Pilot Fishery Ecosystem Issue: Red Tide

Ecosystem Technical Committee Meeting

May 9, 2025

Red tide as a pilot FEI

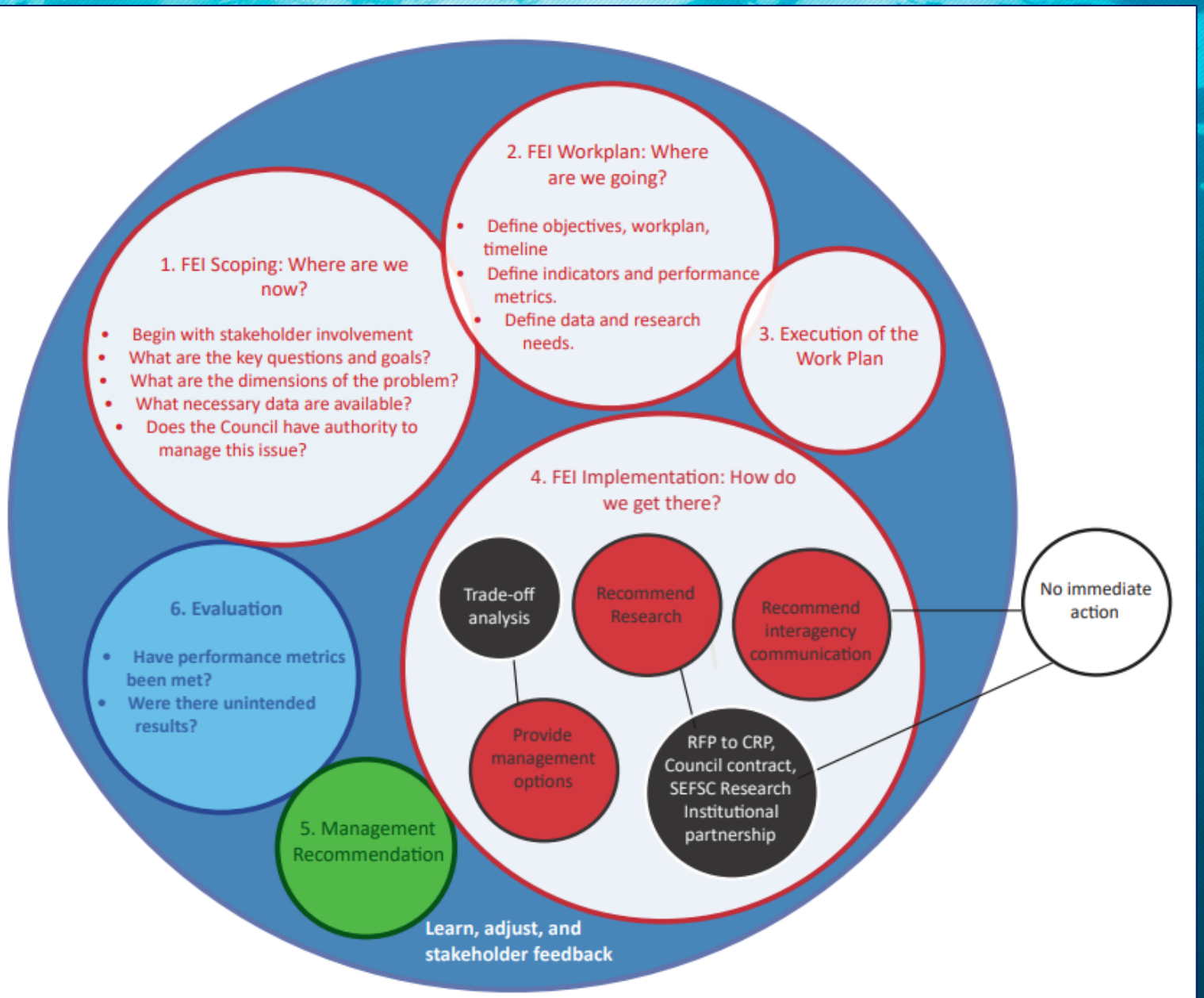
ETC Motion – September 2023

The Ecosystem Technical Committee (ETC) recommends to select one pilot Fishery Ecosystem Issue (FEI) in order to help develop the Fishery Ecosystem Plan process and the FEI loop procedures. The ETC recommends that Red Tide be the FEI that is initially piloted.

Council Motion – October 2023

The Council supports the Ecosystem Technical Committee's approach utilizing red tide as the initial FEI that will articulate potential management applications to the Council.

