

An aerial photograph showing a coastal area with a large canal system, residential developments, and a runway. The water is a deep blue-green color, and the land is a mix of green vegetation and grey urban areas. The canal system is a prominent feature, winding through the landscape and connecting different parts of the coast. The residential areas are densely packed with buildings, and the runway is a long, straight strip of land. The overall scene depicts a complex coastal environment with significant human intervention.

# Environmental Canal Restoration, Effects on Plants, Animals and Sediments

Jason Howard, Sara Wilson, James Fourqurean  
Marine Education And Research Initiative, Florida International University  
WGPP meeting, April 18



Made possible by:



**Seagrass Ecosystems  
Research Lab**  
Florida International University

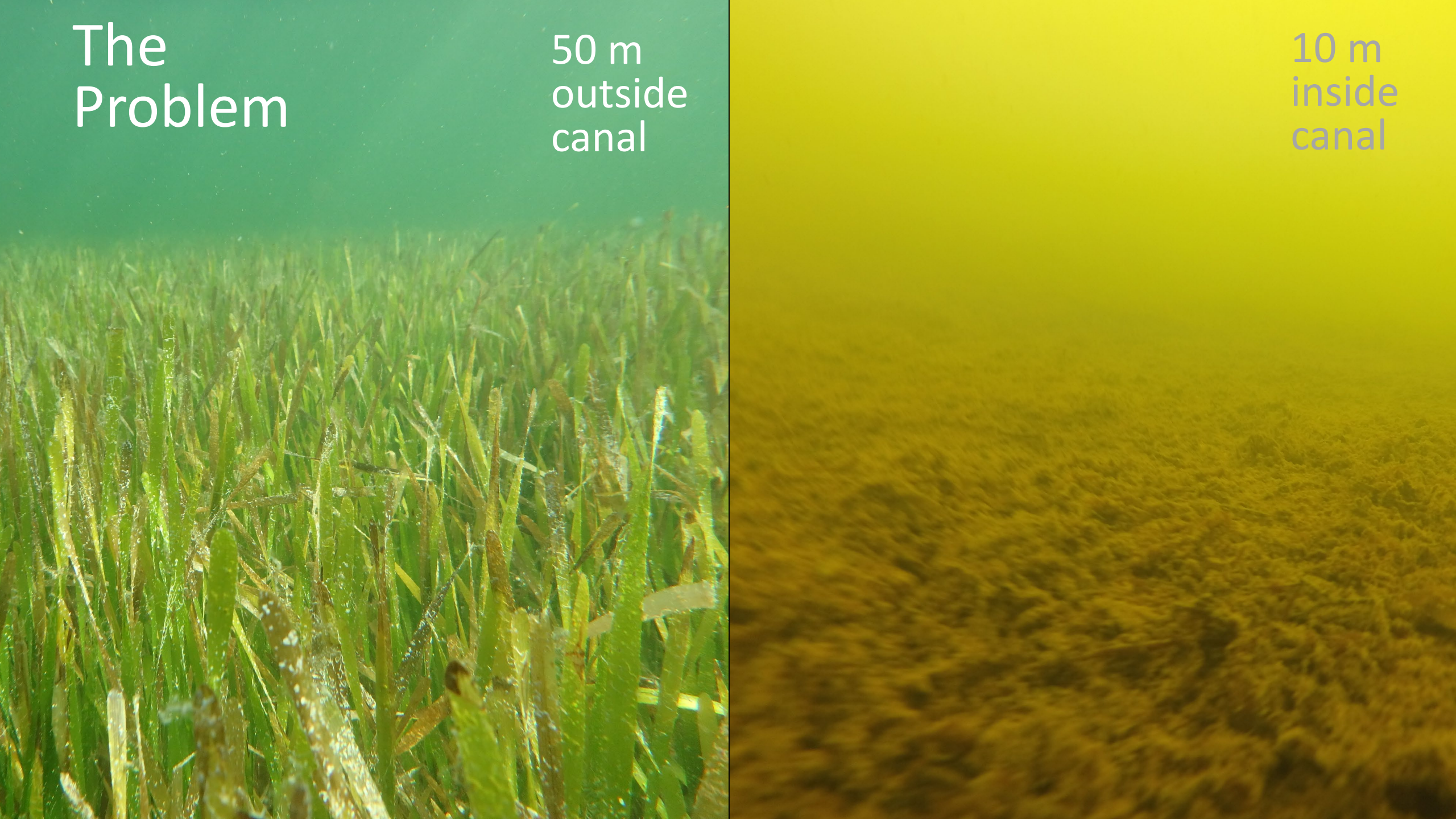




# The Problem

50 m  
outside  
canal

10 m  
inside  
canal







# Potential Solutions

## Technologies

- Weed gate
- Backfilling
- Muck removal
- Aeration
- Culvert

9 Canals  
+controls

## Infrastructure

- municipal sewer

6 Canals  
in Islamorada



# 25 canals over the FL Keys

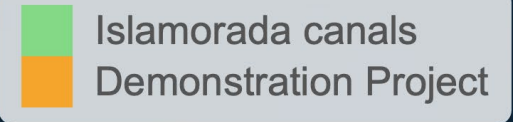
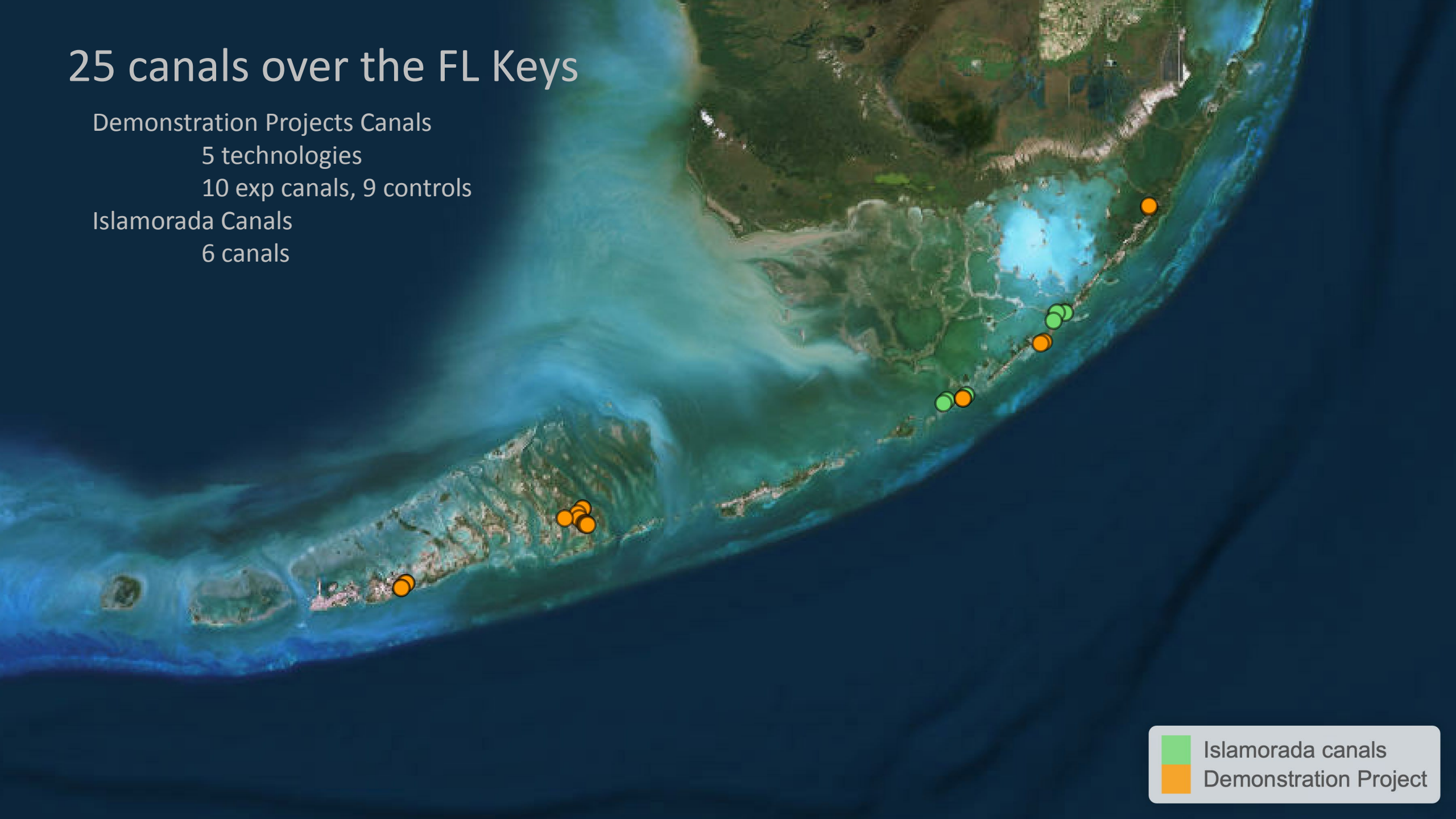
Demonstration Projects Canals

