

Hurricane Irma impacts on Submerged Aquatic Vegetation (SAV) of near shore Biscayne Bay: Changes in diversity in restored and protected areas

Kathleen Sullivan Sealey, Jacob Patus, Zoi Thanopoulou,
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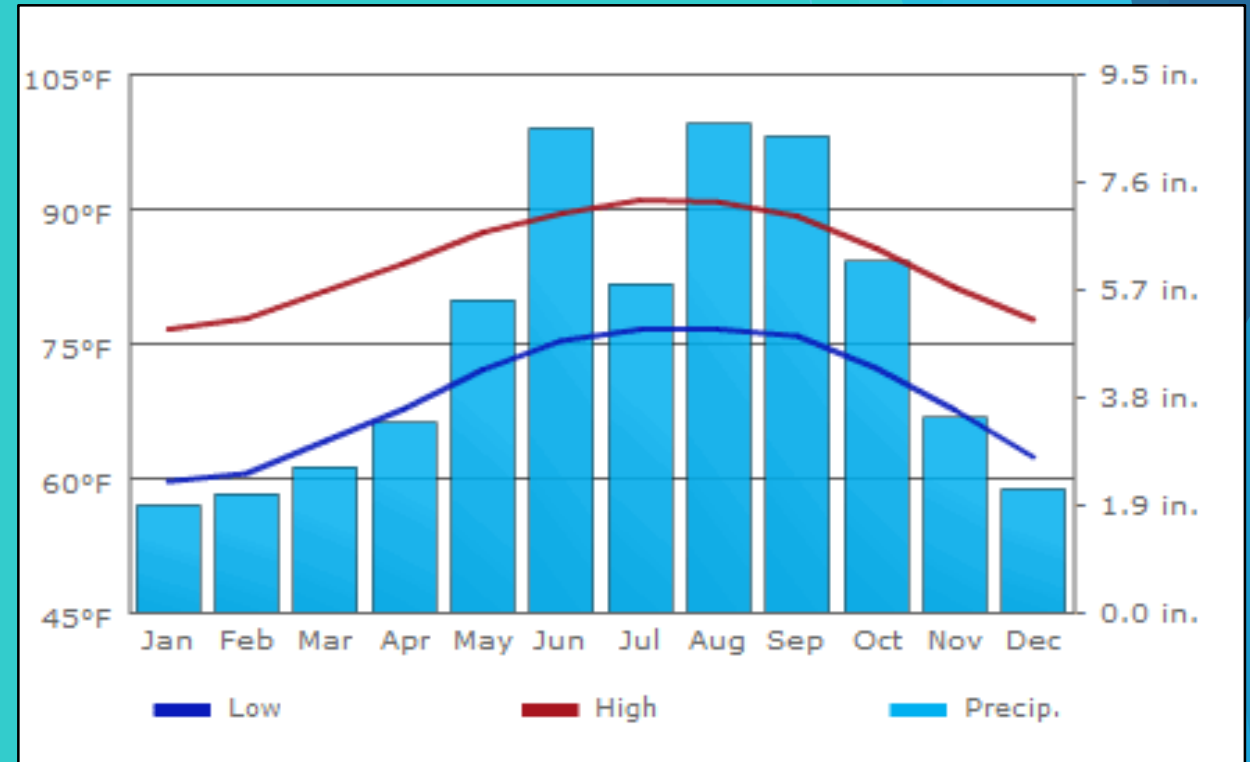
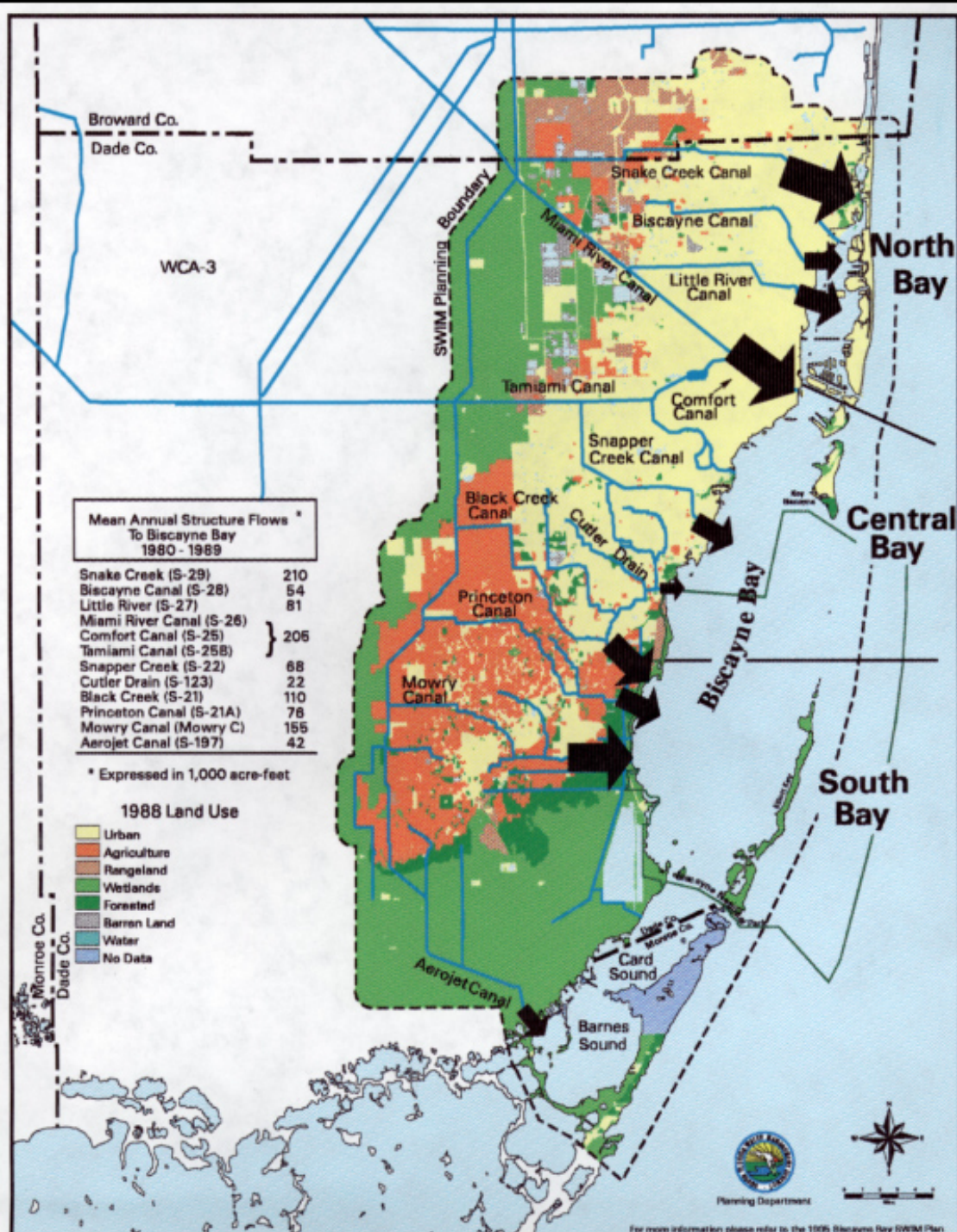


