



L. Oberhofer

Recreational fisheries in the Everglades: status, trends, values & ties to restoration

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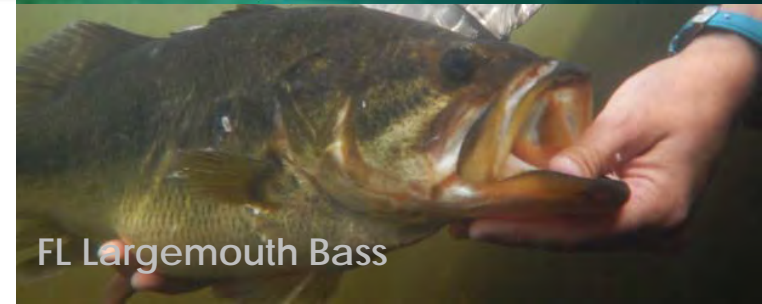
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Dr. Christopher Kavanagh, ENP

Tim McDonald, FWC

About us:

Fish – Fisheries – Angler dynamics: 15 yrs



Recreational fisheries in the Everglades:

1. Value of recreational fisheries

2. Status of recreational fisheries:

3. Fisheries-flows relationships



1. Value of recreational fisheries: **Florida**



Florida leads the US in:

1. Economic impact

- Sales, income, value added \$ + jobs
- Sales \$ 11 B/yr (16% of US)

2. Numbers of anglers

- 36% of all US fishing trips

3. Quality of fishing

- 15% of world records

Fishing is a core socioeconomic activity

1. Value of recreational fisheries: **Everglades**



Greater Everglades:

1 in 5 FL anglers fishes region

\$1.2 billion/yr in economic impact
(2008 \$)

FL Keys:

Fishing accounts **\$837 M/yr**

- 20% of tourism \$

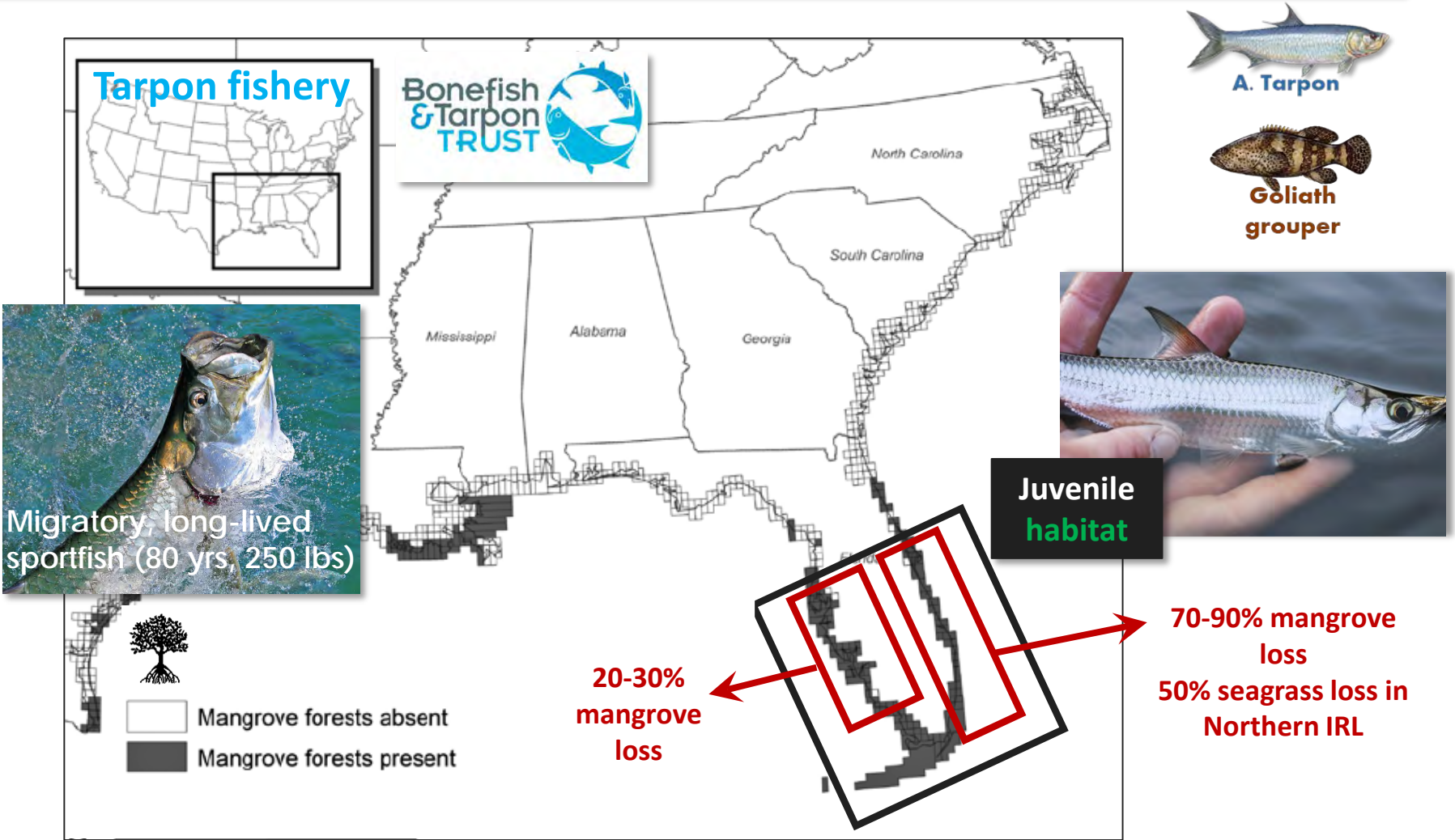
Florida Bay

\$439 M/yr in economic impact by
264,000 anglers

- Foregone benefits **\$69 M/yr**

1. Value of recreational fisheries: Everglades

Critical **habitat**: Increased reliance on **Everglades** with habitat loss



2. Status of recreational fisheries

Limited monitoring:

- Few long datasets
- Couple of spp

Informative sources:

A. Angler records

B. Local angler knowledge

2. Status of recreational fisheries

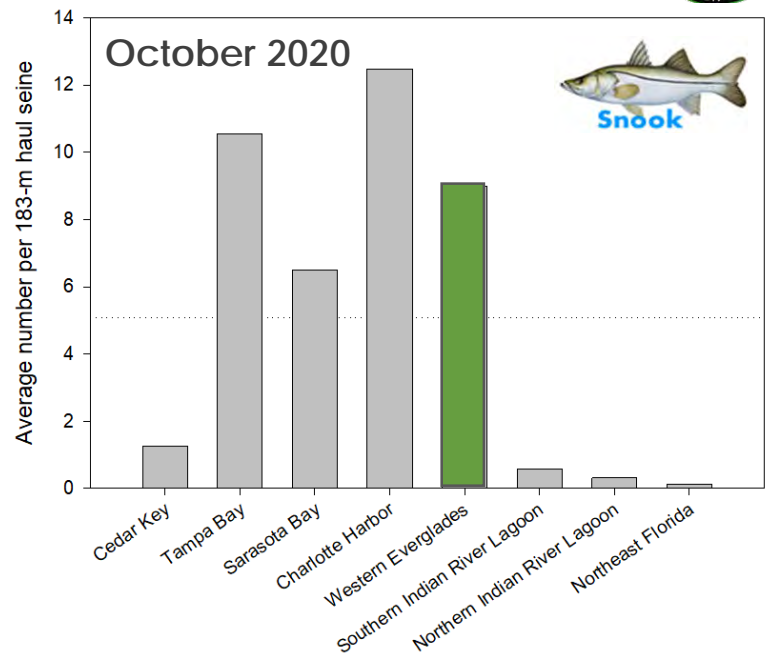
Limited monitoring:

