Seascape and Food Web Impacts of the Fish Spinning Phenomenon in the Florida Keys

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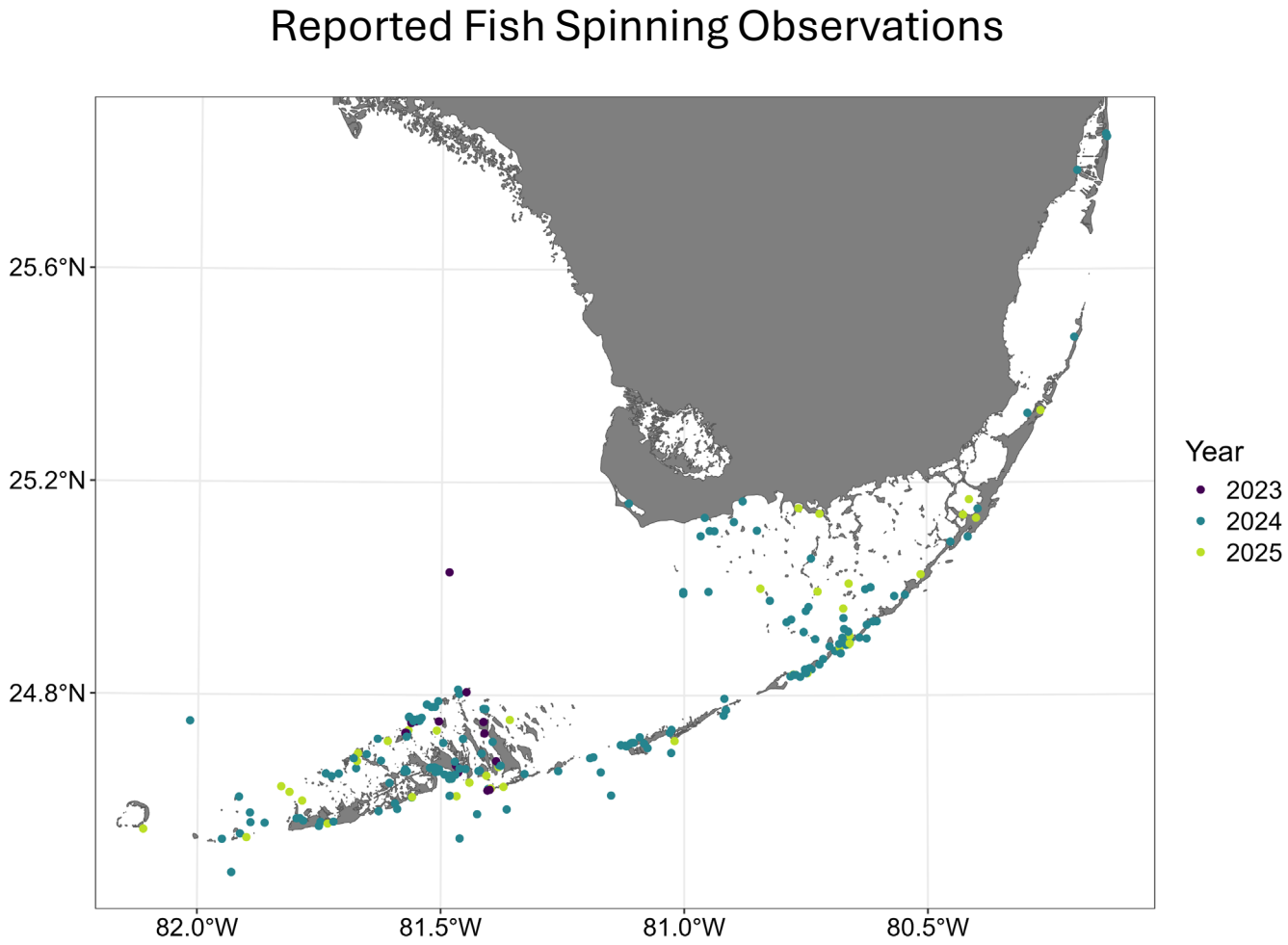
1. Florida International University
2. Bonefish and Tarpon Trust

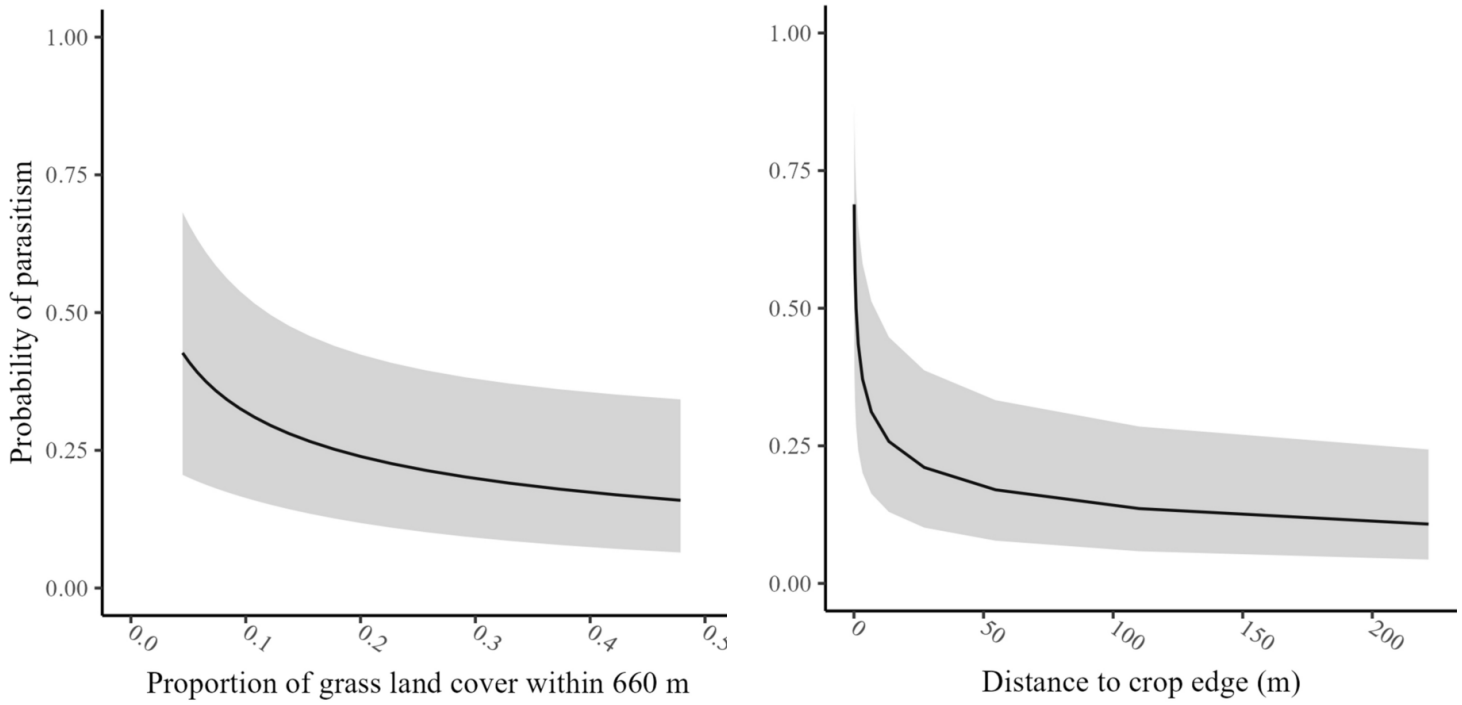
Fish spinning

- Began Fall 2023
- Over 80 species affected
  - Smalltooth Sawfish
  - Crevalle Jack
- Prey species?



