Integrating Coastal and Aquatic Habitat Information Into Fisheries Management

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FWC Division of Marine Fisheries Management

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Photo Credit: Southwest Florida WMD

Presentation Overview

Part 1

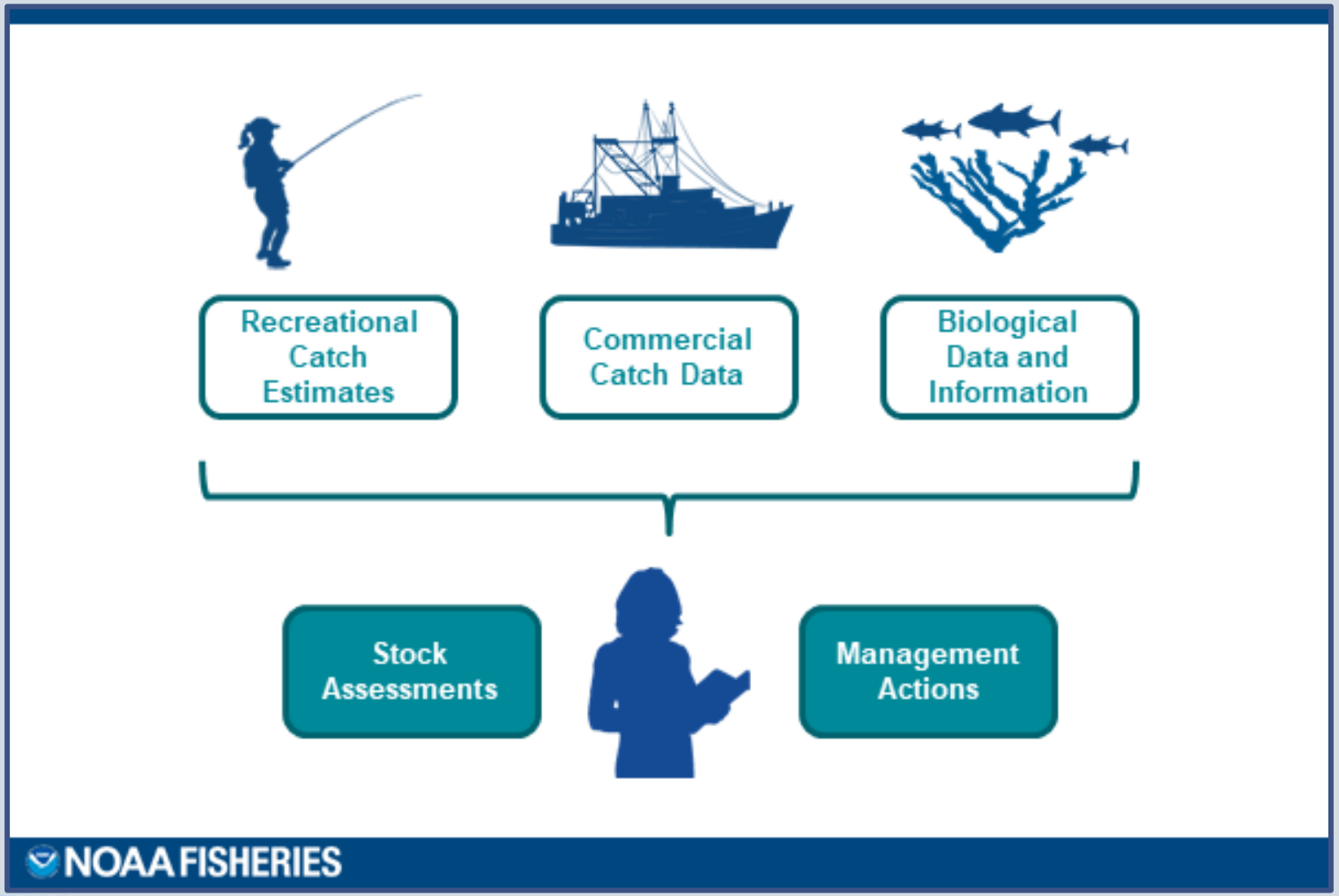
Using habitat information to inform fisheries management decisions

Part 2

Promoting sustainable fisheries through habitat conservation

Photo credit: Kody Glass

Traditional Fisheries Management Framework



Graphic Credit: NOAA Fisheries

Fisheries Management is Changing

Modeling Quantitative Value of Habitats for Marine and Estuarine Populations

Romuald N. Lipcius[1], David B. Eggleston[2], F. Joel Fodrie[3], Jaap van der Meer[4], Kenneth A. Rose[5], Rita P. Vasconcelos[6,7] and Karen E. van de Wolfshaar[8]*

Salt marshes as nurseries for nekton: testing hypotheses on density, growth and survival through meta-analysis

Thomas J. Minello[1,*], Kenneth W. Able[2], Michael P. Weinstein[3], Cynthia G. Hays[4]