- Few long datasets
- Couple of spp

Informative sources:

- A.** Angler records
- B.** Local angler knowledge

FWC Fisheries-Independent Monitoring



-Powerful **statewide** monitoring allows comparison

-Started in **Everglades** Fall 2020



2. Status of recreational fisheries

Limited monitoring:

- Few long datasets
- Couple of spp

Informative sources:

A. Angler records

B. Local angler knowledge

Dockside interviews at Flamingo/Everglades City



- 1980-present
- 192,728 reports (4,818/yr)
- Fisheries-dependent: catch/angler effort
- Used for spp trends & stock assessment
- Underutilized in restoration context



2. Status of recreational fisheries

Limited monitoring:

- Few long datasets
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Informative sources:

A. Angler records

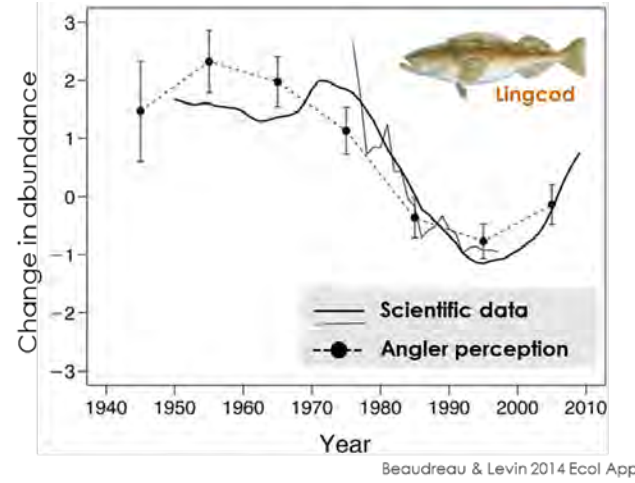
B. Local angler knowledge

Expert opinion = Resource users' *knowledge & beliefs*

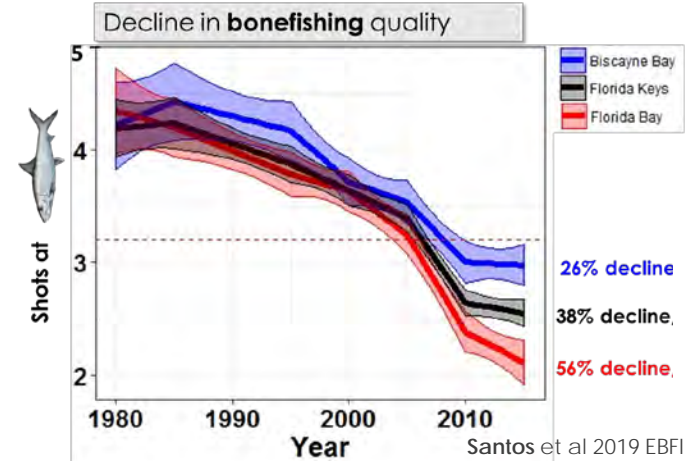
Fill in data gaps, complement & challenge data - **High-quality**

In **Everglades** = Expert **fishing guides** (decades, >250 days/yr)

Guide knowledge: detailed, reliable, inexpensive, real-time + partners in conservation