Biscayne Bay



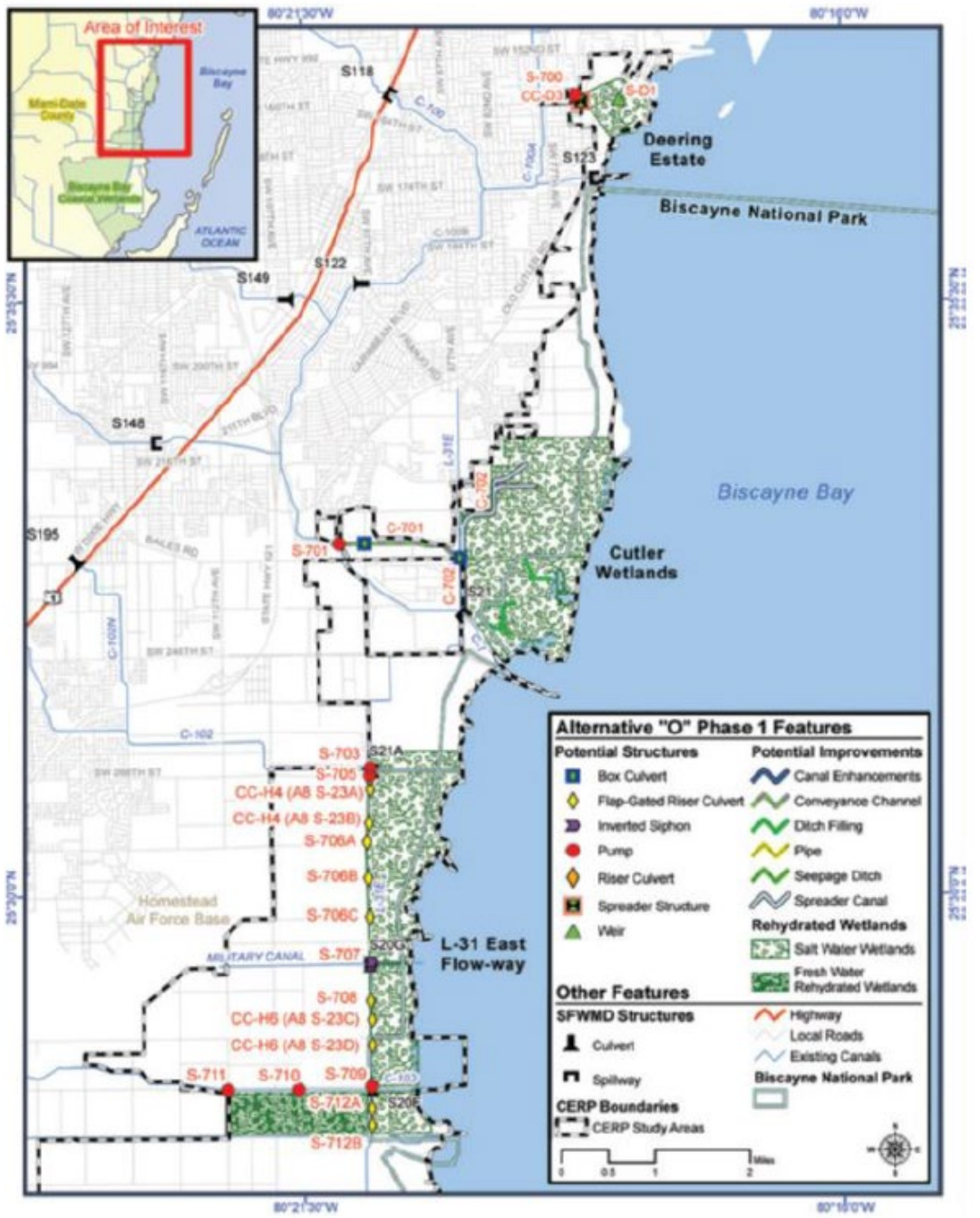
- ❖ **MARINE LAGOON SYSTEM** covering 1,110 sq. kilometers; Unique carbonate geology.
- ❖ Pre-Development (prior to 1900) this was a large **MARINE** lagoon separated by a coastal ridge from extensive wetlands and Everglades system.
- ❖ Development diverted fresh water into lagoon, created deep channels and spoil islands. Groundwater seepage into the lagoon was altered.
SYSTEM ALTERED TO ESTUARY LAGOON
- ❖ Today, water quality improvements include expanded protected areas, restoring mangrove wetlands as well as diverting freshwater flows.
SYSTEM BOTH ESTUARINE AND MARINE

RAINFALL SEASONALITY AND FRESHWATER RUN OFF TO BISCAYNE BAY



CERP and Biscayne Bay Coastal Wetlands

GOAL: Improve the ecological health of Biscayne Bay (including freshwater wetlands, tidal creeks and near-shore habitat) by adjusting the quantity, quality, timing, and distribution of freshwater entering Biscayne Bay and Biscayne National Park.