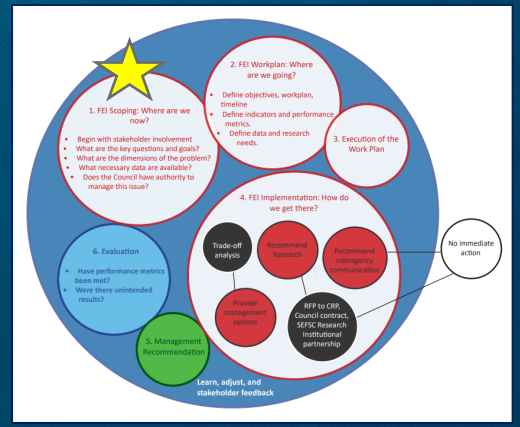
FEI Loop



Last modified by ETC Sept 2023

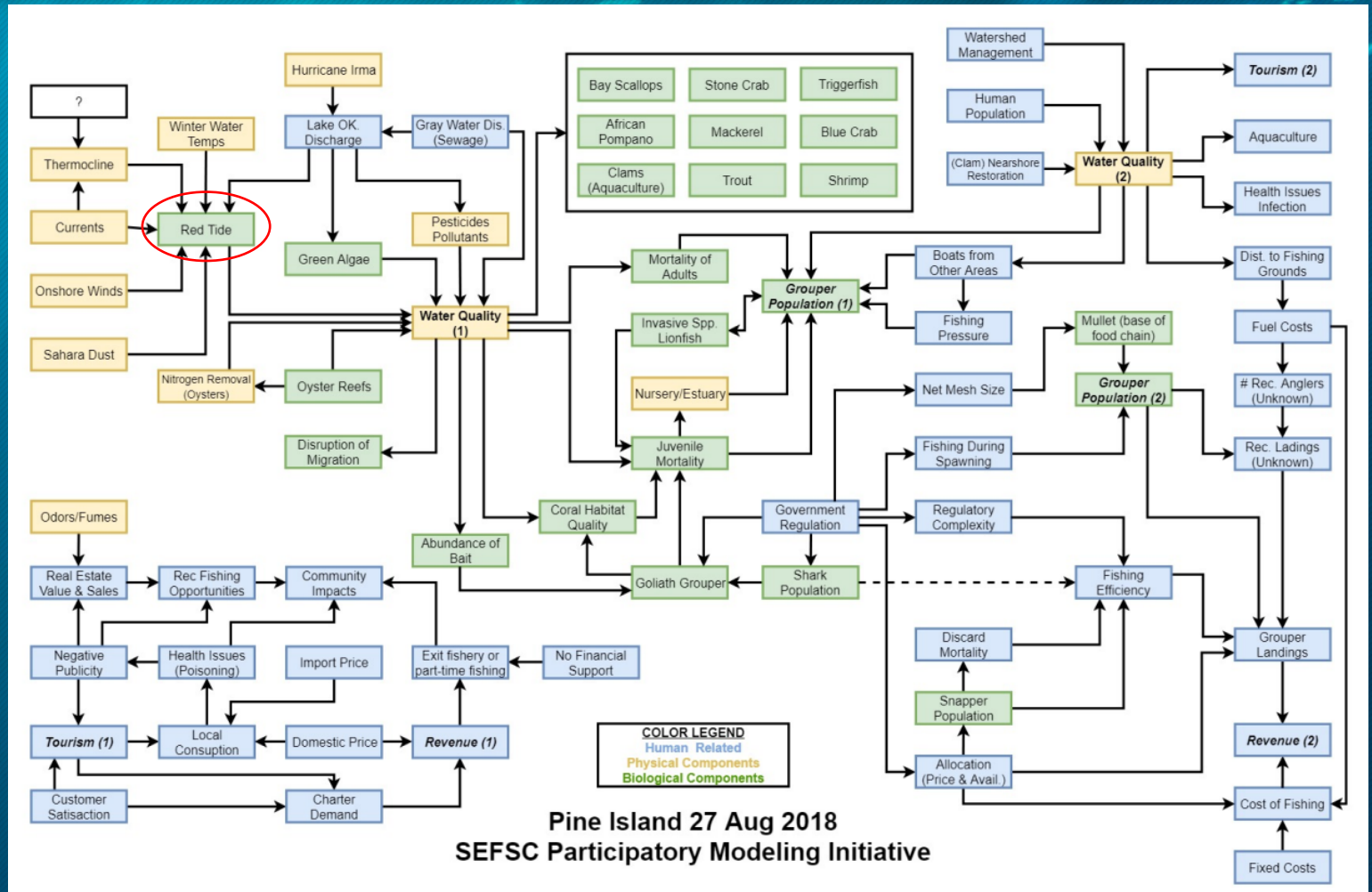
1. FEI Scoping: Where are we now?

- Begin with stakeholder involvement
- What are the key questions and goals?
- What are the dimensions of the problem?
- What necessary data are available?
- Does the Council have the authority to manage this issue?



Stakeholder involvement: Conceptual modeling

- 2018 SEFSC stakeholder workshops in SW FL
- Insights into red tide impacts to socio-ecological system



Credit: SEFSC/M. Karnauskas

Stakeholder involvement: Red tide oral history interviews

- Local ecological knowledge from FL Gulf coast commercial and for-hire fishermen (2018-2019)
- Perception of increasing red tide severity and duration caused by water quality, nutrient runoff, and coastal development
- Proposed management solutions:
  - Facilitate access to substitute species
  - Removing fishing limits when red tide mortality is inevitable
  - Flexibility in gear and permits
  - Economic provisions during recovery (e.g., waiving permit fees)
  - Cooperative research

Blake et al. (2022, Marine Policy)

Stakeholder involvement:
Need for updated FEI-specific input?

- FWRI Fish Kill Hotline
  - Observations of red tide mortality and location

- Fisherman Feedback Tool
  - Could be deployed to request information about impacts to fishing practices and to better quantify offshore blooms

Key questions and goals

What do we hope to achieve by embarking on the red tide FEI?

Properly account for red tide mortality when setting catch levels?

Mitigate the impacts of red tide events on the fishing industry?

Prevent red tide events from occurring?

Key questions and goals

- Which stock assessments need red tide mortality consideration?
- Do red tide impacts extend beyond episodic mortality during bloom events?
- Are methods for determining harvest limits robust to future changes in red tide frequency/severity?
- How can management approaches be adapted to improve resilience to red tide?
- Impacts to fishing communities from severe localized events vs widespread events?

