



OVERVIEW OF THE STATE'S WATER QUALITY MONITORING PROGRAM IN THE FLORIDA KEYS NATIONAL MARINE SANCTUARY AND AQUATIC PRESERVES

Genevieve Schave^{1,2}, Tristan Clute³, and Dr. Nicholas Parr¹

¹Florida Keys National Marine Sanctuary, Florida Department of Environmental Protection, Marathon, FL, USA

²Florida Sea Grant, University of Florida, Gainesville, FL USA

³Biscayne Bay Aquatic Preserve, Florida Department of Environmental Protection, Miami, FL, USA



Introduction

DEP's water quality monitoring program is comprised of two different programs to monitor short- and long-term variation and trends.

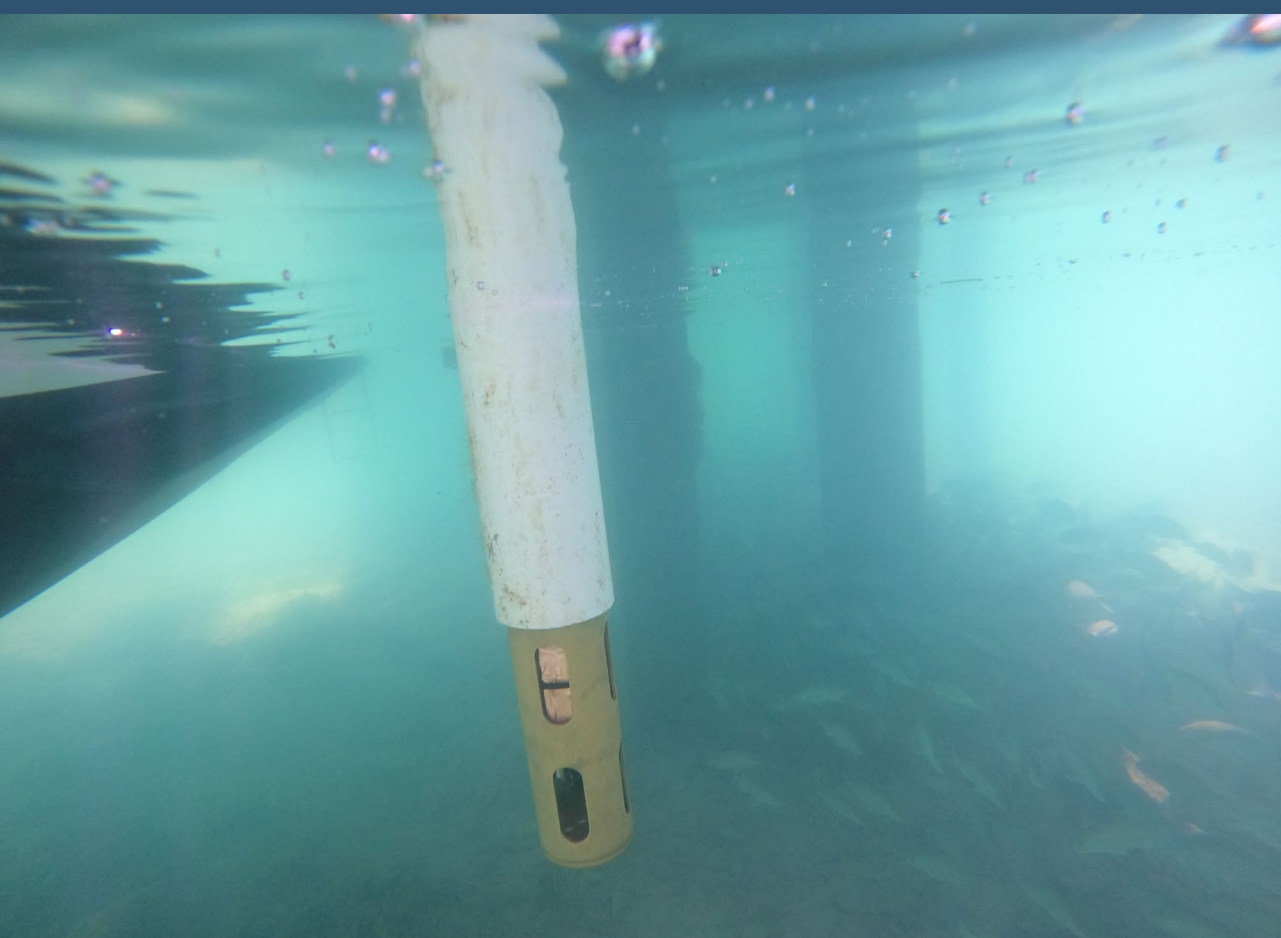
- The discrete water quality monitoring program
 - Assesses sub-watersheds to identify water quality impairments and establish numeric nutrient criteria
 - Analyzes Chlorophyll-a, Turbidity, Total Kjeldahl Nitrogen, Nitrate-Nitrite, Pheophytin A, and Total Phosphorus (through bottle grab samples) & pH, Dissolved Oxygen (DO), Temperature, Specific Conductivity, and Salinity (through YSI ProDSS handheld)
- The continuous water quality monitoring program
 - Collects data readings every 15 minutes through YSI ProDSS sonde mount stations
 - Analyzes pH, Dissolved Oxygen, Temperature, Specific Conductivity, Salinity, Total Algae, and Turbidity (YSI EXO2 Sondes). Permanent sonde stations reside in both Florida Keys Aquatic Preserves.
- Lignumvitae Key Aquatic Preserve (LKAP)
 - In 1969 Florida legislature designated approximately 6,700 acres (10.5 square miles) of water, just off the southwestern shore of Islamorada, as LKAP.
 - Pervaded with seagrass flats, mangrove forests, and hard-bottom communities, this protected area spans across both the bay and oceanside of the Keys
- Coupon Bight Aquatic Preserve (CBAP)
 - Also, established in 1969, CBAP is located in the southern portions of Big Pine Key and is the Florida's southernmost aquatic preserve.
 - Spanning over 5400 acres (8.5 miles squared), this protected area consists of both lagoon and oceanside waters. The Newfound Harbor Keys separates the inner sheltered waters of the bight from its outer oceanic portion. This diverse area is inhabited by mangrove forests, seagrass beds, mixed hardbottom, and patch reef communities which bring forth a vast array of aquatic and marsh wildlife including the iconic Key Deer.
- The major benthic habitats, seagrasses, mixed hardbottom, and coral patch reef, found in both aquatic preserves rely on oligotrophic water. Water quality impairments can weaken seagrasses and encourage outcompeting algae growth. The monitored parameters and the subsequent data collected are vital for source tracking. This data can also inform future environmental regulation and enforcement.



