

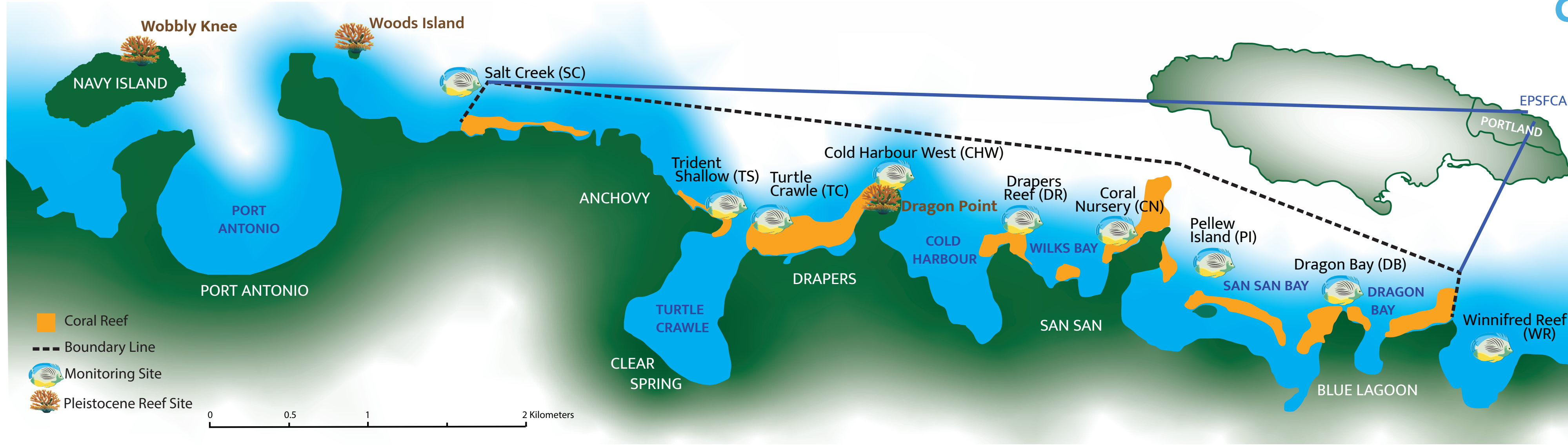
# Environmental Monitoring to Support Coral Reef Management in East Portland Special Fishery Conservation Area, Jamaica

Claire M. Williams (cmw3@utexas.edu), Pearl Bergan, Debbie-Ann Gordon Smith, Rowan Martindale, Denise Henry  
University of Texas at Austin, Alligator Head Foundation, University of the West Indies

