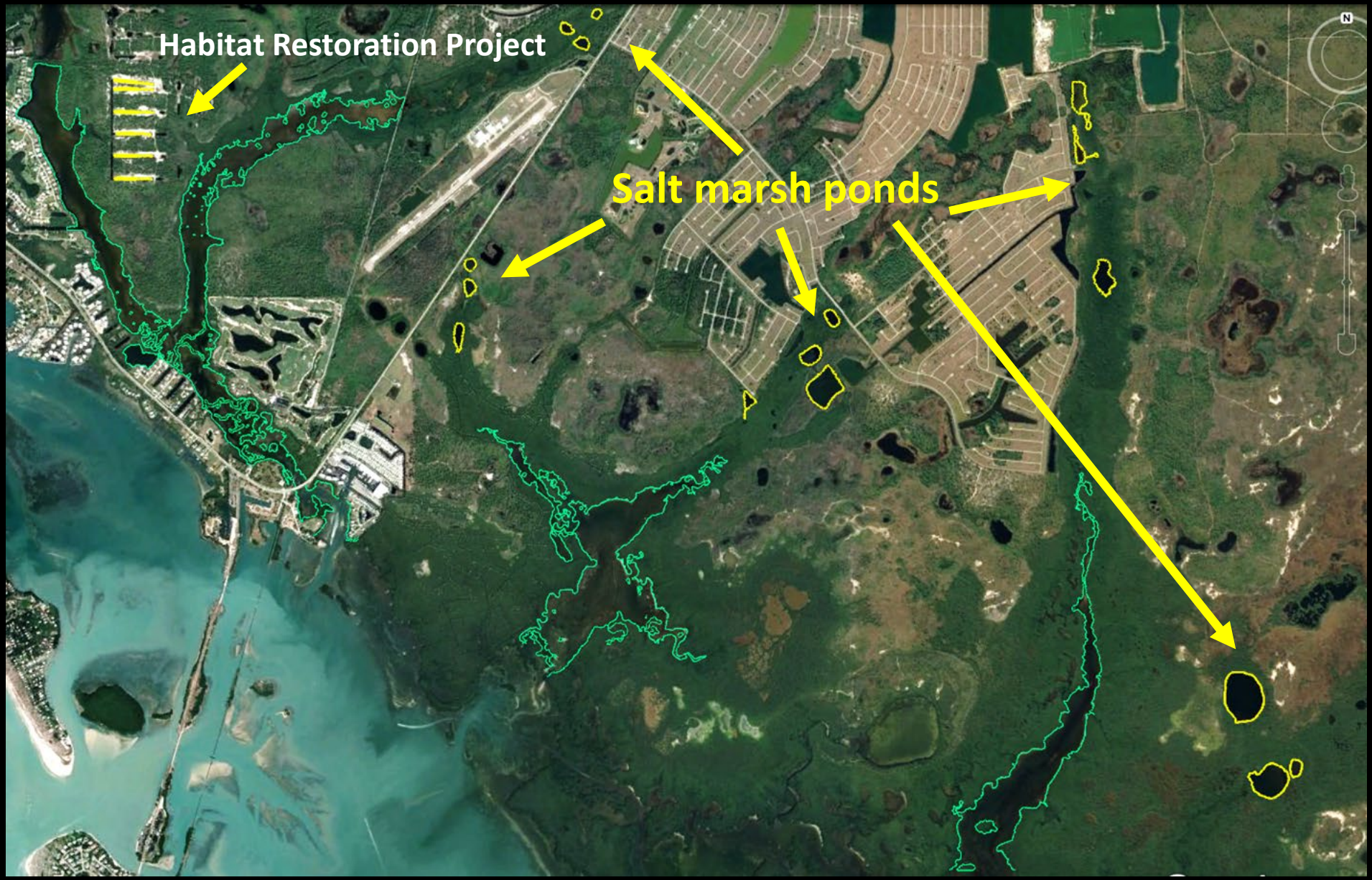
Examples: Coastal Everglades

Creeks and ponds – juvenile snook and tarpon

A new approach to define an economically important fish as an umbrella flagship species to enhance collaborative stakeholder-management agency habitat conservation

JoEllen K. Wilson · Philip W. Stevens · David A. Blewett · Ross Boucek · Aaron J. Adams

Coastal ponds and creeks sampled in RESTORE fisheries study (2019 – 2022)