Single species, escapement & mortality

↓

+ habitat availability

↓

+ water quality, spatial planning

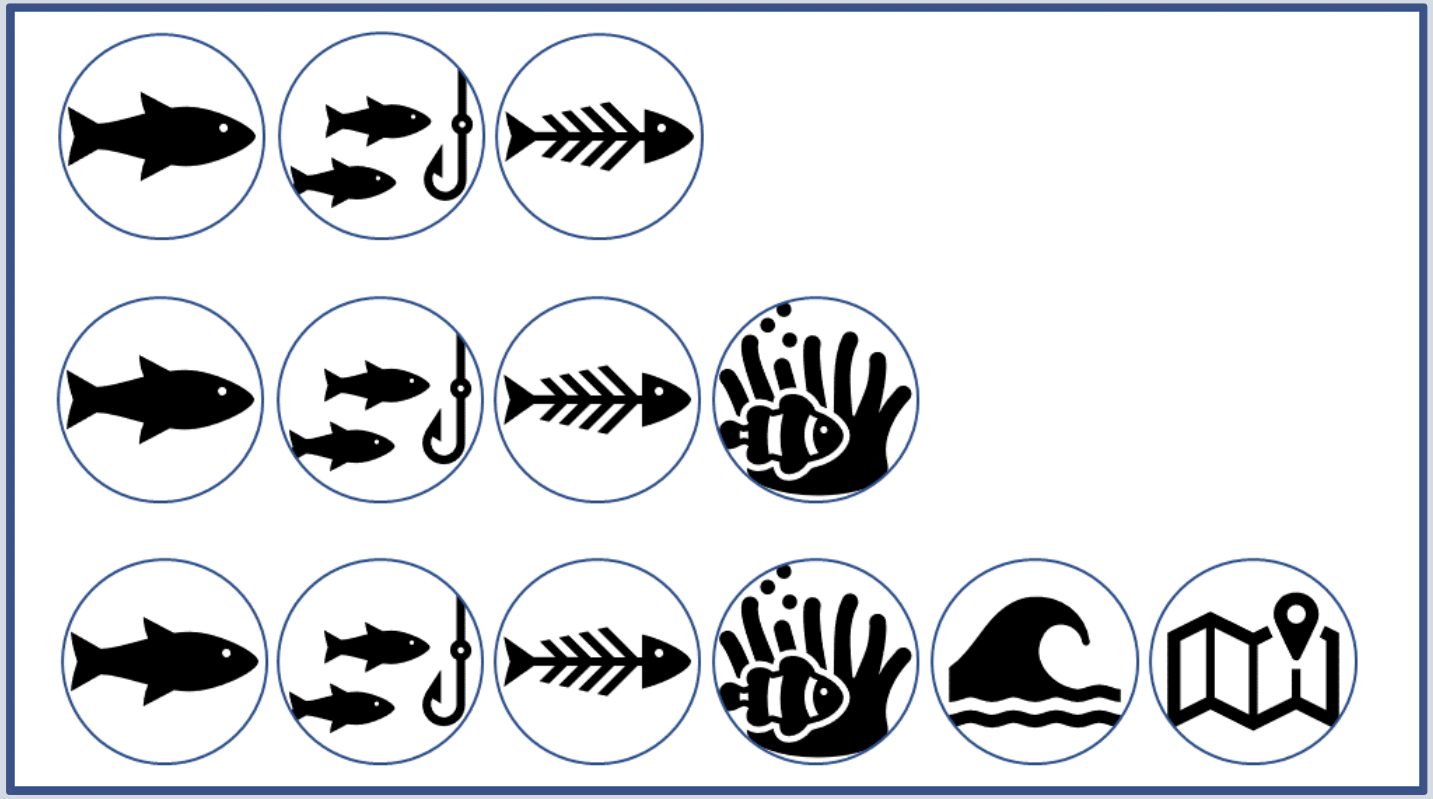


Figure inspired by Dolan et al. 2016

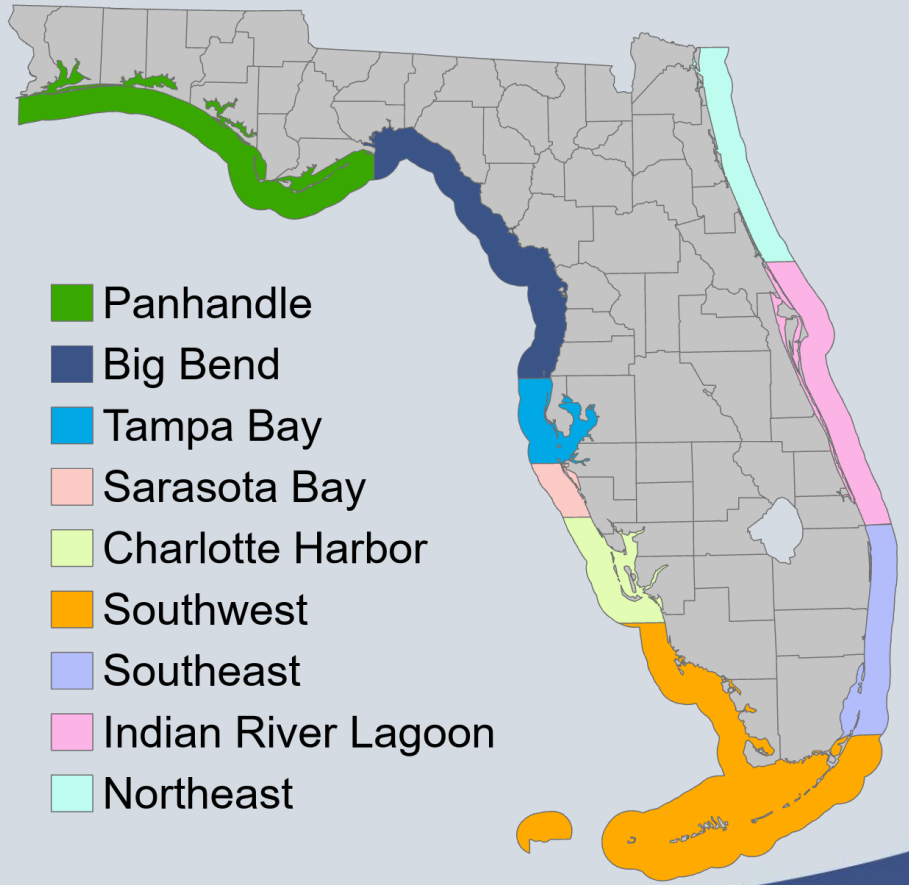
Stakeholder Feedback

- Concerns about their local fishing experience
  - Related to environmental issues
  - Increased fishing effort
- Stakeholder interests
  - Smaller management regions
  - Additional management metrics
  - Greater transparency