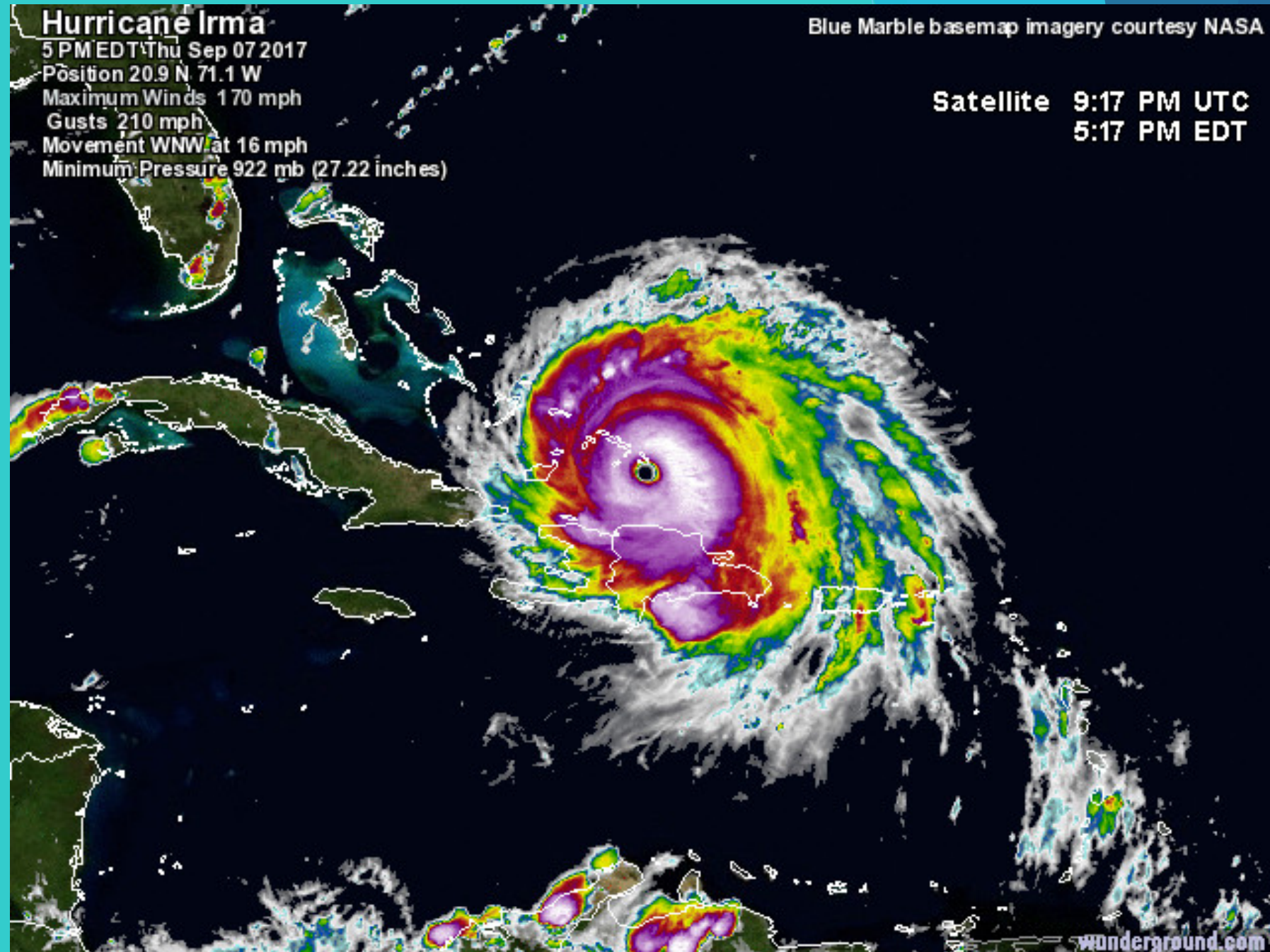


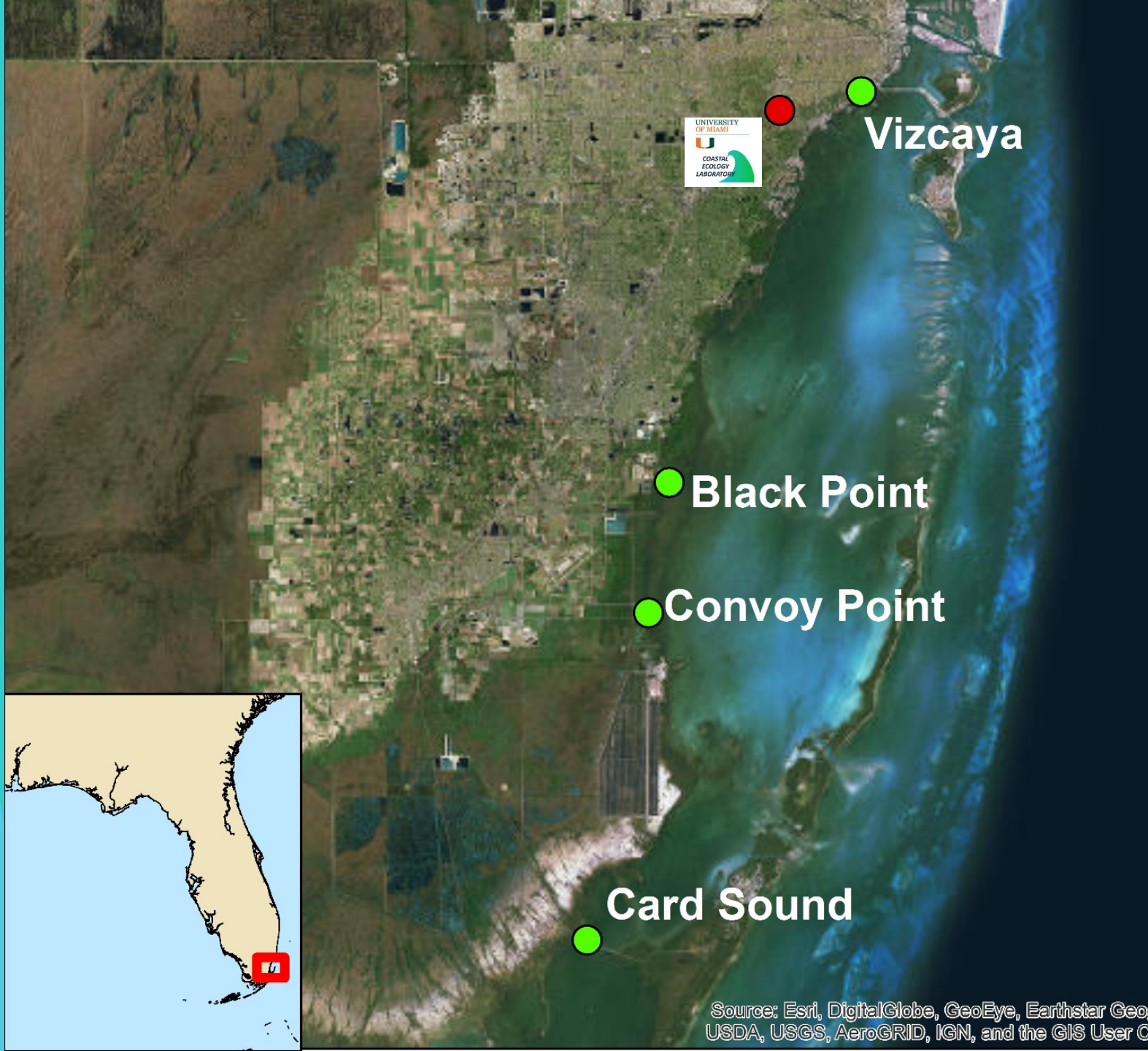
LEARNING BY DOING FIELD SAMPLING OF COASTAL ENVIRONMENTS STARTED in 2015

- ❖ FOCUS ON OUTREACH AND EDUCATION ACTIVITIES (BIOBLITZ)
- ❖ FOCUS ON LONG-TERM CHANGES IN COASTAL BIOLOGICAL DIVERSITY IN BISCAYNE BAY
- ❖ ENGAGE UNDERGRADUATE AND GRADUATE STUDENTS
- ❖ USE PLATFORMS LIKE iNATURALIST

Hurricane Irma

- ▶ Aug. 30 - Sep. 13, 2017
- ▶ Made landfall in FL on Sep. 10 as Category
- ▶ 99 mph wind gusts in Miami-Dade County
- ▶ \$65 billion in damages



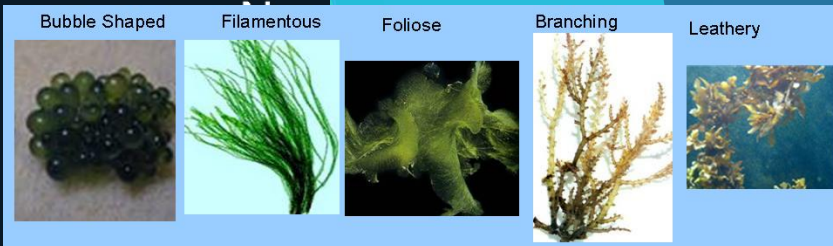


Vizcaya

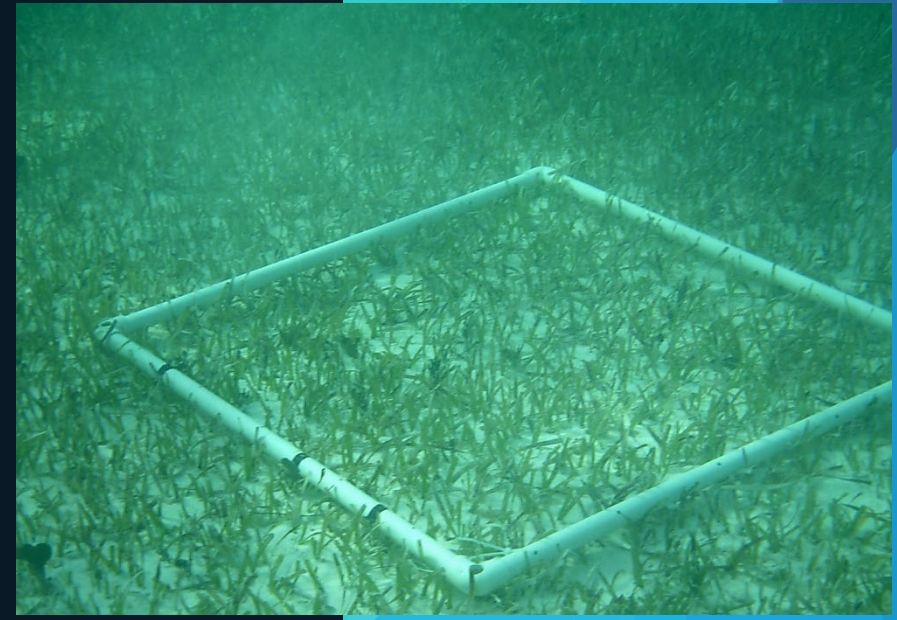
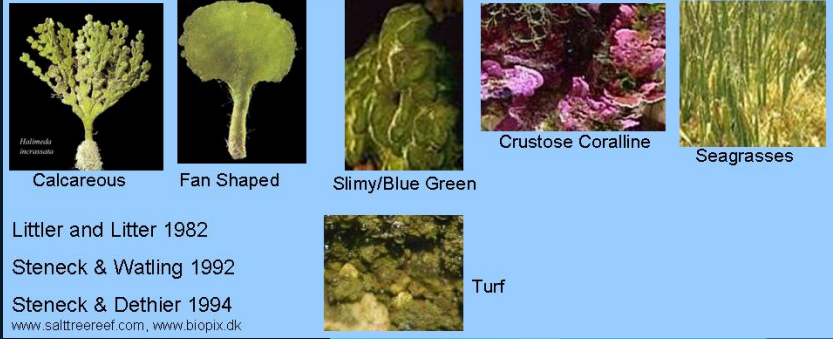
Black Point