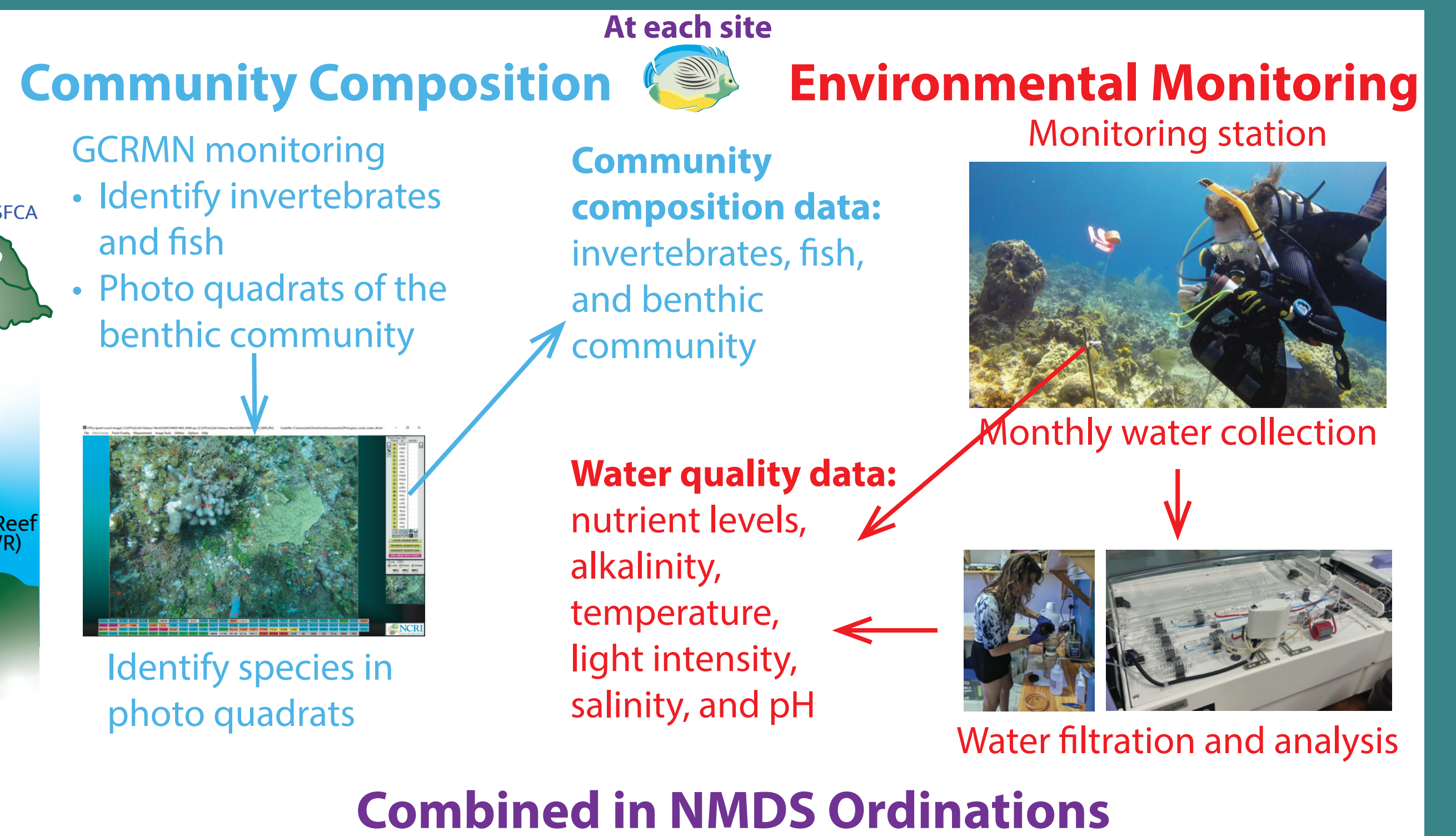
## Introduction

- Jamaican reefs face a variety of threats including warming oceans<sup>1</sup>, disease<sup>2</sup> and algal overgrowth exacerbated by urchin death<sup>3</sup>, overfishing<sup>4</sup> and pollution<sup>5</sup>.
- A lack of baseline data is a barrier to conservation efforts in many areas of the island outside of the well-studied Discovery Bay, northwest Jamaica.
- To obtain an ecological baseline for future conservation benchmarks, this project synthesized community assemblage data and environmental data from a reef in the northeast of Jamaica

