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# Ongoing research efforts related to red tide harmful algal bloom impacts on fisheries

NOAA Fisheries Southeast Fisheries Science Center  
NOAA Atlantic Oceanographic & Meteorological Laboratory

Gulf Council Ecosystem Technical Committee Meeting  
May 9, 2025



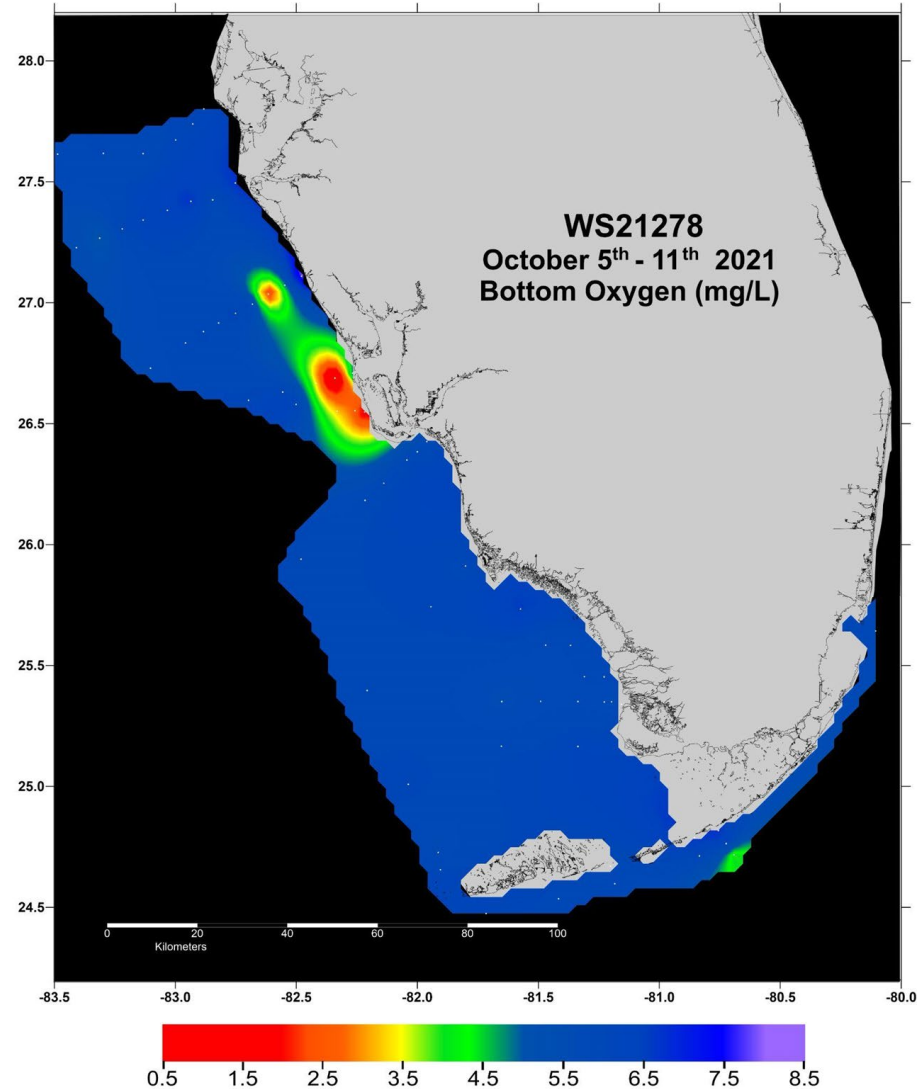
**NOAA FISHERIES**

# SEFSC red tide-related research themes

1. Can we predict extreme red tide events and create an **early warning system** for industry?
2. What are the impacts of red tide events on **fish populations**?
3. How can we best account for these impacts in **adjusting catch limits**?
4. What are the impacts of red tide events on **fishing communities**?
5. **What can management do** to ameliorate the impacts and increase fishing industry resilience?