Convoy Point

Card Sound

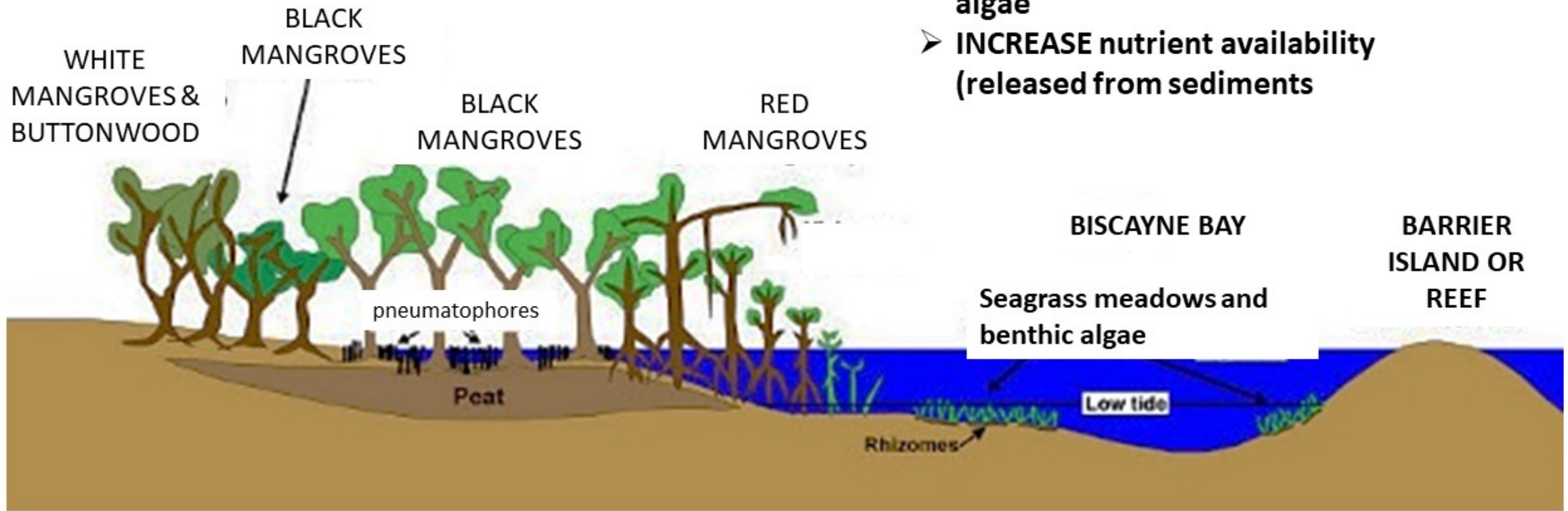


FUNCTIONAL GROUPS OF BENTHIC PLANTS



HURRICANES CAN INCREASE COASTAL MARINE PLANT DIVERSITY BY DISTURBANCE

← **INTACT COASTAL WETLANDS** →

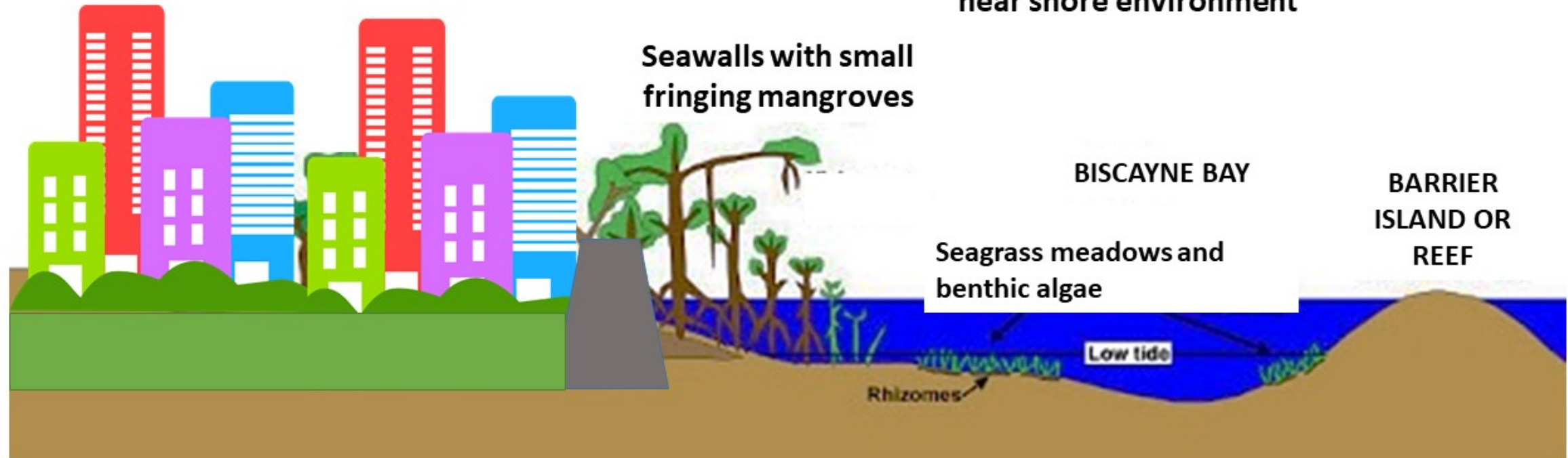


- INCREASE Current flow and velocity, storm surges
- INCREASE Circulation and flushing sediments offshore
- INCREASE settlement areas for benthic algae
- INCREASE nutrient availability (released from sediments)

HURRICANES CAN DECREASE COASTAL MARINE PLANT DIVERSITY WITH EUTROPHICATION AND HIGH TURBIDITY

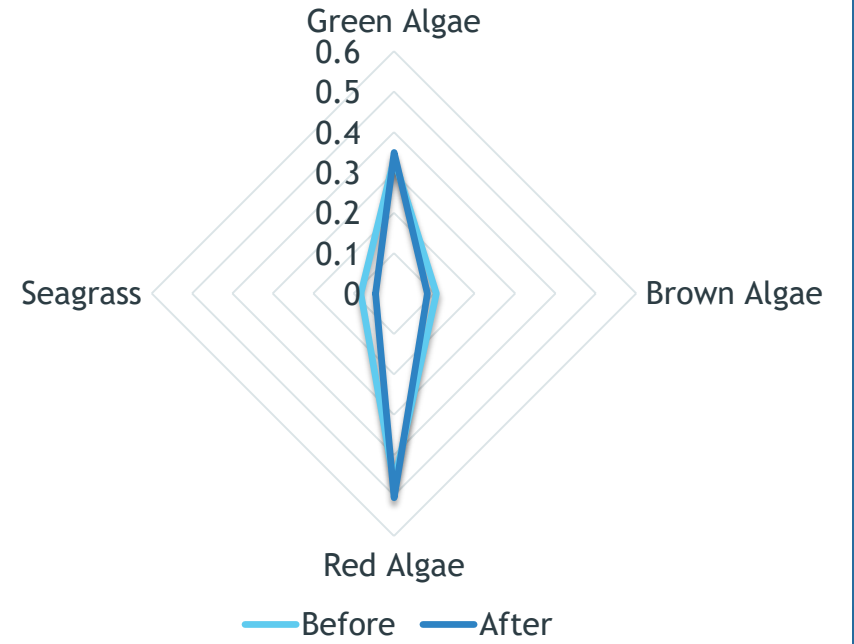
- INCREASE suspended sediment to excess, increasing turbidity
- INCREASE nutrients to excess, stimulating Harmful Algal Bloom (HAB)
- DECREASE light to the benthos and seagrass
- INCREASE Pollutants and solid waste to near shore environment