Graphic Credit: FWC

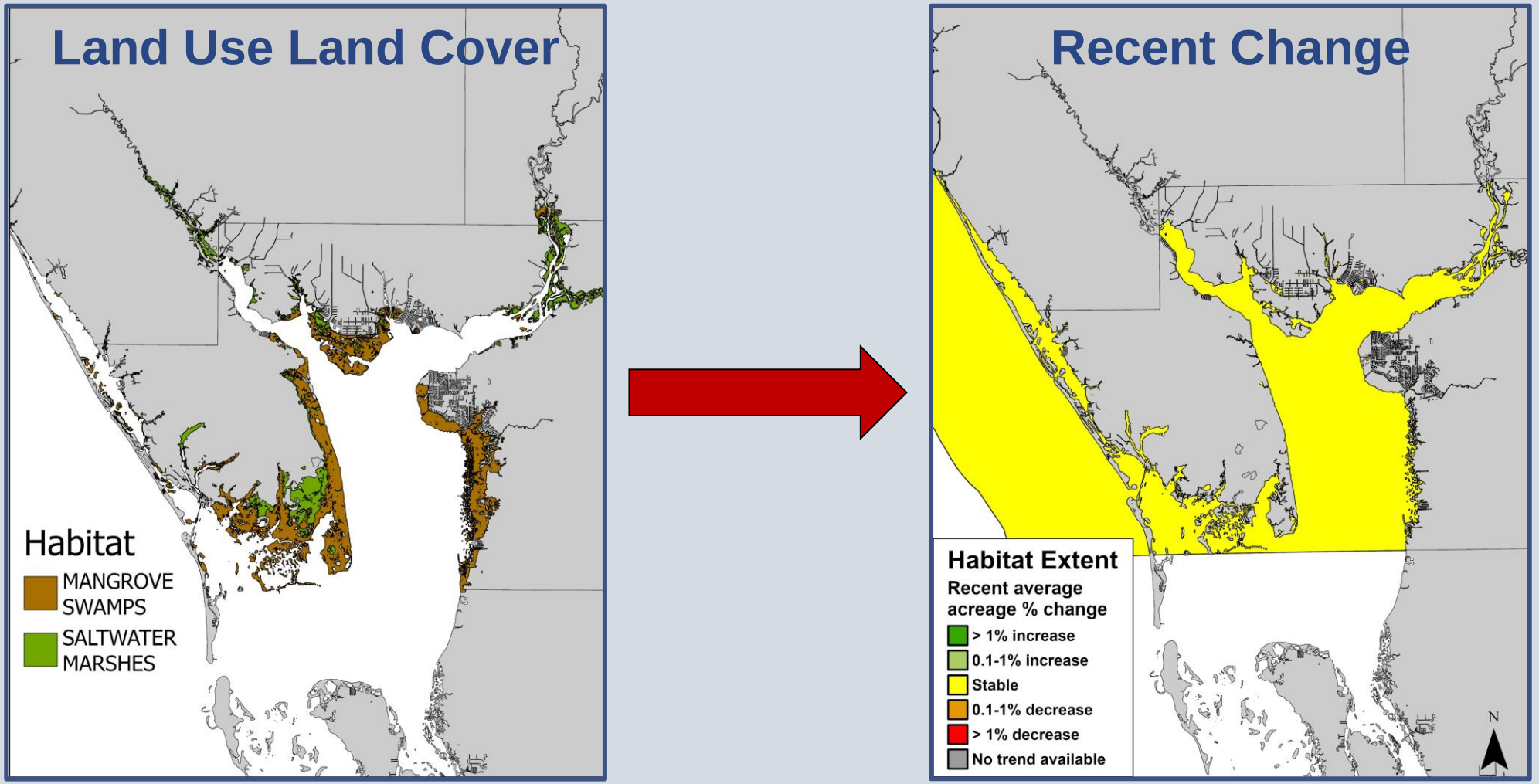
Holistic Fisheries Management

- Explicitly include regional differences in ecological and anthropogenic factors into management process
- Greater flexibility for addressing smaller scale regional issues
- Management metrics evaluated annually
  - Stock assessment
  - Relative abundance
  - **Habitat**
  - **Harmful algal blooms**
  - Fishing effort and landings
  - Stakeholder feedback
  - **Temperature (snook only)**



Graphic Credit: FWC

Habitat Metric: Saltmarsh and Mangroves



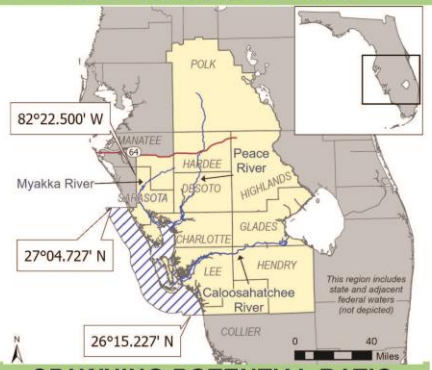
Graphic Credit: FWC

Annual Review of Metrics

2023 Annual Review of Snook Management Metrics

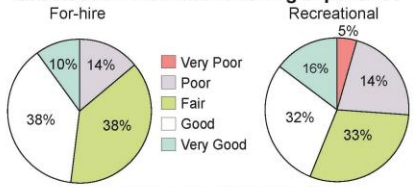
CHARLOTTE HARBOR SNOOK MANAGEMENT REGION

REGION BOUNDARIES

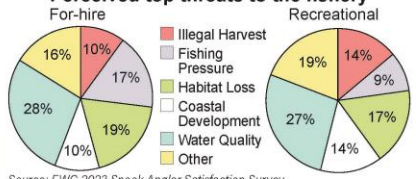


STAKEHOLDER FEEDBACK

Satisfaction with recent fishing experience



Perceived top threats to the fishery



Source: FWC 2023 Snook Angler Satisfaction Survey

SPAWNING POTENTIAL RATIO

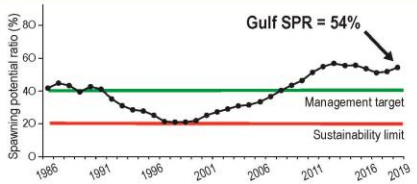