Quantitative: surveys



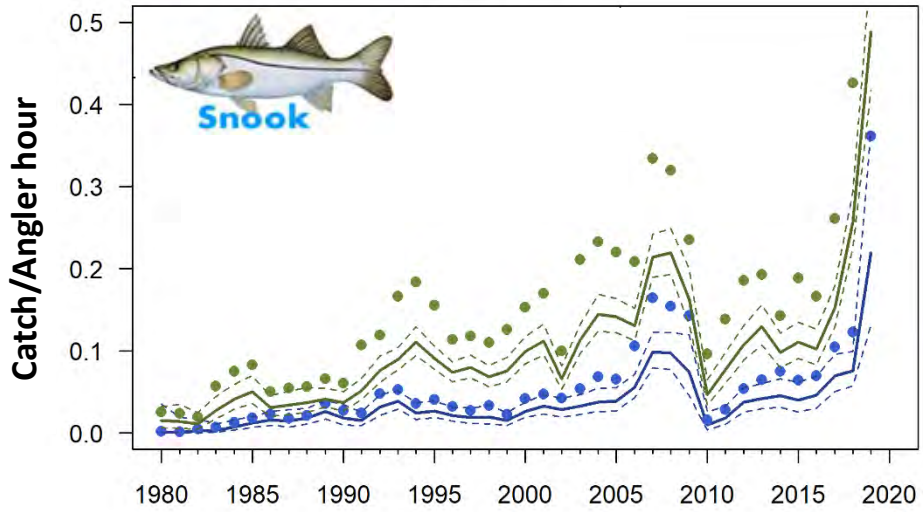
A. Angler records



A. Angler records



— Backcountry
— Florida Bay

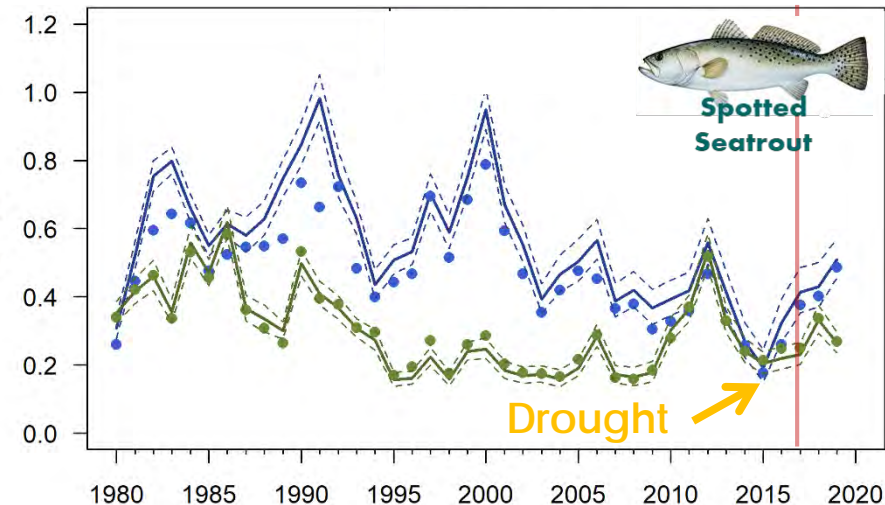
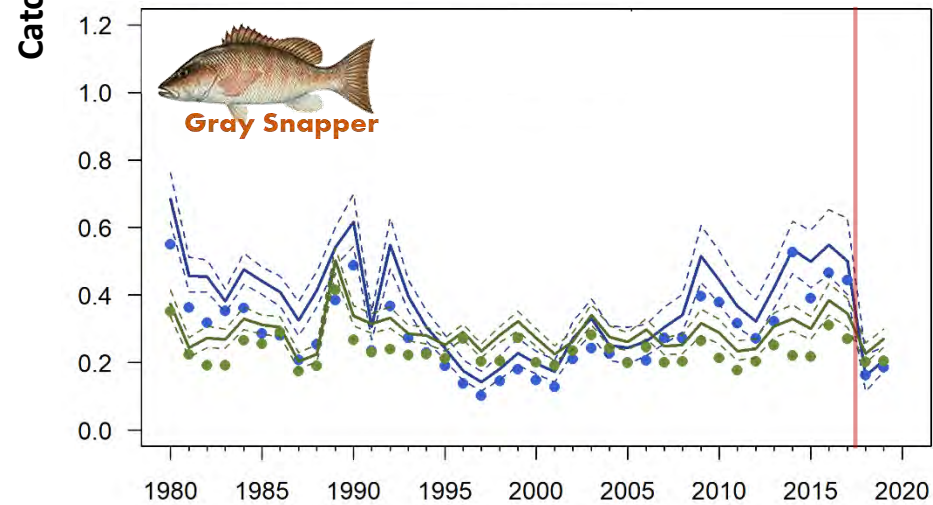
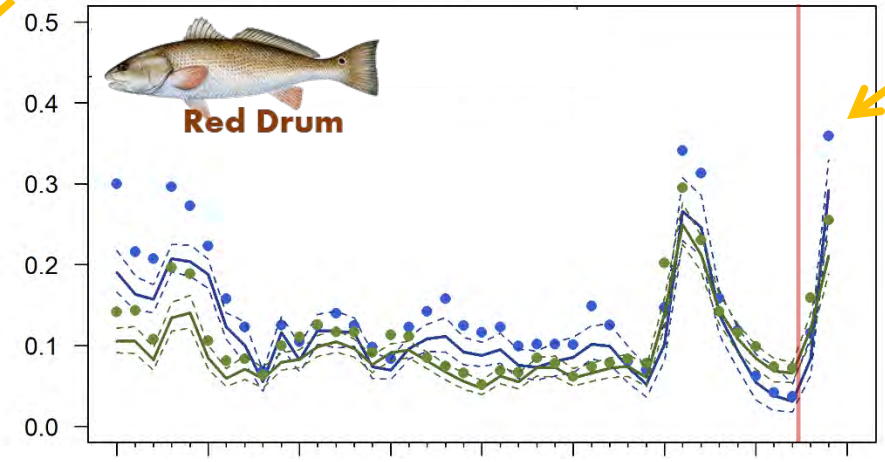
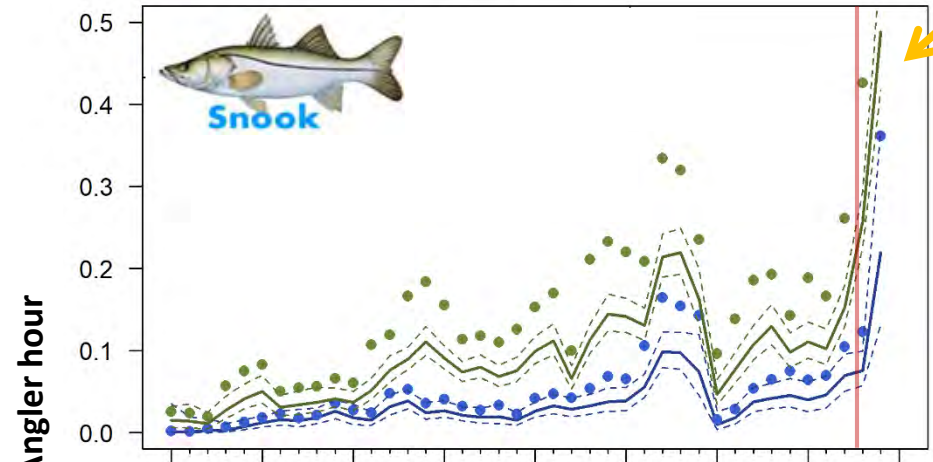


A. Angler records

- High **Snook** & **Red drum** catches
- Steady catches for **Gray Snapper**
- Low **Seatrout** catches in FL Bay



— Backcountry
— Florida Bay



Hurricane Irma

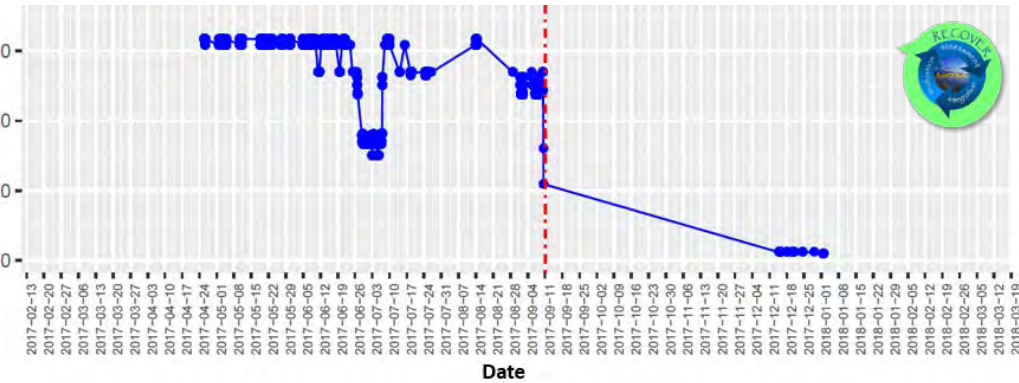
-Fish spawn with
- **Irma** = spawning season of



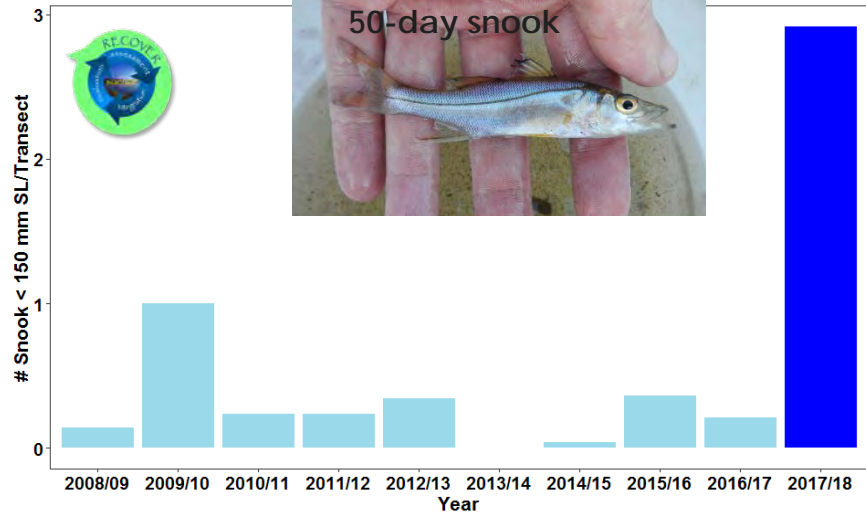
-**Snook** movements are best explained by rapid increase in stage