Dimensions of the problem

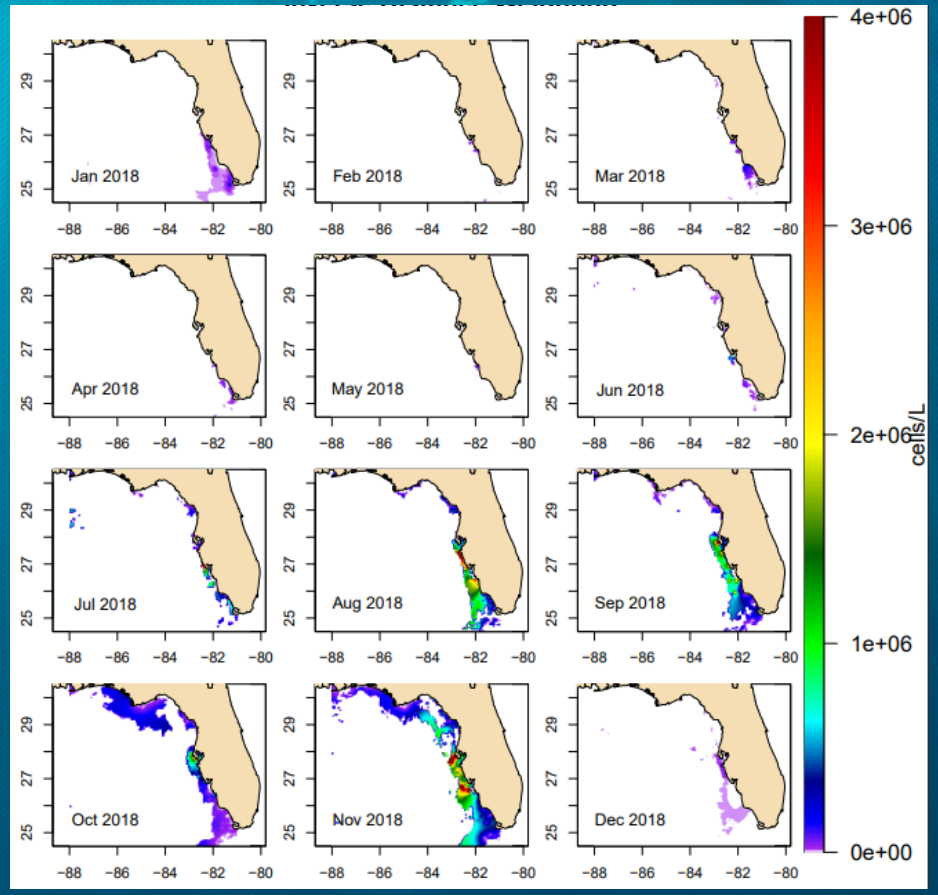
- West Florida Shelf
- Single species management
  - Gag and red grouper
- Need for an ecosystem perspective
  - Other affected stocks
  - Social and economic tradeoffs
  - Interjurisdictional cooperation

How do we define the red tide problem?

Which lens do we view the problem through?

Data availability: Red tide

- FWRI HAB monitoring program
  - *Karenia brevis* cell count data
  - 1998-present
- Remote sensing
  - 2002-present
- West Florida Shelf Ecosystem Model maps (Vilas et al. 2023)
  - 2002-2023



Credit: D. Chagaris

Data availability: Red tide index

- Satellite/FWRI HAB data-derived; for stock assessments
  - Gag (SEDAR 33), 1998-2010
  - Red grouper (SEDAR 42), 2004, 2005, 2007, 2014
  - Red grouper (SEDAR 61), 2003-2017 *not recommended for use

- FWRI HAB data-derived (Stumpf et al. 2022)
  - 1953-2018
  - Southwest FL
  - Nearshore (<5km)

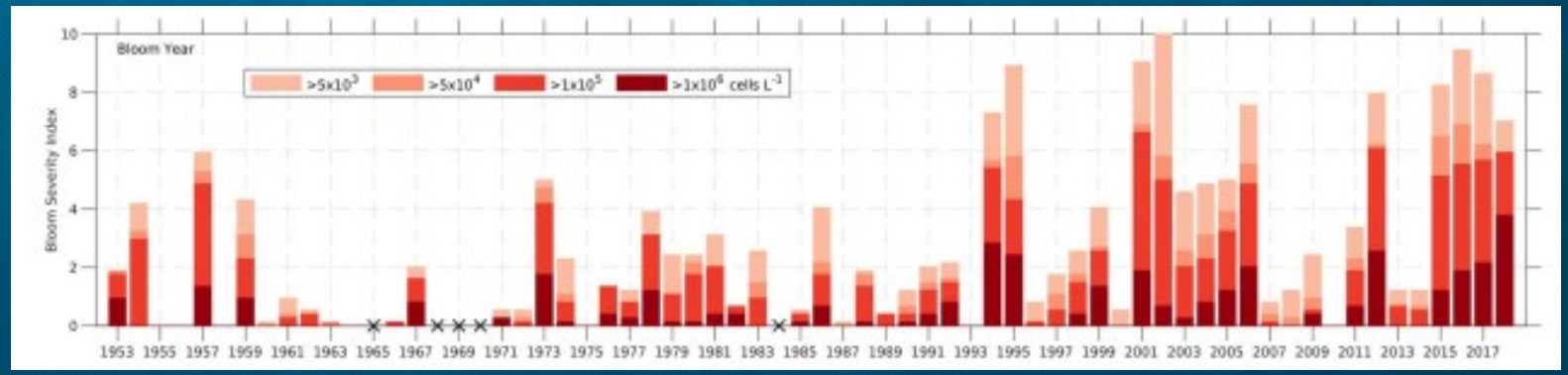


Figure 3, Stumpf et al. 2022

Data availability:
Fisheries & environmental data

Fisheries – reef fish, CMP

- Commercial landings
- Recreational landings
- Indices of abundance

Environment

- Temperature
- River discharge
- Loop current position
- Hurricane data

Data availability: What else do we know?