5 technologies

10 exp canals, 9 controls

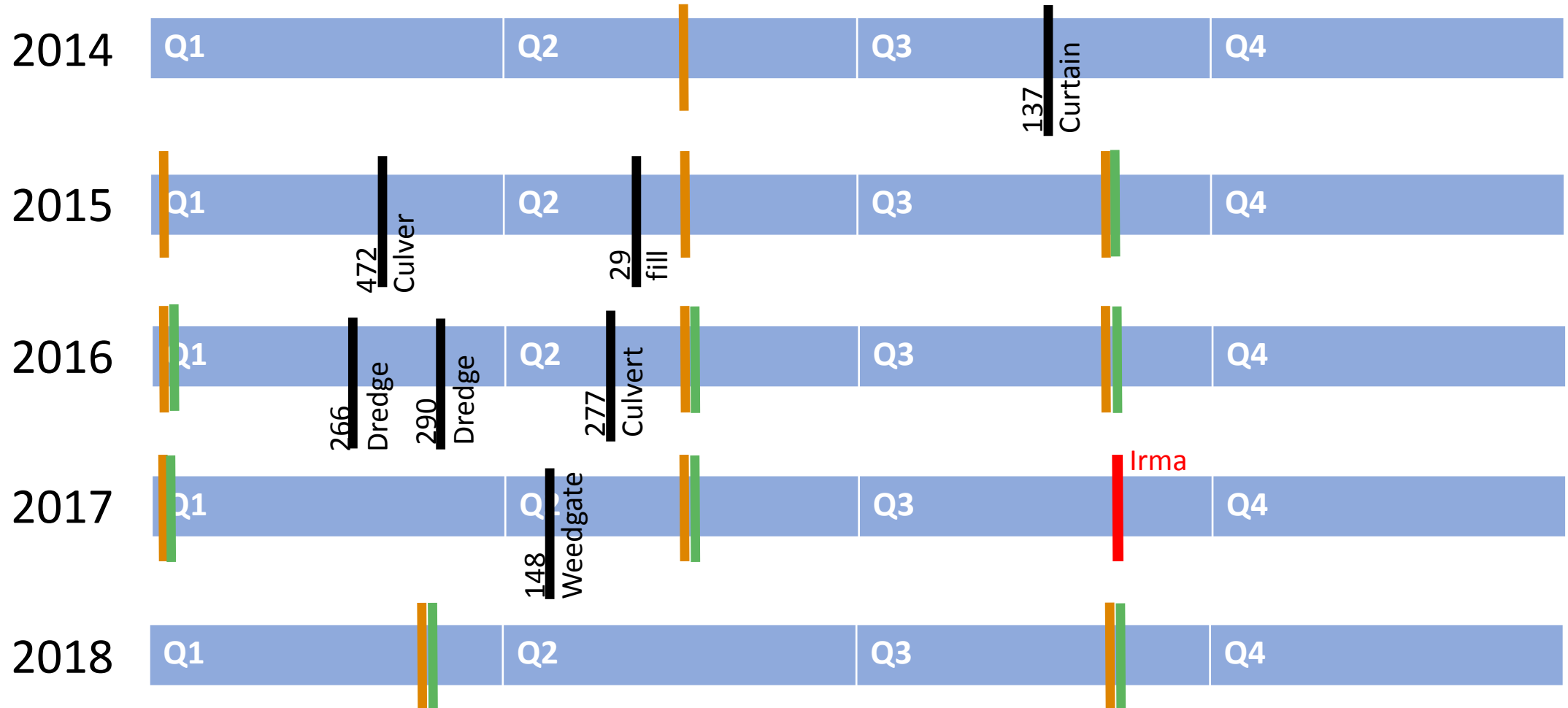
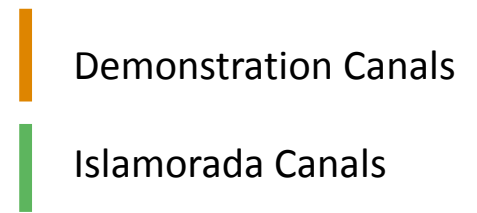
Islamorada Canals

6 canals

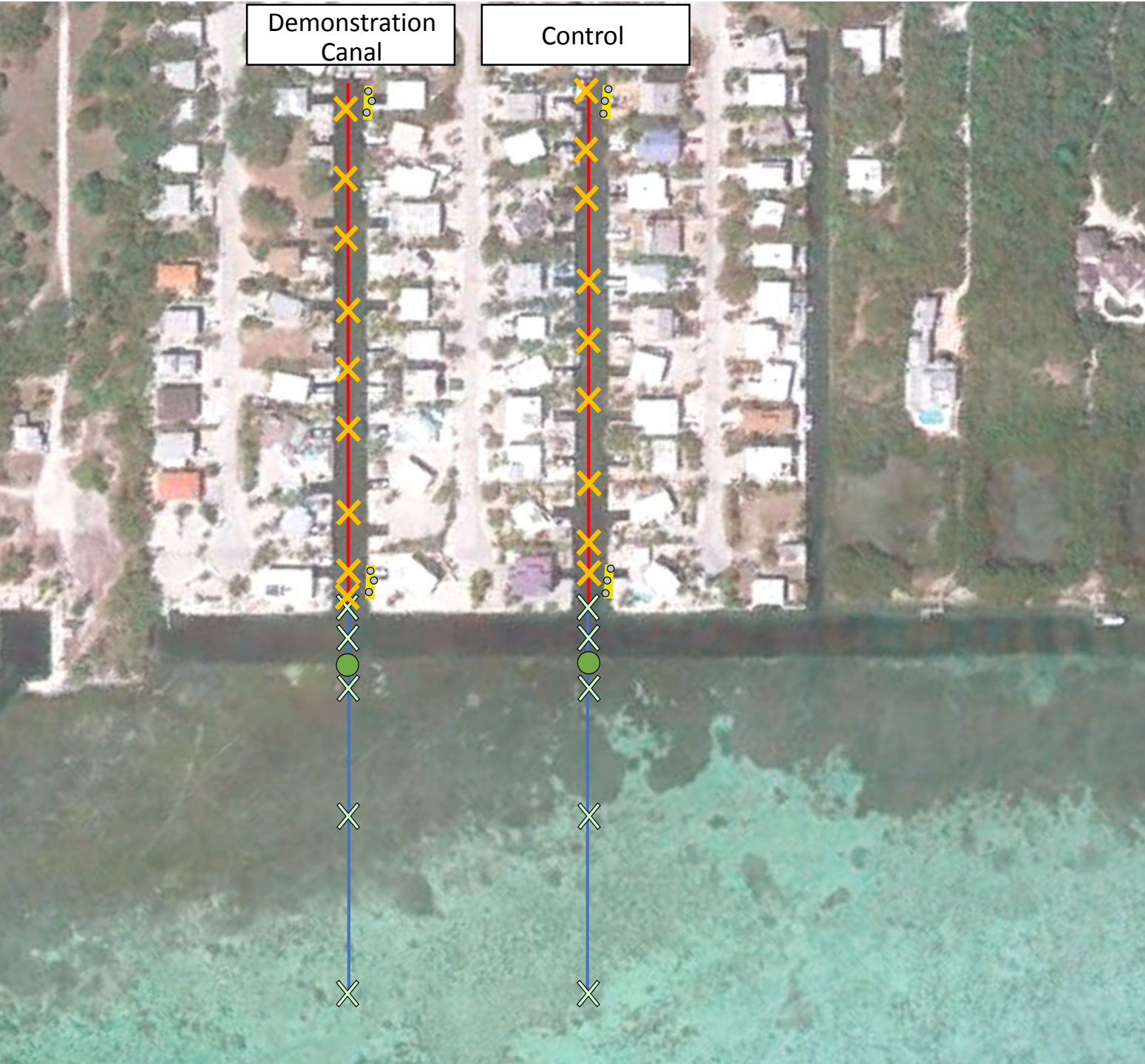




# Monitoring Schedule







# Sampling Design

50cm x 50cm  
sites for  
benthic  
coverage

50cm x 50cm  
sites for  
benthic  
coverage

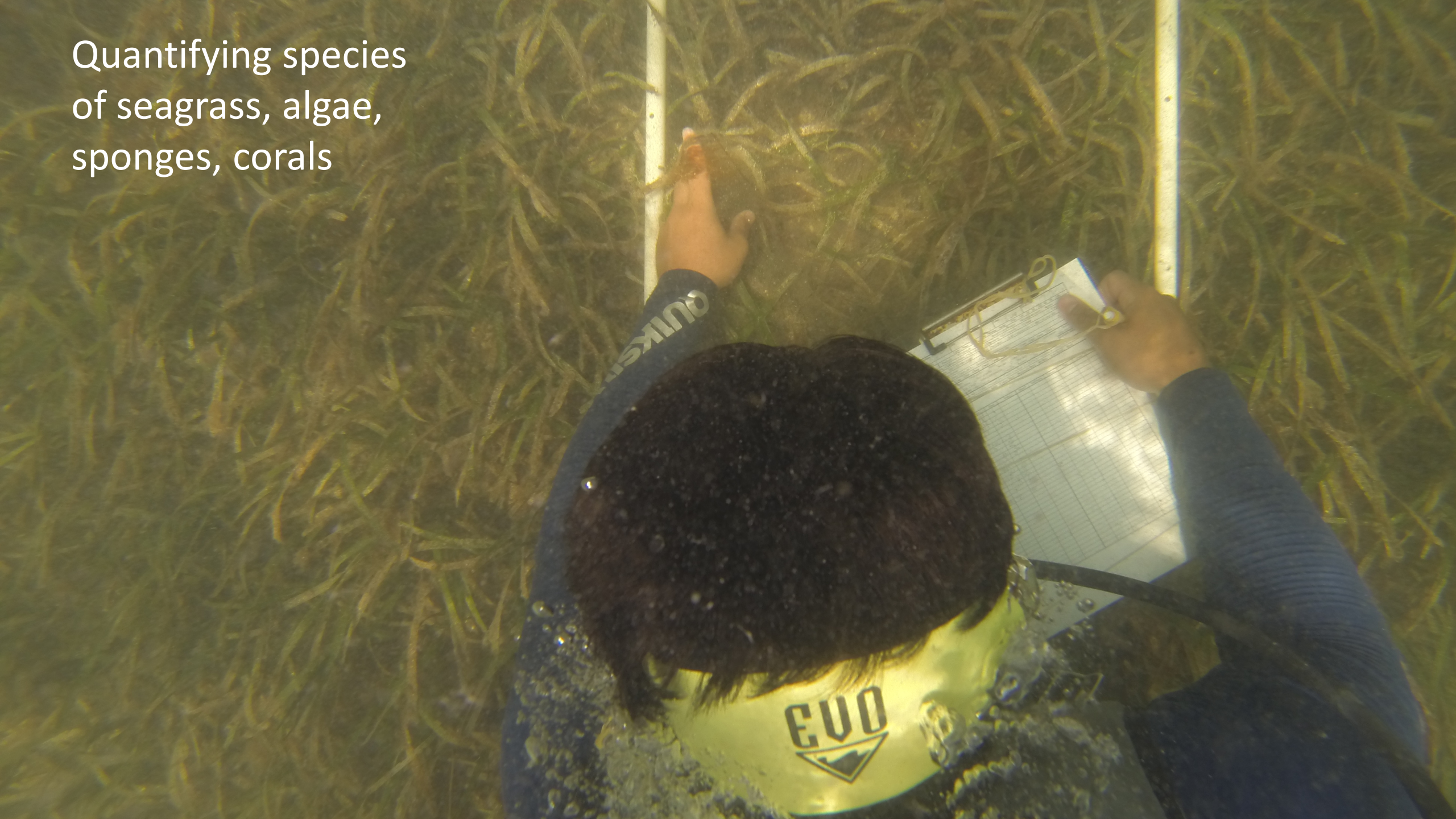
10cm x 10cm  
randomly  
placed for  
canal wall  
coverage