Detections/River Km



Snook exited Shark River to spawn



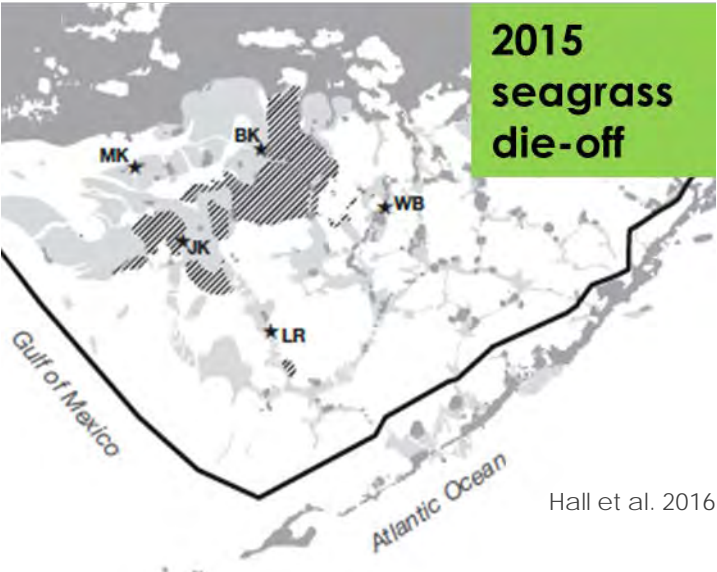
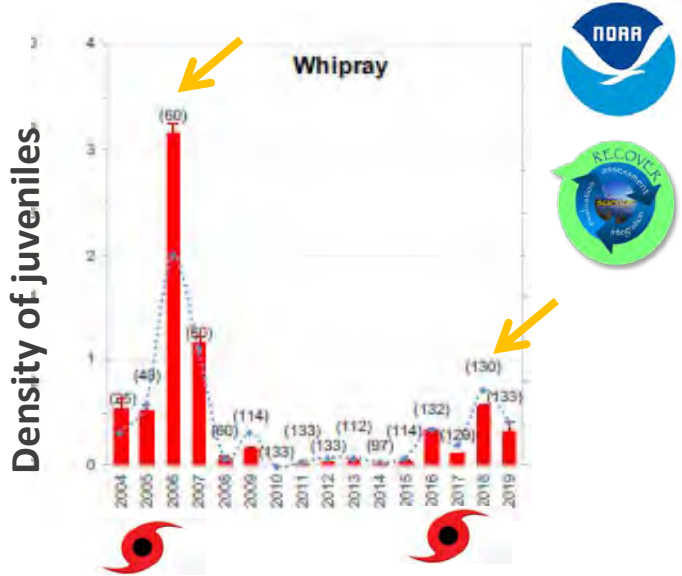
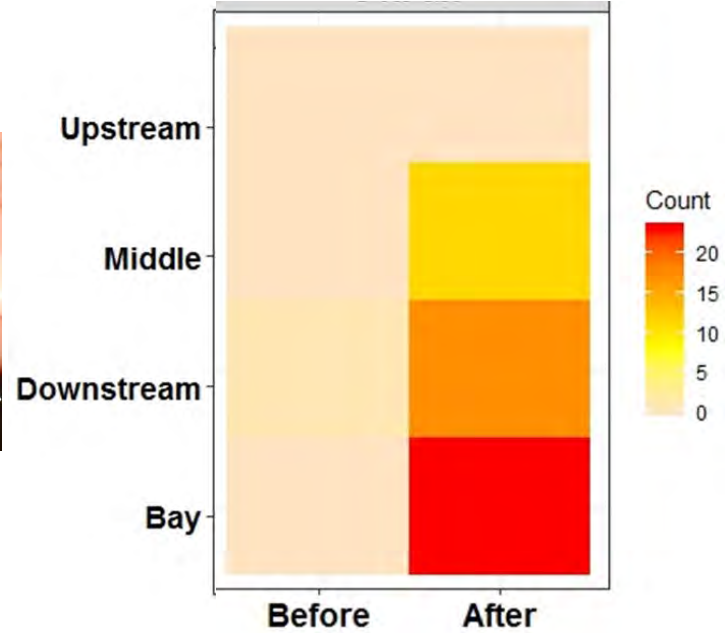
Highest number of baby **snook**

FL Sportsman article '**Hurricane** babies'

Hurricane Irma



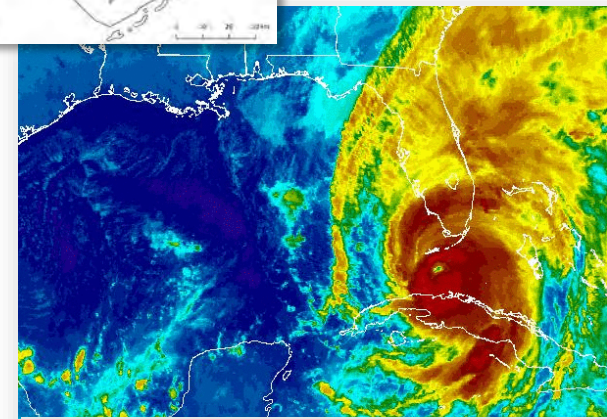
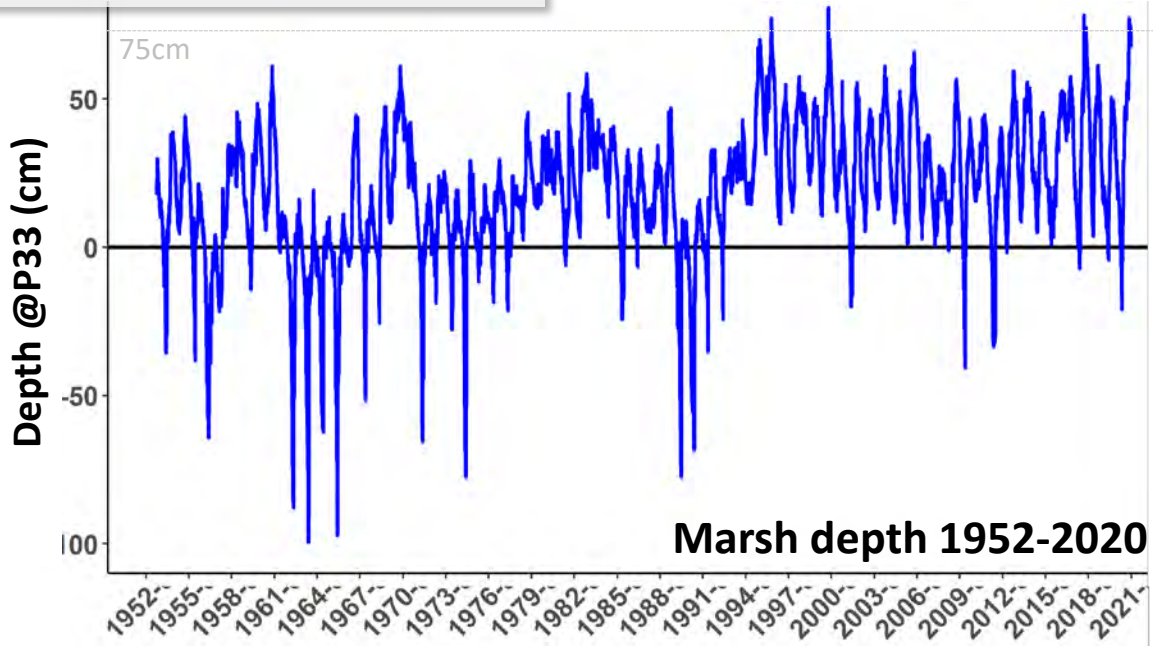
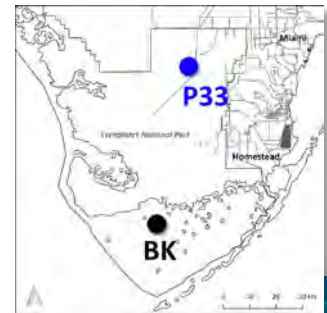
Highest number of baby redfish



Hall et al. 2016

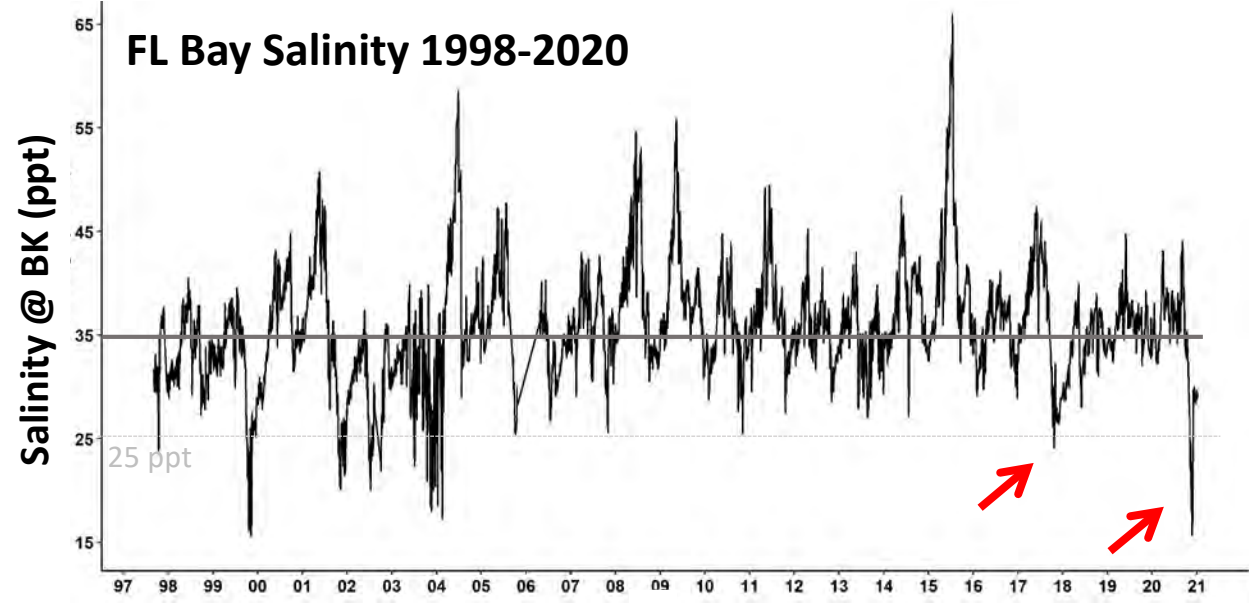
Good recruitment but modest & no benefit to fishery: **Hypersalinity** + **seagrass** die off