Foraging and risk of fish spinning

- Foraging habitat
  - Seagrass vs pelagic
- Prey items
- Seascape
  - Fragmented vs continuous



Stephenson et al. 2024 *Landscape Ecology*

Objectives

1. Investigate influence of seascape or habitat type and configuration on occurrence of fish spinning behavior

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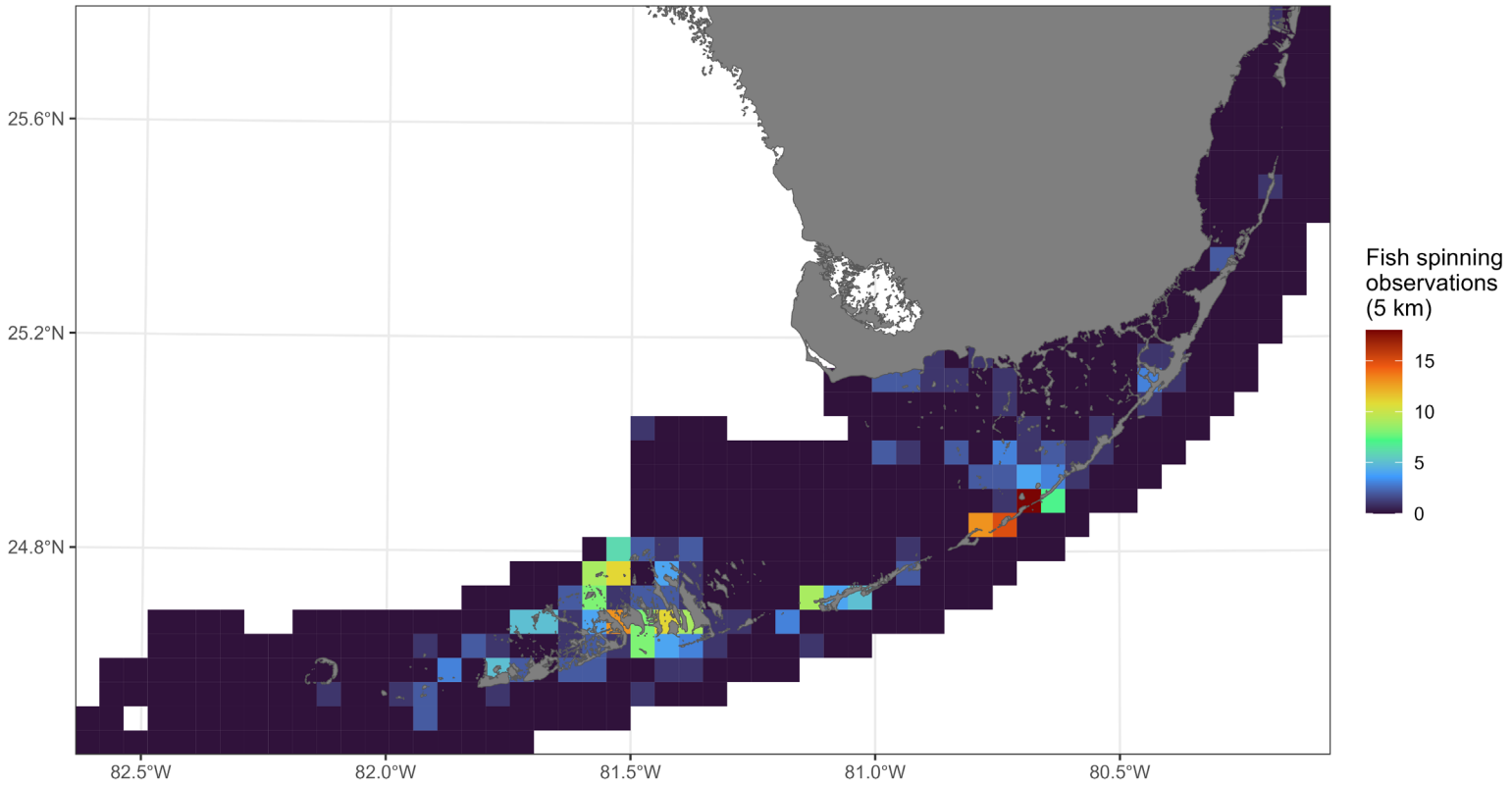
2. Examine changes in prey community structure in areas affect by fish spinning

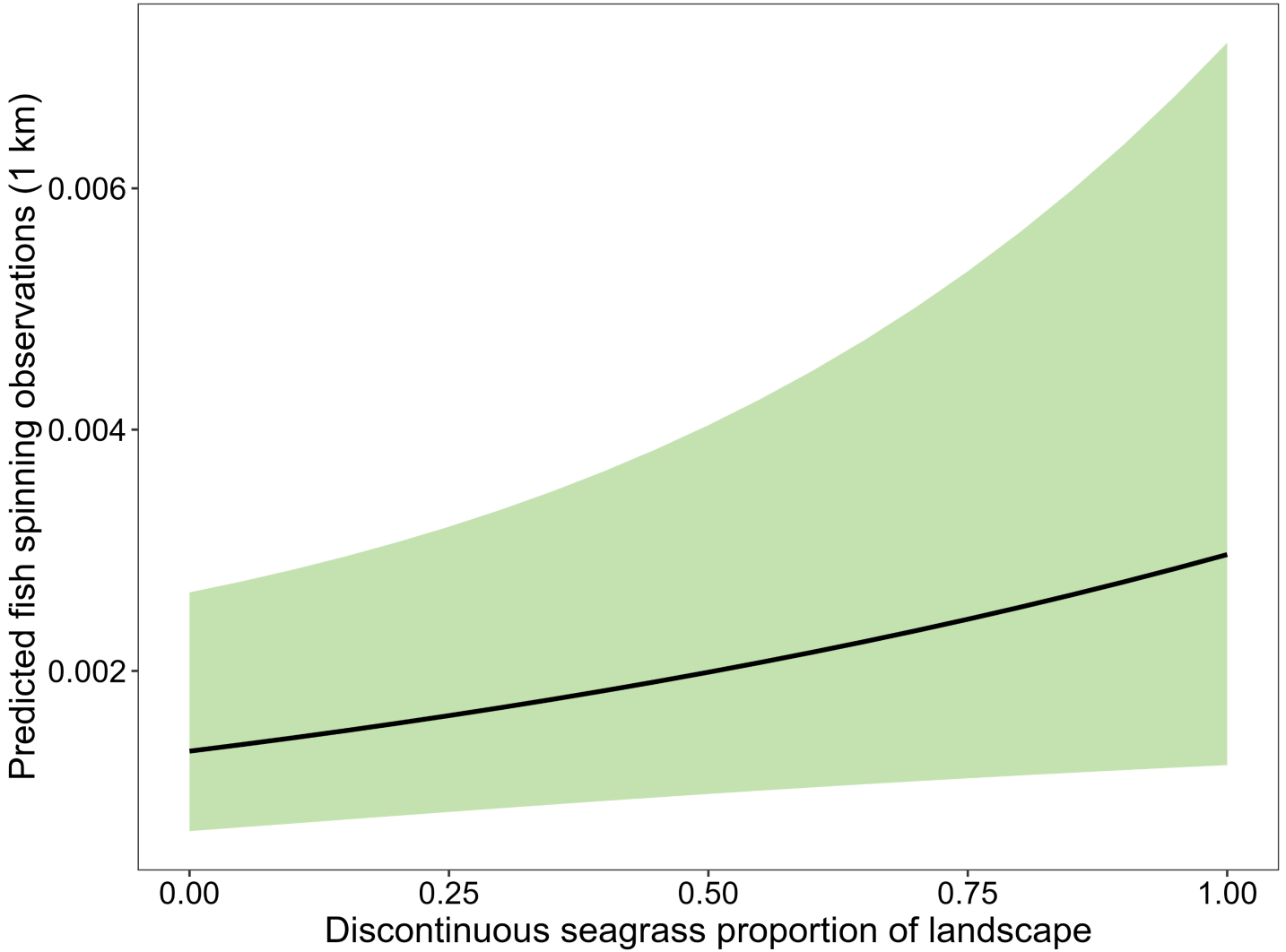
3. Assess the relationship between resource use and susceptibility to fish spinning behavior