← DEVELOPED COASTAL ZONE →

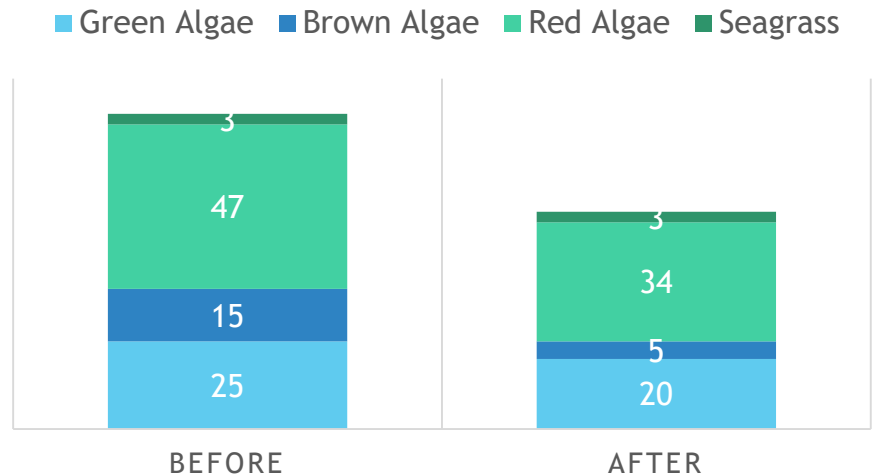


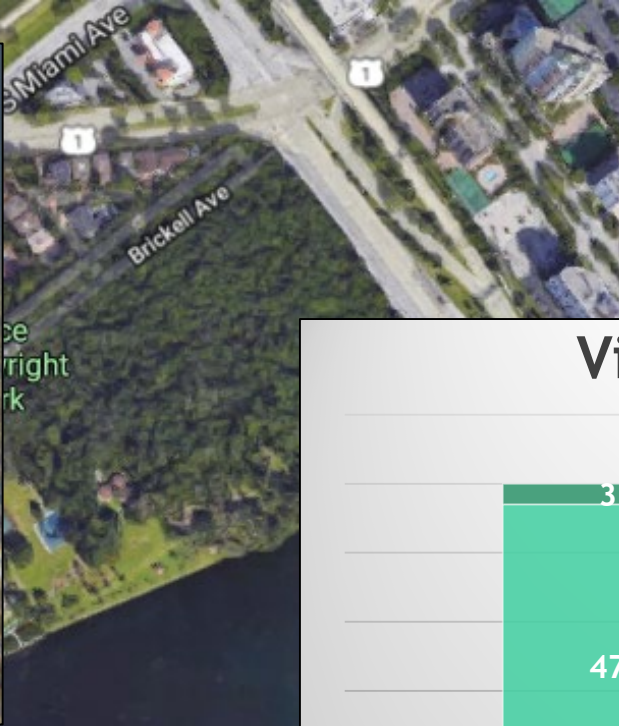


Vizcaya - Relative Density

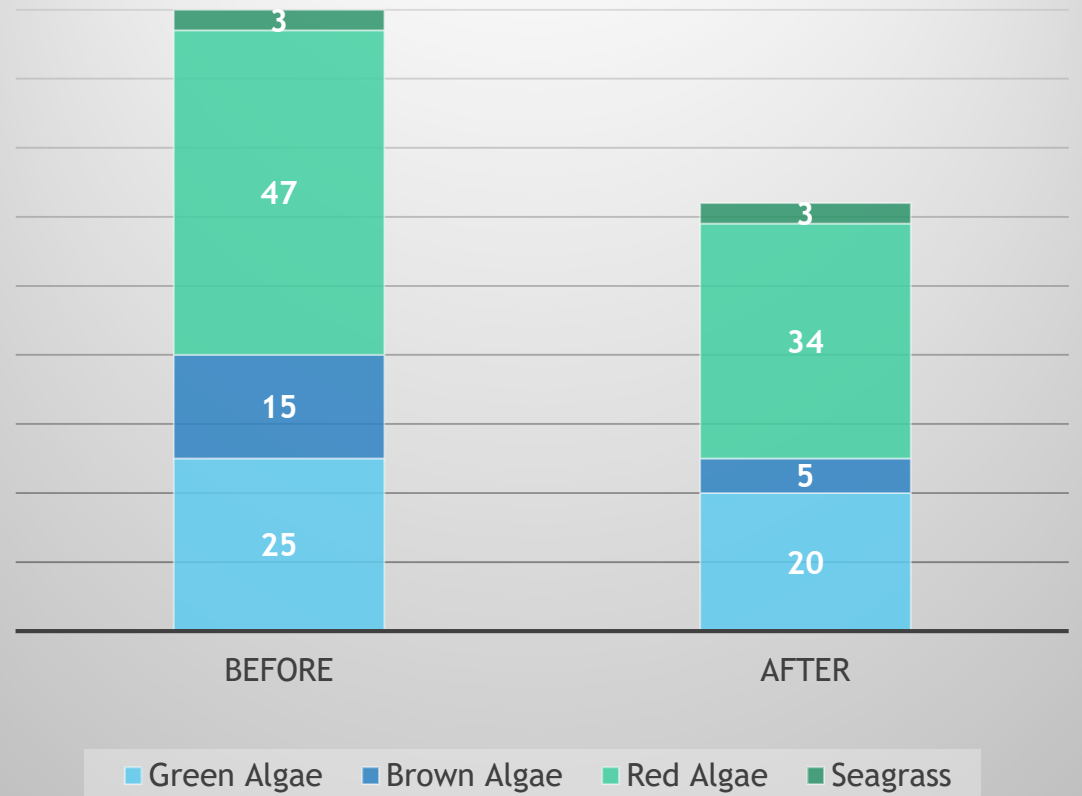


VIZCAYA- SPECIES RICHNESS





Vizcaya- Species Richness

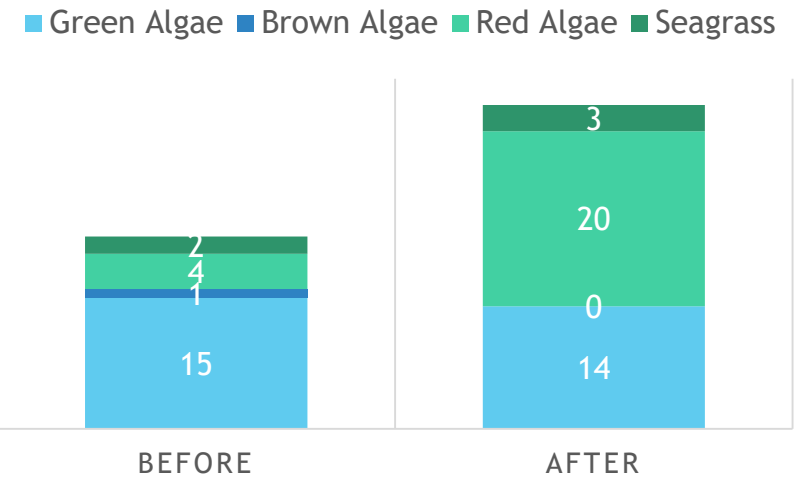


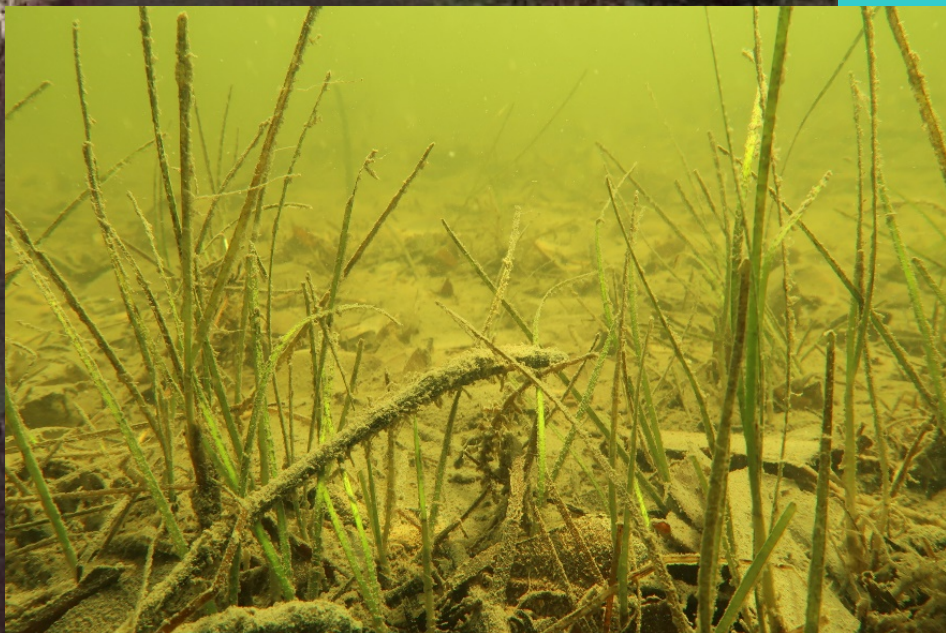
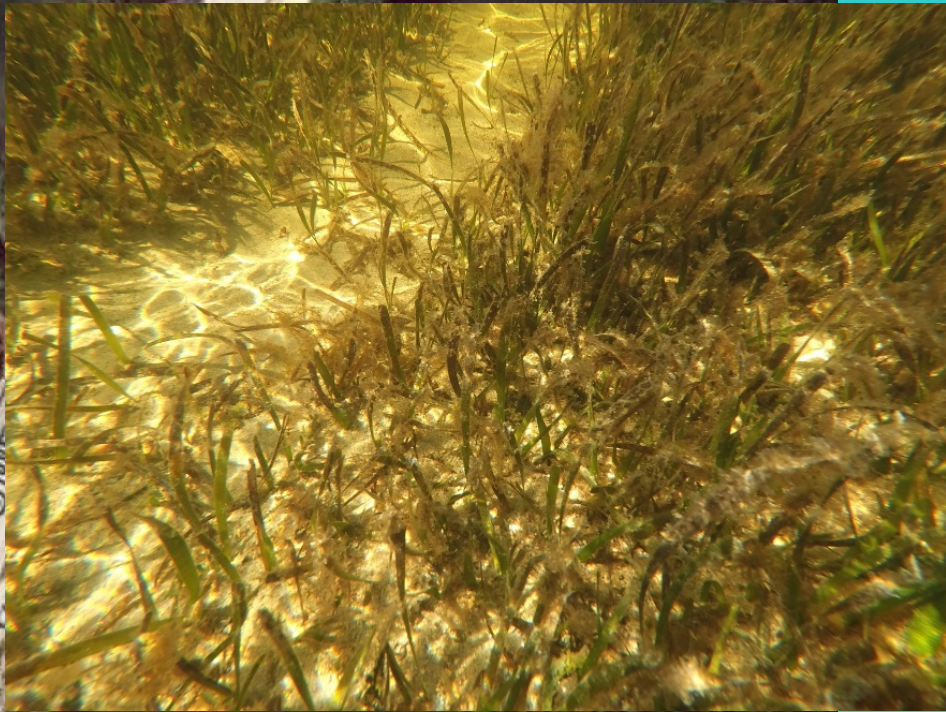