Hurricane Irma



Hurricanes = peak flows + low salinities

- Pulses of spawning
- **Wet conditions** = good growing for babies



B. Local angler knowledge



Anglers!



L. Oberhofer

B. Local angler knowledge

Fishing Guides report:

1. High fishing quality:

'The no-motor zones are thick with snook & baby tarpon. We haven't seen this in 20 years'

'Top 5 years as far as numbers, 100 snook days'

2. Tough fishing conditions:

Fish are moving more with **seagrass loss**

Guides move to find clean water: *'A new normal'*

3. Conservation concerns:

High fishing pressure with Covid-19

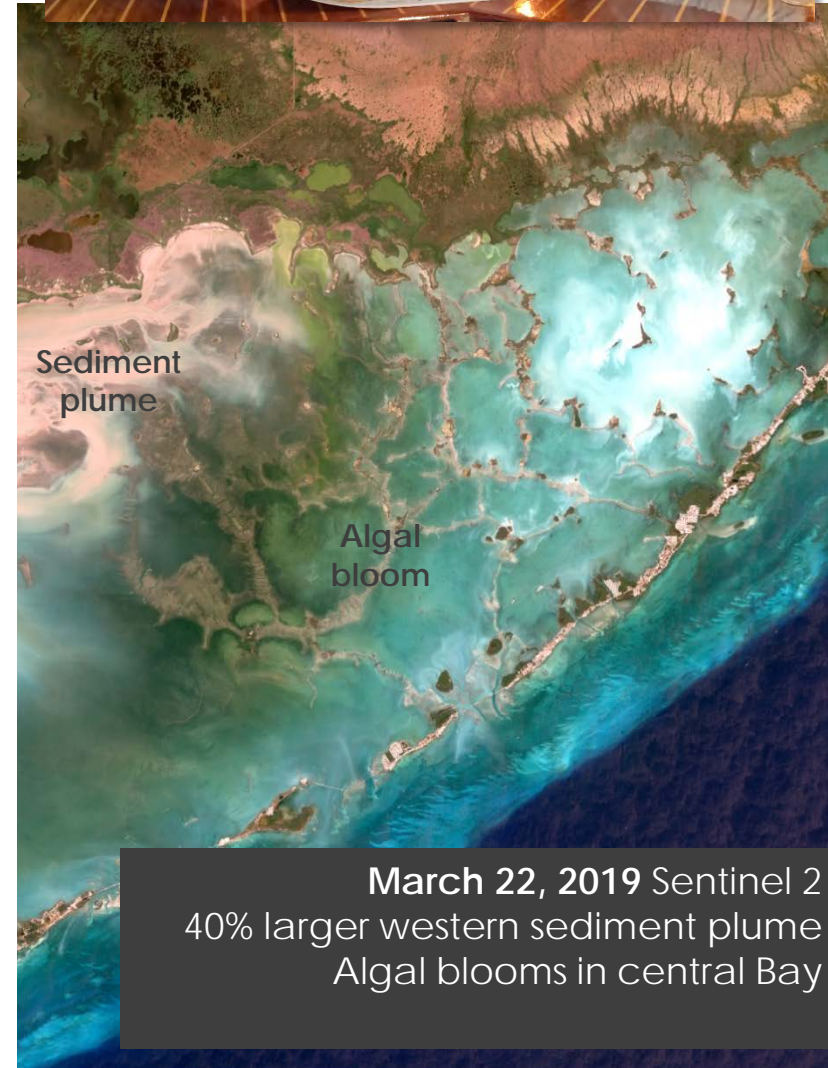
Reliance on storms for good fishing

Interest in *catch & release* fisheries

Willingness to be an information source



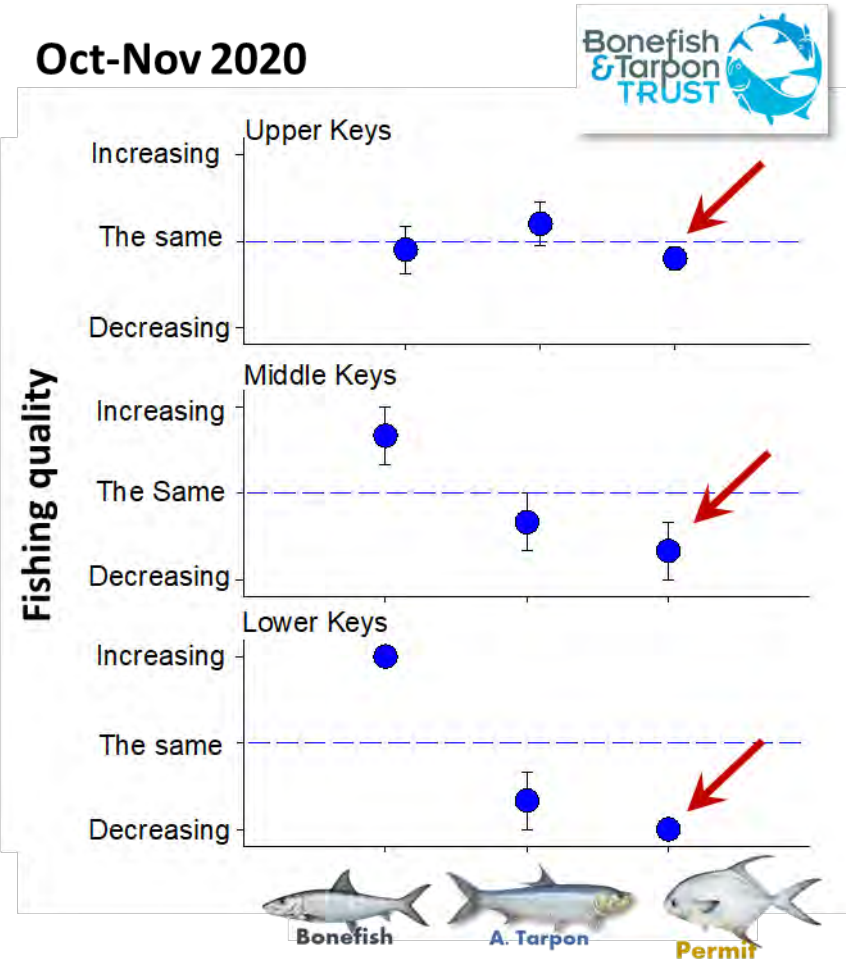
Interview with
Capt Steve Thomas



March 22, 2019 Sentinel 2
40% larger western sediment plume
Algal blooms in central Bay