Seagrass leaf  
sample for  
chemical  
analysis

25 Canals  
Sampled 3 x yr<sup>-1</sup>



Quantifying species  
of seagrass, algae,  
sponges, corals



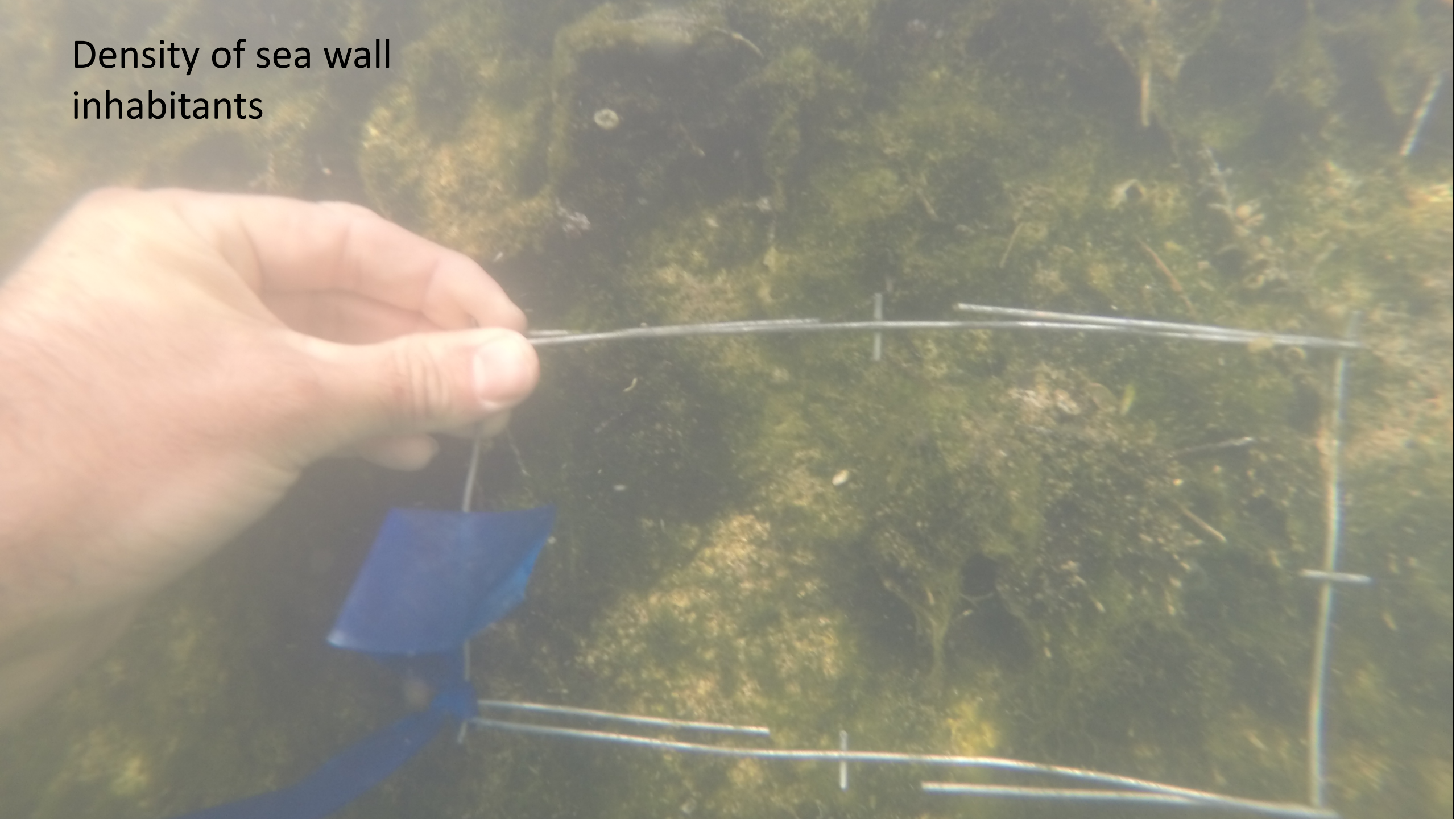


## Sediment characteristics





Density of sea wall  
inhabitants





# Fish surveys





# Seagrass tissue chemistry

C:N:P

$^{13}\text{C}/^{12}\text{C}$

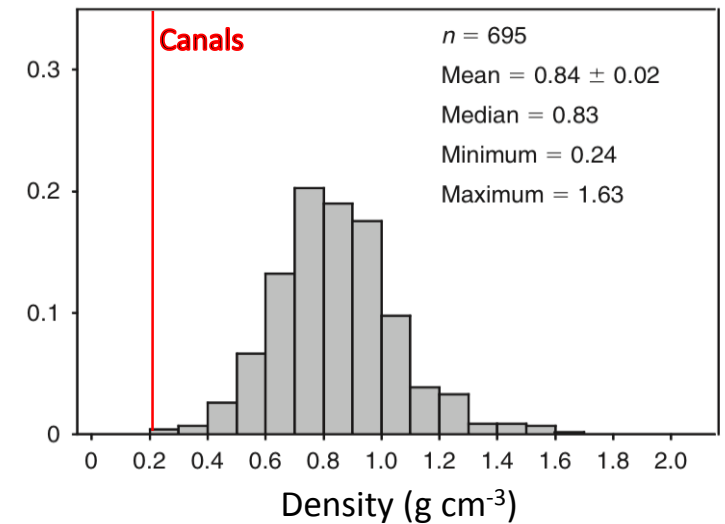
$^{15}\text{N}/^{14}\text{N}$





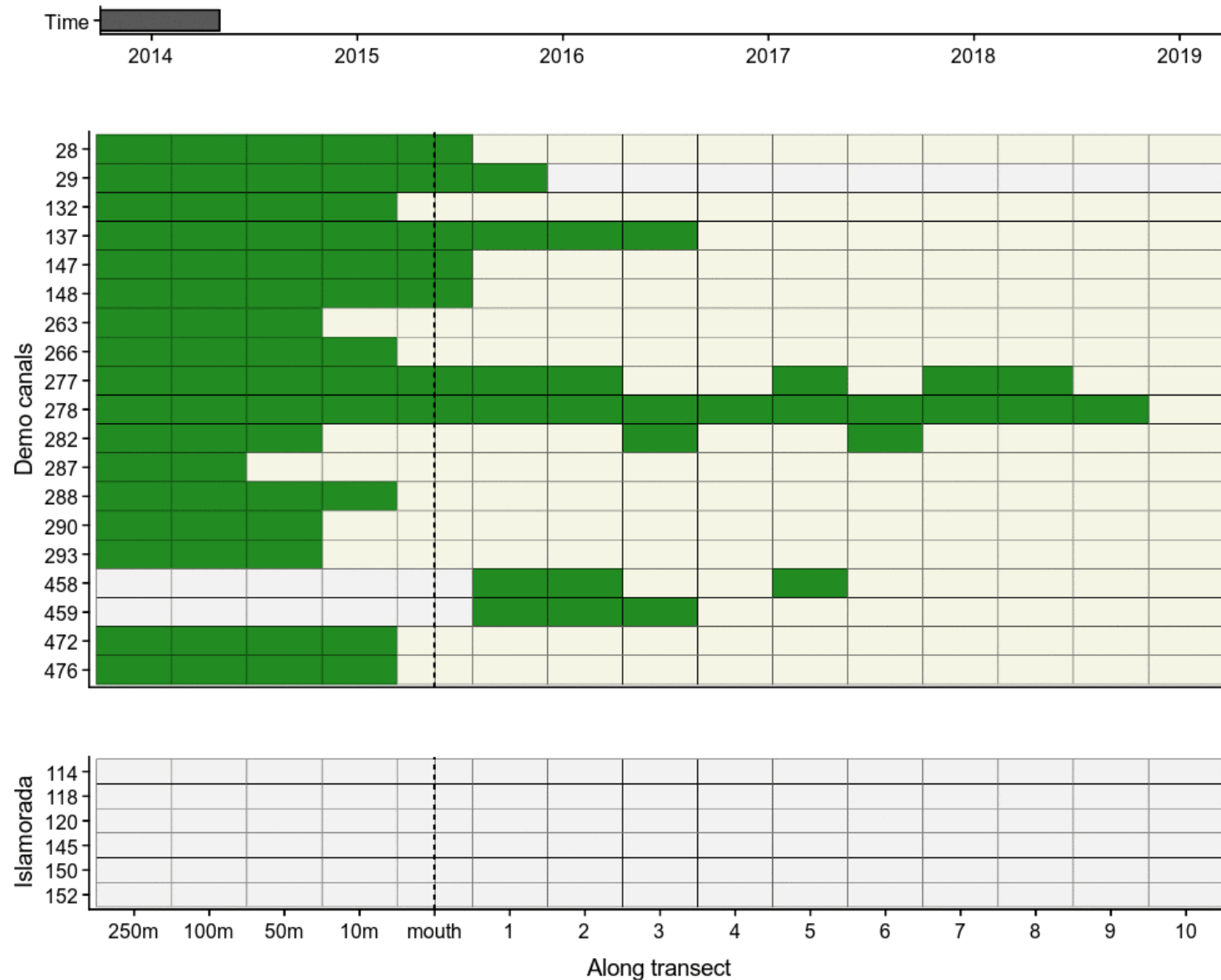
Most monitored  
canals still look bad,  
but there are  
exceptions