Context, Geomorphology, Connectivity

FWRI Wetlands Group

Elevations

Landscape Resistance

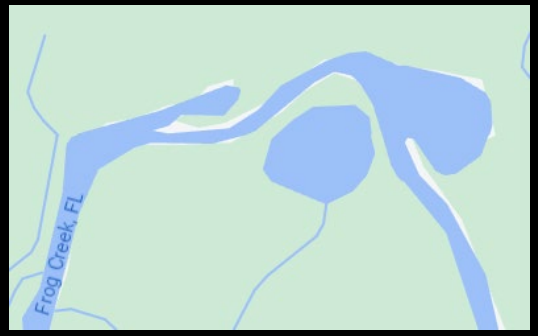
Added columns in the dataset

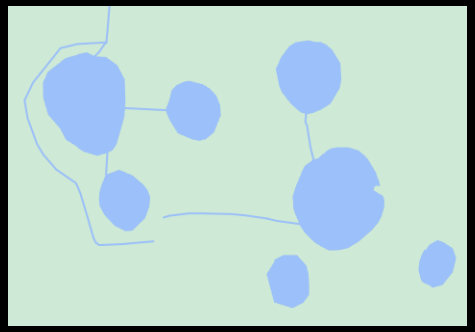
Fish abundance

Conditions at time of sampling

GIS and wetland survey

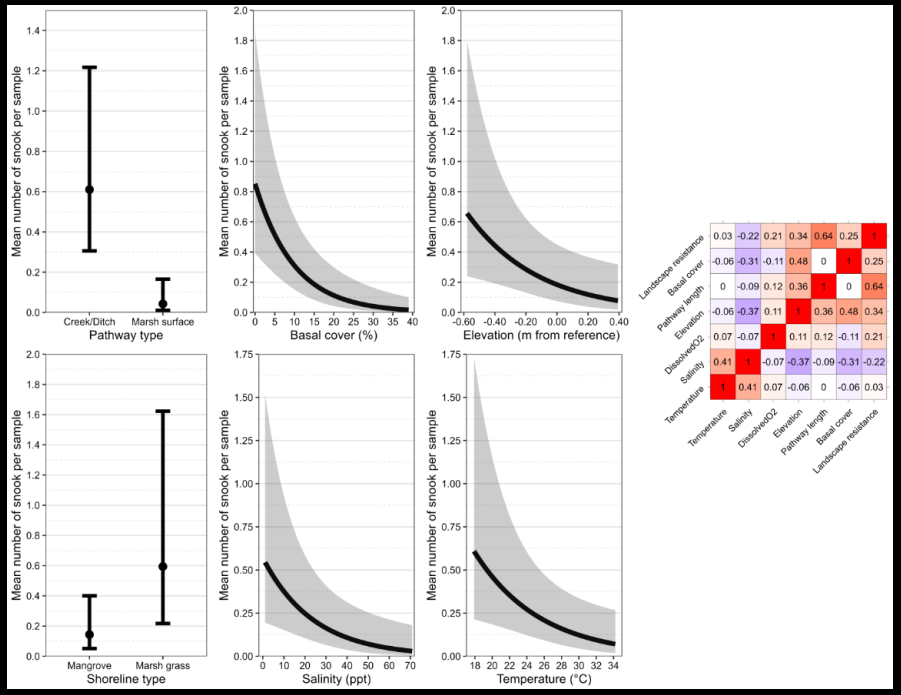
	Fish		Habitat					Context and Geomorphology		Connectivity				
Coastal Pond	Snook abundance (average)	Tarpon presence (1) or absence (0)	Water depth (m)	Temperature (deg C)	Salinity (ppt)	Dissolved oxygen (mg/L)	Shore type	Pathway length (m)	Pond size (m)	Pathway type	Elevation (m)	Canopy cover (%)	Basal cover (%)	Landscape resistance (%)
C1	12.1 (5.0)	0,0,0,0,1,0	0.6 (0.06)	23.9 (0.8)	29.8 (2.5)	4.3 (0.3)	Marsh grass	665	15	Creek/Ditch	-0.414	81.0	0.0	1.0
C2	3.9 (2.0)	0,0,0,0,0,0	0.4 (0.04)	24.4 (0.8)	30.9 (2.6)	4.2 (0.4)	Marsh grass	595	15	Creek/Ditch	-0.414	81.0	0.0	1.0
C3	7.7 (3.3)	0,0,0,0,0,0	0.4 (0.05)	25.9 (0.9)	31.1 (2.6)	5.0 (0.3)	Marsh grass	434	15	Creek/Ditch	-0.414	81.0	0.0	1.0
C4	8.8 (3.2)	0,0,0,0,0,0	0.6 (0.09)	26.9 (0.8)	30.7 (2.4)	5.7 (0.3)	Marsh grass	279	15	Creek/Ditch	-0.414	81.0	0.0	1.0
C5	12.7 (3.5)	0,0,0,0,0,0	0.8 (0.08)	26.9 (0.9)	31.5 (2.2)	5.2 (0.2)	Marsh grass	372	15	Creek/Ditch	-0.414	81.0	0.0	1.0
C6	6.6 (3.0)	0,0,0,0,0,0	0.8 (0.08)	27.1 (0.9)	31.6 (2.3)	5.8 (0.3)	Marsh grass	542	15	Creek/Ditch	-0.414	81.0	0.0	1.0
C9	0	0,0,1,0,1,0	0.6 (0.05)	25.7 (0.8)	10.9 (2.8)	5.7 (0.5)	Mangrove	699	79	Creek/Ditch	-0.381	96.6	39.0	70.0
F1	7.2 (3.2)	0,0,0,0,0,0	0.3 (0.02)	24.7 (0.9)	37.7 (4.7)	4.1 (0.4)	Mangrove	1646	83	Creek/Ditch	-0.418	82.8	12.0	12.0
F2	3.9 (2.0)	1,0,0,0,1,0	0.5 (0.03)	25.3 (0.9)	37.1 (4.4)	4.1 (0.4)	Mangrove	1469	79	Creek/Ditch	-0.397	97.4	21.0	44.0
F3	8.3 (7.7)	1,0,1,1,1,1	0.6 (0.03)	25.7 (0.8)	38.3 (3.4)	3.6 (0.3)	Mangrove	1047	68	Creek/Ditch	-0.579	98.2	3.0	31.0
F4	0	1,0,1,1,1,0	0.5 (0.05)	26.3 (1.1)	13.7 (1.3)	4.2 (0.4)	Mangrove	1240	82	Marsh surface	0.393	88.5	32.6	27.4
F5	0.6 (0.6)	1,0,0,1,1,0	0.6 (0.05)	24.7 (0.8)	20.8 (1.4)	4.1 (0.4)	Mangrove	920	108	Marsh surface	0.288	90.9	20.8	28.4
F6	4.0 (2.8)	0,0,0,1,0,0	0.4 (0.03)	25.2 (0.6)	19.6 (0.8)	5.6 (0.2)	Mangrove	1070	186	Marsh surface	0.288	90.9	20.8	28.4
F7	10.5 (6.7)	1,1,1,1,1,1	0.3 (0.02)	23.9 (1.2)	38.0 (4.3)	4.9 (0.3)	Mangrove	340	57	Marsh surface	0.273	90.9	20.8	28.4
W2	0	0,0,1,1,0,1	0.4 (0.03)	24.5 (0.8)	6.3 (0.3)	6.2 (0.4)	Mangrove	1830	62	Marsh surface	0.385	94.5	8.4	43.8
W3	0	0,0,1,1,1,1	0.7 (0.05)	25.4 (0.8)	17.5 (1.2)	4.4 (0.5)	Mangrove	800	107	Marsh surface	0.218	91.9	28.3	43.2
W4	34.7 (10.8)	1,0,0,1,0,1	0.6 (0.02)	26.6 (0.6)	29.3 (1.6)	6.4 (0.2)	Mangrove	2138	281	Creek/Ditch	0.035	98.2	0.0	91.0
W5	17.2 (9.5)	0,0,1,1,0,1	0.7 (0.03)	25.8 (0.6)	33.7 (2.0)	5.4 (0.2)	Mangrove	1208	238	Creek/Ditch	0.035	92.7	16.0	11.0
W6	22.0 (15.8)	1,0,1,1,1,1	0.7 (0.03)	25.3 (0.7)	33.5 (2.7)	3.8 (0.3)	Mangrove	1524	84	Creek/Ditch	0.035	92.7	16.0	11.0