B. Local angler knowledge

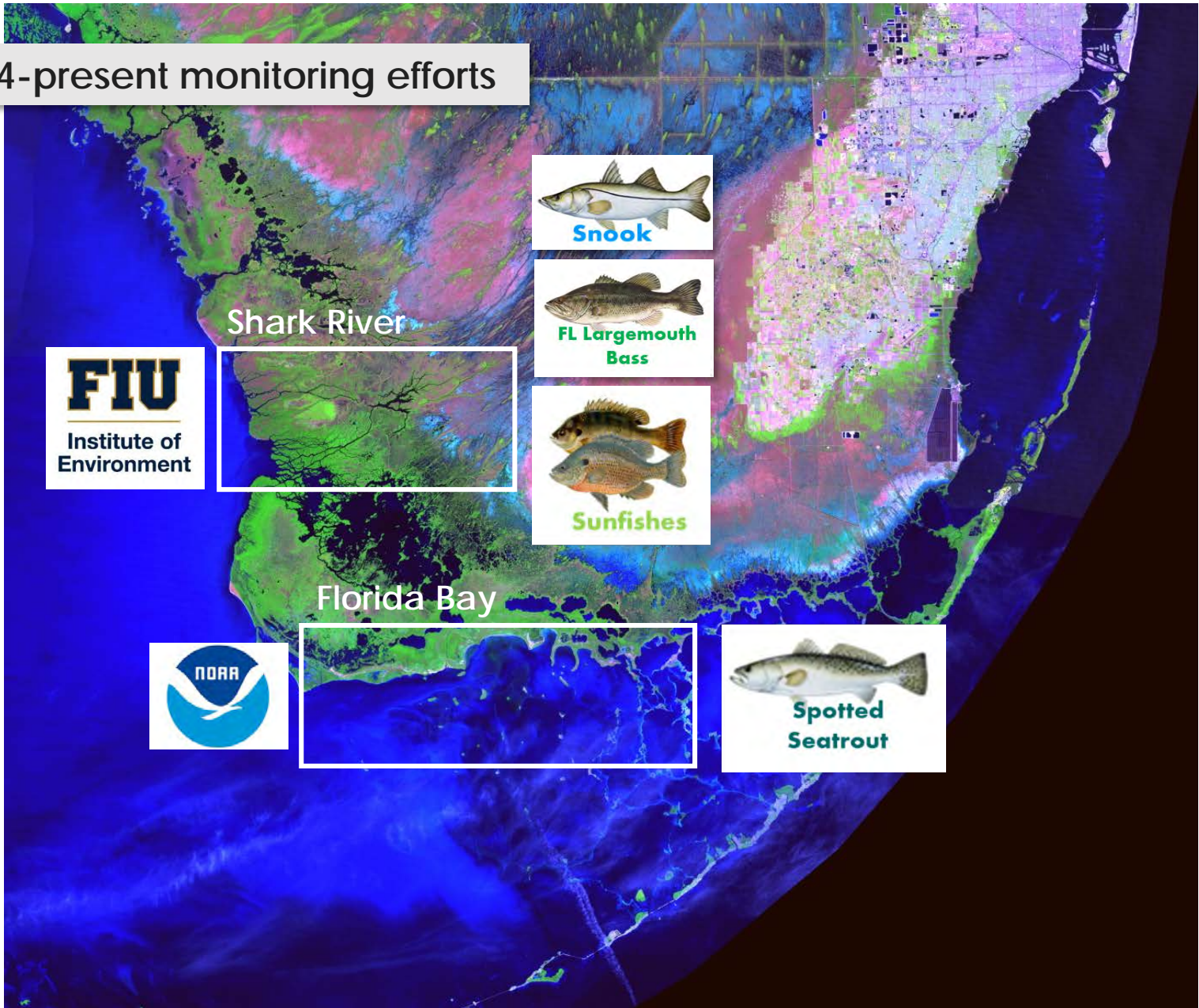
Quantitative & real-time:
Bimonthly Rapid Fishery Assessment



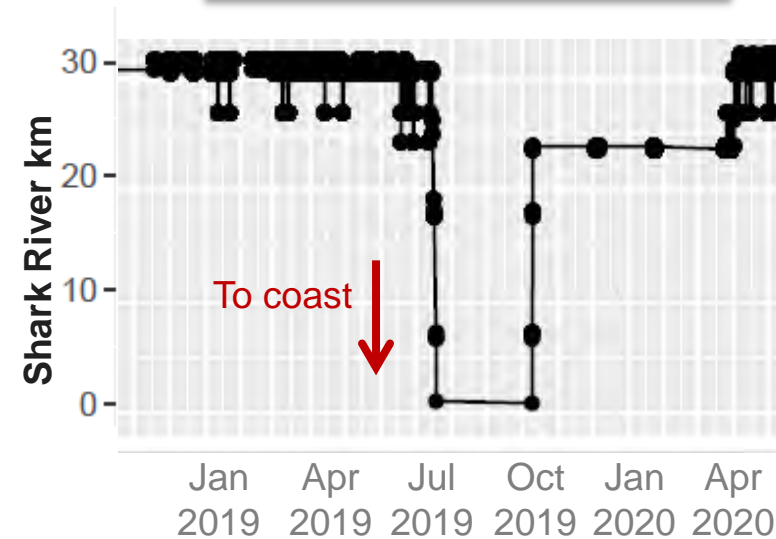
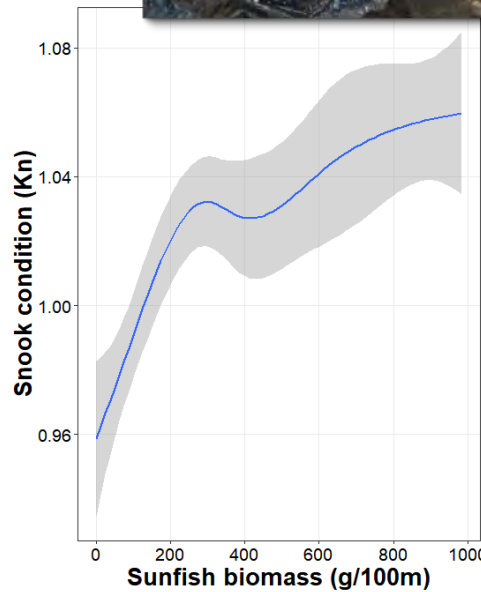
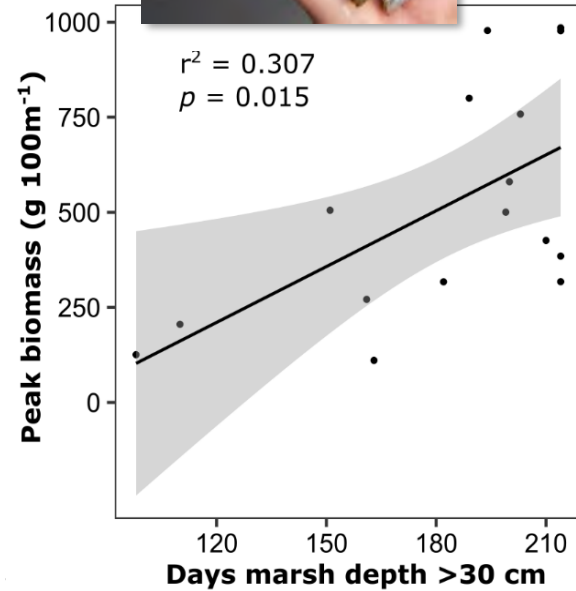