Florida Bay Seagrass Sediment








## Where plants are present



plants

	Absent
	Present
	No Sample

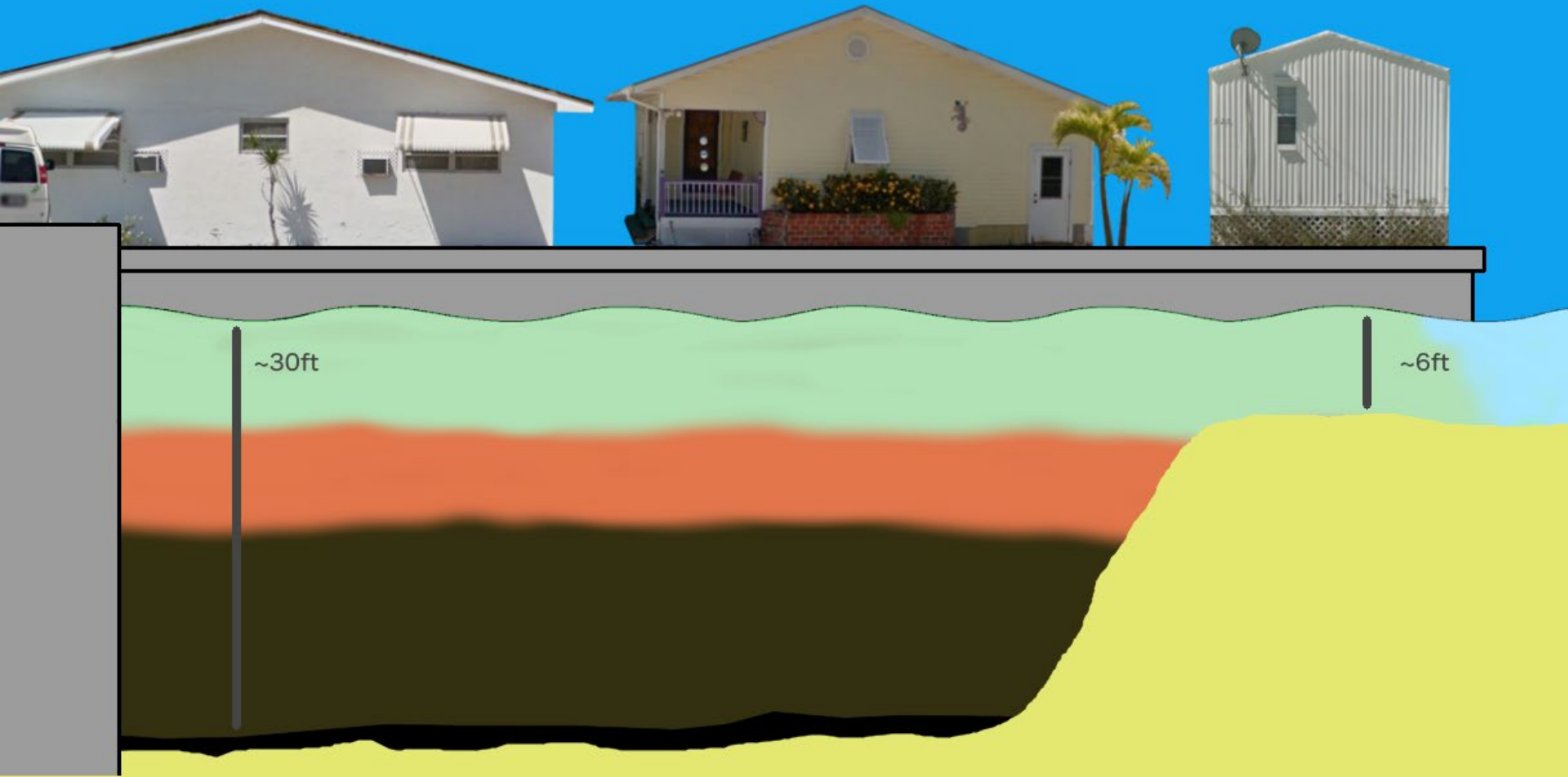


# Where plants are present



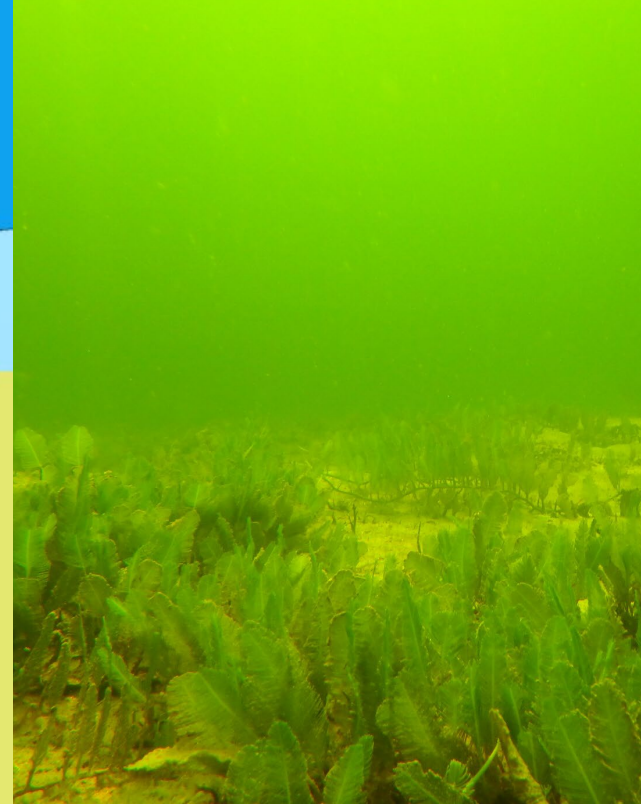
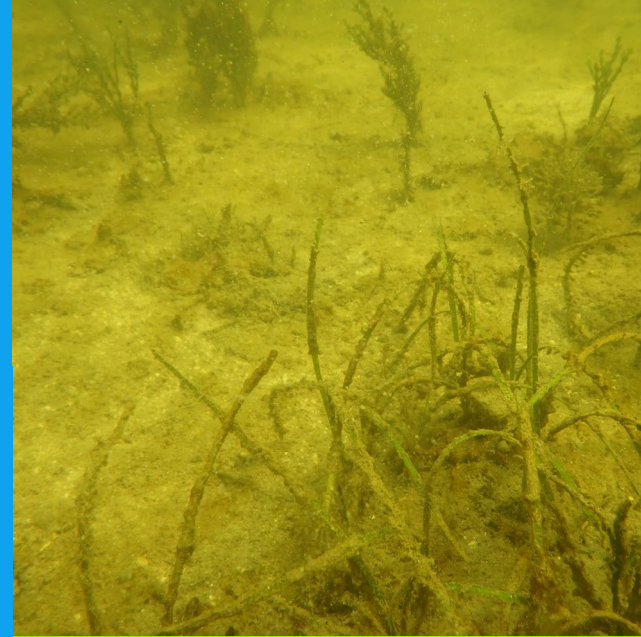
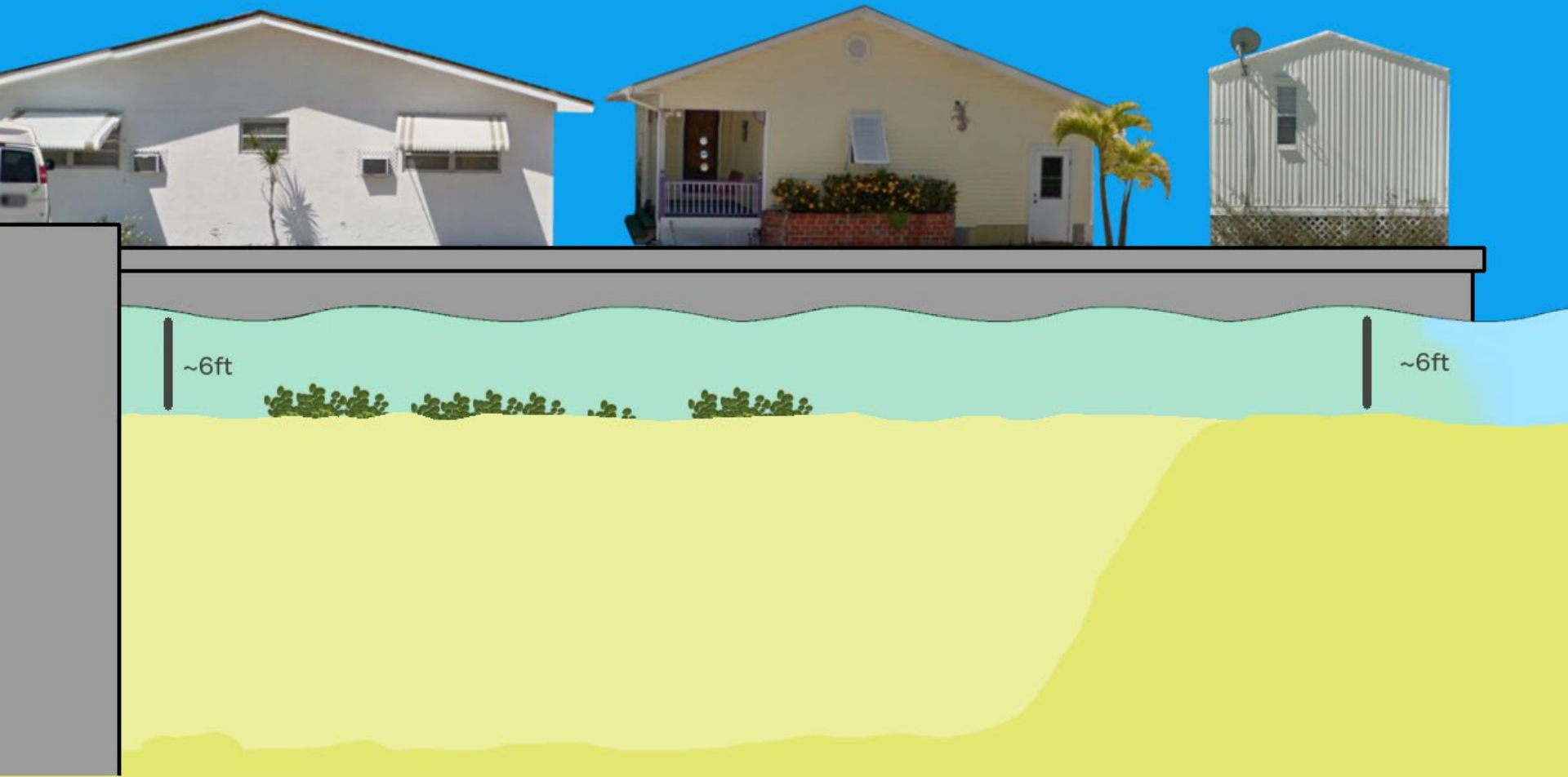