- Stock assessments
  - Red tide mortality incorporated in gag and red grouper assessments beginning in 2009
- Management
  - SSC has considered red tide uncertainty when recommending gag and red grouper catch limits
- Commercial fleet dynamics (Perruso et al. 2023)
  - Spatial effort displacement
  - Effort and revenue – no influence
- Charter/for-hire revenue
  - 61% decrease in 2018 when red tide was present locally
  - UF/IFAS Economic Impact Analysis Program
- Hypoxia (Turley et al. 2022)
  - Associated with some red tide events

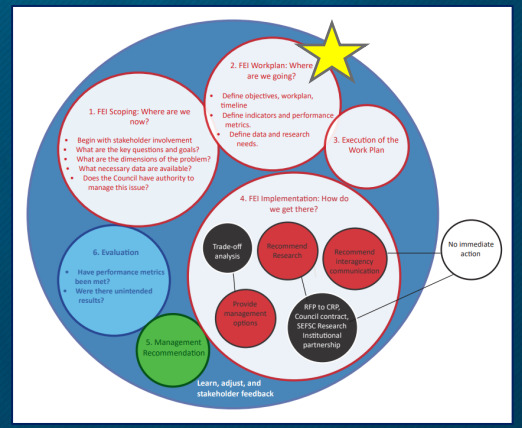
Council authority

- Cannot manage water quality
  - Inter-agency communication

- Fisheries management avenues
  - Manage fishing mortality for affected fisheries
  - Adjust risk tolerance to account for red tide uncertainty
  - Improve communication strategies for affected stakeholders
  - Increase industry resilience in the face of red tide

2. FEI Workplan: Where are we going?

- Define objectives, workplan, timeline
- Define indicators and performance metrics
- Define data and research needs



2. FEI Workplan: Where are we going?

A. Ongoing research focused on red tide in fisheries *(05b – Dr. Karnauskas)*

B. Development of updated red tide index for evaluation of impacts on landings *(Council staff)*

C. Where else can we go?

Objectives, workplan, timeline:
(A) Ongoing research

- Objectives: Improve incorporation of red tide episodic mortality and uncertainty into stock assessments and projections

- Workplan: Project-specific

- Timeline: Project-specific
  - FEI-specific timeframe for SSC consideration?

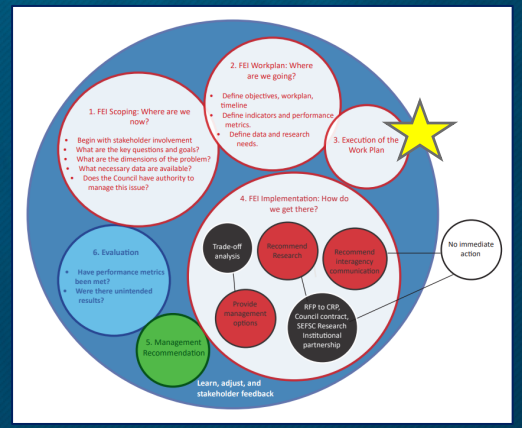
Objectives, workplan, timeline:
(B) Index development

- Objectives: Develop updated red tide index for evaluation with landings and environmental variables of interest
- Workplan: Acquire data, test index variations, exploratory landings analyses
- Timeline: May 2025 ETC feedback

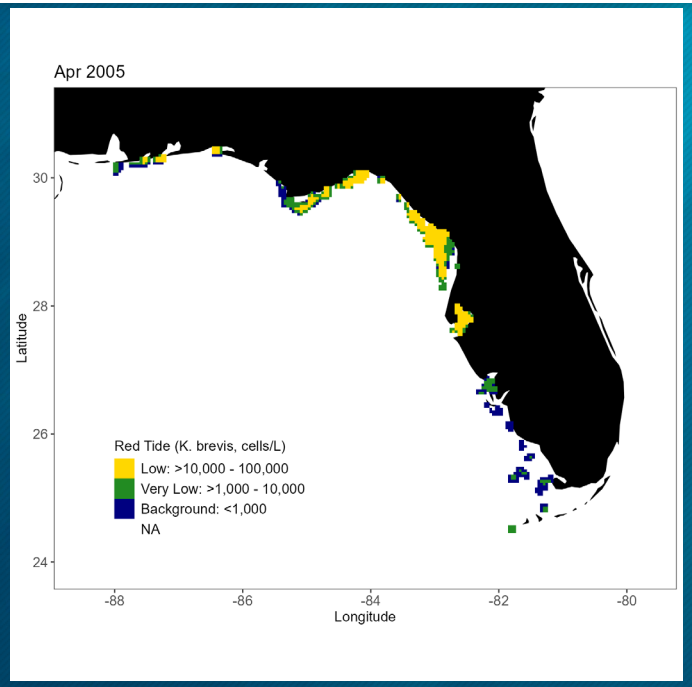
3. Execution of the workplan
(B) Index development

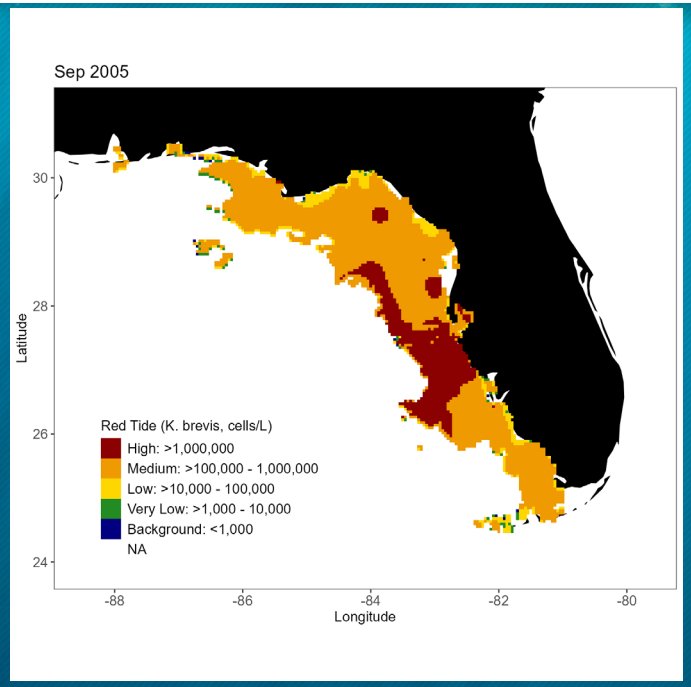
- Red tide index
  - West Florida Shelf Ecosystem Model monthly red tide maps, 2003-2022
  - FWRI *K. brevis* cell count thresholds
    - Background (<1,000 cells/L)
    - Very Low (>1,000-10,000 cells/L)
    - Low (>10,000-100,000 cells/L)
    - Medium (>100,000-1,000,000 cells/L)
    - High (>1,000,000 cells/L)