Figure 1. Estimated spawning potential ratio (SPR) for the Gulf of Mexico stock assessment region compared to limit and target.

Source: FWC 2020 Snook Stock Assessment

HARMFUL ALGAL BLOOMS

Likelihood of fish kills	Frequency	Average duration (months)	2022 duration (months)
Possible	20 out of 20 years (100%)	5.8	3
Probable	19 out of 20 years (95%)	5.0	3

Table 1. Frequency and duration of red tide where fish kills were possible or probable within the region over the previous 20 years.

Source: FWC FWRI, Harmful Algal Bloom Group

ABUNDANCE TRENDS

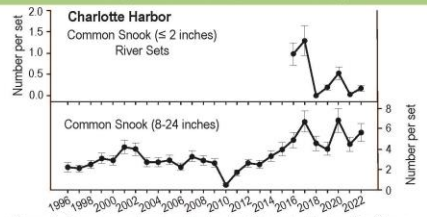


Figure 2. Abundance trend estimates for Charlotte Harbor. Top figure is young-of-year (<1 year old) snook sampled in the river and below, sub-adults/adults (8-24 inches) sampled in the bay.

Source: FWC FWRI Fishery Independent Monitoring Program

FISHING EFFORT AND LANDINGS

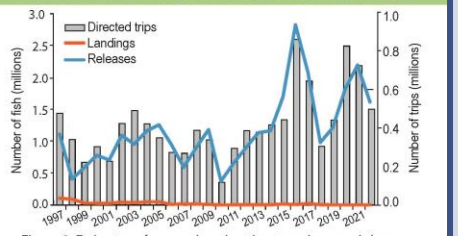


Figure 3. Estimates of annual angler trips targeting snook (gray bars), landings (orange line), and releases (blue line).