Methods Objective 1



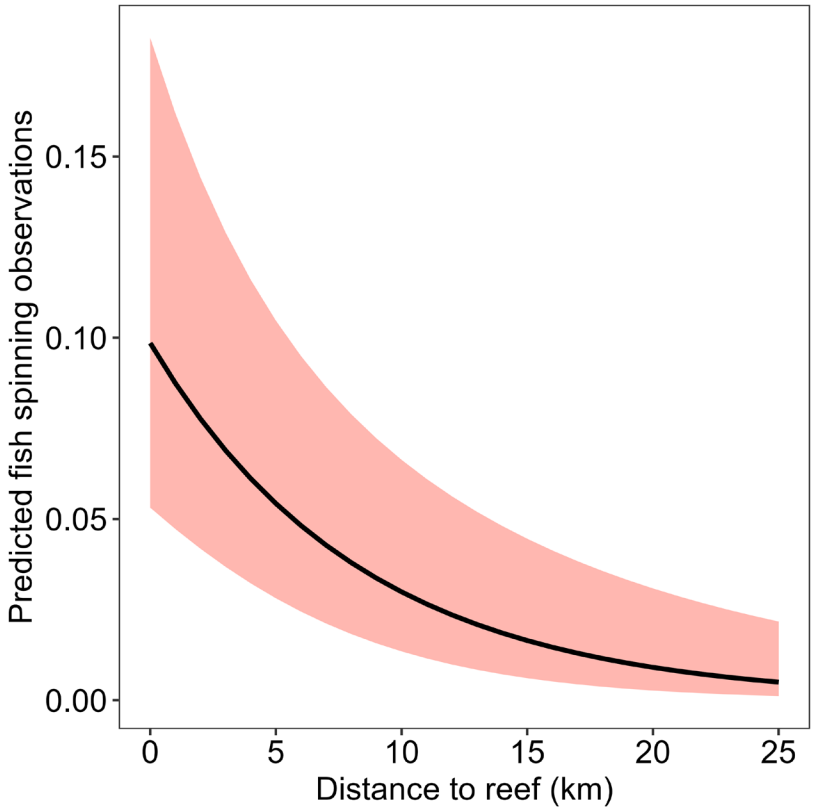
- Fish spinning observations
  - BTT reporting hotline
- Unified reef map
  - Amount of continuous seagrass
  - Amount of discontinuous seagrass
  - Distance to reef
  - Distance to land
- GLMs at 1 km and 5 km scale

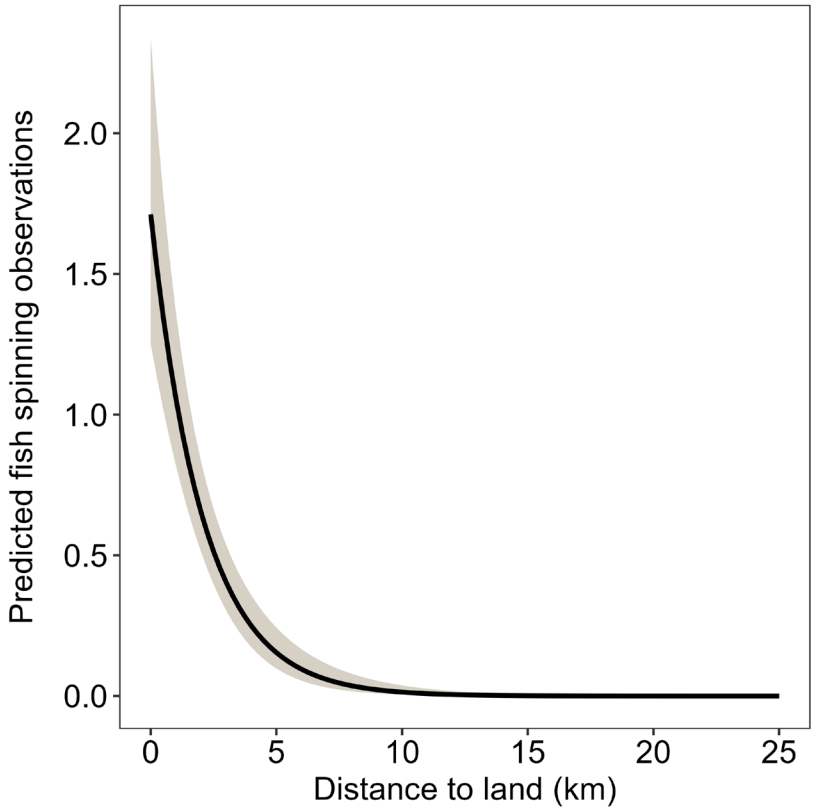
Higher occurrence of fish spinning with increased discontinuous seagrass



- Only at 1 km scale and not 5 km scale
- No relationship with continuous seagrass
- Higher in areas where meadows fragmented