3. Fisheries-flows relationships:

2004-present monitoring efforts



3. Fisheries-flows relationships: High water

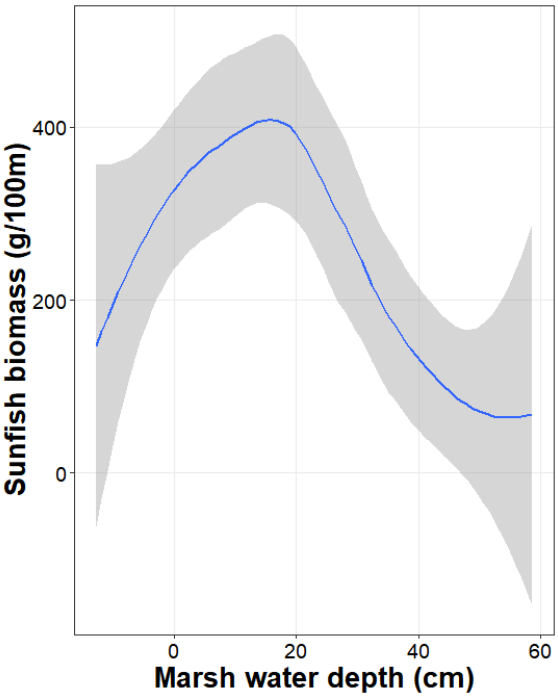


Produces more **prey** in marshes

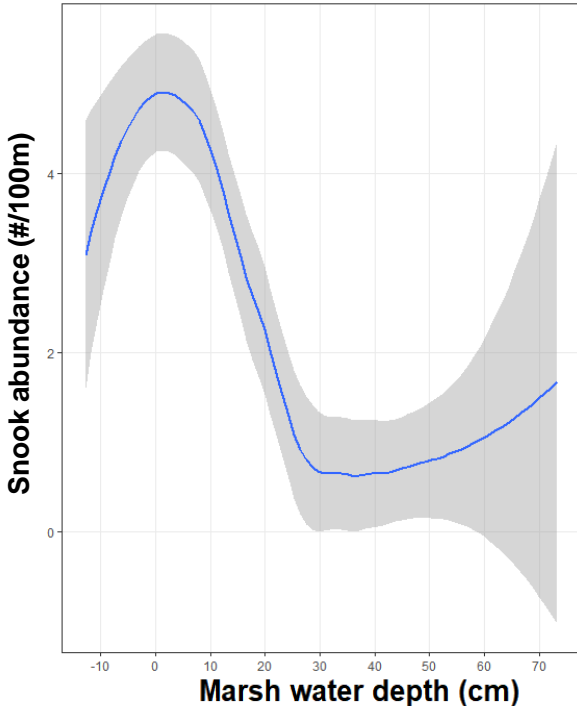
Improves **snook** health (fatter)

Prompts **snook** to migrate to spawn (timing)
High stage ($r^2 = 0.26$) + stage change ($r^2 = 0.12$)

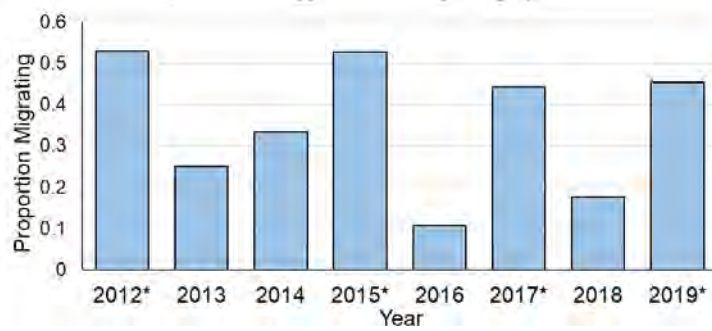
3. Fisheries-flows relationships: Moderate dry down



Brings **prey** to mangrove creeks

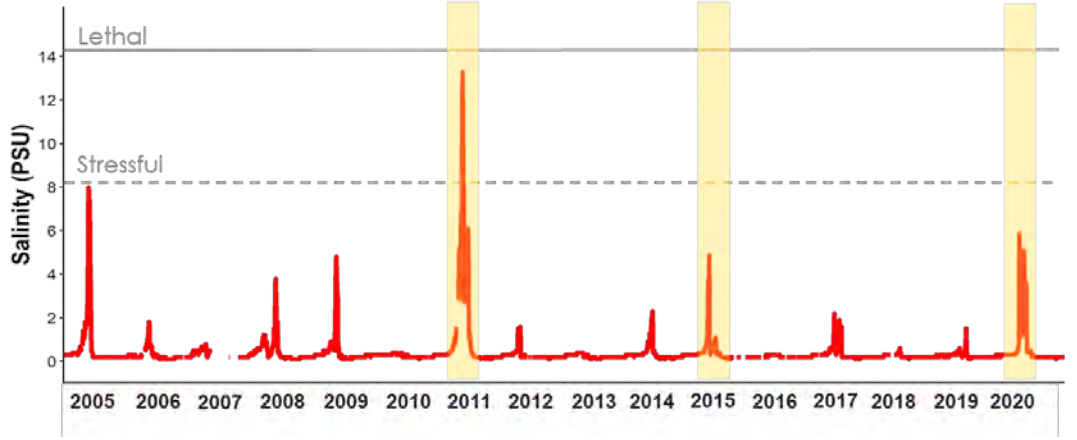
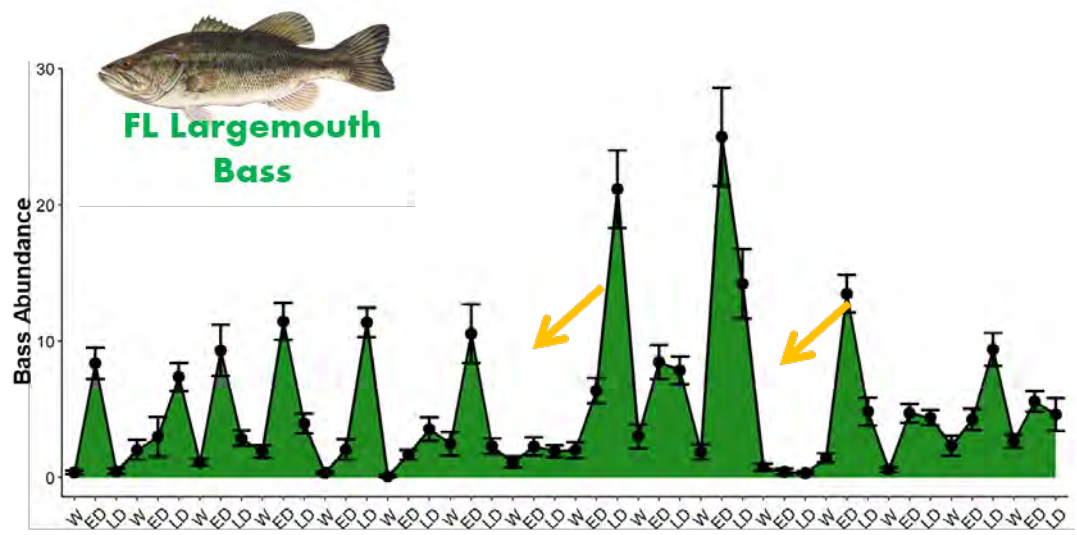