Source: NOAA Fisheries Marine Recreational Information Program (MRIP)

HABITAT TRENDS

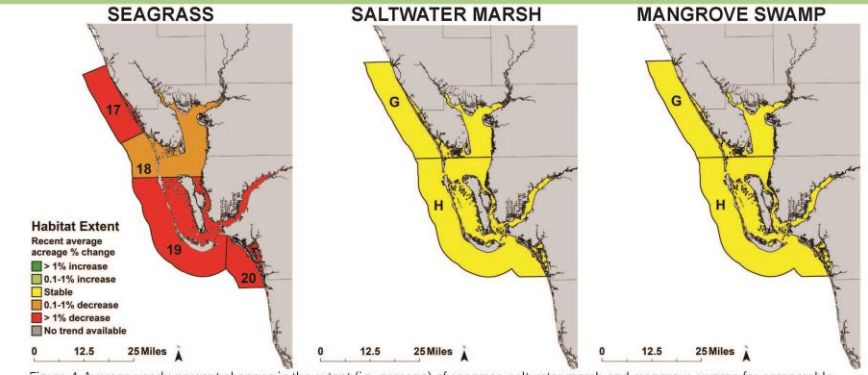


Figure 4. Average yearly percent changes in the extent (i.e., acreage) of seagrass, saltwater marsh and mangrove swamp for comparable years. Date ranges for the comparisons are provided in Table 2.

Location	Monitoring zone	Annual recent change (reference years)	Long-term overall change (reference years)
17 – Seagrass	Lemon Bay	-2.2% (2020-2022)	-5.7% (1988 vs. 2022)
18 – Seagrass	Upper CH	-1.0% (2020-2022)	-18.5% (1988 vs. 2022)
19 – Seagrass	Lower CH	-1.1% (2014-2021)	14.9% (1999 vs. 2021)
20 – Seagrass	Estero Bay	-2.7% (2014-2021)	9.9% (1999 vs. 2021)
G – Saltwater Marsh	Charlotte Harbor (SWFWMD)	-0.07% (2017-2020)	-7.6% (1990 vs. 2020)
H – Saltwater Marsh	Charlotte Harbor (SFWMD)	0.03% (2016-2019)	25.9% (1995 vs. 2019)
G – Mangrove Swamp	Charlotte Harbor (SWFWMD)	-0.08% (2017-2020)	10.0% (1990 vs. 2020)
H – Mangrove Swamp	Charlotte Harbor (SFWMD)	-0.02% (2016-2019)	3.32% (1995 vs. 2019)

Table 2. Observed habitat changes in extent (i.e., acreage) for comparable surveys of seagrass, saltwater marsh and mangrove swamp. Locations correspond to the maps in Figure 4.

Sources: Southwest Florida Water Management District, South Florida Water Management District, FWC Fish and Wildlife Research Institute

TEMPERATURE

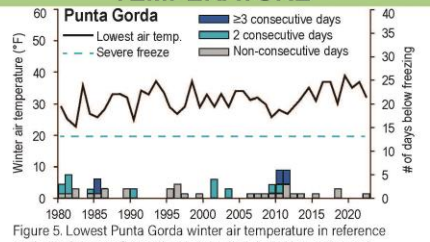


Figure 5. Lowest Punta Gorda winter air temperature in reference to the 20°F severe freeze threshold, which is the lower thermal tolerance of many tropical species. The bars represent the total number of occurrences of below freezing temperatures and indicate whether they were of non-consecutive days, 2 consecutive days, or ≥ 3 consecutive days. Consecutive days of air temperature below freezing is an indicator of water temperature dropping below the lower lethal limit for snook, which can result in fish kills.

Source: Applied Climate Information System

SUMMARY

- Spawning potential ratio in the Gulf of Mexico has been above the management target since 2009.
- Majority of survey respondents reported their recent snook fishing experience as either "good" or "fair."
- Sub-adult/adult snook abundance increased from 2010 to 2017 and has since fluctuated at that higher level with occasional declines during red tide events.
- Fishing effort and release levels decreased in 2022 following a spike between 2020 and 2021.
- Duration of the 2022 red tide bloom was less than average, but this region was impacted by an atypical red tide event in early 2023.
- The long-term impact on habitat, as well as related effects on fish populations, by Hurricane Ian in this region are still unknown but are being evaluated.
- Seagrass acreage in the northern portions of the region has declined since 2020, and current acreage is less than what was observed in 1988.
- Increasing presence of filamentous algae may be impacting seagrass and water quality.