Card Sound - Relative Density



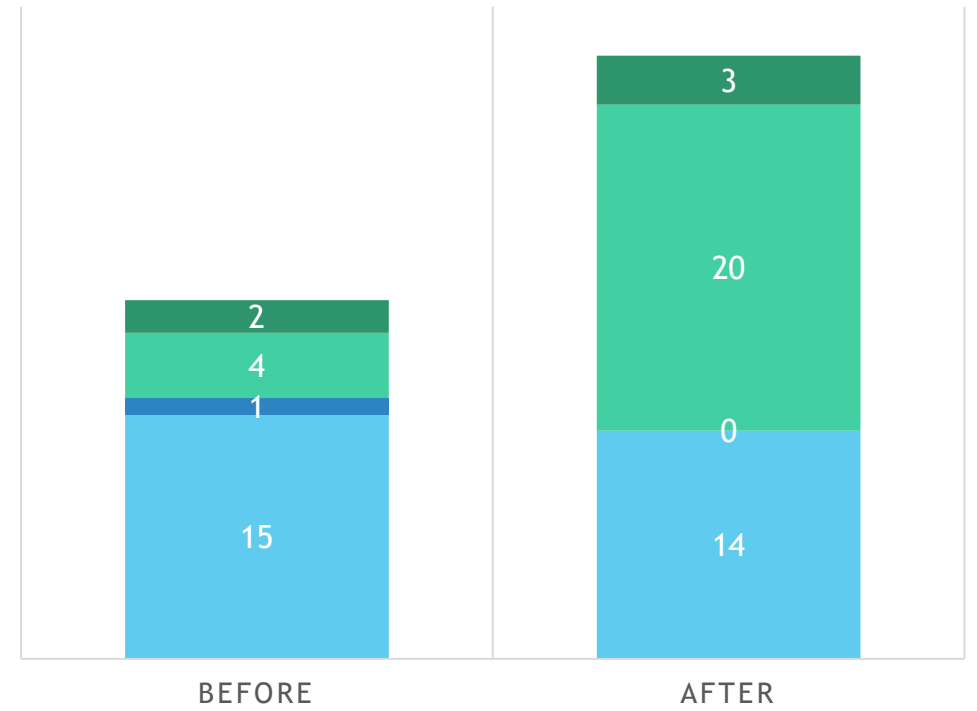
CARD SOUND- SPECIES RICHNESS





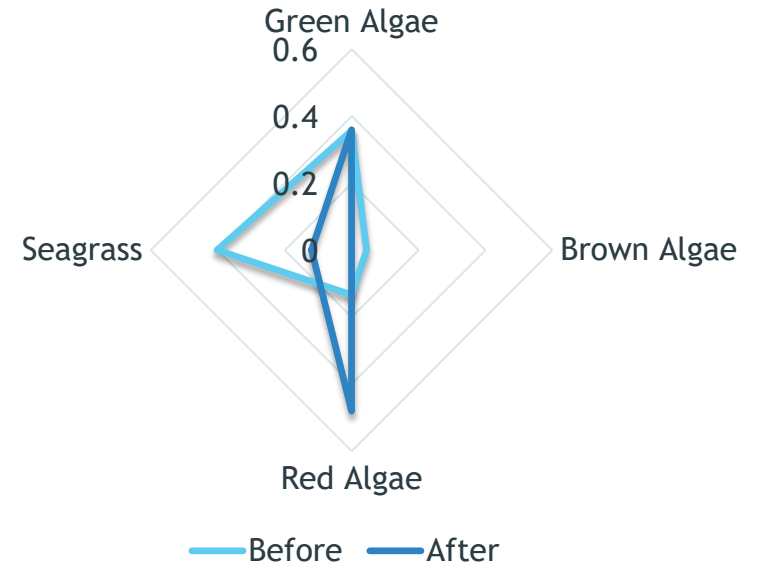
CARD SOUND- SPECIES RICHNESS

■ Green Algae ■ Brown Algae ■ Red Algae ■ Seagrass

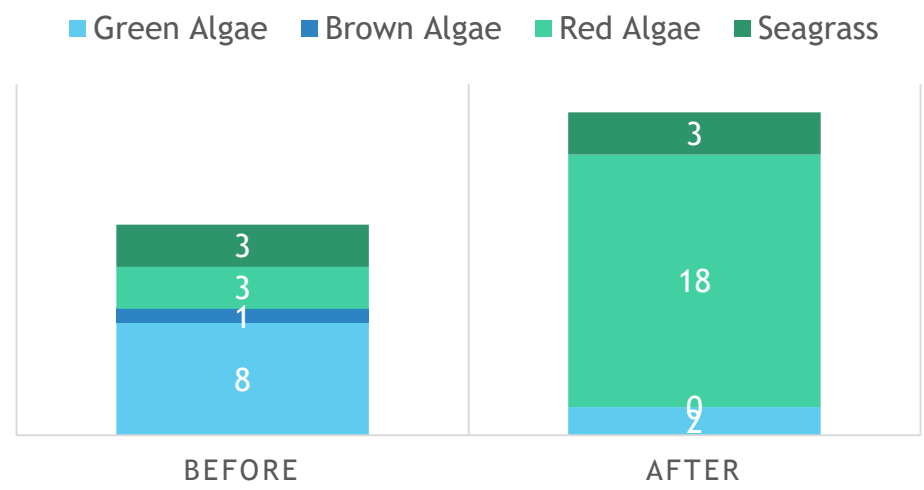


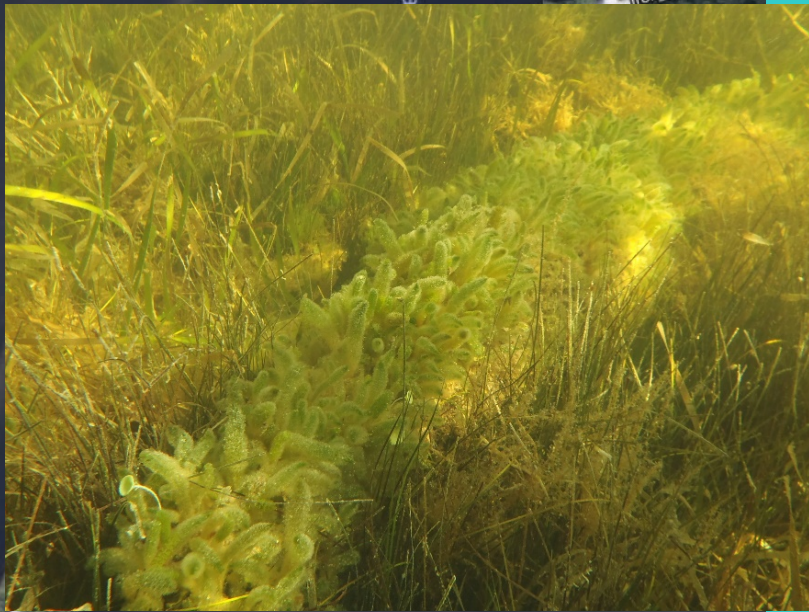


Black Point - Relative Density



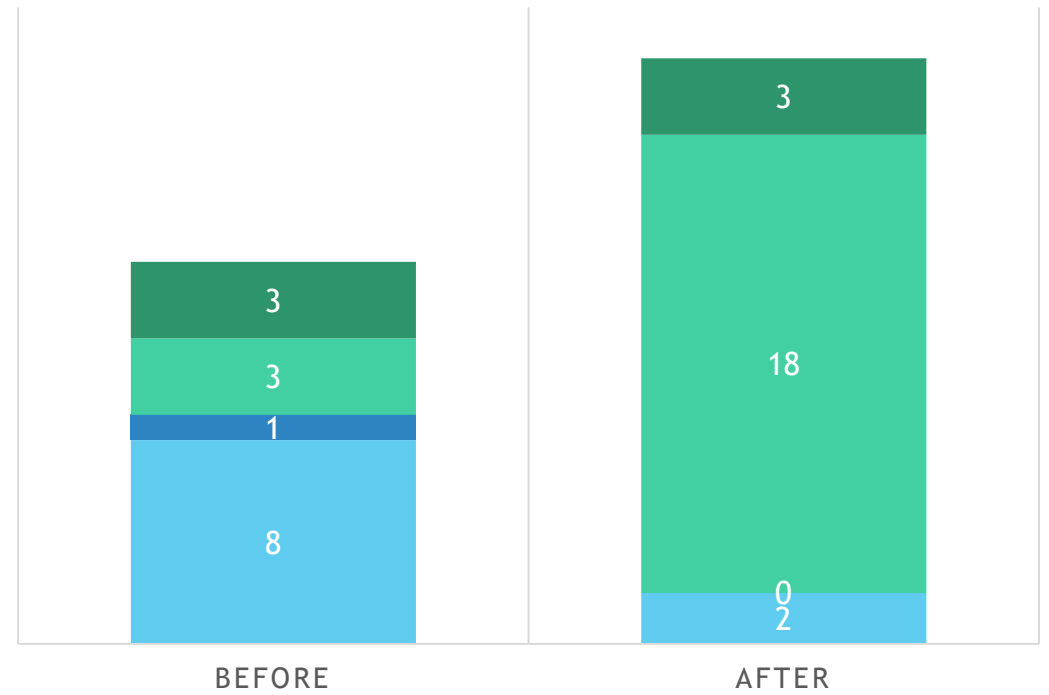
BLACK POINT - SPECIES RICHNESS