# Canal 29 – Pre-treatment



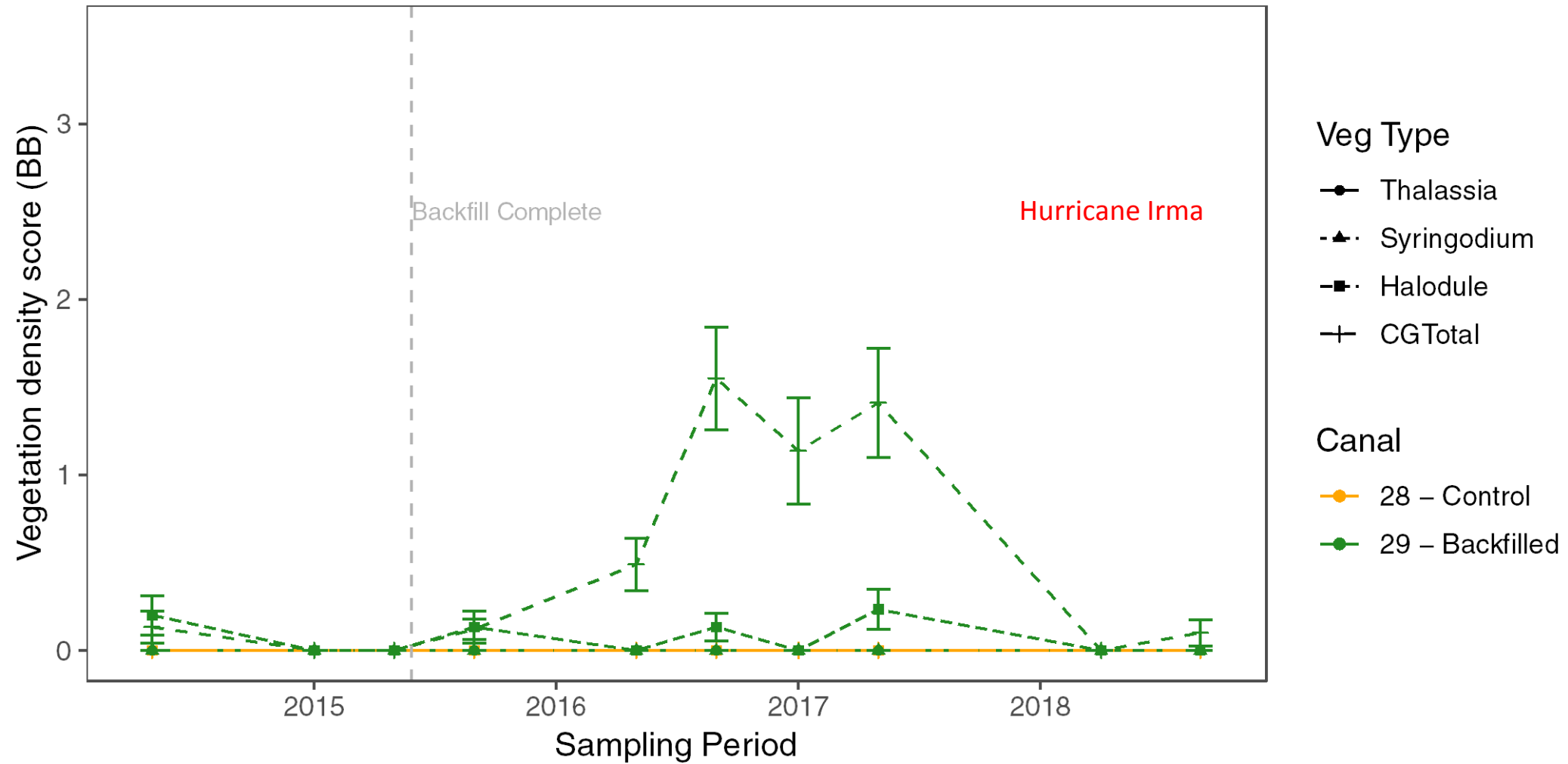


# Canal 29 – Post-treatment



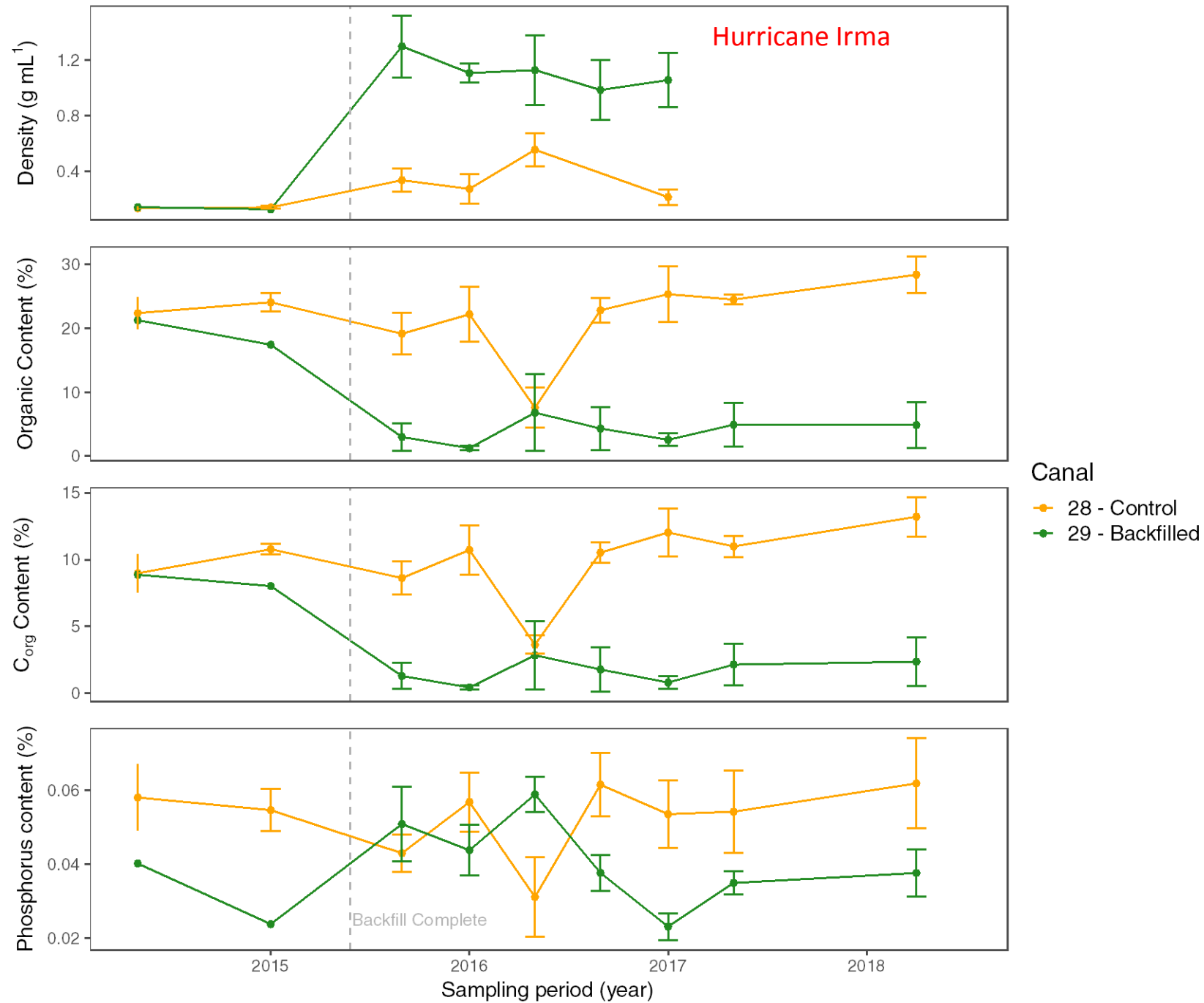