Draws **snook** upriver to forage

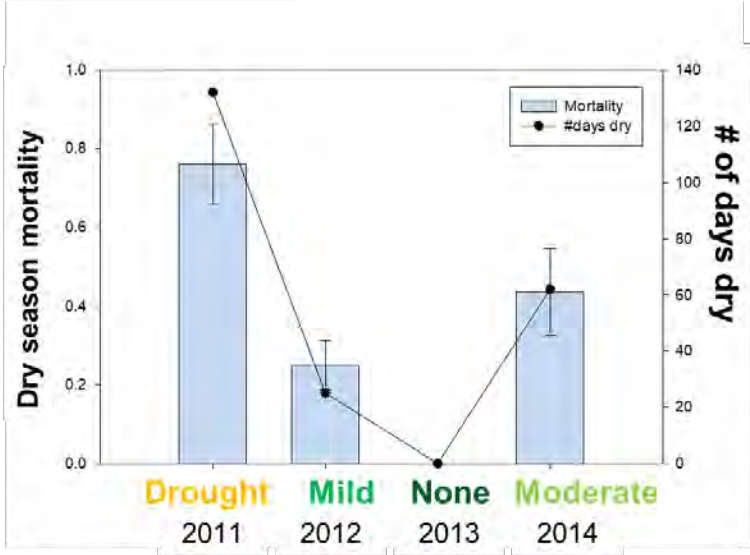


Determines how many **snook** spawn
 # days marsh < 15 cm ($r^2 = 0.16$)
 Min stage ($r^2 = 0.12$)

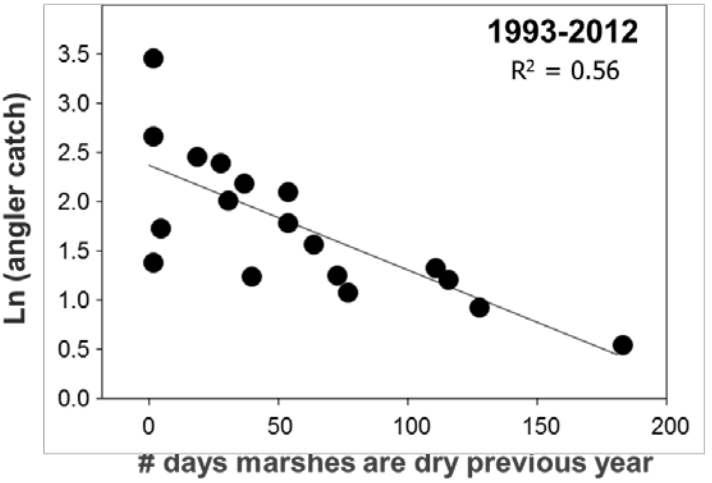
3. Fisheries-flows relationships: Drought



Causes stressful/lethal salinities & lower abundance



Causes bass mortality

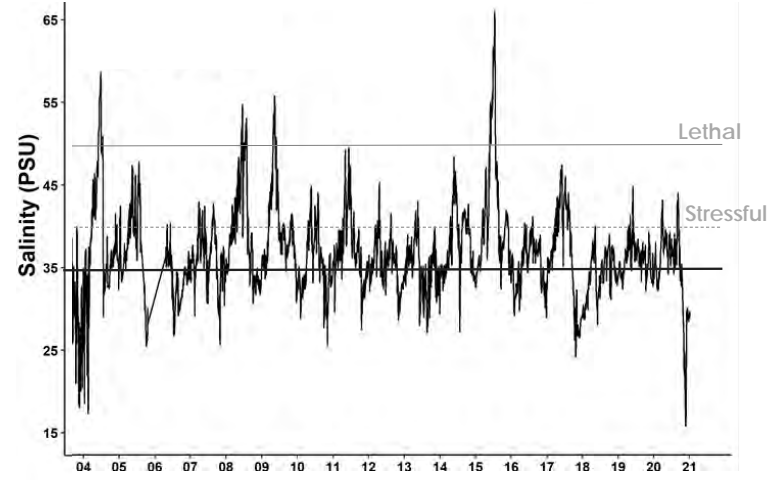
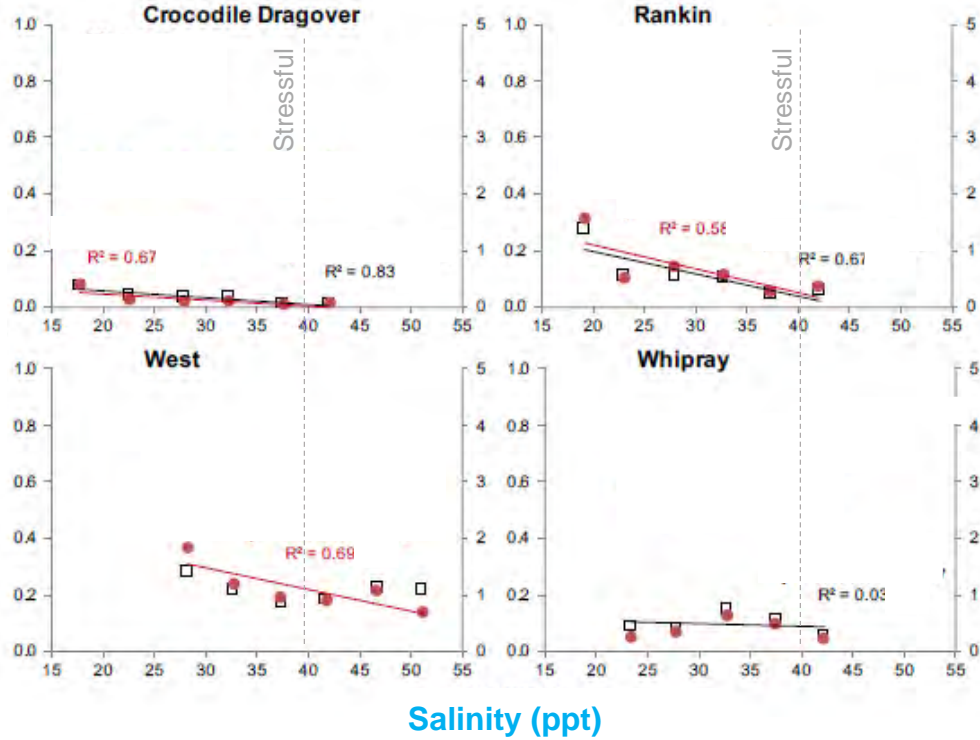


Results in lower angler catches

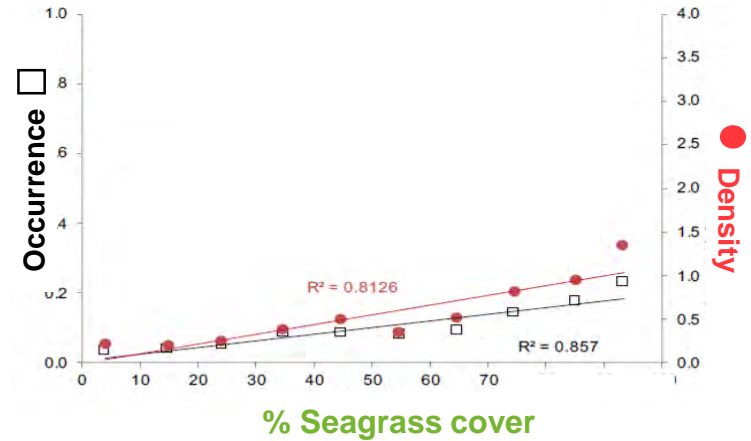
3. Fisheries-flows relationships: Hypersalinity & seagrass loss



C. Kelble et al.



Salinities reach stressful levels



High salinities = less juvenile seatrout

More seagrass = more juvenile seatrout

Recreational fisheries in the Everglades:

1. High socioeconomic value: \$ ½ Billion/yr + ¼ million anglers
 2. Value of **fishing guide knowledge** = real-time data
 3. **Fisheries** are good shape:
 - **Irma** provides insight on **positive** response to **high flows**
 - **Seagrass loss** & **hypersalinity** limit benefits in FL Bay
 4. Strong **fisheries-flows** relationships
 - **High flows** & **moderate dry downs** benefit prey & fish health/spawning
 - **Droughts** cause mortality & lower angler catches
 - **Seagrass loss** & **hypersalinity** decrease juvenile fish
- Need to account for **dependency of valuable coastal fisheries on freshwater**





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