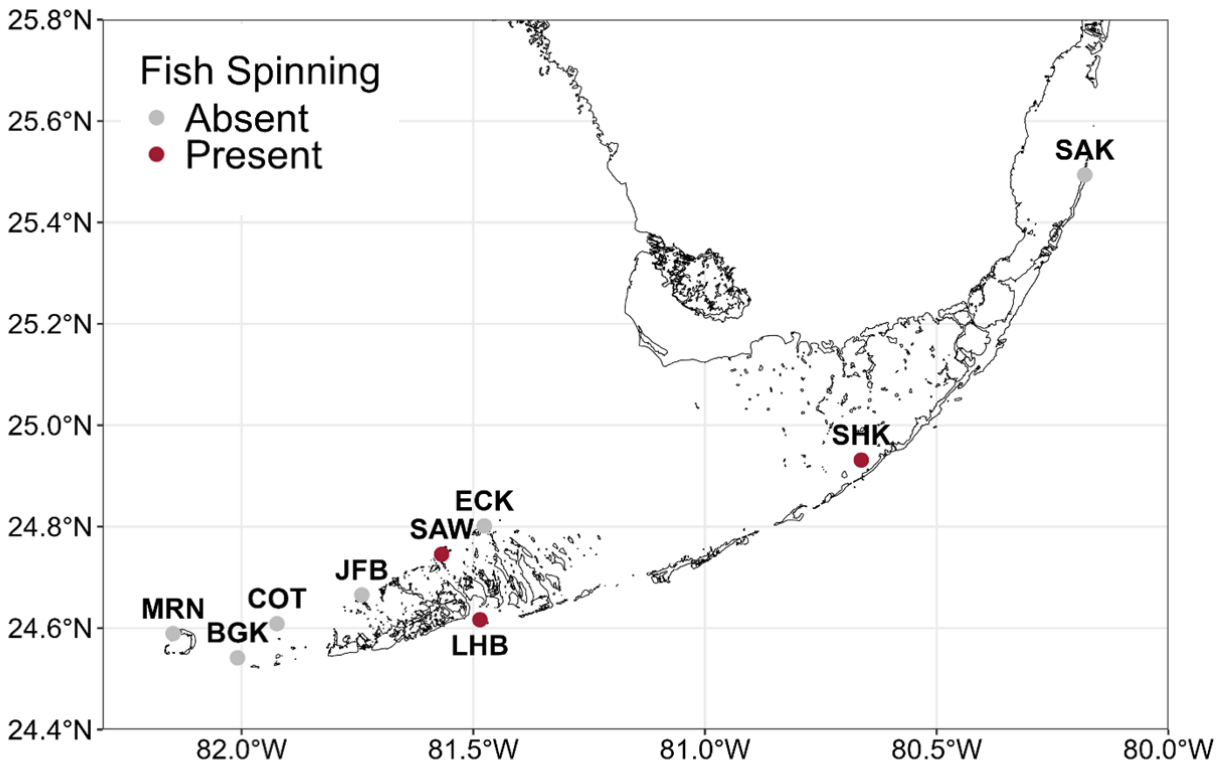
Higher occurrence of fish spinning closer to reef and land



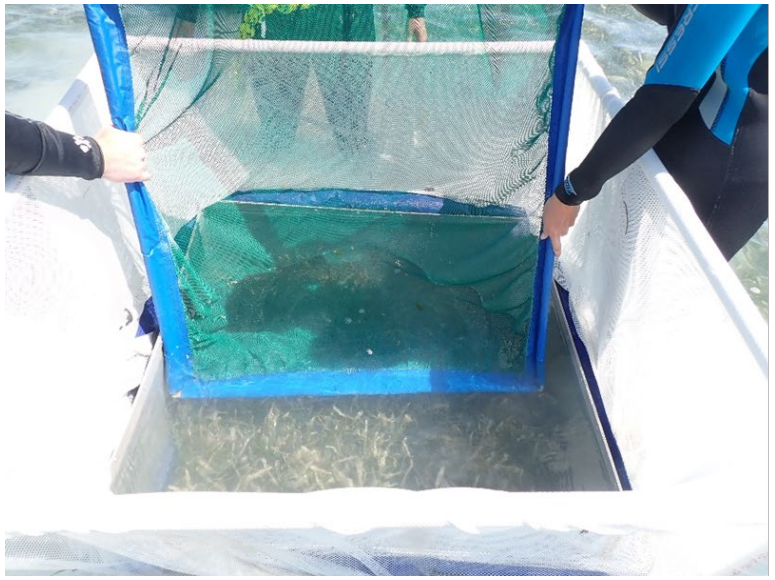


- Same response at 1 km and 5 km scale
- Fish spinning toxin closer to reef and land
- Potentially related to higher human activity (increased reporting)