# Canal 29 – Vegetation Changes

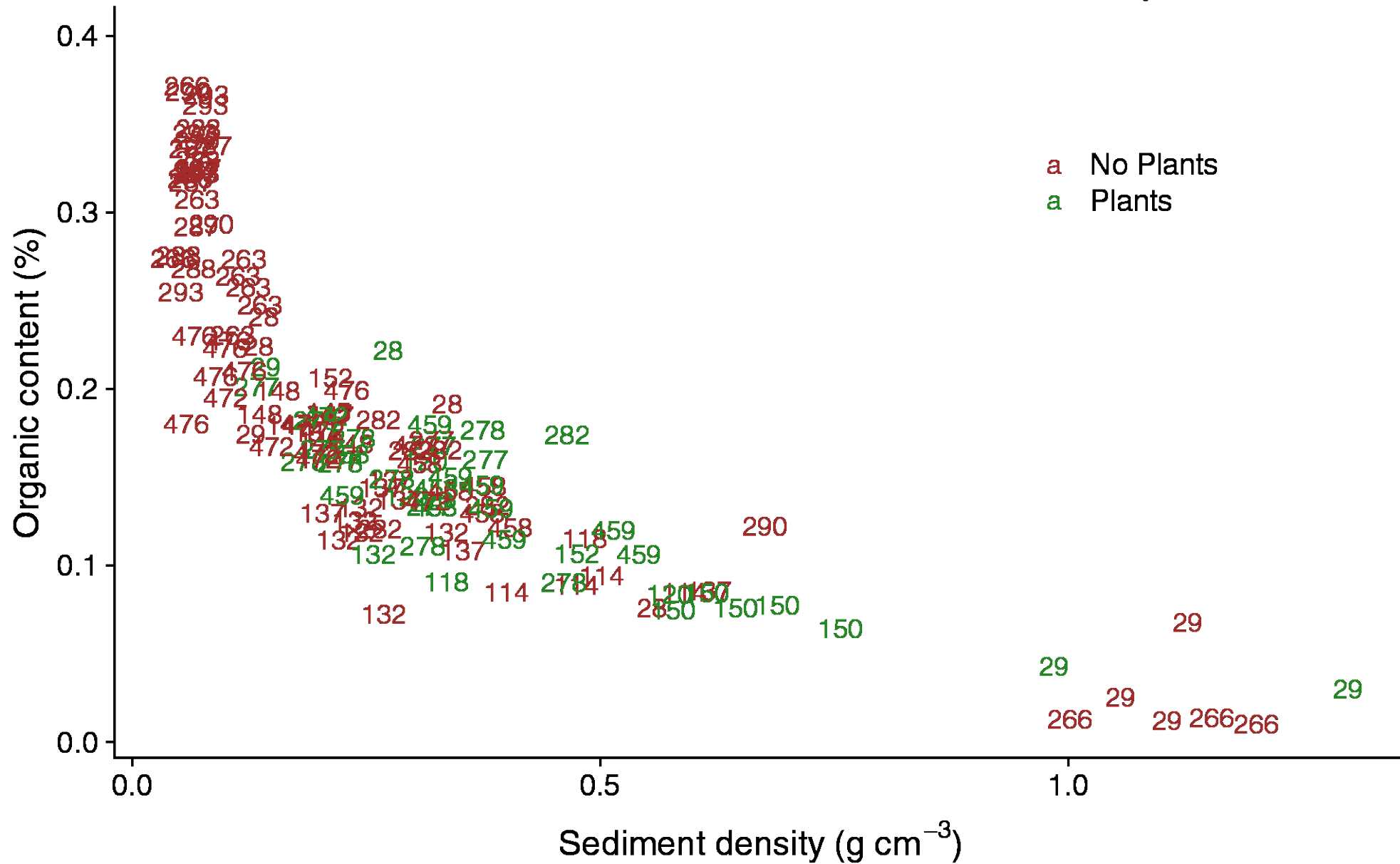




# Canal 29 – Sediment Change

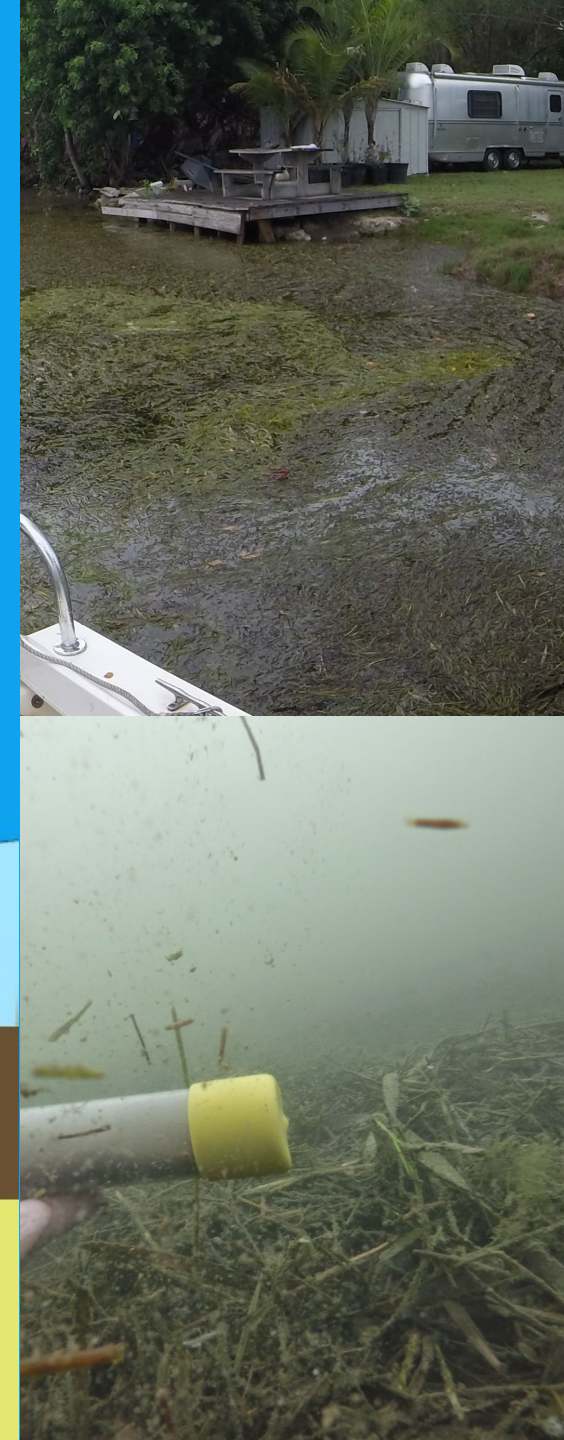
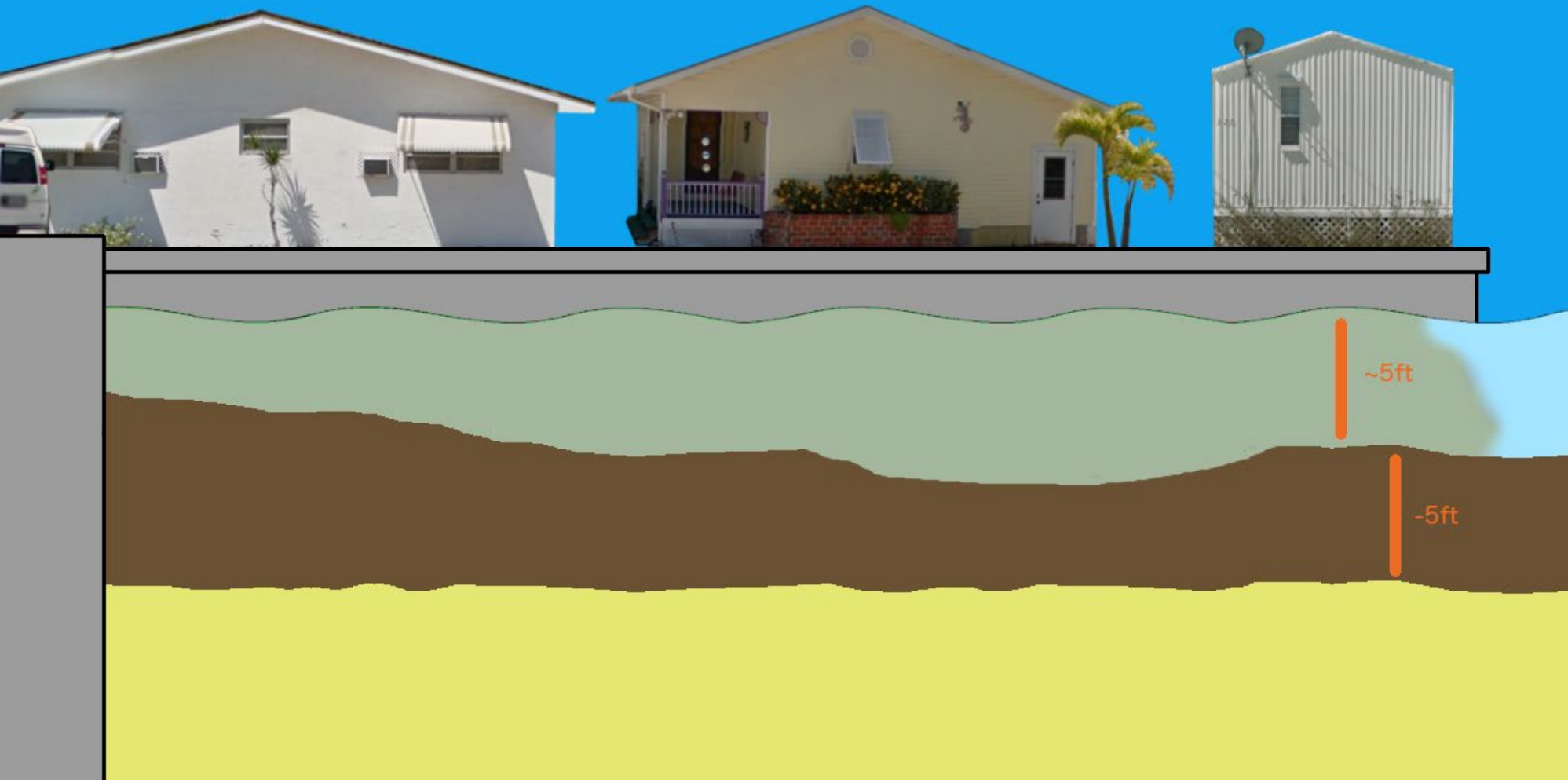