# AOML/FWC routine monitoring

- Surveys every other month since 1998
- **Samples:** red tide, dissolved oxygen, nutrients, temperature, salinity, zooplankton, phytoplankton
- **Goals:** 1) Understand the correlation between red tide and environmental/oceanographic conditions, 2) quantify the impact of freshwater runoff & Everglades restoration on the coastal ecosystem



# AOML biogeochemical modeling

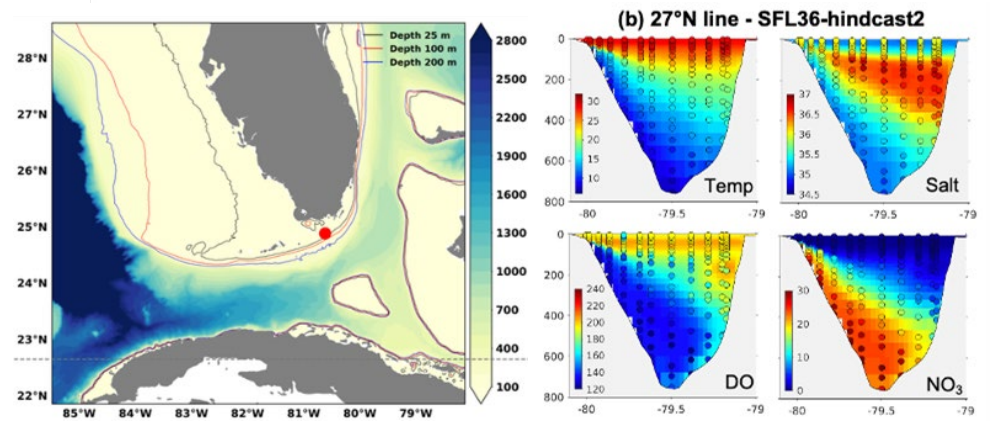
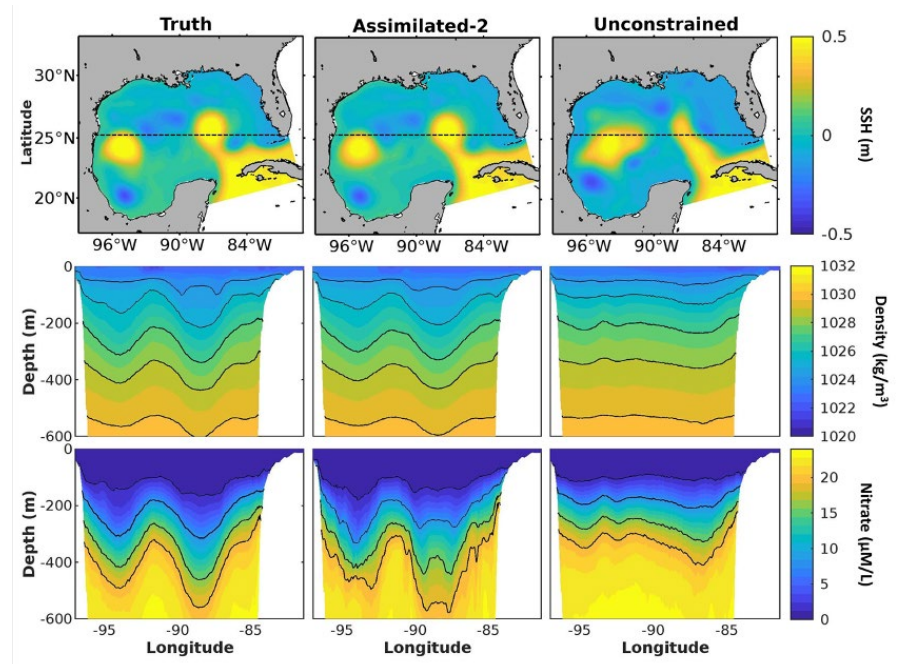
Building a subseasonal-to-seasonal **red tide and hypoxia warning system** for the West Florida shelf

- Ocean modeling framework validated against in situ observations and satellite data

## Florida Regional Ecosystems Stressors Collaborative Assessment (FRESCA) Project

- Investigating how five key stressors (ocean acidification, hypoxia, red tides, warming, and eutrophication) are impacting marine ecosystems of South Florida

*Led by Fabian Gomez*



# Red tide ecosystem modeling

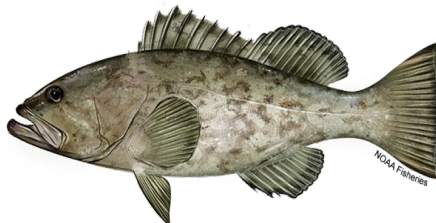


- Restore-funded projects led by University of Florida (led by D. Chagaris):
  - [2017-2020 West Florida Shelf model development](#)
  - [2023-2028 Operationalizing the WFS ecosystem model](#)
- Overall project goal is to develop estimates of red tide mortality for use in stock assessments of Gulf groupers, working closely with SEFSC assessment analysts
  - [Gag grouper](#) - incorporated into projections
  - [Red grouper](#) - informed red tide selectivity