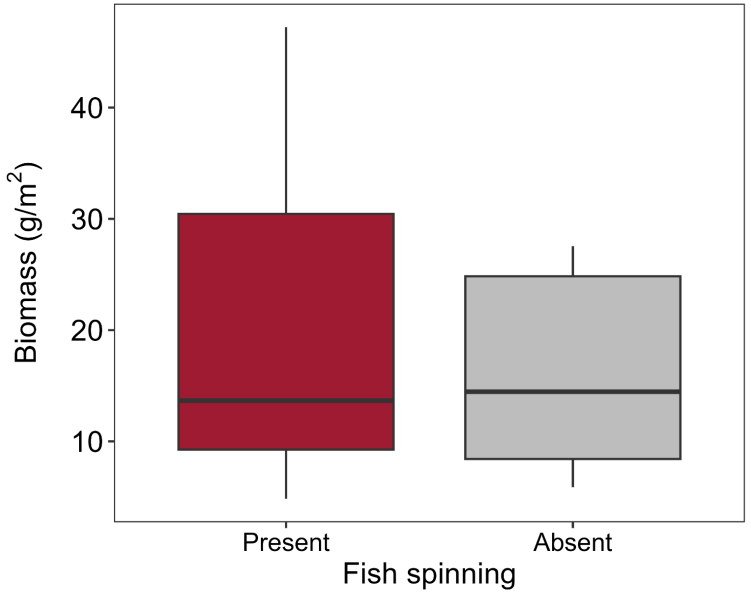
Methods Objective 2

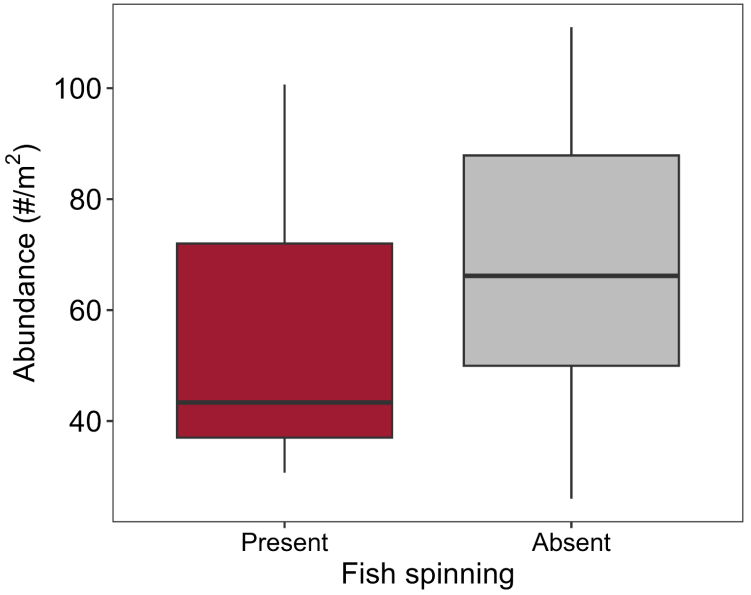


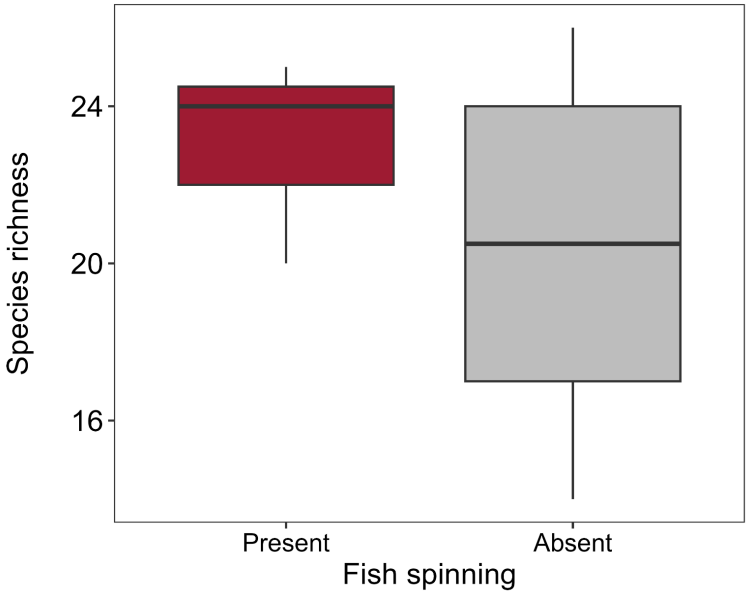
- Throw traps
- 8 sampling locations
  - 3 fish spinning
  - 5 non-fish spinning

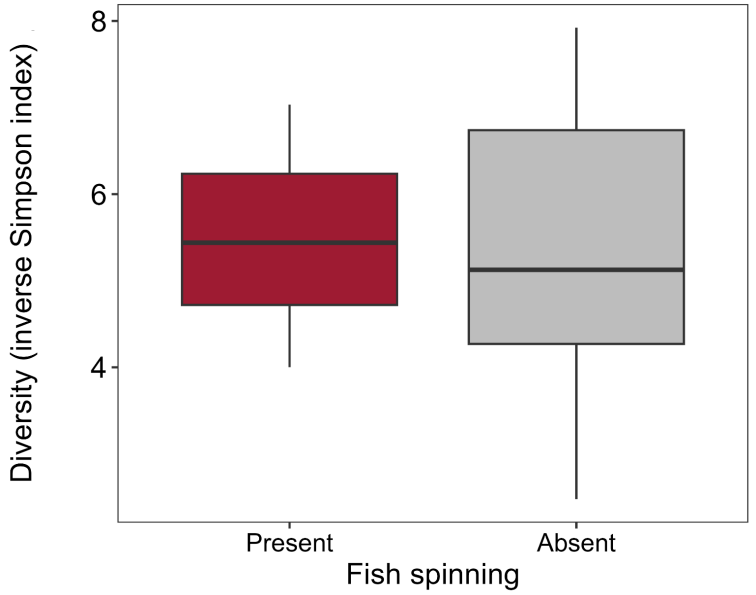


Prey communities did not differ in areas with fish spinning









- No differences in biomass, abundance, species richness, or diversity
- No differences in community composition
- Communities likely influenced by site specific factors

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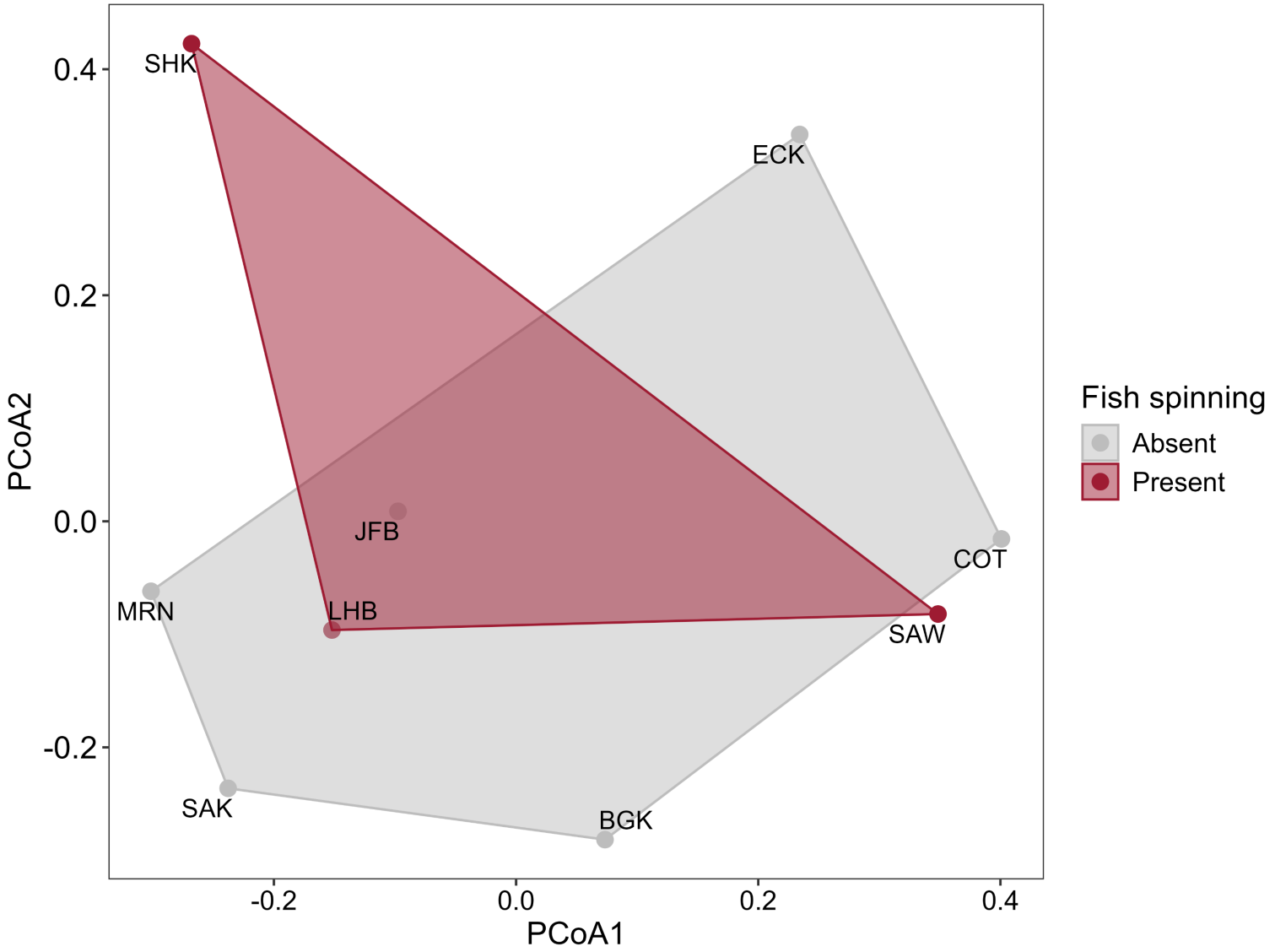