# Where plants are present

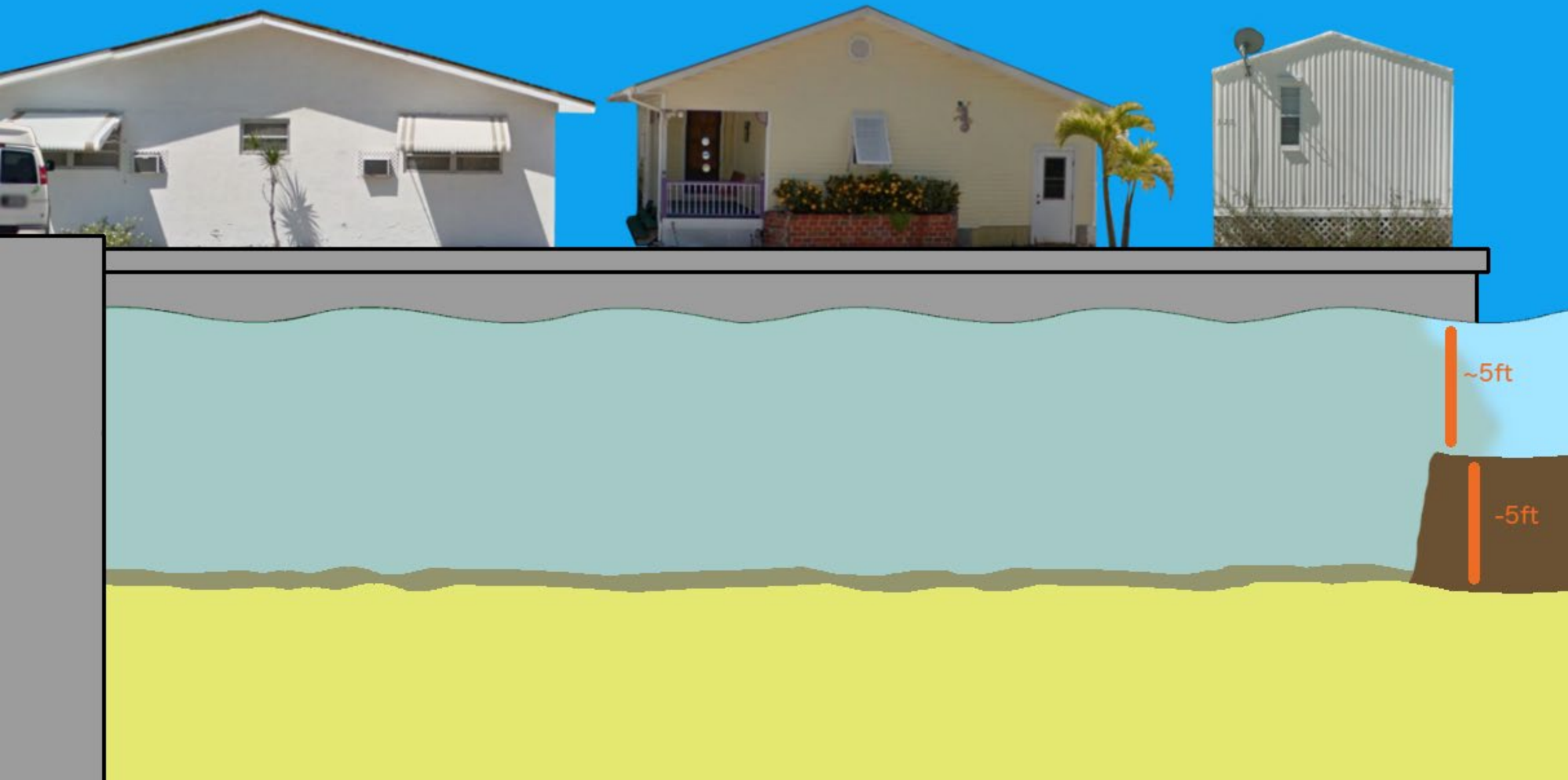




# Canal 266 – Pre-treatment

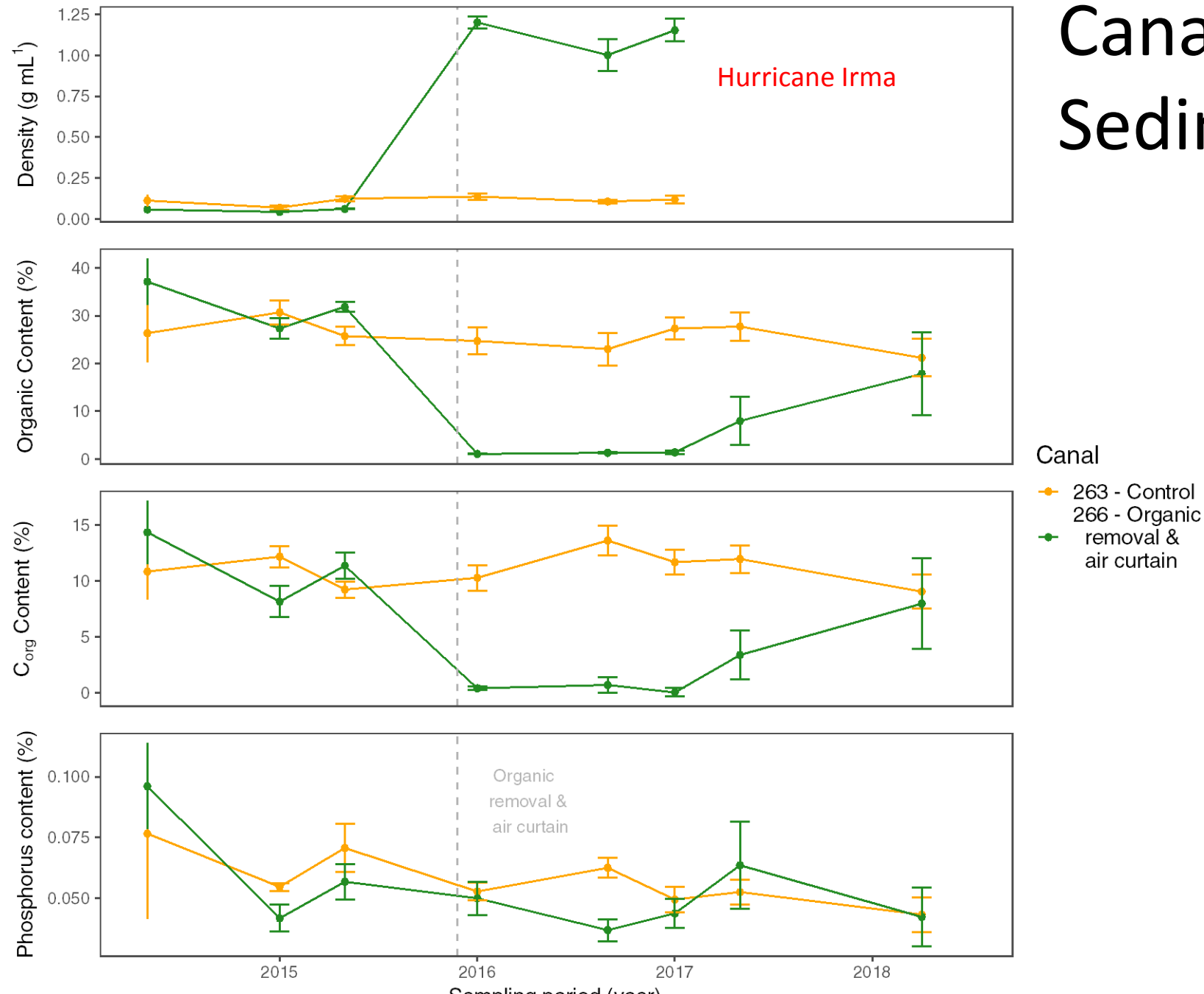


# Canal 266 – Post-treatment

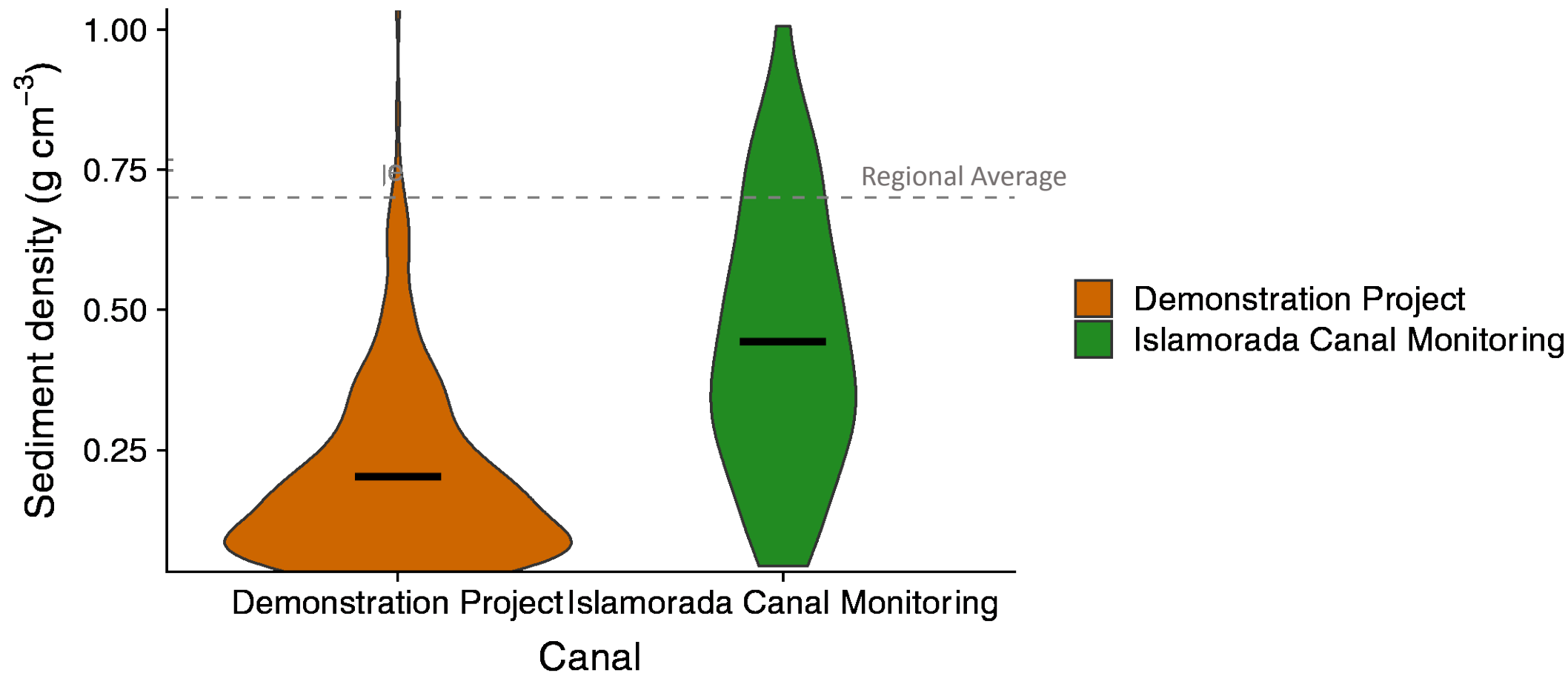




# Canal 226 – Sediment Changes



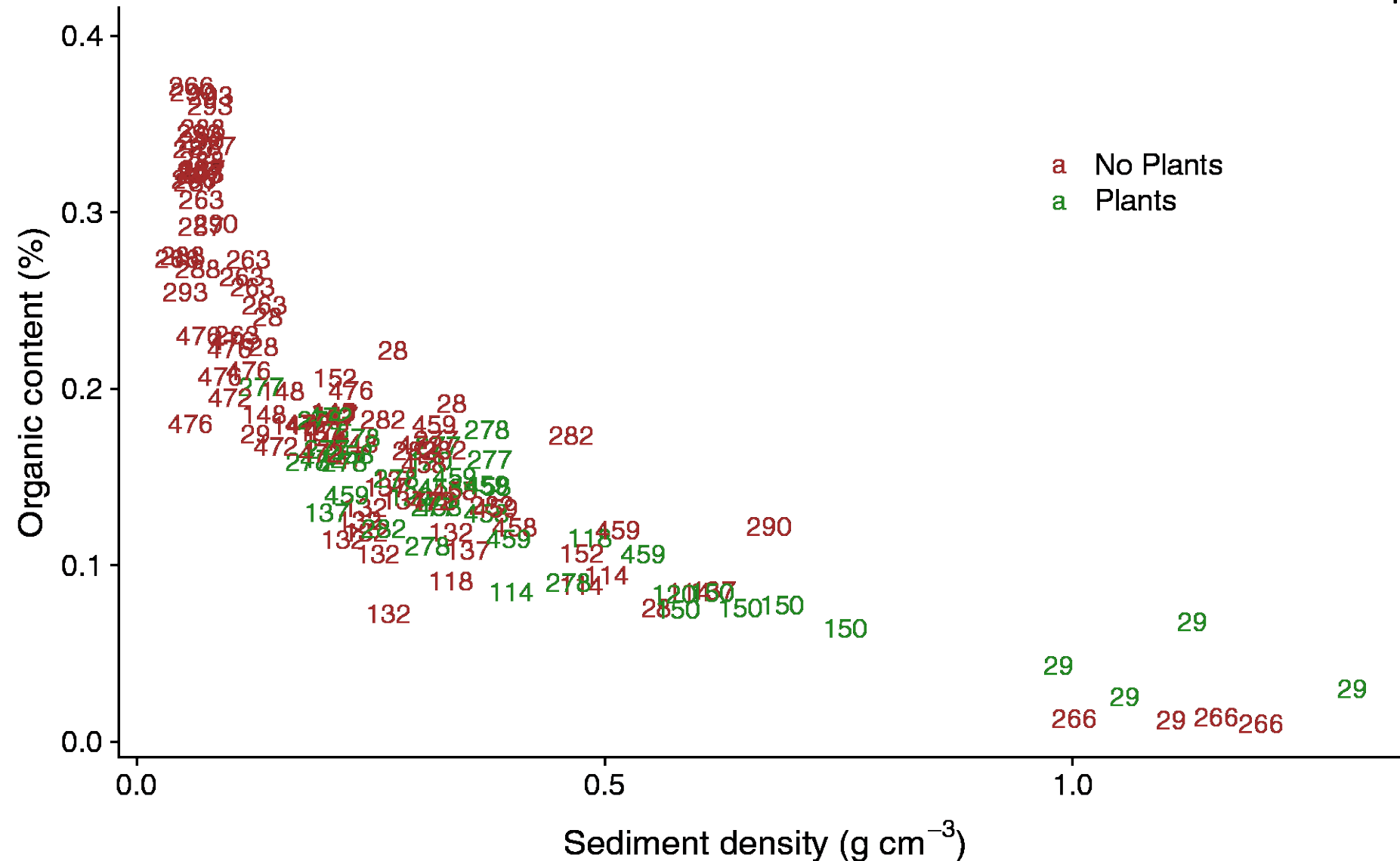
# Sediment Conditions between Projects



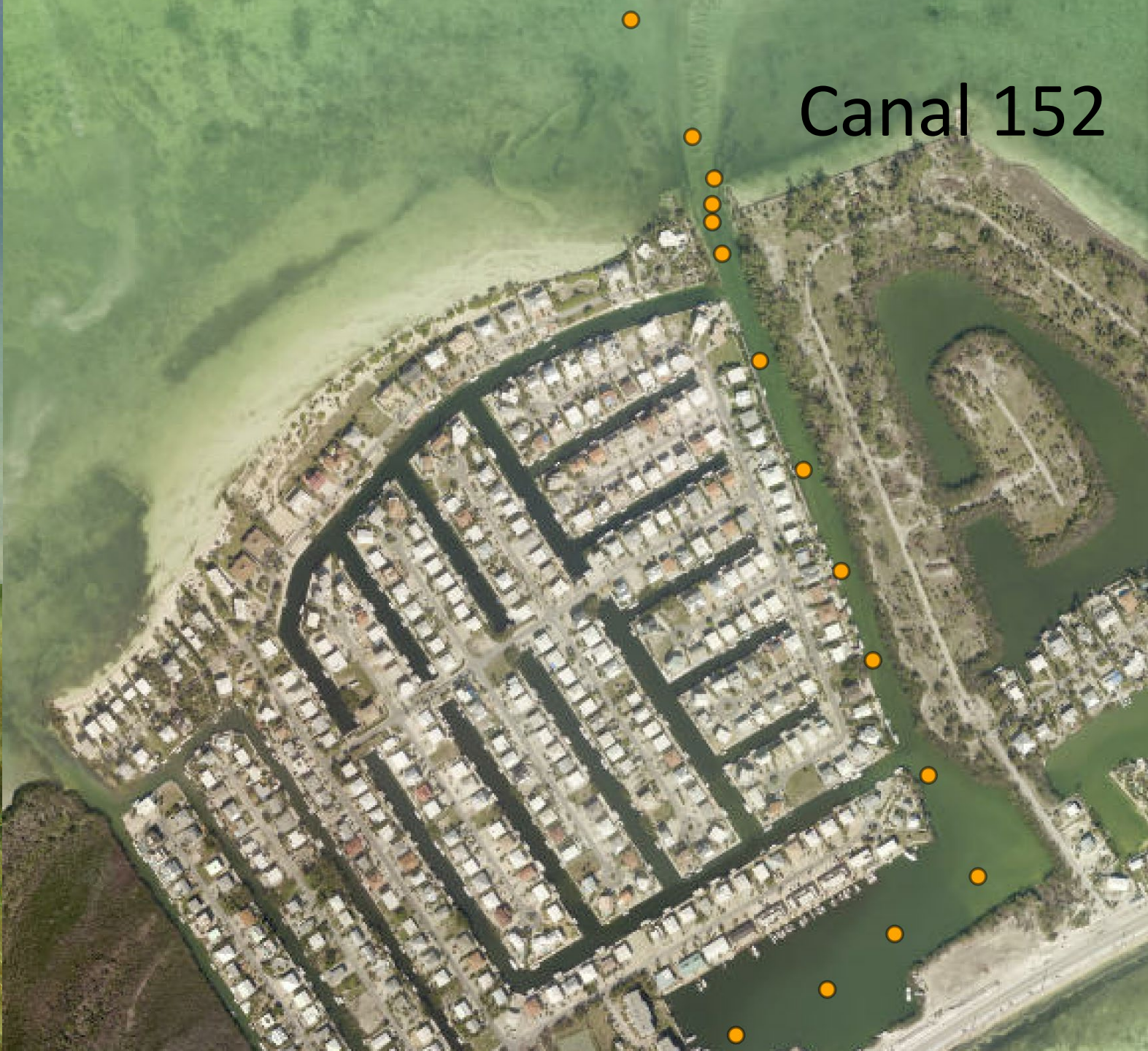


# Where plants are present

In Islamorada



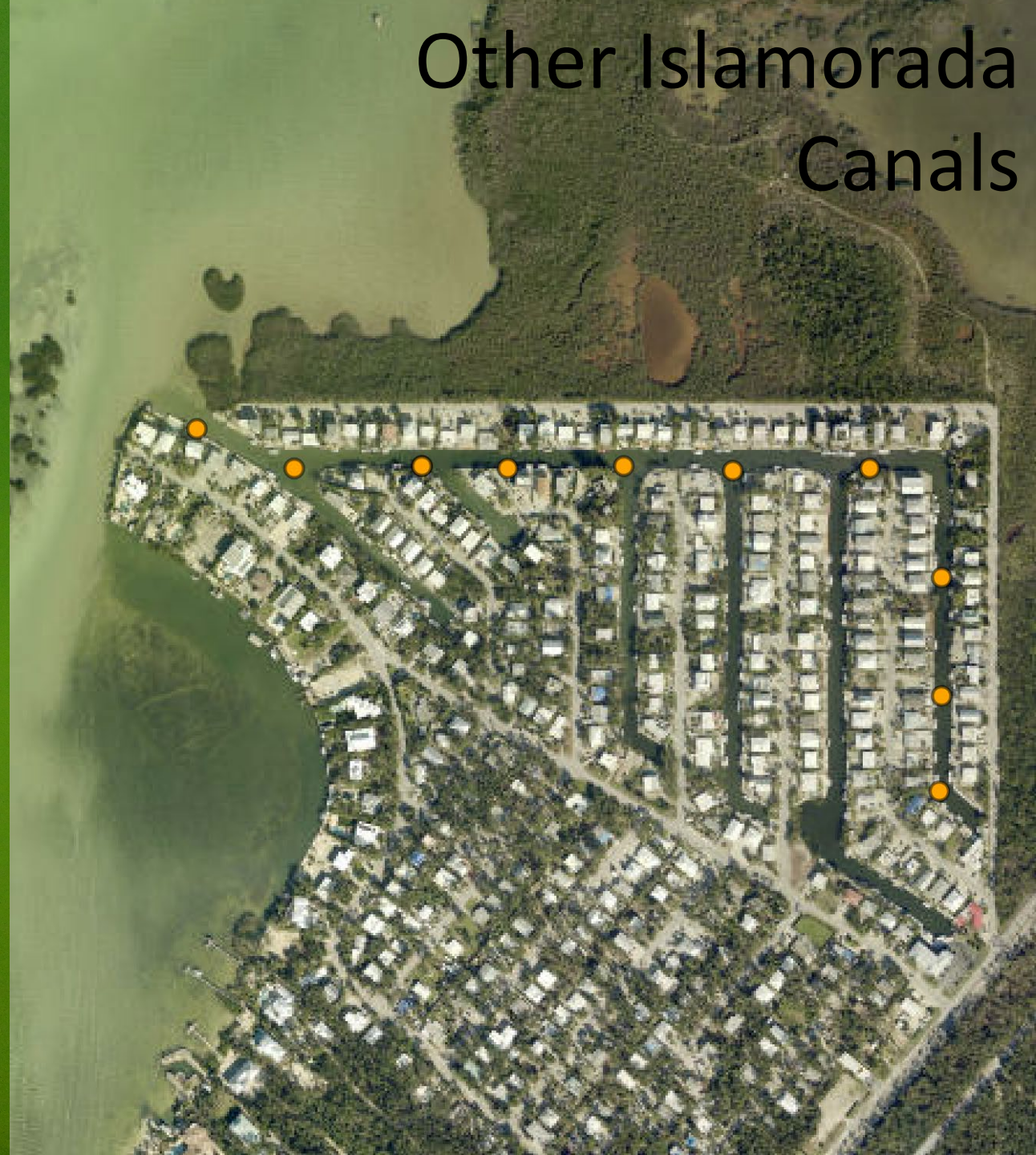




Canal 152



# Other Islamorada Canals





seagrass.fiu.edu



## Status of Residential Canal Benthic Habitats in the Florida Keys and the Effectiveness of Remediation Technologies Project Report

Prepared for the Water Quality Protection Program, Florida Keys National Marine Sanctuary & The Village of Islamorada, Monroe County, Florida

# Floral, Faunal, and Sediment Monitoring in Islamorada Canals

## Project Update

Prepared for the Village of Islamorada, FL

### Experimental canal restoration in the Florida Keys

Effects on plants, animals, & sediments



#### What's happening?

Many of the over 500 canals in the Florida Keys have signs of poor water quality: dark water, unfavorable odors, and a lack of plants and animals. Changes in waste water management will help reduce nutrient loading, but Monroe County is taking additional steps to clean up waterways. Ten canals were selected to receive technologies designed to improve water circulation and reduce the organic muck piled up on canal bottoms. Successful and cost-effective technologies can be used in further canal clean-up projects.



Left: Floating muck in canal impairs water quality. Right: current dug to improve circulation. Page top: an curtain keeps out muck