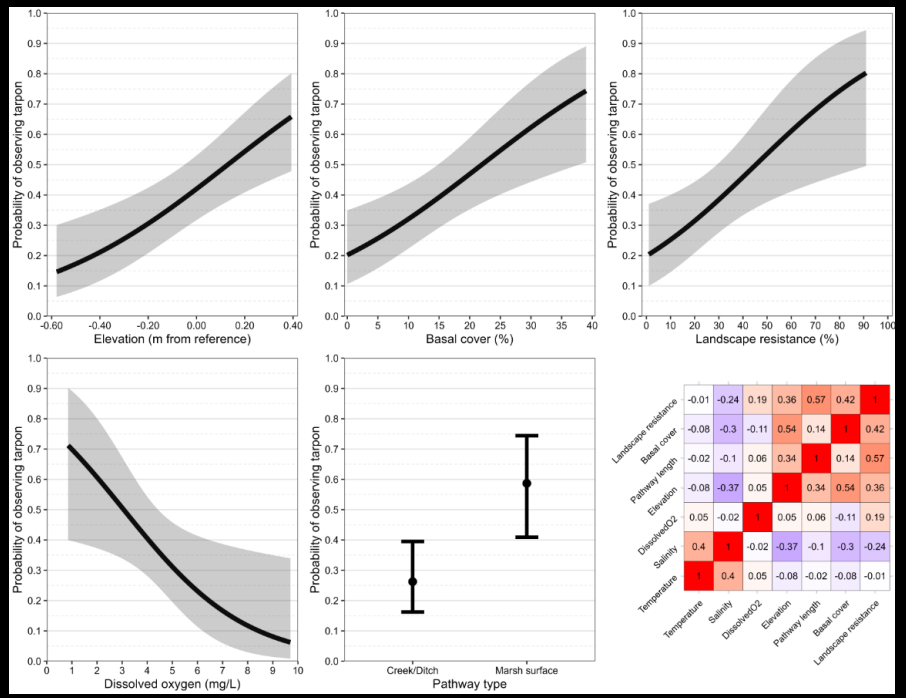




More connected

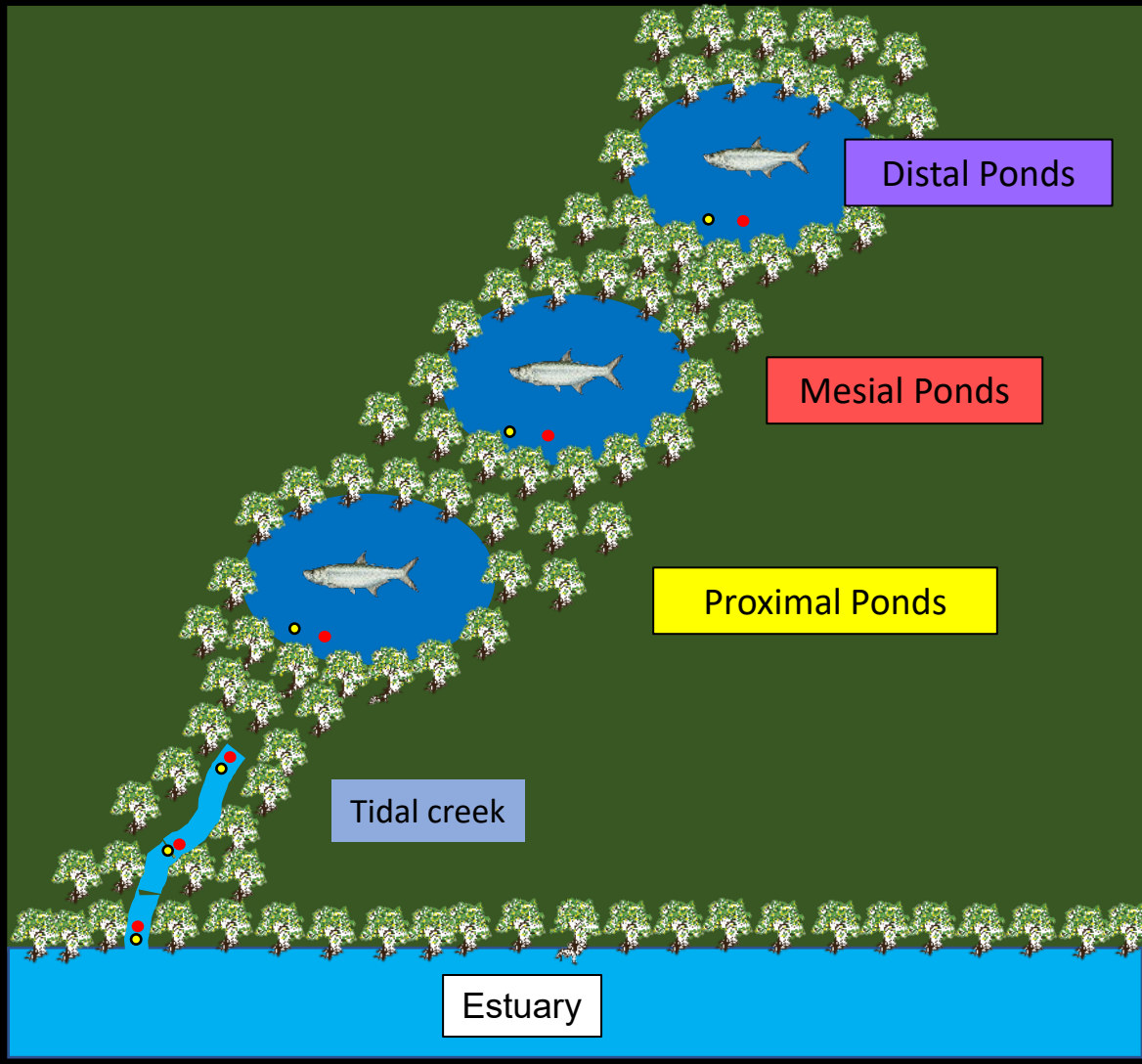
Less connected





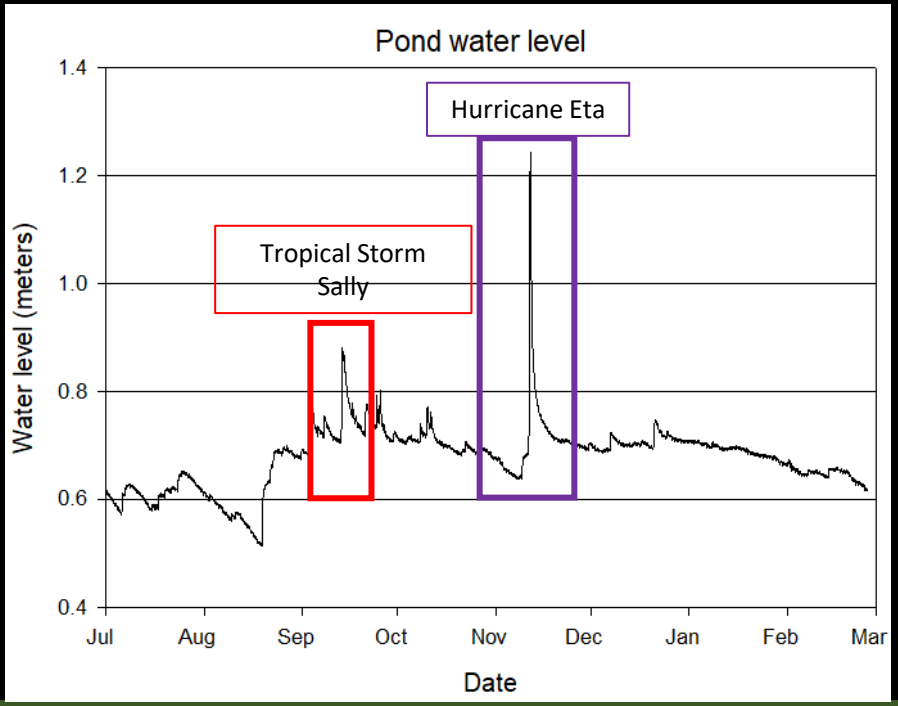
Now that the fish are here….
<u>How exactly do they get out?</u>