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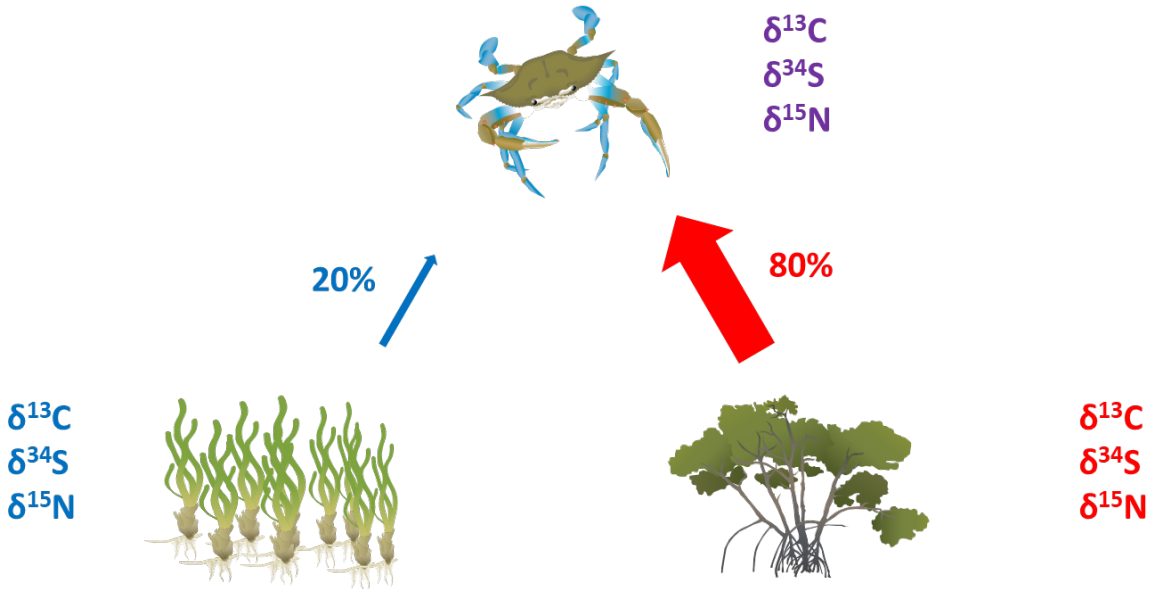
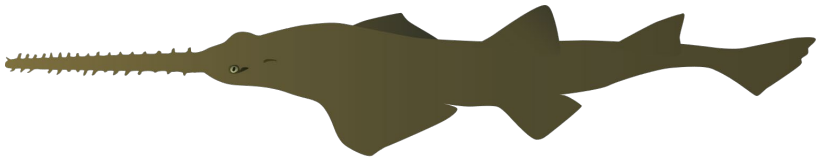
Methods Objective 3

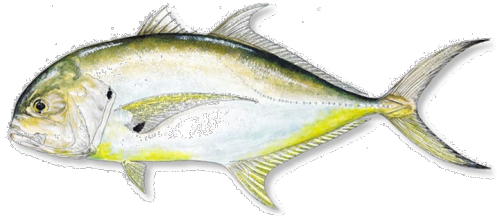
Bayesian stable isotope mixing models (MixSIAR Stock et al. 2018)



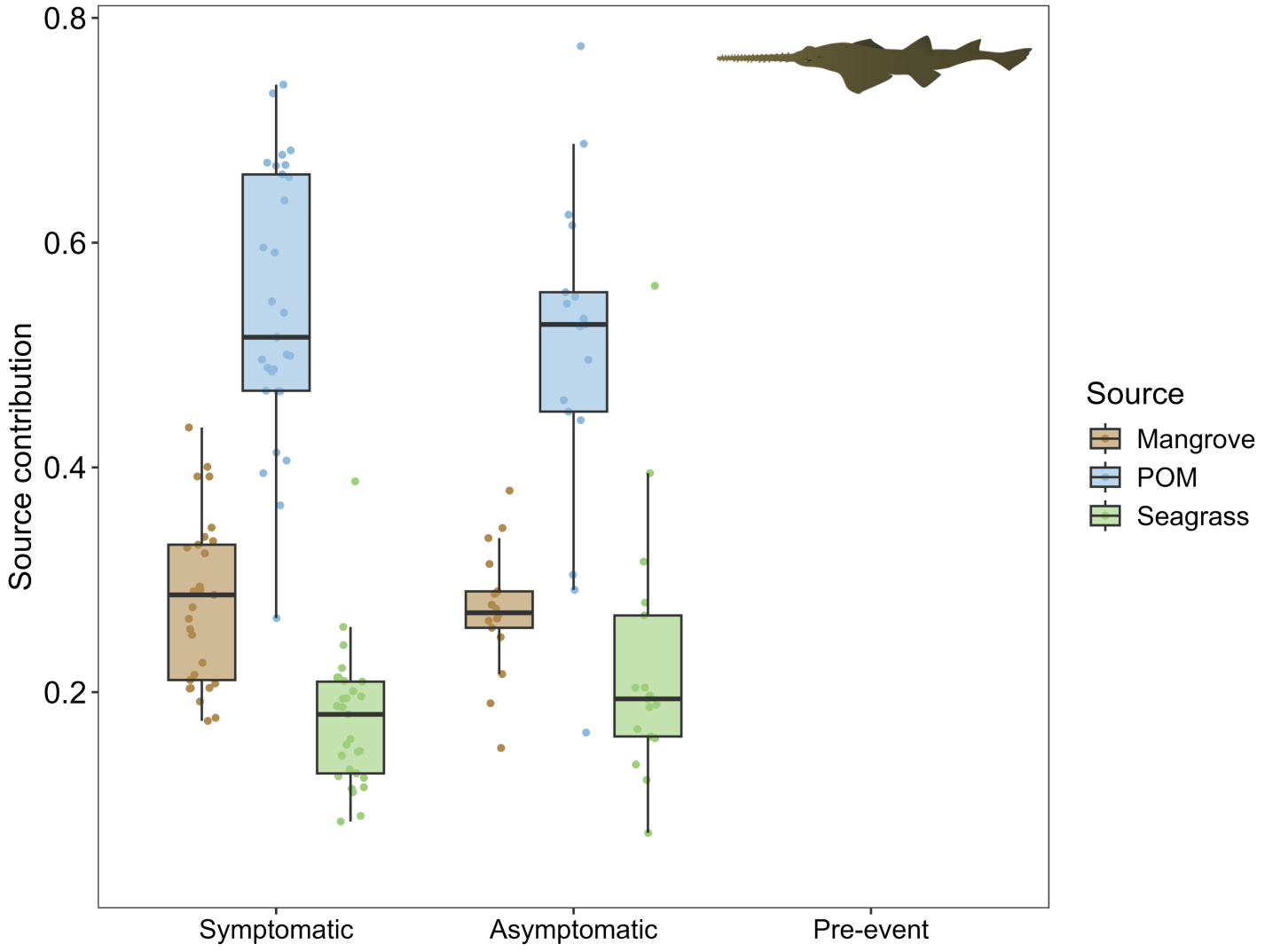
- Smalltooth Sawfish
  - Necropsy (symptomatic)
  - Healthy (asymptomatic)
  - Pre-event
  - Muscle
  - FWC, FSU