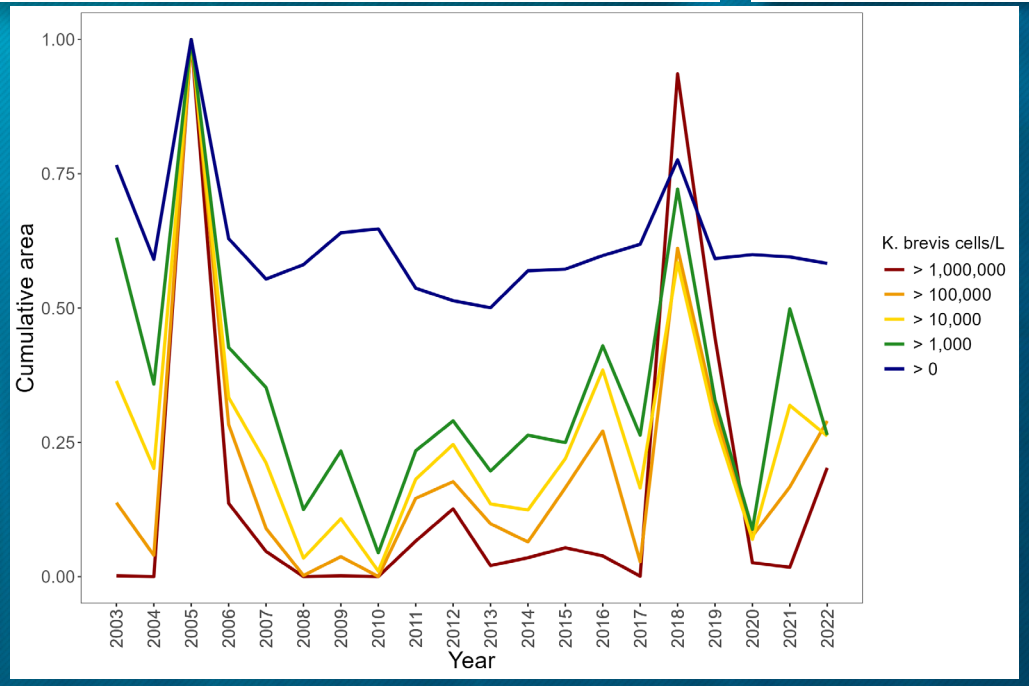
Fish kills



Red tide index - version 1

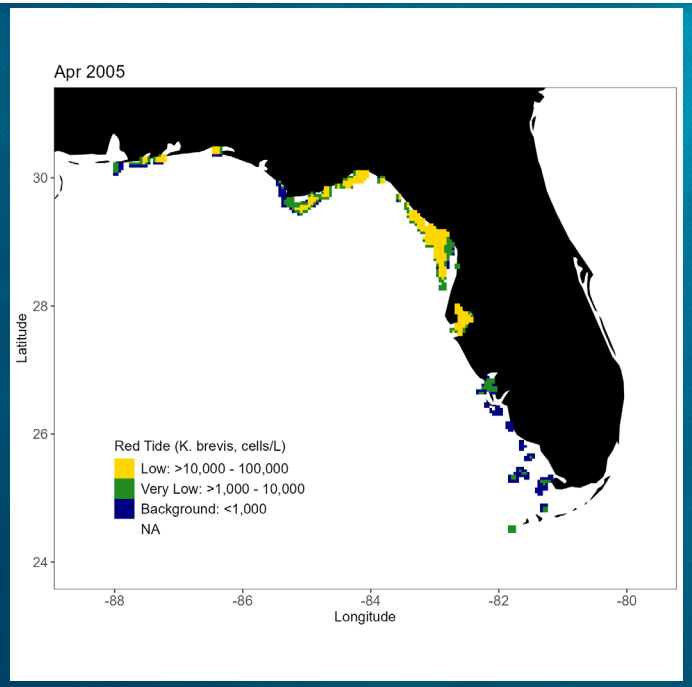


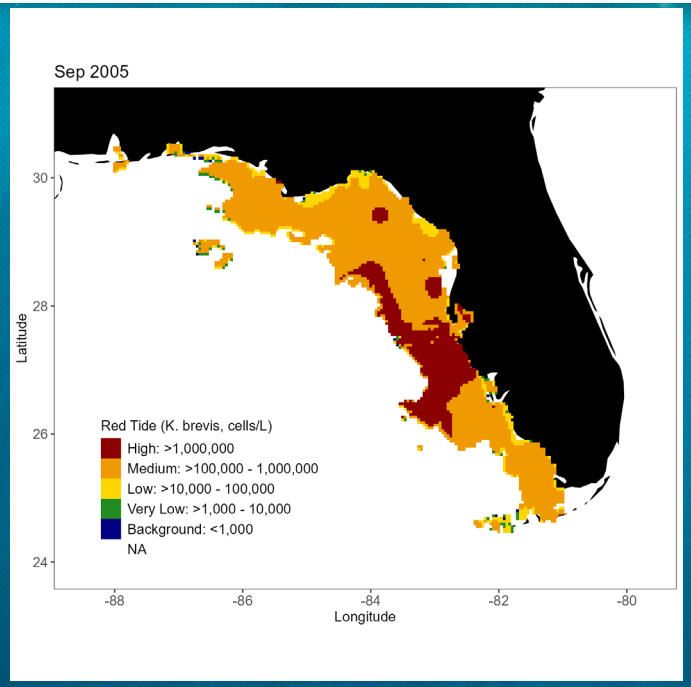


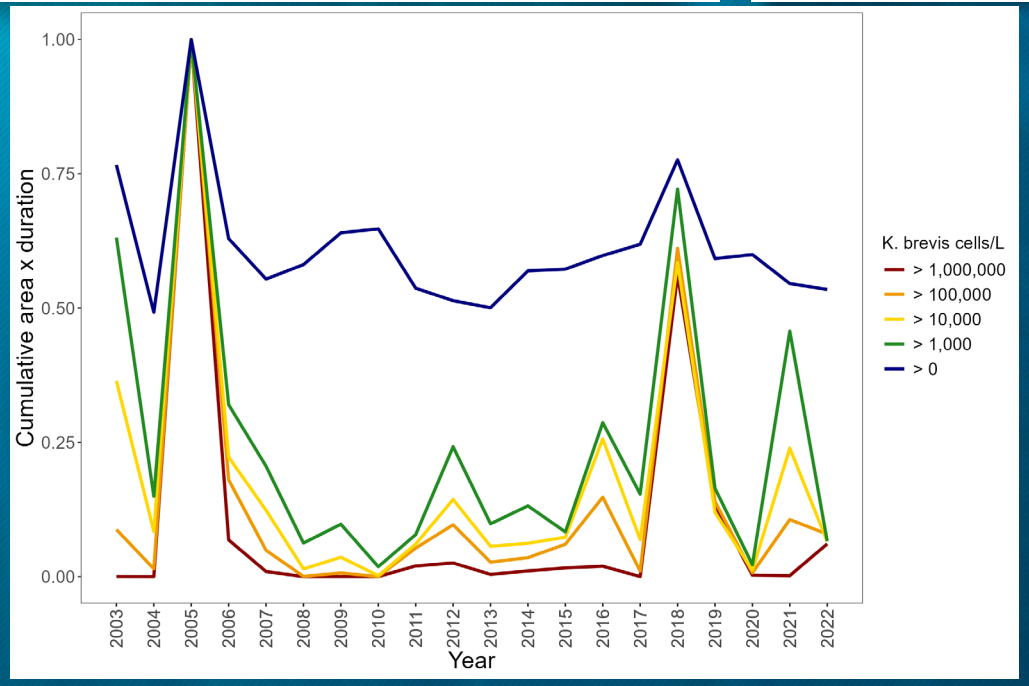