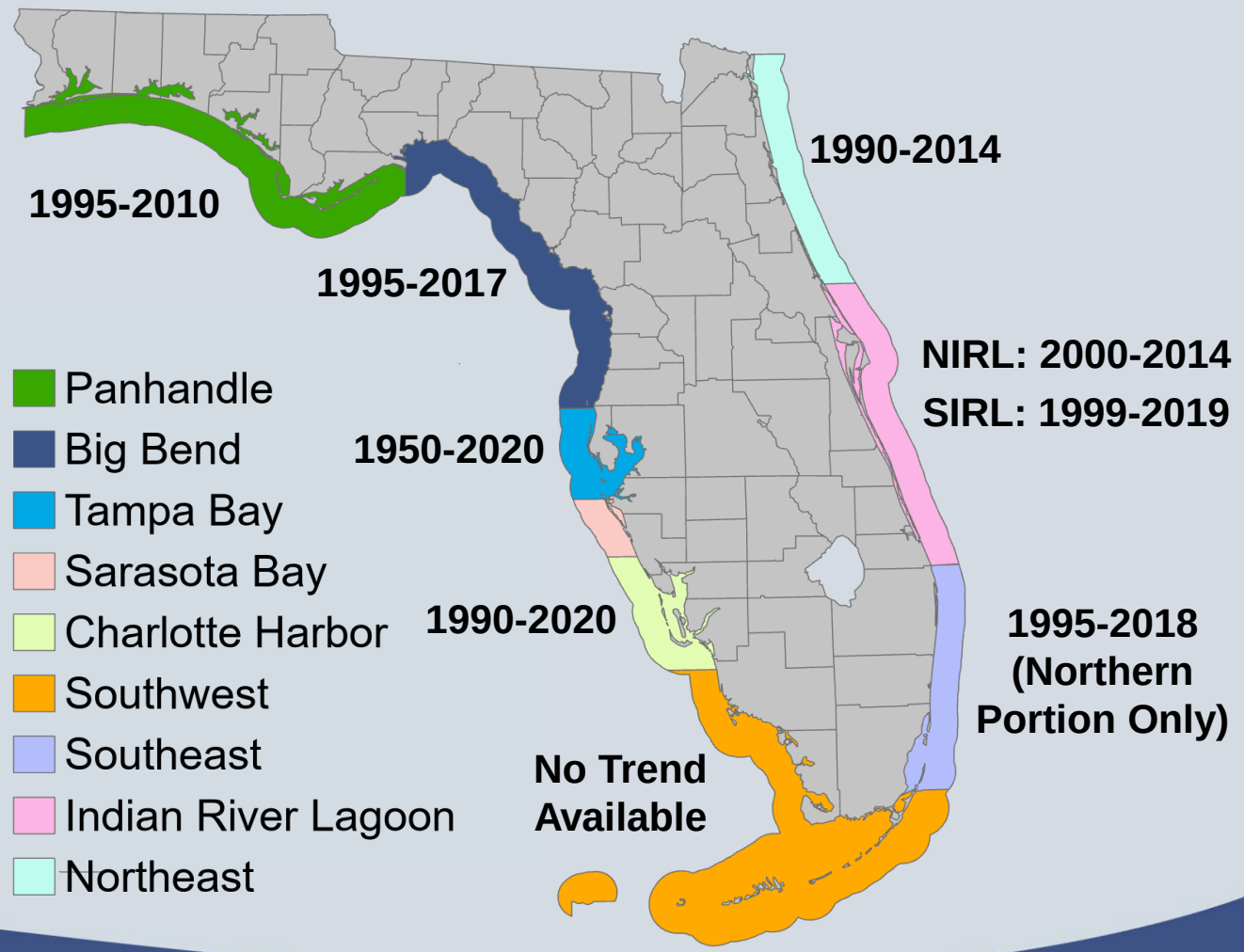
Graphic Credit: FWC

Spatial Variability

- Mapping data is variable across the state
- Mapping challenges
  - Limited resources
  - Variable methodologies
  - Coverage inconsistencies

Thank you partners for your habitat mapping efforts!