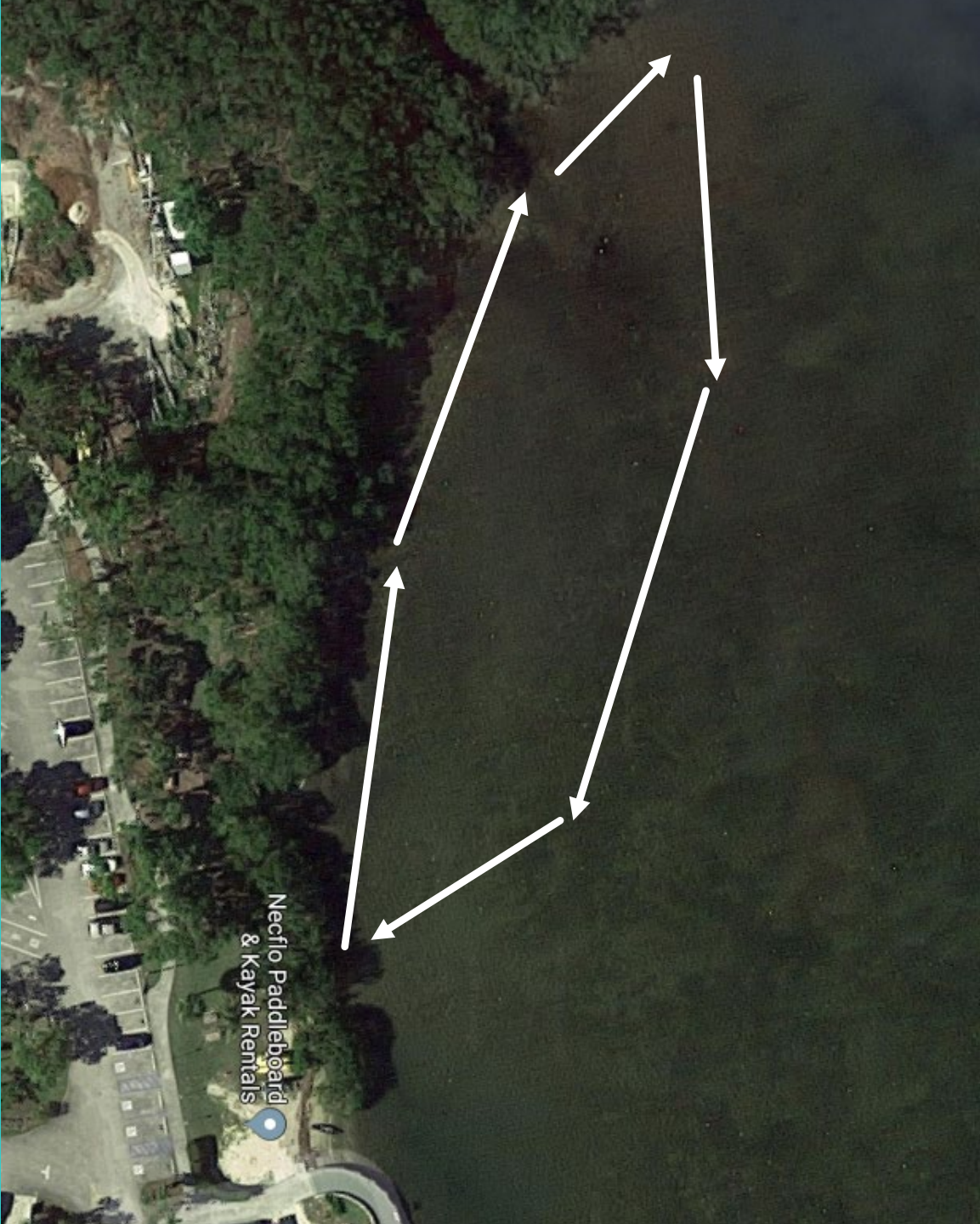




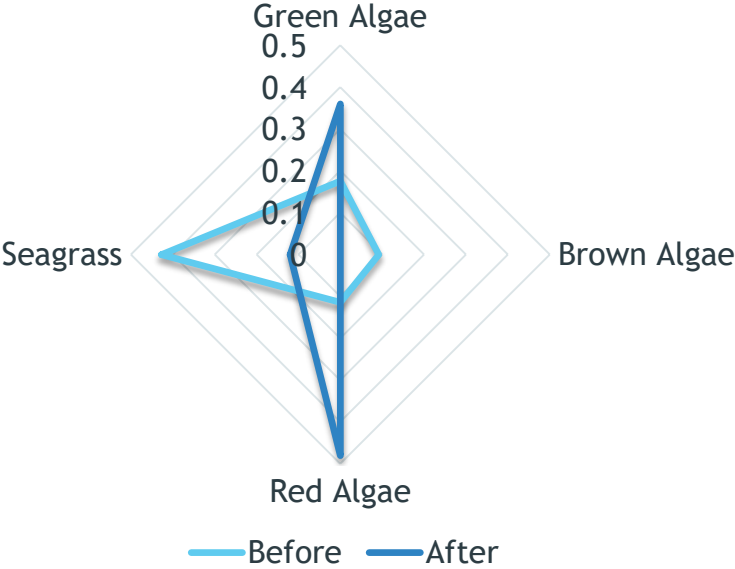
BLACK POINT - SPECIES RICHNESS

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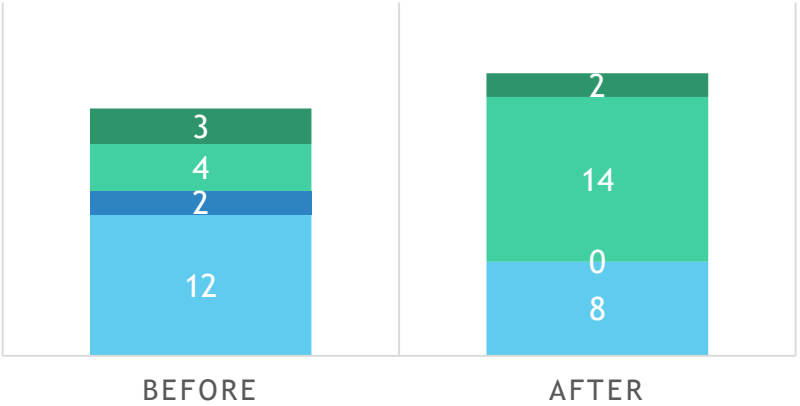


Convoy Point - Relative Density



CONVOY POINT - SPECIES RICHNESS

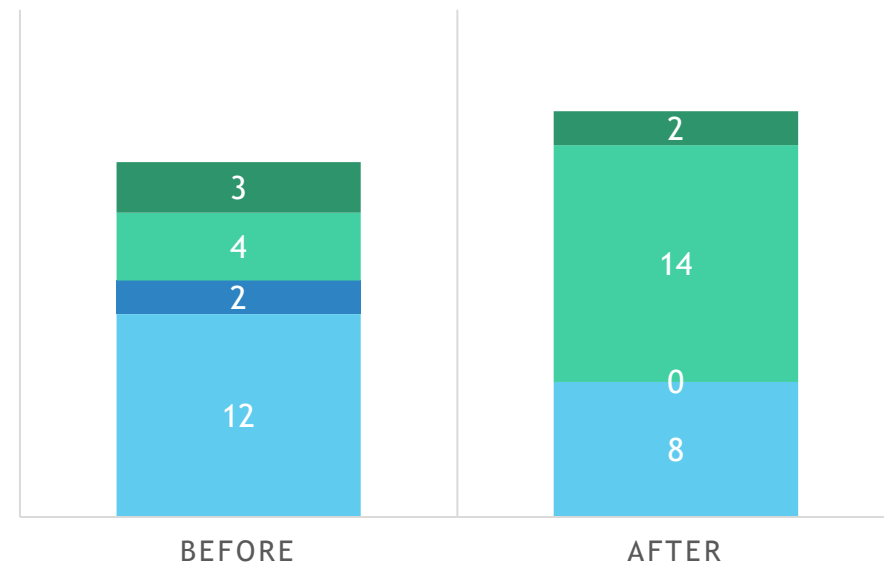
■ Green Algae ■ Brown Algae ■ Red Algae ■ Seagrass





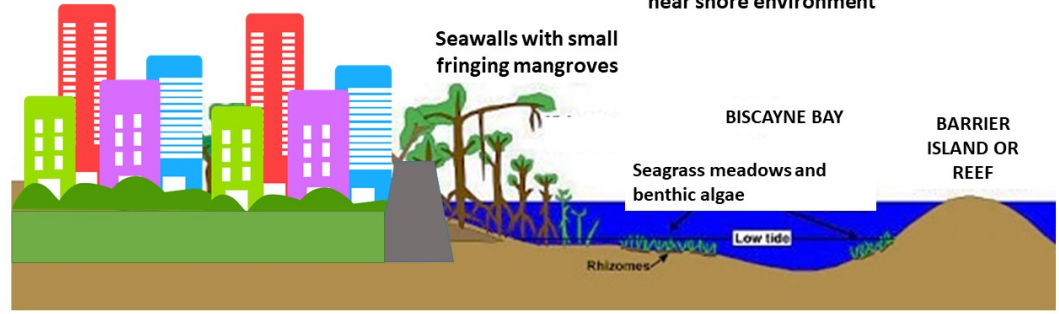
CONVOY POINT - SPECIES RICHNESS