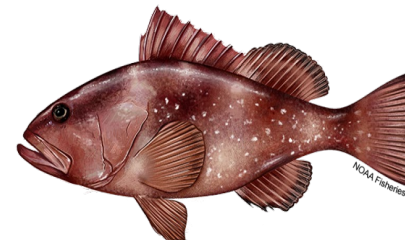
# Red tide mortality and assessment benchmarks



- [Building next generation forecasting capacity](#) project led by Nathan Vaughan
  - Evaluate how reference points are affected by episodic events of severe red tides causing mass mortality, and how we can best manage these fisheries given future uncertainty



Gag Grouper



Red Grouper

# Simulation testing inclusion of red tide in stock assessment

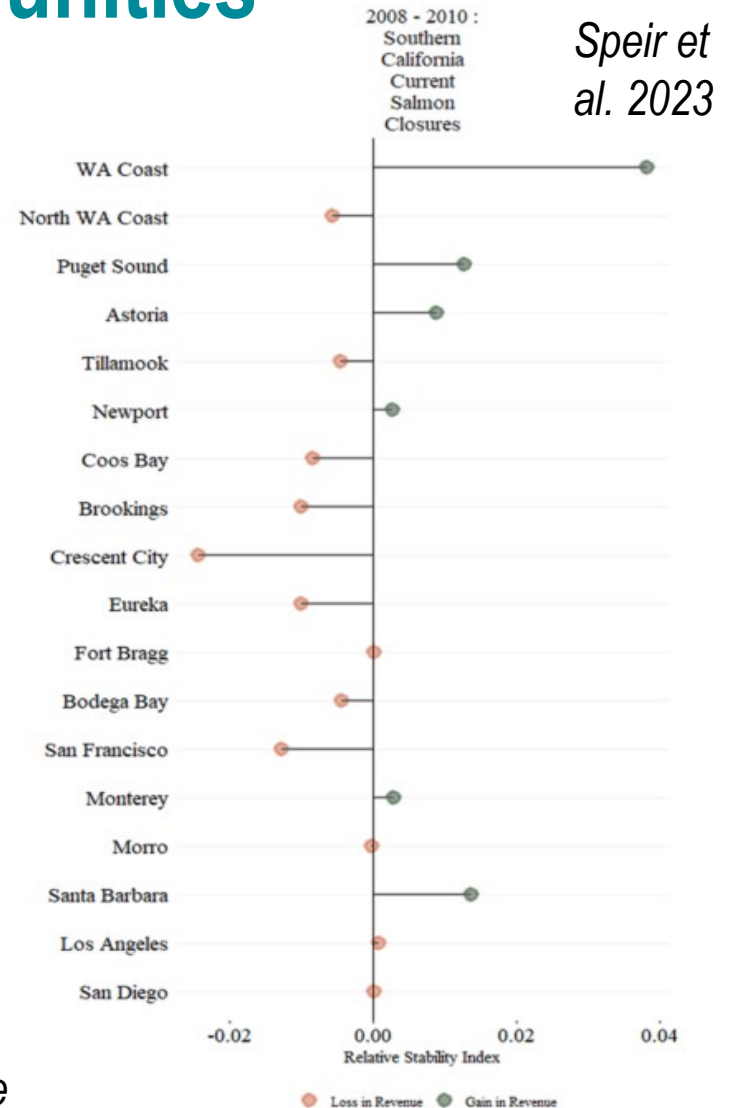
Lisa Ailloud, Skyler Sagarese, Nathan Vaughan, Katie Siegfried, Alex Norelli

- **Use simulation** (SSMSE) to evaluate the performance of different approaches used to model red tide in our stock assessments using red grouper and gag grouper as case studies
- **Test sensitivity** of each approach to possible source of bias and imprecision in the available red tide and recreational catch data
- **Provide practical guidance** to facilitate more routine consideration of episodic mortality events in stock assessments

# Resilience in fishing communities

Assessing patterns of resilience following major disturbances, focusing initially on Category 4/5 hurricanes (LA) and red tides (FL).