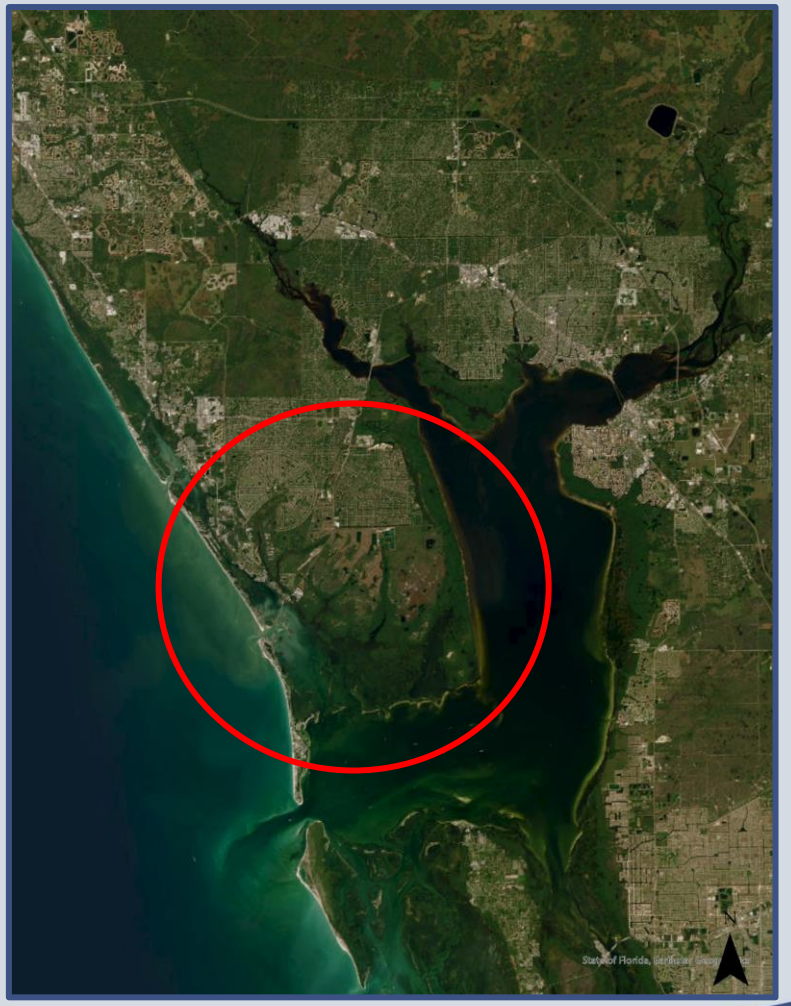
Mapping Time Series



Graphic Credit: FWC

Habitat Conservation

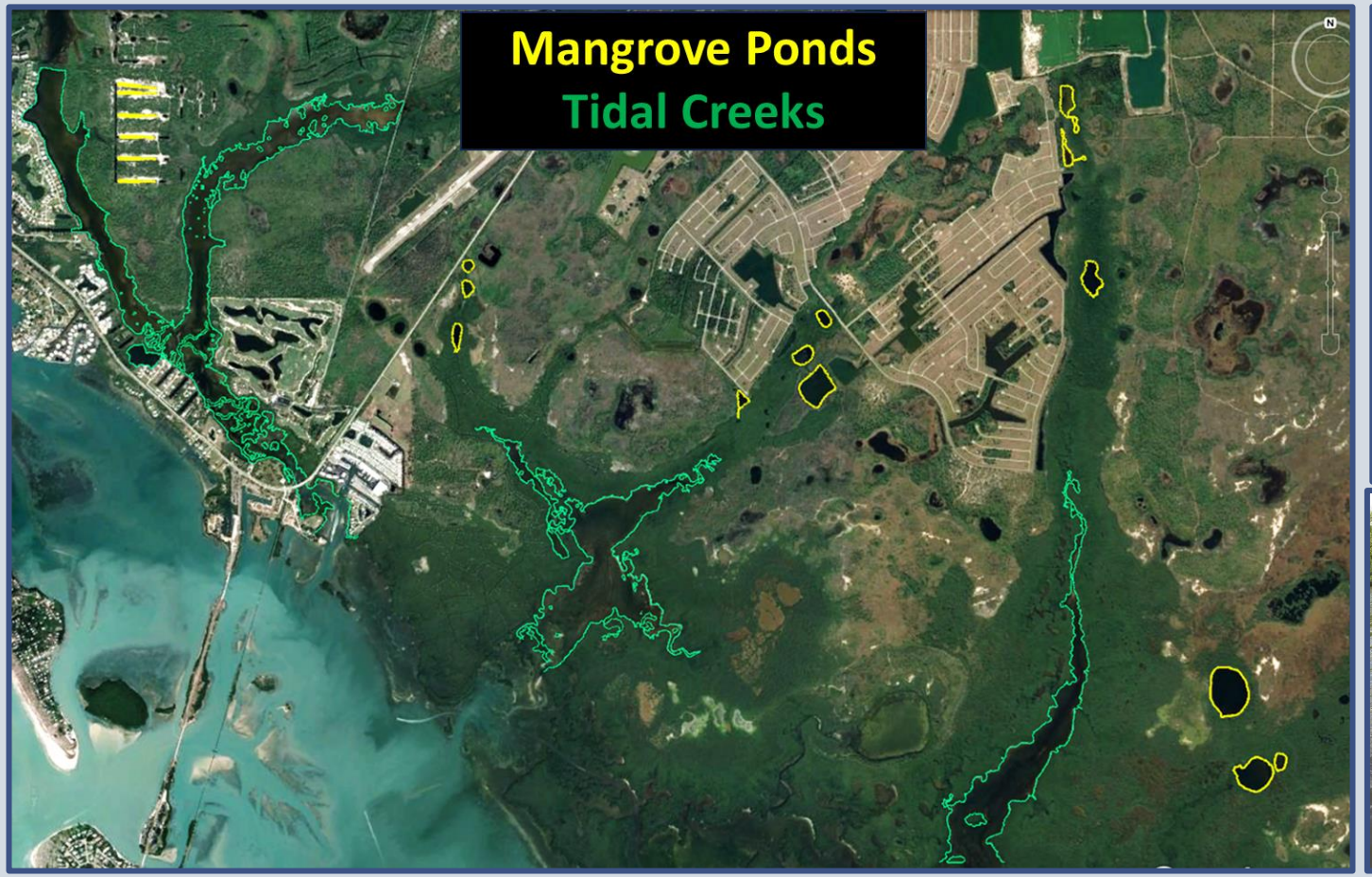
Charlotte Harbor



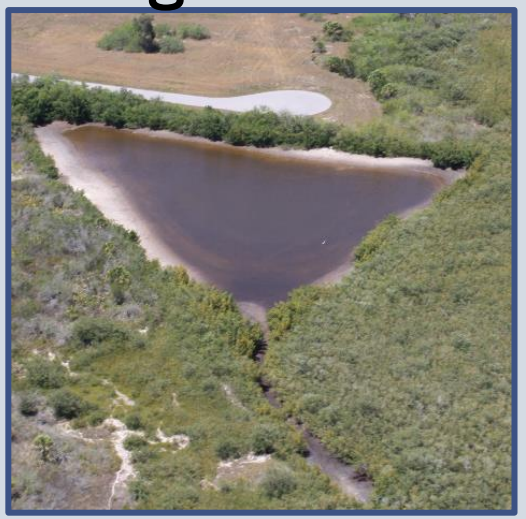
Graphic Credit: FWC

Research Informing Habitat Conservation

Tidal Creeks



Mangrove Ponds



Graphic Credit: FWC

The Conservation Challenge

How can we conserve critical fish habitat in a growing world?

Graphic Credit: FWC

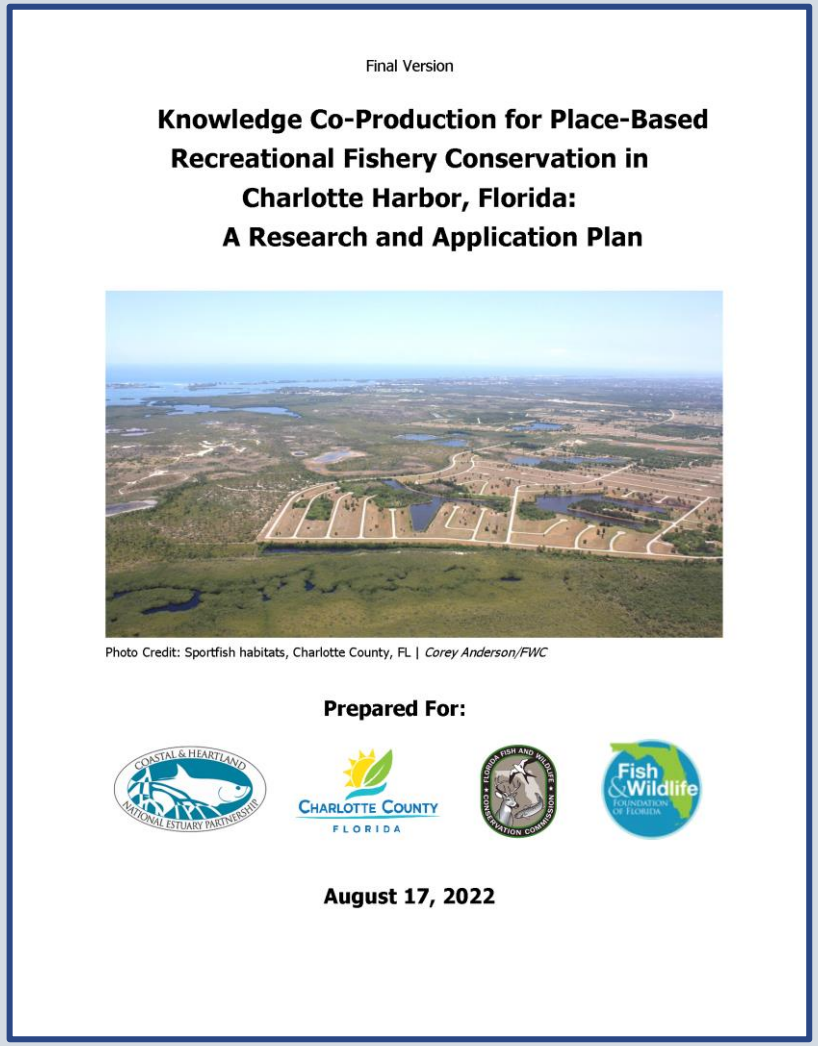
Collaborating with Key Partners

Phase 1: A Co-Produced Plan

- Planned Research Needs and Application
- Recommendations
  - Additional fish habitat research
  - Habitat and stormwater modeling
  - Conservation decision support tools
  - Public outreach for residents

Phase 2: Implementation (NOAA funded)

- Develop urban planning recommendations
- Promote economic resilience through environmental stability



Final Version

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:

August 17, 2022

Graphic Credit: FWC

Key Take-home Messages

- ***Continue mapping habitat!***
- ***Coastal habitat mapping data is critical for fisheries management decisions.***
- ***We need to continue to find new and innovative ways to protect and restore coastal marsh and mangrove habitat.***

Top photo courtesy: FWC
Bottom photo courtesy: Kody Glass

Questions