- Annual cumulative area of red tide
  - Calendar year

Red tide index - version 2

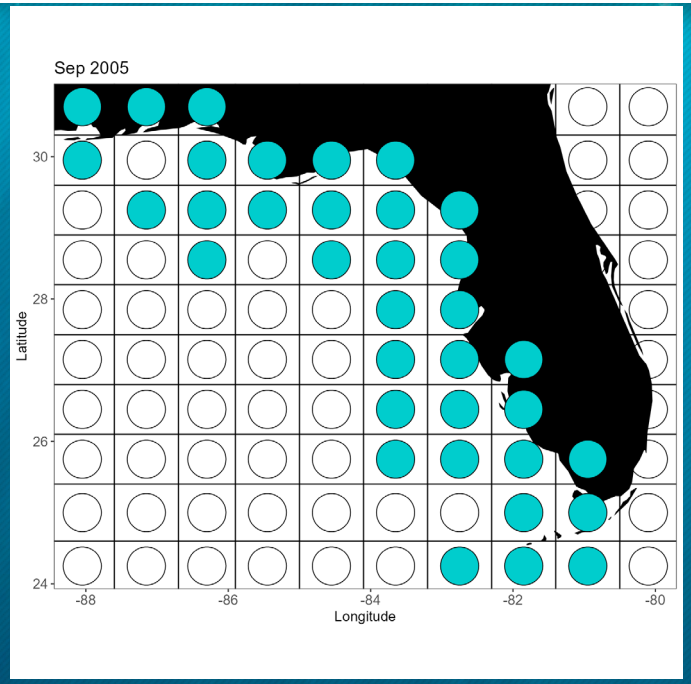


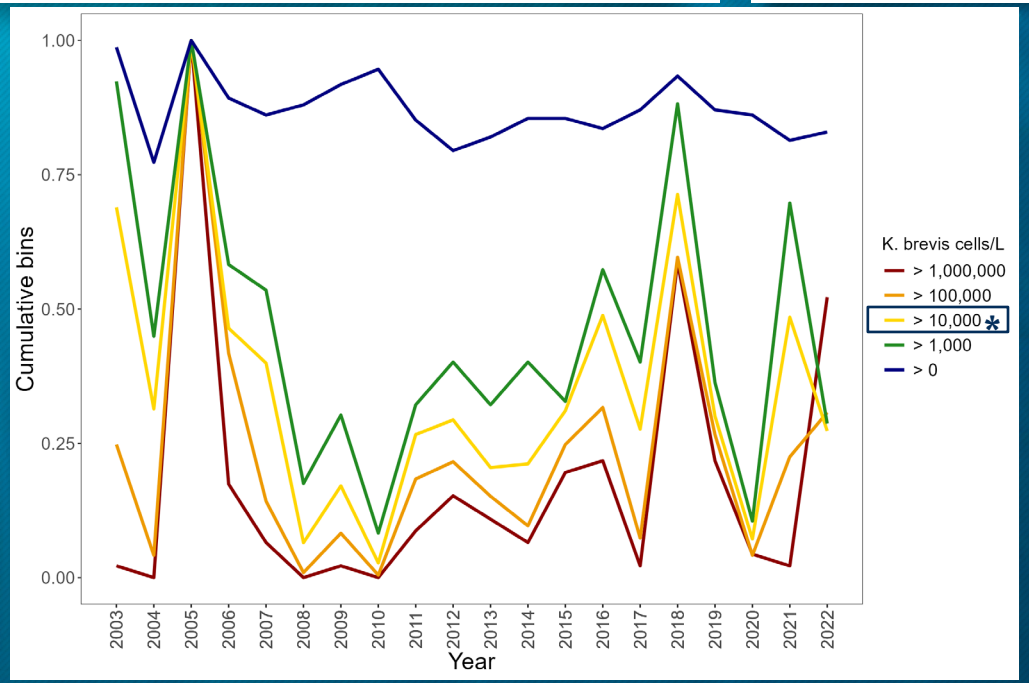




- Annual cumulative area of red tide scaled by bloom duration (months)