- Crevalle Jack
  - Symptomatic
  - Asymptomatic
  - Pre-event
  - Muscle and fin
  - BTT, USA, FIU



Healthy and necropsy Sawfish same resource use



- Necropsy and healthy Sawfish rely on pelagic resources
- Differed from pre-event Sawfish which used more mangrove (ontogenetic or temporal shift)
- Energy use likely not major contributor to risk of fish spinning in Sawfish

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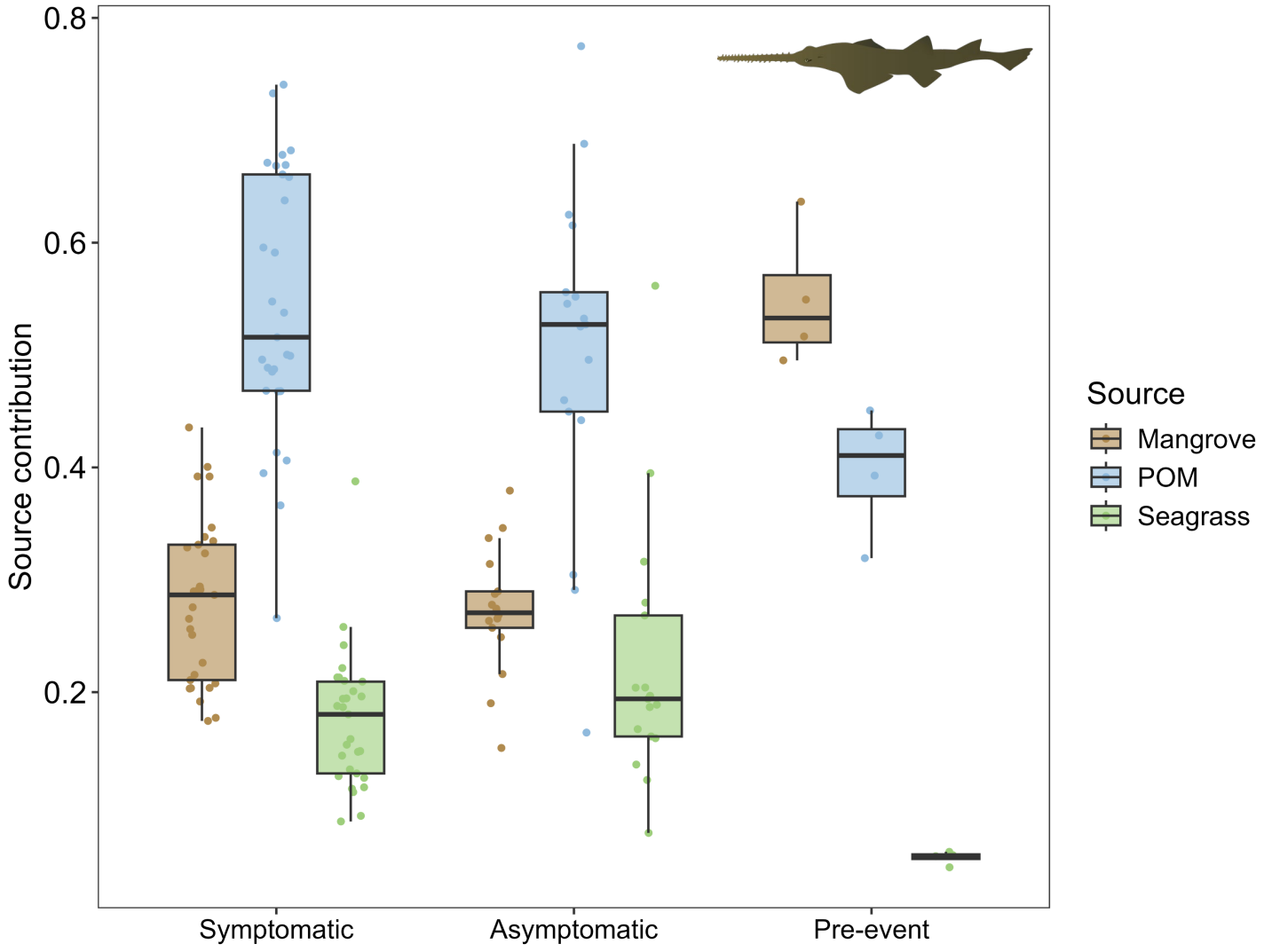