#### How were canals studied?

Seagrasses, fish, and animals are what we want to see in our canals, but they're also reliable indicators of water quality. Starting 2014, The Seagrass Ecosystems Research Laboratory at Florida International University has been monitoring these indicators inside and out canals to understand the effectiveness of the demonstrated technologies.



#### Did remediation work?

Some demonstrated technologies have already started showing improvements in water quality. Backfilling deep, stagnant canals with fresh sand improved conditions enough to bring back clearer water, macroalgae, seagrasses, and fish. In other canals, muck piled high enough to interfere with boat propellers was successfully removed through dredging. The experimental culvert installed in Geiger Key has already improved water clarity and fish abundance. These technologies induced rapid improvements but continued monitoring and management are critical to sustain them. Other technologies like air curtains, aerators, and some culverts will require longer periods before they can be proven effective. Improvements in wastewater management and continued restoration projects in impaired canals will help maintain outstanding waters in the Florida Keys. Read more in the [full report](#).

Left: Dark water becomes clearer with plant life after backfilling. Middle: Muck piled high enough to interfere with boat propellers was successfully removed through dredging. Right: Macroalgae supports new muck and seagrass restoration from previously dead

#### Monroe County Canals by the numbers

2014	Monitoring started
25	Canals monitored
8	Canals recieved technologies
375	Monitoring sites
827	Sediment samples analyzed
12	Presentations that included canal data
9	Students trained
4	Canals already showing improvements



[seagrass.fiu.edu](http://seagrass.fiu.edu)