## Methods

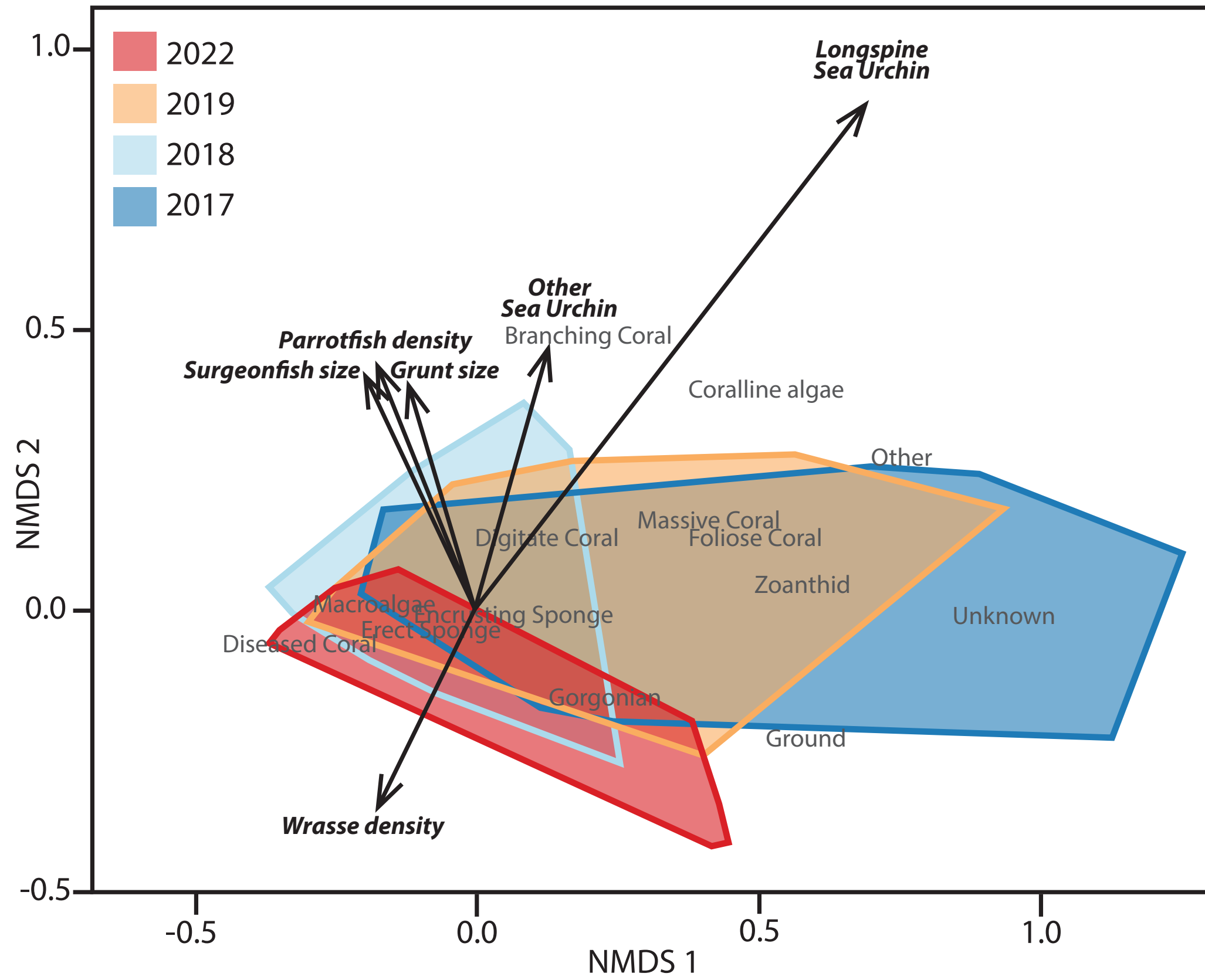


The East Portland Special Fishery Conservation Area (EPSFCA)