Red tide index - version 3

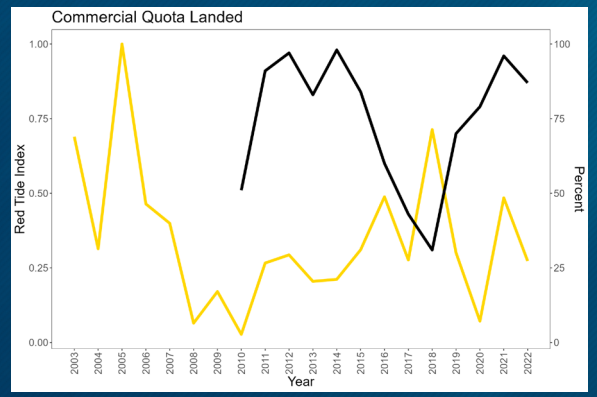


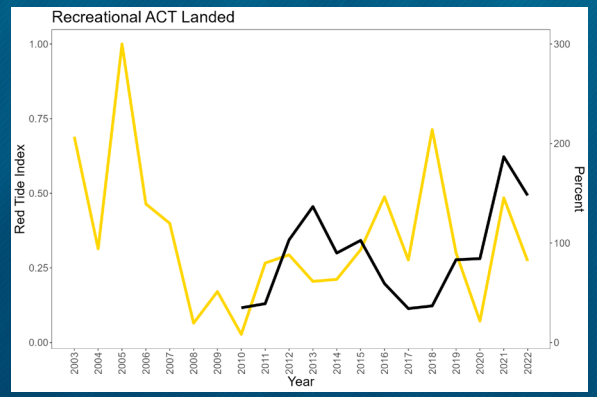


- Annual cumulative bins of red tide occurrence
  - Loosely following Stumpf et al. 2022
  - *Index v3 used in all following plots; >10,000 cells/L threshold (yellow)