Study design

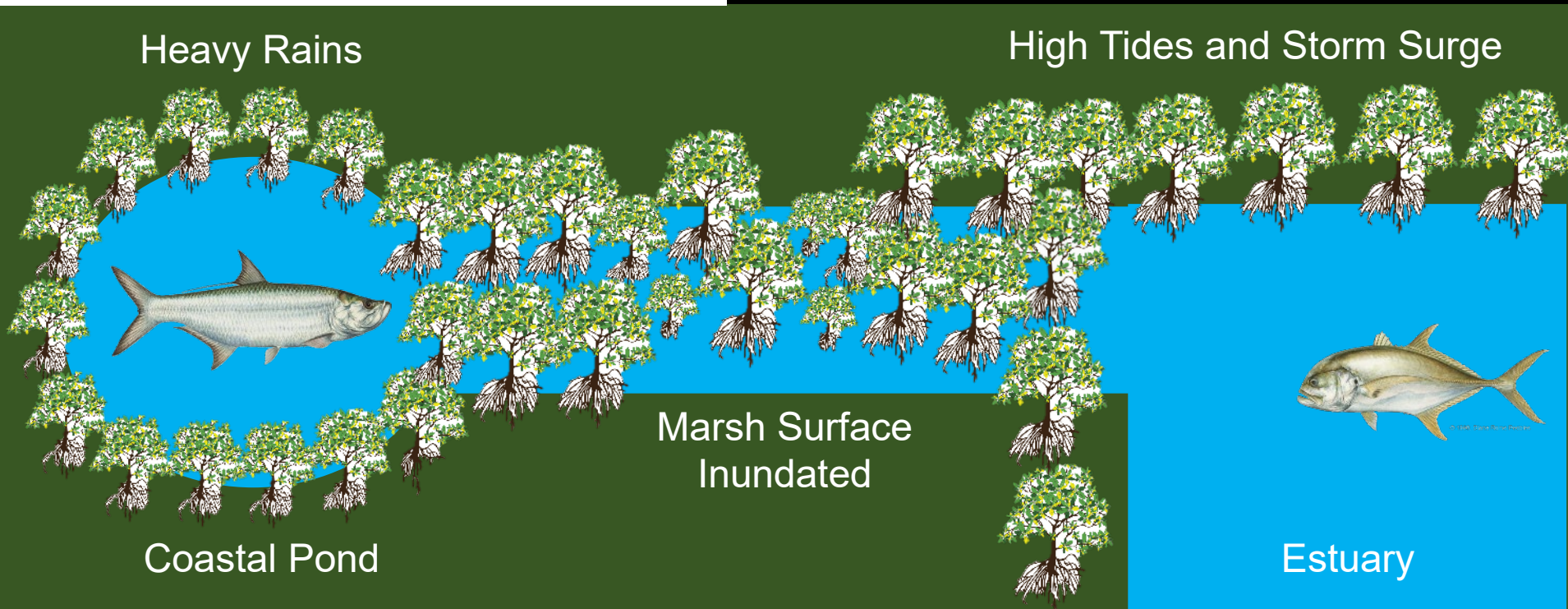


= Acoustic Receiver

= Water Level Logger



Matt Bunting
UF Masters Student

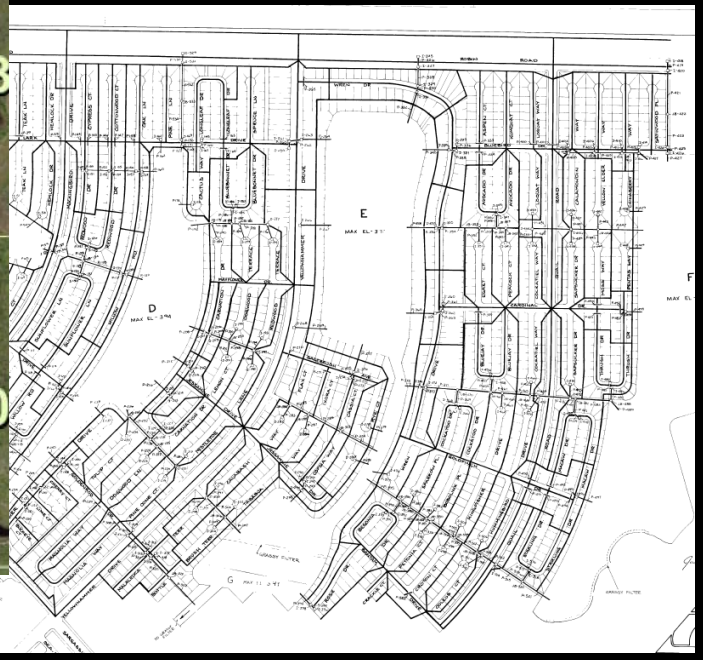


How to conserve coastal ponds – Juvenile snook and tarpon habitat

Who are the “managers”?