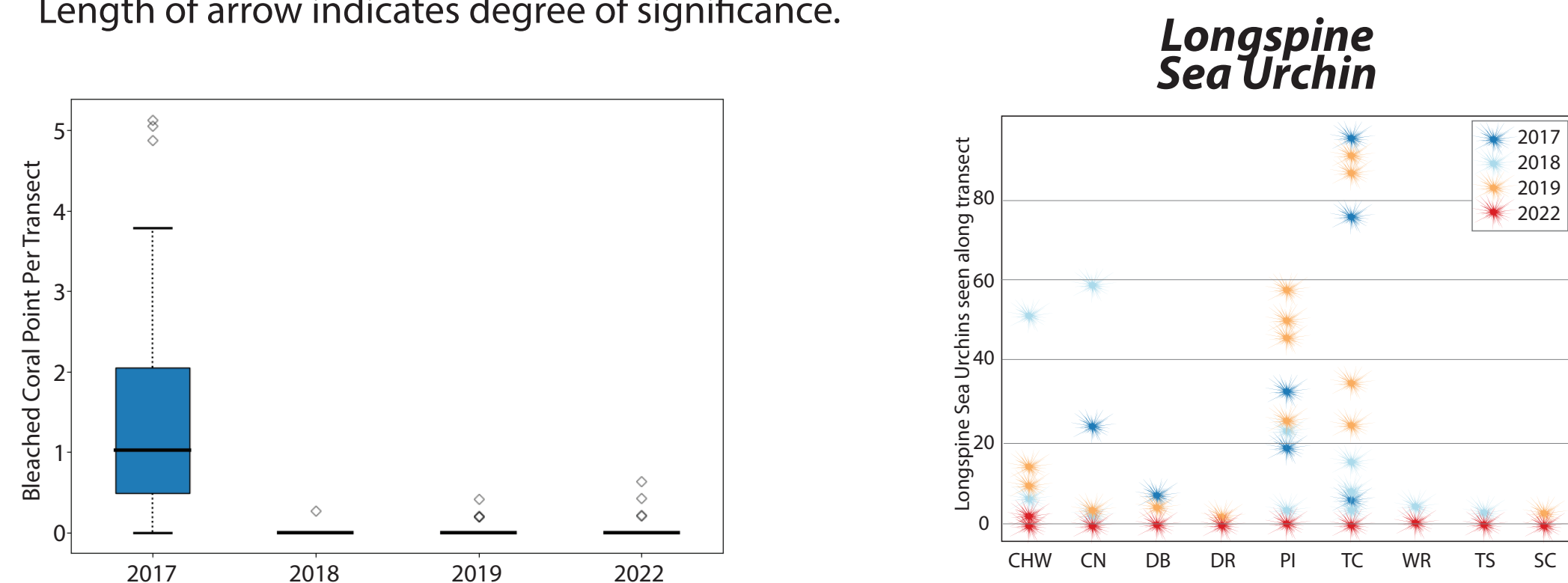


Combined in NMDS Ordinations

## Change over time and ecological controls

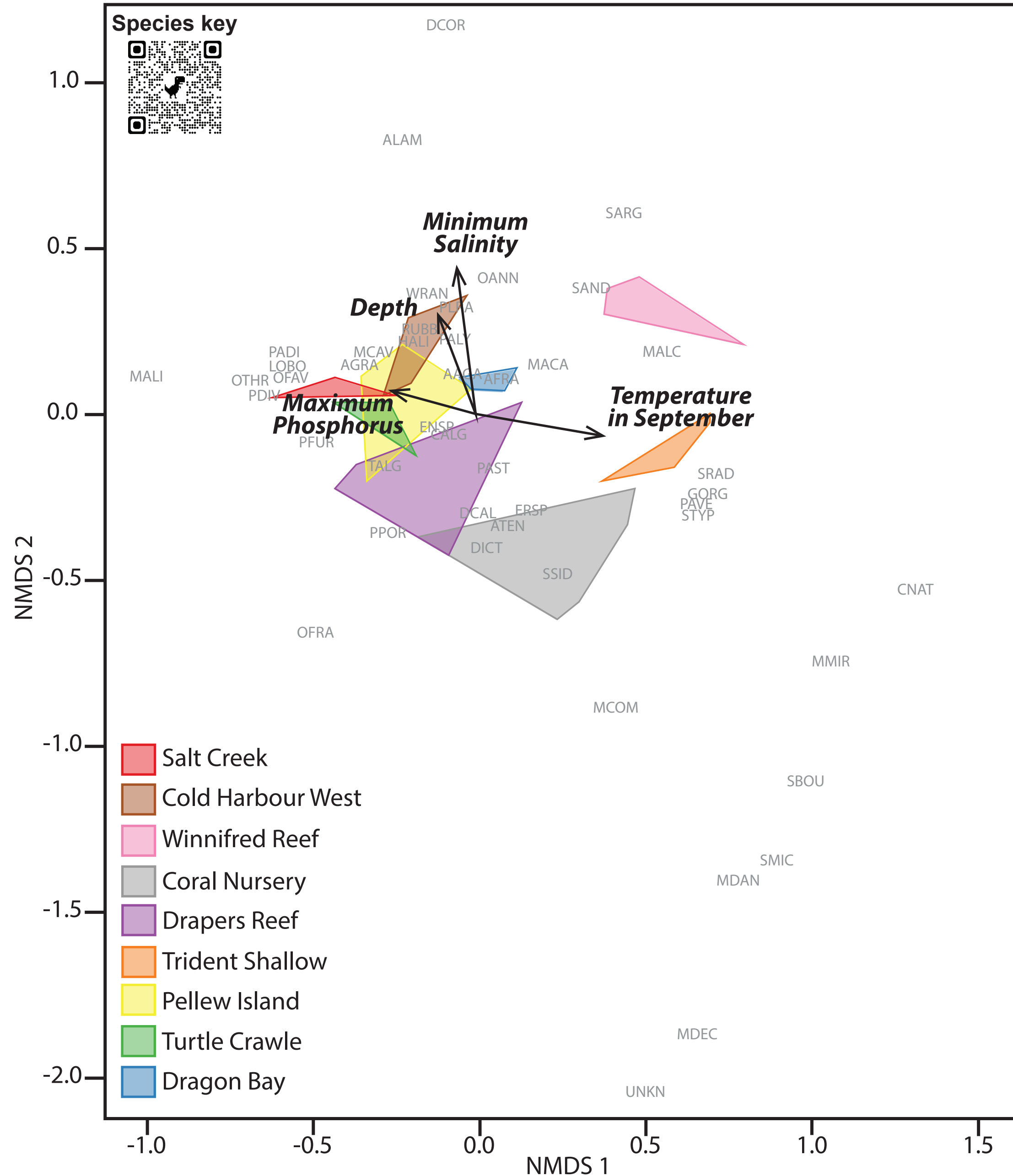


NMDS of groups of benthic community composition for 2017, 2018, 2019, and 2022. Invertebrate and fish arrows indicate significant correlations with benthic composition. Length of arrow indicates degree of significance.