■ Green Algae ■ Brown Algae ■ Red Algae ■ Seagrass



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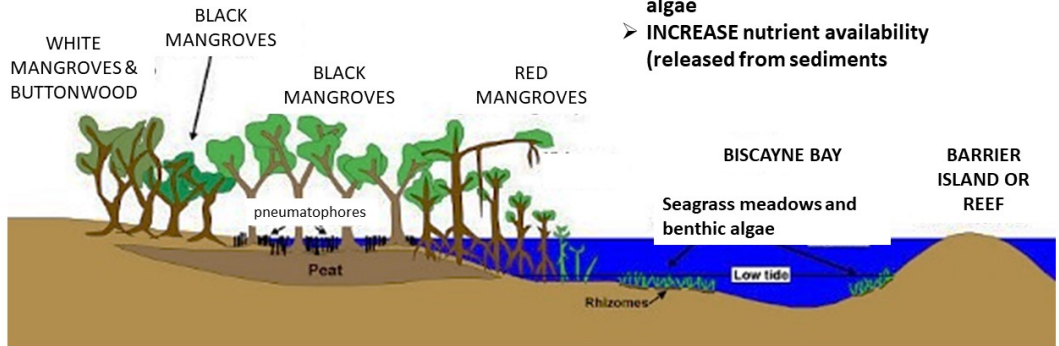
VIZCAYA IS A HIGH DIVERSITY SITE THAT LOST SAV SPECIES AFTER THE HURRICANE

NO RECOVERY YET



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CARD SOUND, CONVOY POINT AND BLACK POINT ALL INCREASED IN SAV SPECIES RICHNESS.

CHANGES ARE RAPID AND DYNAMIC



TO BE CONTINUED...