Land use planning

Stormwater infrastructure




Fish
&Wildlife
Foundation
of Florida


CHARLOTTE
COUNTY
FLORIDA
1921


SPORT FISH
RESTORATION


FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION


SOUTHWEST FLORIDA
WATER MANAGEMENT DISTRICT


FLORIDA FISH AND WILDLIFE
CONSERVATION COMMISSION

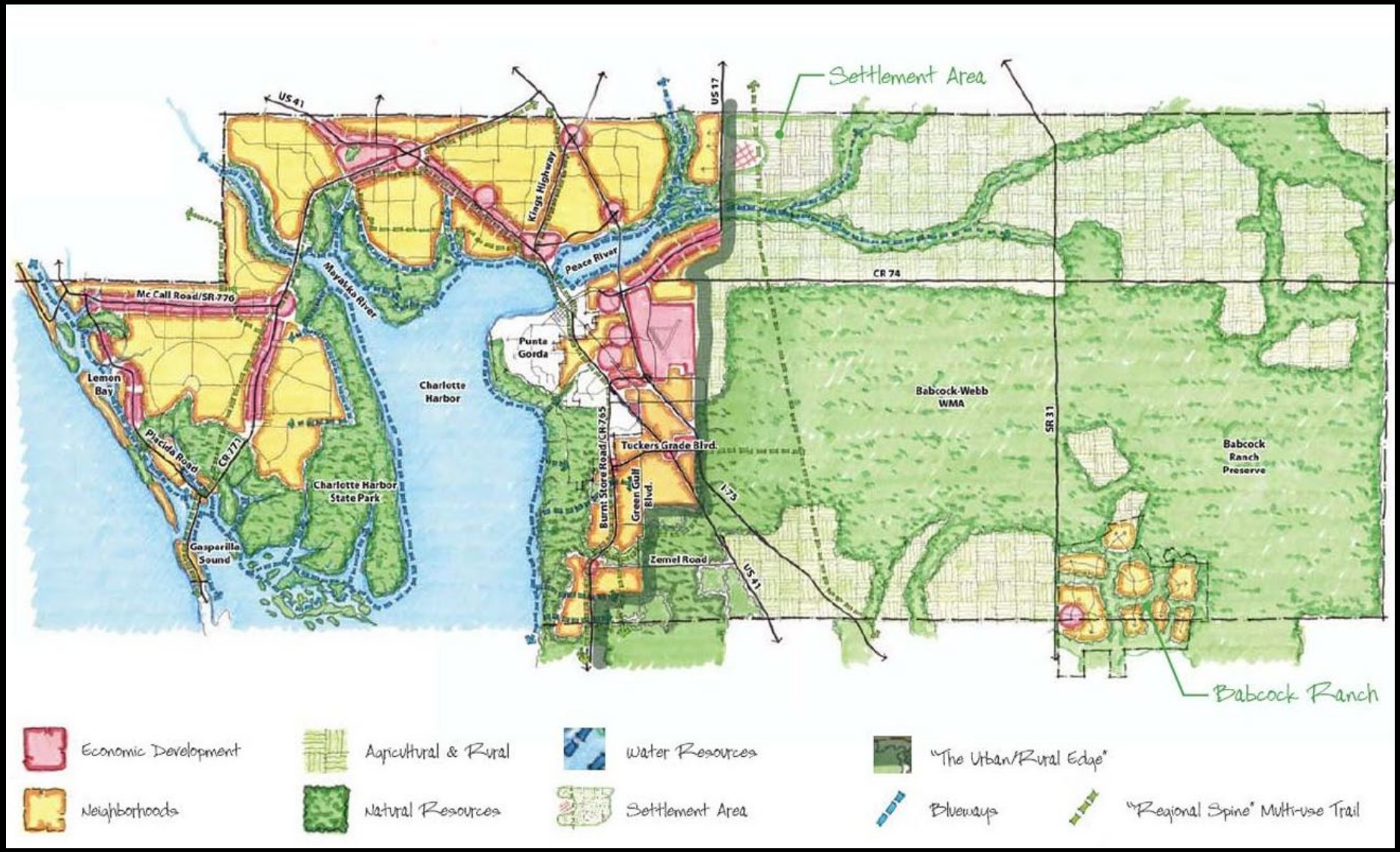

COASTAL & HEARTLAND
NATIONAL ESTUARY PARTNERSHIP


Bonefish
&Tarpon
TRUST

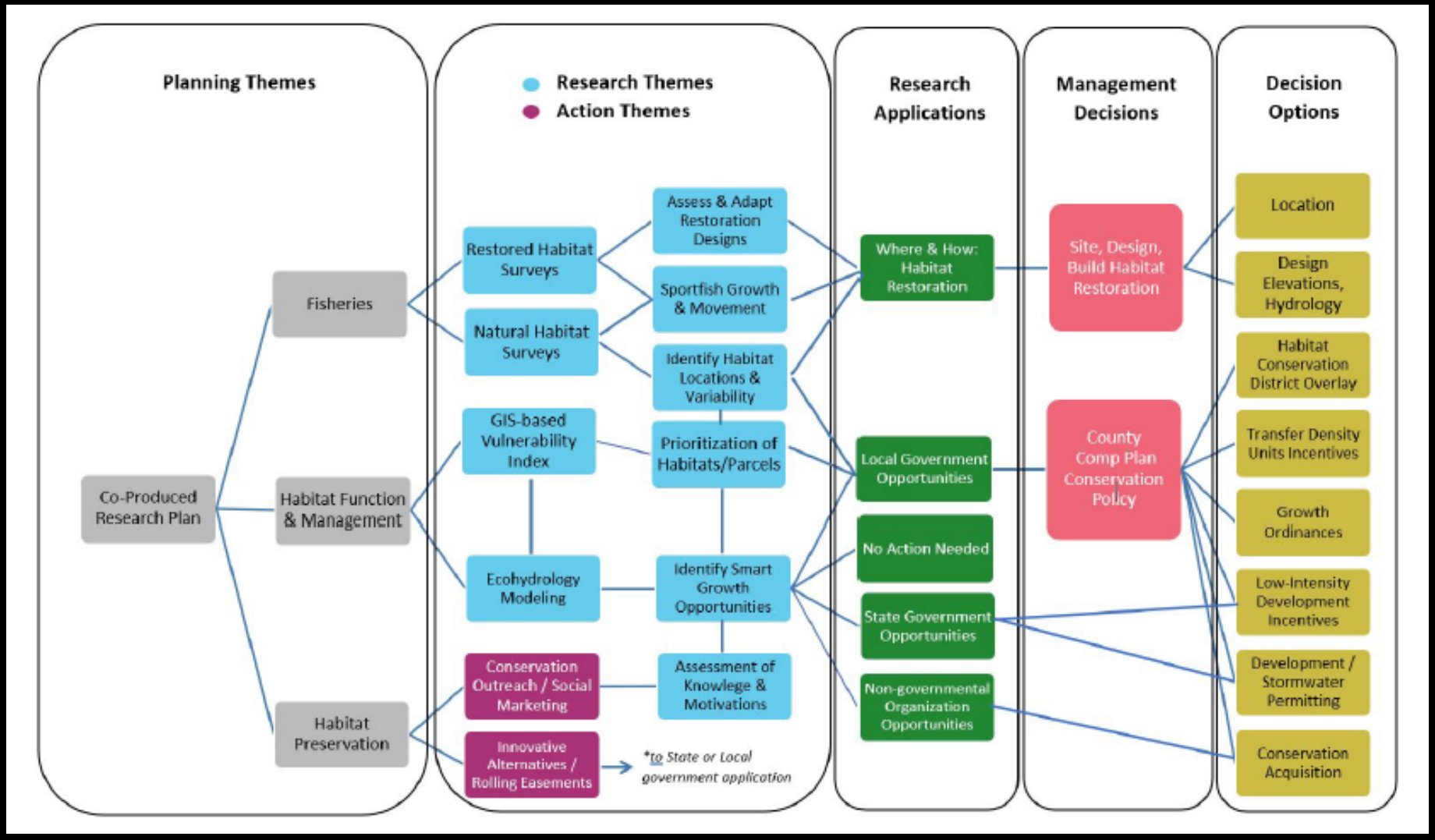

UF
UNIVERSITY of
FLORIDA

NOAA RESTORE Grant: Planning for Actionable Science

2050 Charlotte County Land Use



Planning meetings with managers and scientists



A Co-Produced Research Plan (5 yrs)