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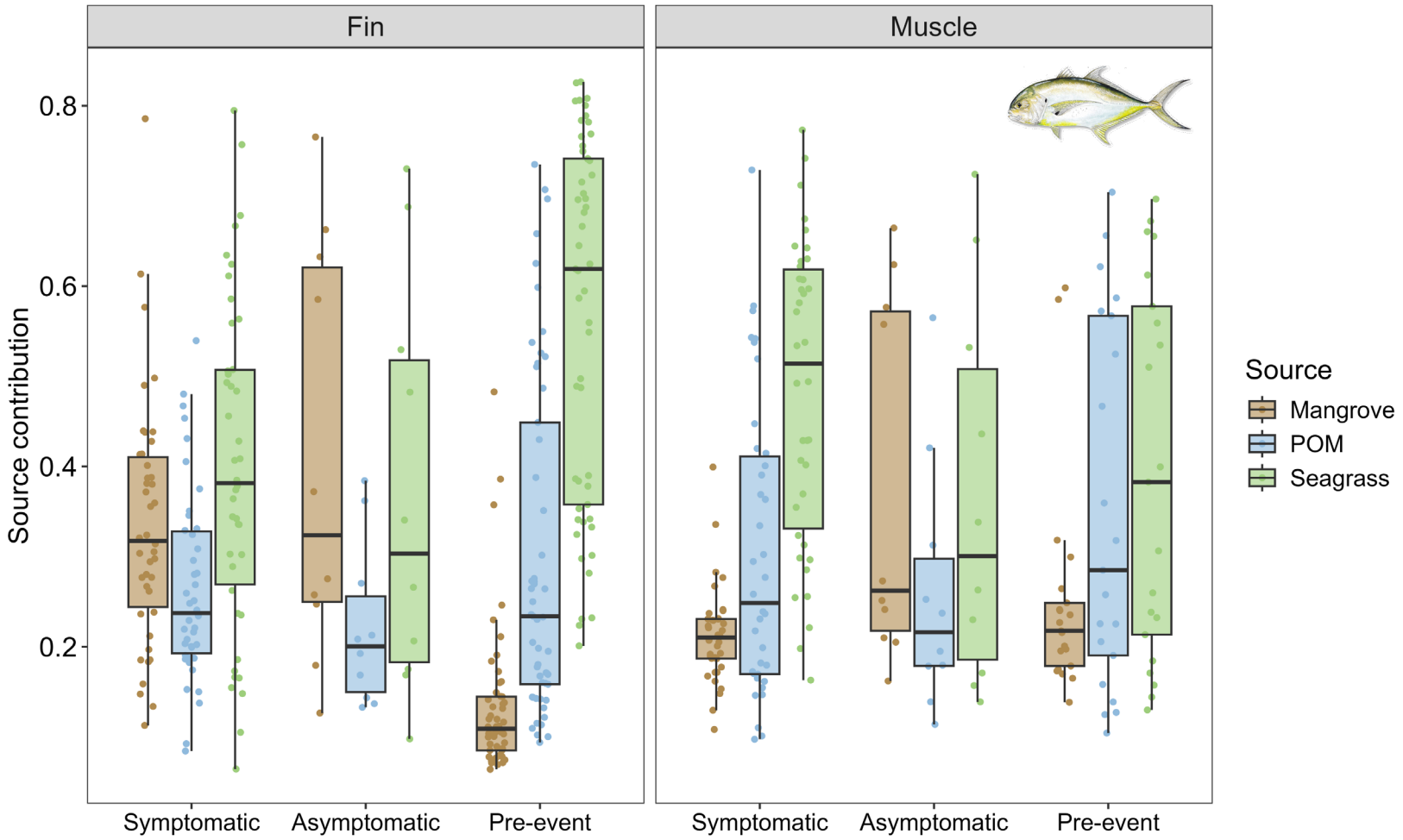
Higher potential exposure for Crevalle Jack when using nearshore microhabitats



- Seagrass was important source
- Symptomatic Jack switch resource use to more mangrove (nearshore) production
- Asymptomatic no shift
- Pathway shift, through prey or location, could increase risk to fish spinning

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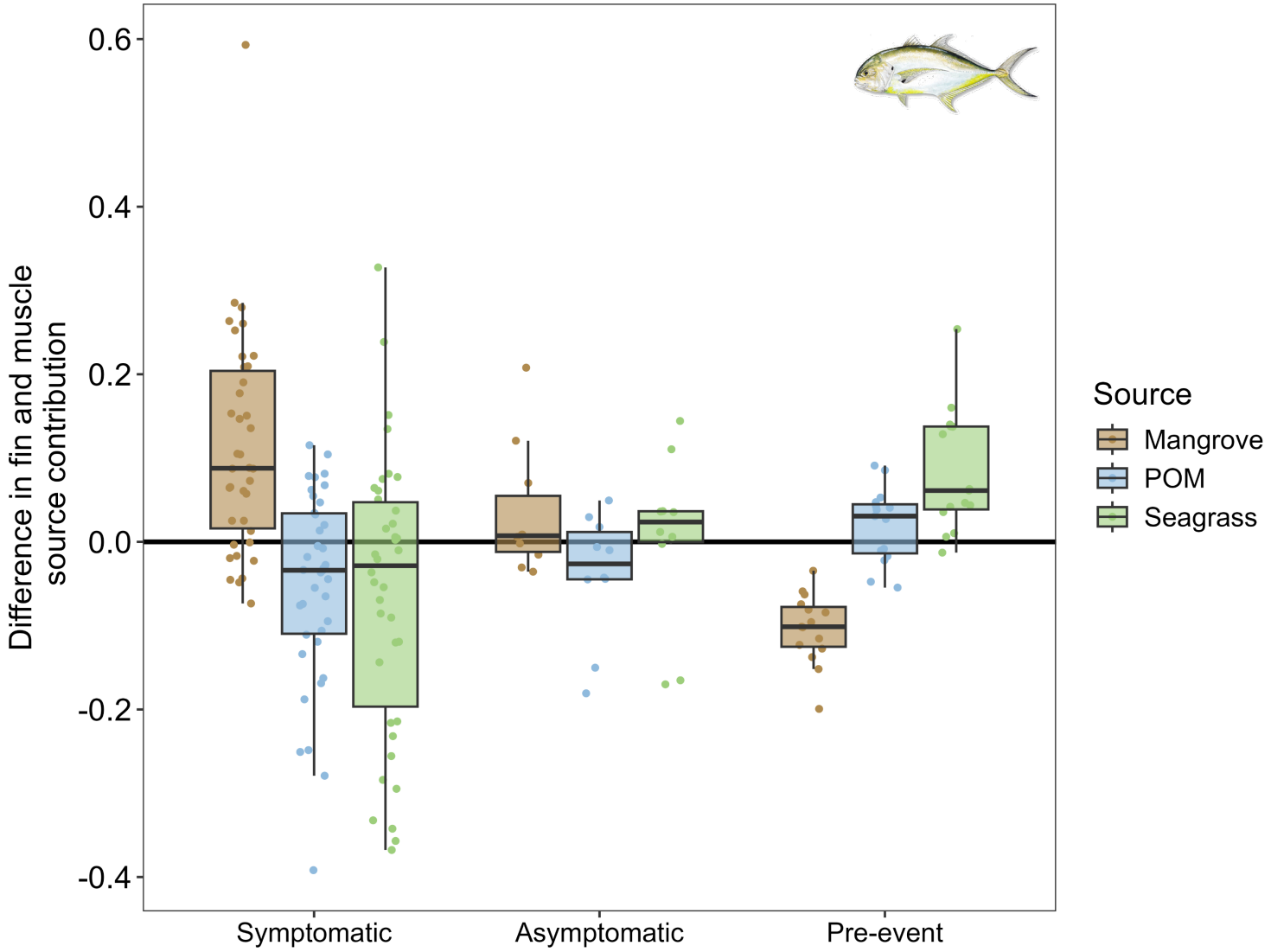

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Conclusions

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- Prey communities showed no spatial differences between spinning vs. non-spinning flats in biomass, abundance, richness, diversity, or composition
- Smalltooth Sawfish did not differ in resource use in symptomatic or asymptomatic individuals but differed from pre-event fish
- Shifts toward nearshore/mangrove energy in symptomatic Crevalle Jack consistent with elevated exposure risk in nearshore microhabitats.

Acknowledgements

Icon credit: IAN image library

Reporting Fish spinning

- BTT, LKGA

Sawfish Samples

- FWC
  - Gregg Poulakis
- FSU
  - Dean Grubbs

Jack samples

- BTT
- USA
  - Alison Robertson

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Questions?

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