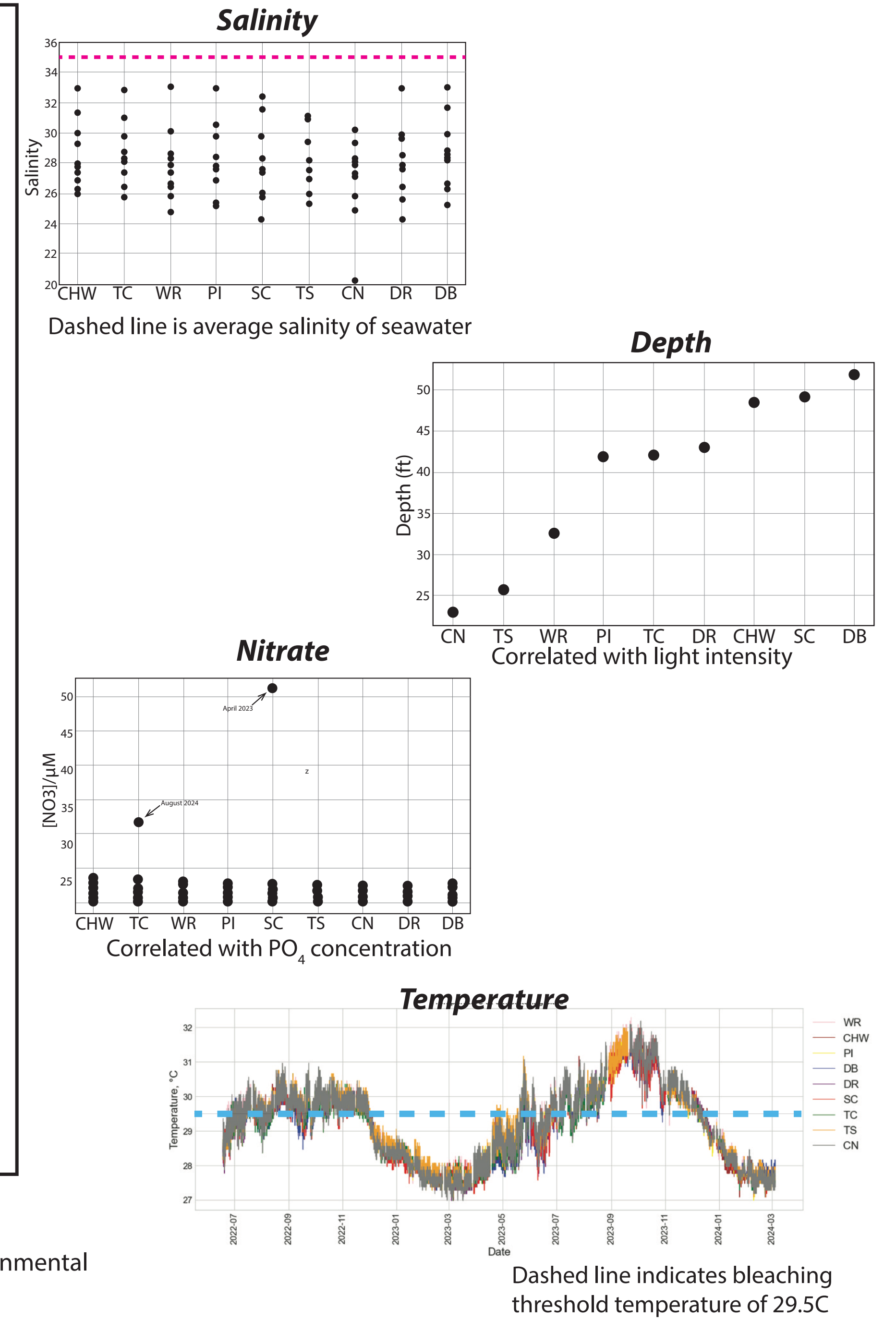


## Results

### Environmental controls on EPSFCA reef composition



NMDS of 2022 benthic composition identified to species (key in QR code). Arrows show environmental variables that are significantly correlated with the benthic community.



## Discussion

- Temporal variation
  - 2017 - 2018 loss of massive corals corresponding with the appearance of stony coral tissue loss disease.
  - 2017- 2018 bleaching event
  - 2018 - 2019 some recovery of these corals
  - 2019 - 2022 decline in all coral and fish (besides wrasse)
    - Increased fishing pressure during COVID 19 pandemic
- Spatial variation
  - In 2022, few sites overlap in community composition
  - Environmental controls differ throughout the reef
  - Nuanced conservation strategies may be warranted**



Reef sites June 2023

- Ecological controls on reef composition
  - Herbivores (sea urchins, parrotfish, surgeonfish) correlate with more corals
    - Loss of urchins (disease in 2022)
- Sites are impacted by processes on land
  - Sites are quite fresh, likely from groundwater input
  - Spikes in  $\text{NO}_3^-$  correlate with rainfall between collection (p-value 0.0296)
- There are many drivers of degradation including increased temperatures, spikes in nutrients, overfishing, disease, and urchin death**

## Future/Ongoing Work

- Collect 2024 GCRMN monitoring data
- Determine groundwater input with oxygen and hydrogen isotopes
- Continue collecting environmental data until June 2024 (2 years)
- Collect benthic composition from Pleistocene fossil reef sites for baseline

## Acknowledgments

Much of this data comes from the scientific monitoring efforts of the staff at Alligator Head Foundation and the community members assisting with the management of the EPSFCA.



Citations