Final Report

Knowledge Co-Production for Place-Based Recreational Fishery Conservation in Charlotte Harbor, Florida: A Research and Application Plan

Photo Credit: Sportfish habitats, Charlotte County, FL | *Corey Anderson/FWC*

Prepared for:

CHARLOTTE COUNTY FLORIDA

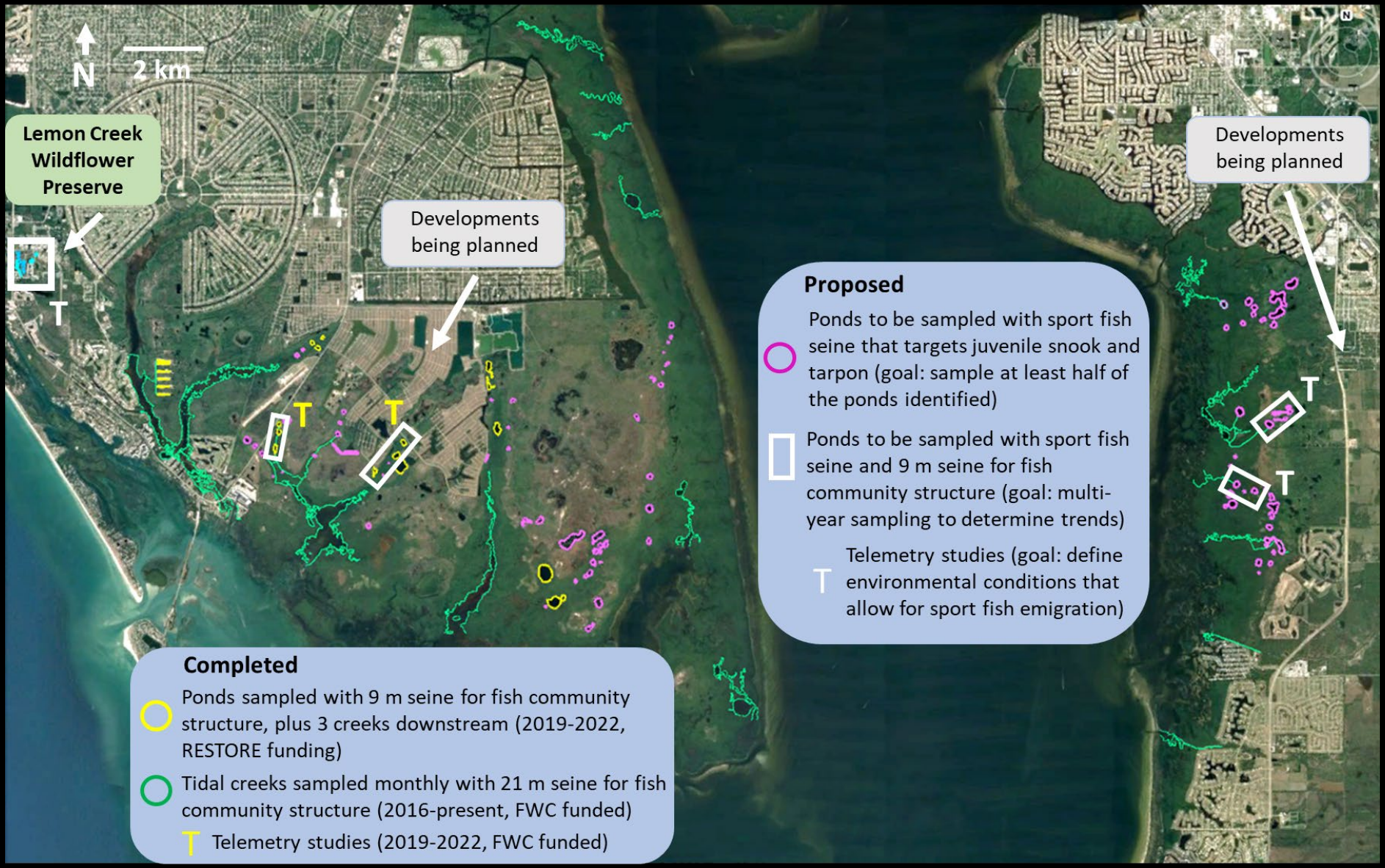
Fish & Wildlife

Prepared by:

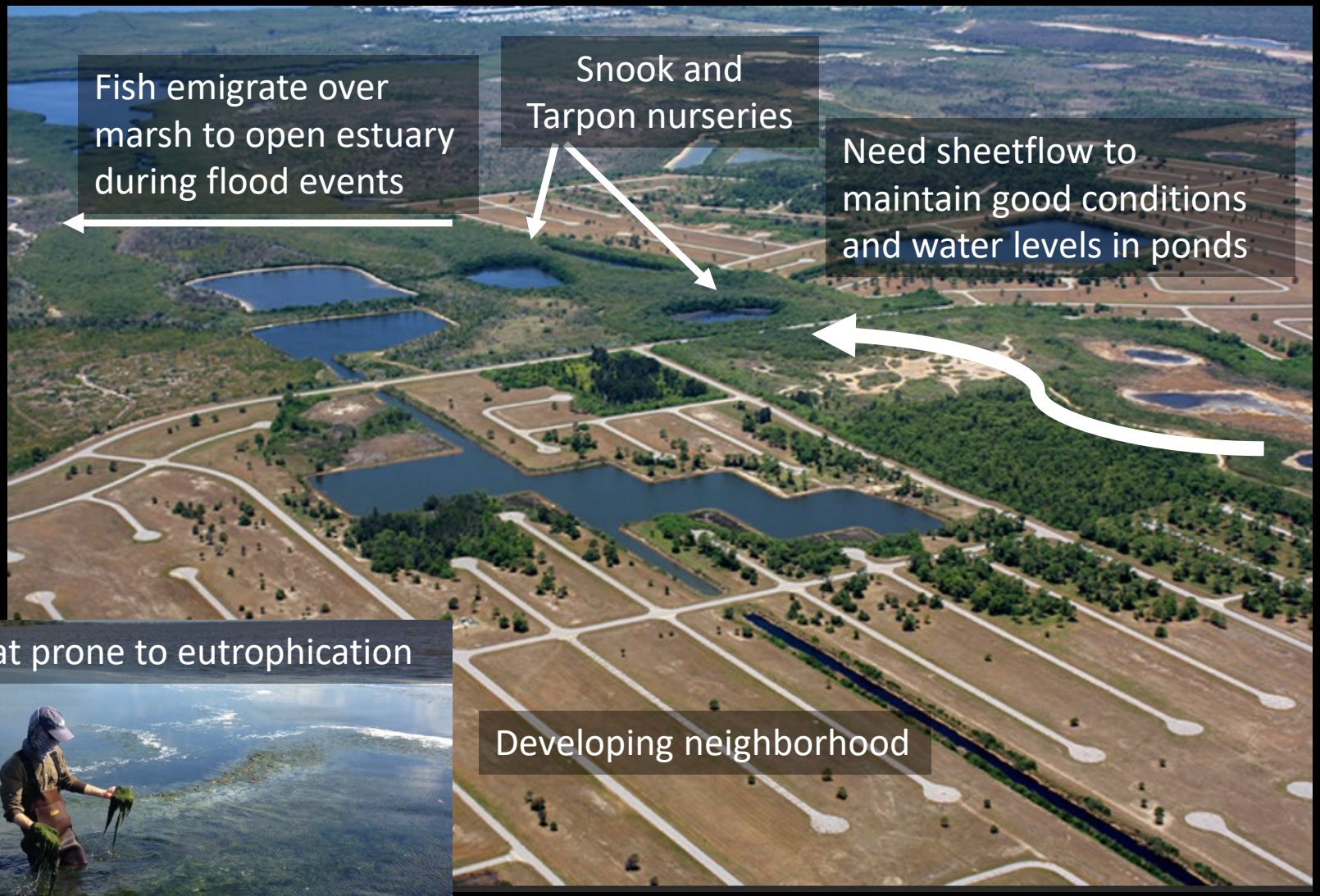
Janicki Environmental, Inc.

August 2022

Fish Sampling

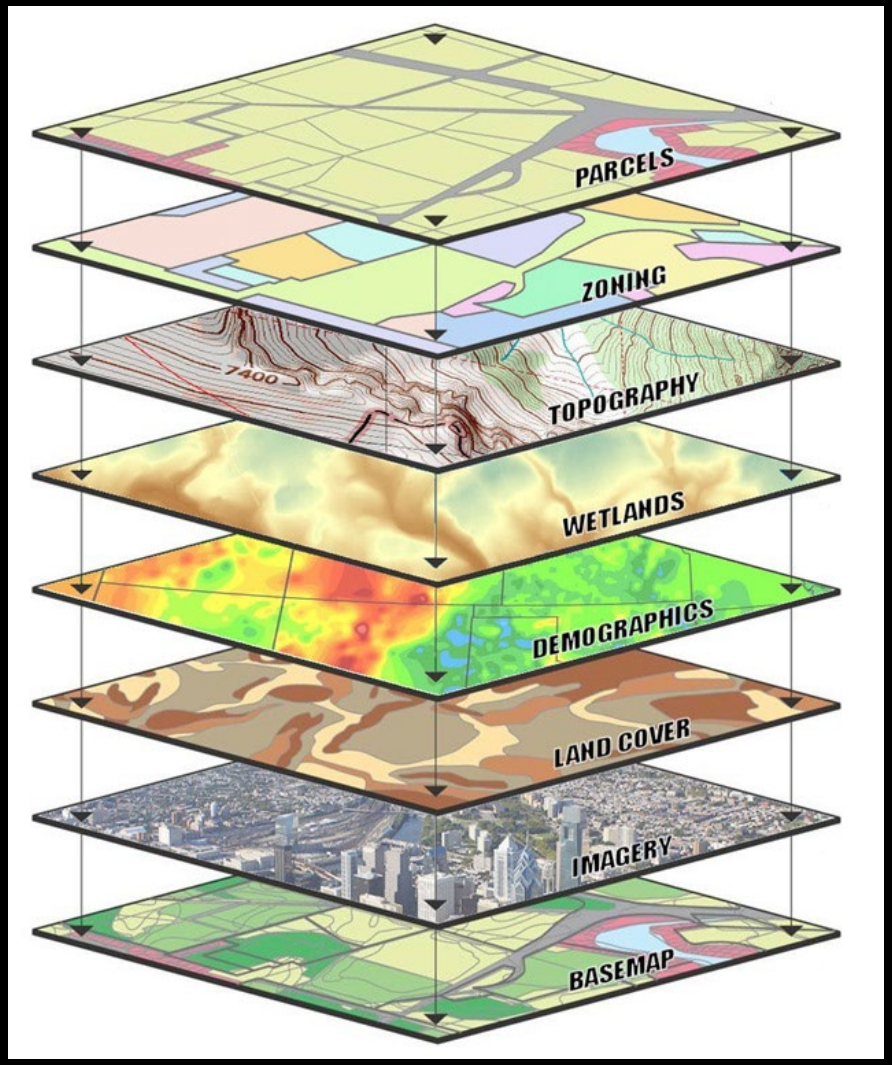


Hydrologic Modeling



Habitat prone to eutrophication

GIS Tools – Identify Conservation Opportunities



Work also informs:
Knowledge co-production for restoration

- Characterize what Biologists know in terms for Engineers
- Develop general design models based on reference habitats