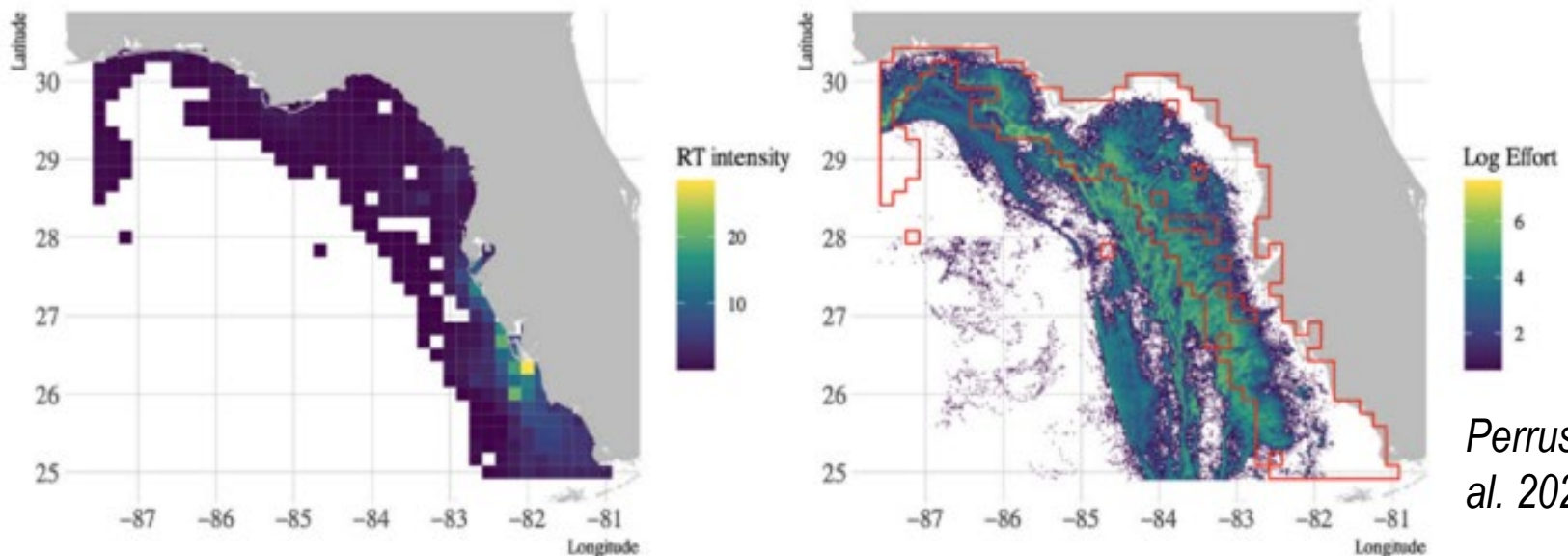
- Phase 1. Adapted from Speir et al. (2023) Relative Stability Index: Measures landings revenue variability post-shock
- Phase 2. Integrate social, cultural, and economic datasets; Identify trajectories: collapse, recovery, stability, or transformation



*Led by Suzana Blake*

# Fishing dynamics in response to red tide

- Fine-scale spatial analyses allow quantification of fleet behaviors and impacts of red tide on effort, displacement, and revenues
- No observable short-term effects at the fleet level, but effects at the vessel level: fishermen avoided intense blooms and fishing effort was displaced



*Perruso et al. 2023*

Maps depicting total red tide intensity and fishing effort during the period 01 January 2008 to 31 December 2019. (left) Total red tide intensity (millions of cells/L) of individual events with concentrations larger than 1,000 cells/L; (right) Total fishing effort (number of fishing pings). Overlaid in red the maximal extent of all red tide events with concentrations larger than 1,000 cells/L.

# Red tide synthesis paper

**Case study** to assist FEI loop scoping phase

- Red tide content and FEI process

Summarizes **fishery triple-bottom line** of Red Tides

- Ecological, economic, and societal impacts

Historical **overview of accomplishments**

- Stock assessments, management actions, and monitoring

Provides example **policy recommendations**

- Fishing mortality, flexibility and access, extra-jurisdictional partnerships, and communication strategies

Outlines **current or needed support**

- Decision support tools, cooperative research, and stakeholder participation

*Turley et al., in prep*