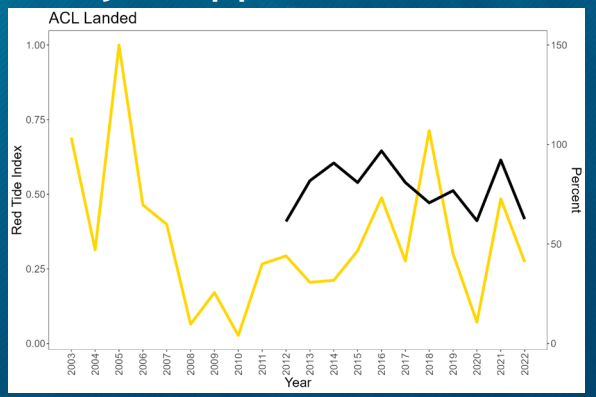
Commercial and recreational landings

Red grouper





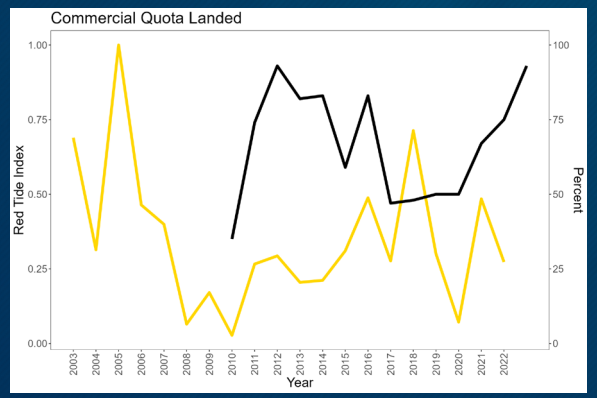
Gray snapper

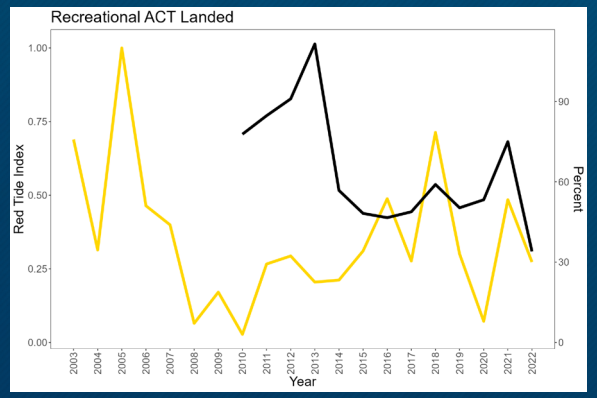


Red tide index

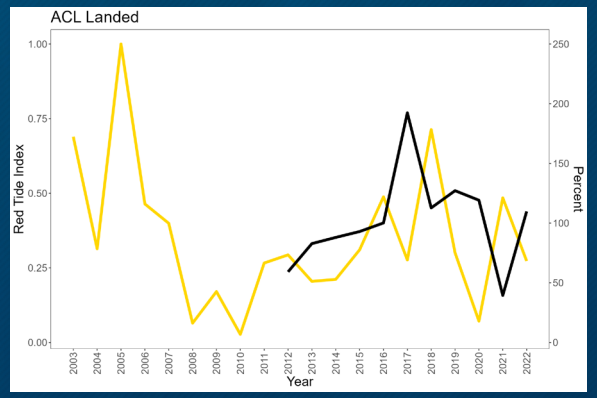
Landings

Gag

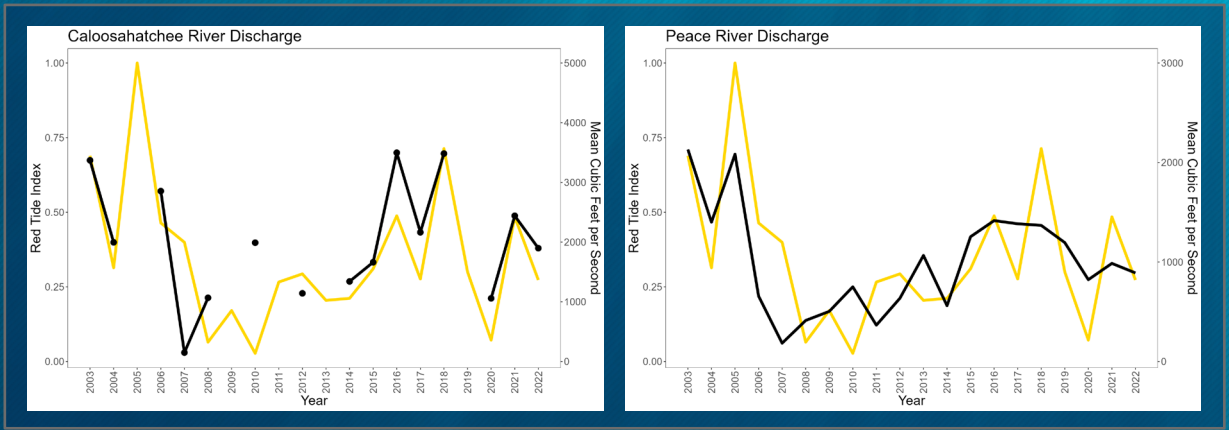




Lane snapper

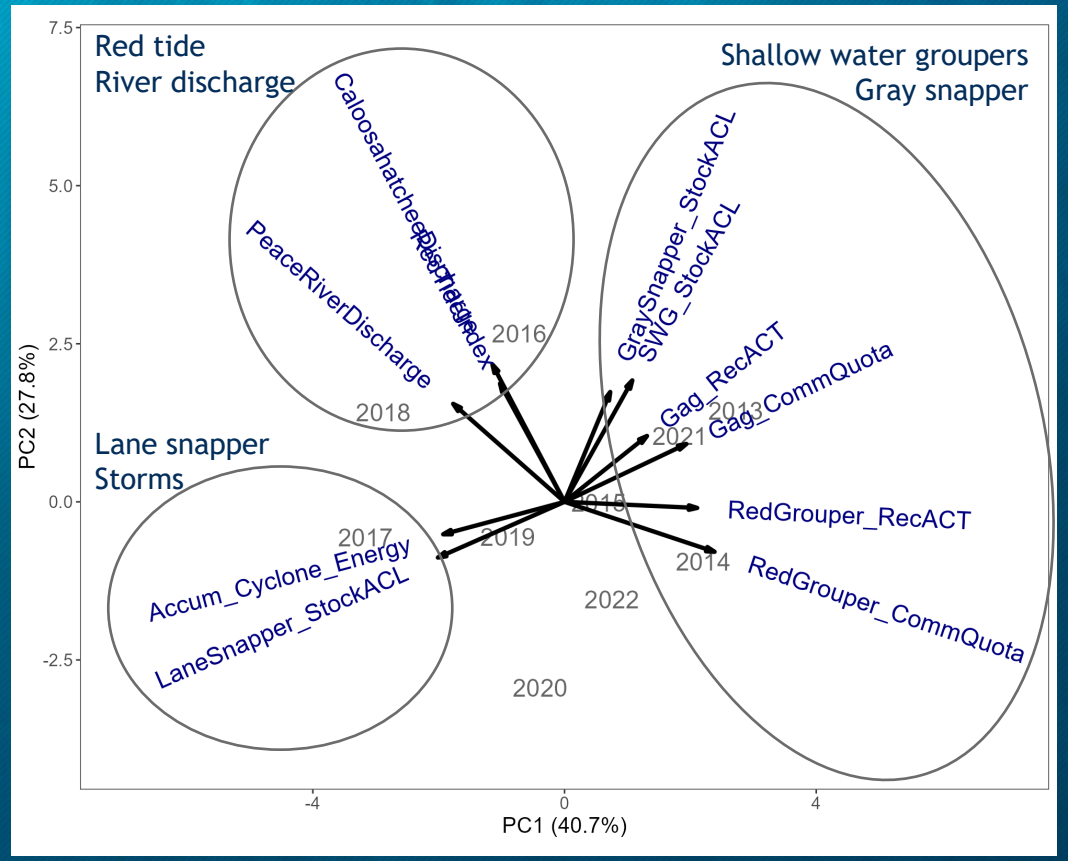


Environmental drivers



Red tide index

Environmental



Objectives, workplan, timeline:
(C) Where else can we go?

- How do we outline objectives toward answering other key questions and goals?
- What are the avenues for addressing goals geared toward resilience?

Indicators and performance metrics

- Which indicators and performance metrics will be needed to measure progress towards the goals of the FEI?
- Are these indicators linked to others which might be influenced by ripple effects?
- What are the most meaningful metrics for post-implementation evaluation?

Data and research needs

- What data gaps exist that are critical to answering the key questions?
- What further research is necessary before taking action?

Next steps

Continuing the red tide FEI loop:

4. Implementation
5. Management recommendation
6. Evaluation