Acquire the engineering specs

Creek/ditch connection

More snook at -0.6m NAVD88

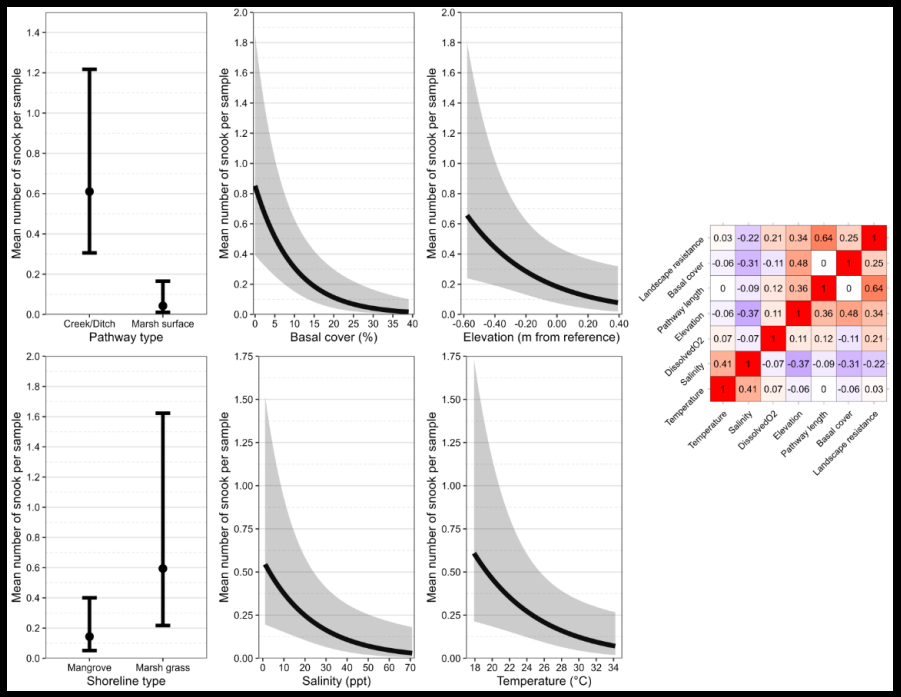
Basal cover < 10%

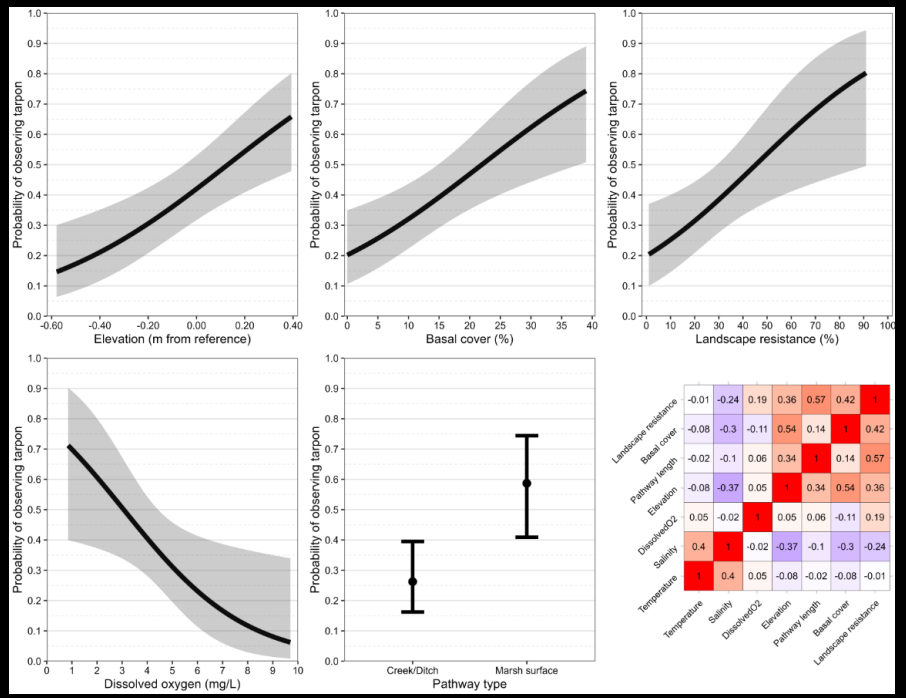
Species overlap at -0.4m NAVD88

Ponds separated by mangrove forest

More tarpon at 0.2m NAVD88

Basal cover >30%





Robinson Preserve Expansion Restoration

Lemon Creek Wildflower Preserve

LEMON BAY CONSERVANCY
ESTABLISHED 1971

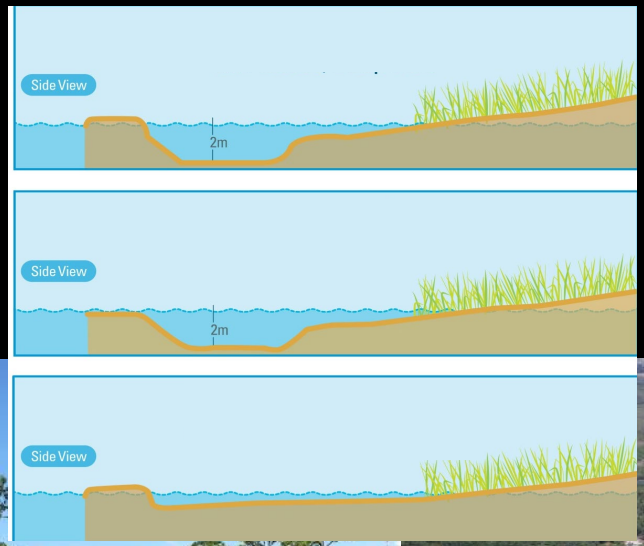
NOAA

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

COASTAL & HEARTLAND NATIONAL ESTUARY PARTNERSHIP

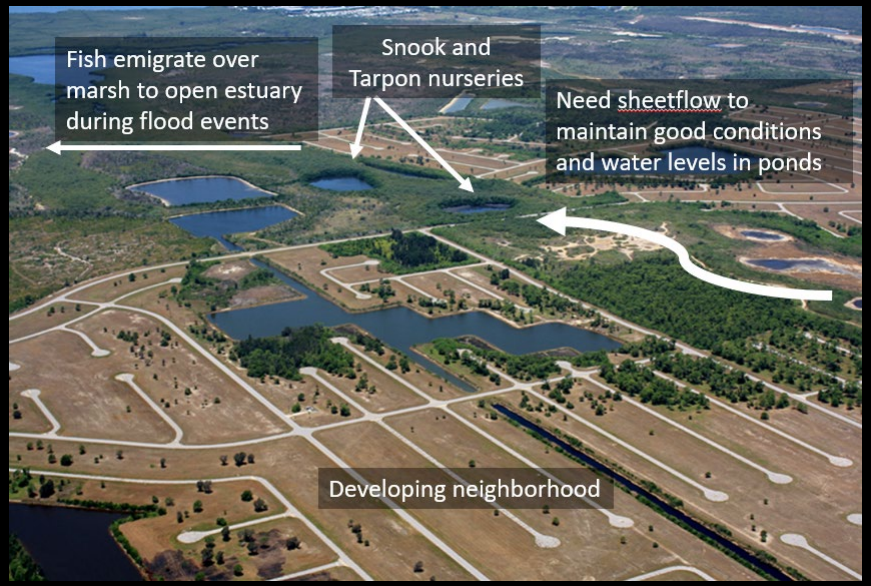
Bonefish & Tarpon TRUST



Experimental design:
Connection type and depth

Charlotte Harbor Preserve State Park: Coral Creek

Including hydroecological connections at the land-sea interface in conservation of sportfish habitat



Slides for questions

Planning for the future…

Nurseries in an urban landscape?