EXO2 Sonde with various sensors, post deployment

Counterclockwise from top:
-Dissolved Oxygen
-Total Chlorophyll
-Conductivity & Temperature
-Turbidity
-pH

The middle sensor contains a wiper brush that rotates before each reading to brush the sensor faces clean before sampling.



This sonde mount station is located under the dock at Lignumvitae Key Botanical State Park.

Mounts are permanent and consists of PVC to protect the sonde body, a copper guard that prevents biofouling without preventing flow to the sensors, and the YSI EXO2 Sonde.

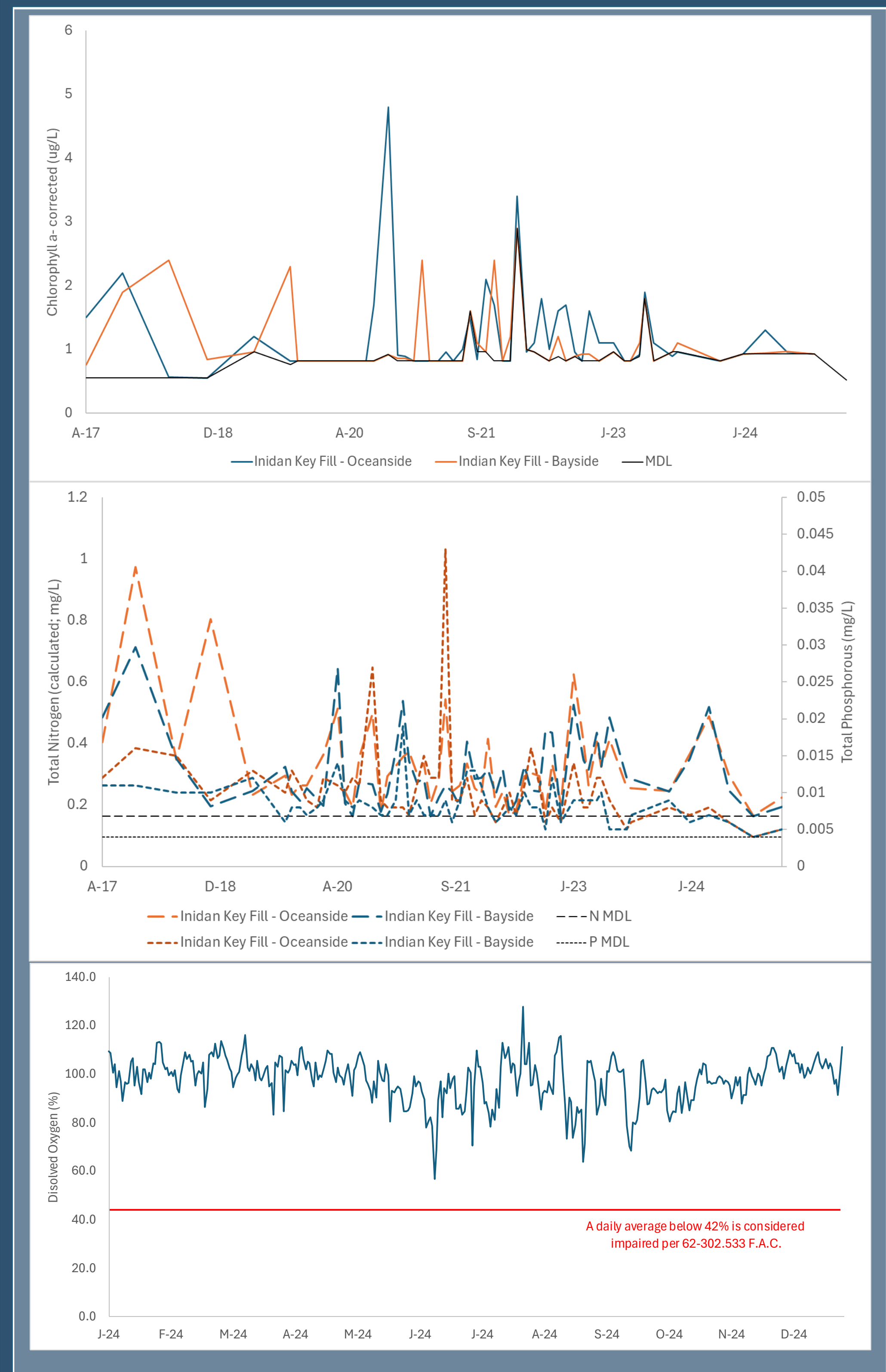
Protocol

- Water quality sampling with bottle grabs are done using a YSI ProDSS Handheld.
- Bottle grabs sent to DEP's Division of Ecosystem Assessment and Restoration (DEAR) lab in Tallahassee for analysis.
- Continuous water quality data is collected using YSI EXO2 Sondes.
- Both devices require calibration < 24 hours before deployment and a continuous calibration check < 24 hours following retrieval
- Both the ProDSS and EXO2 models require yearly maintenance at a YSI certified facility
- Nineteen total sites are sampled quarterly for Nutrients, Chlorophyll-A, Turbidity, pH, Salinity, DO and Temperature (1 site sampled for Sunscreens).
- Four sites are sampled every 15 minutes (sondes swapped monthly) for Chlorophyll-A, DO, Turbidity, pH, Salinity, Specific Conductance and Temperature.

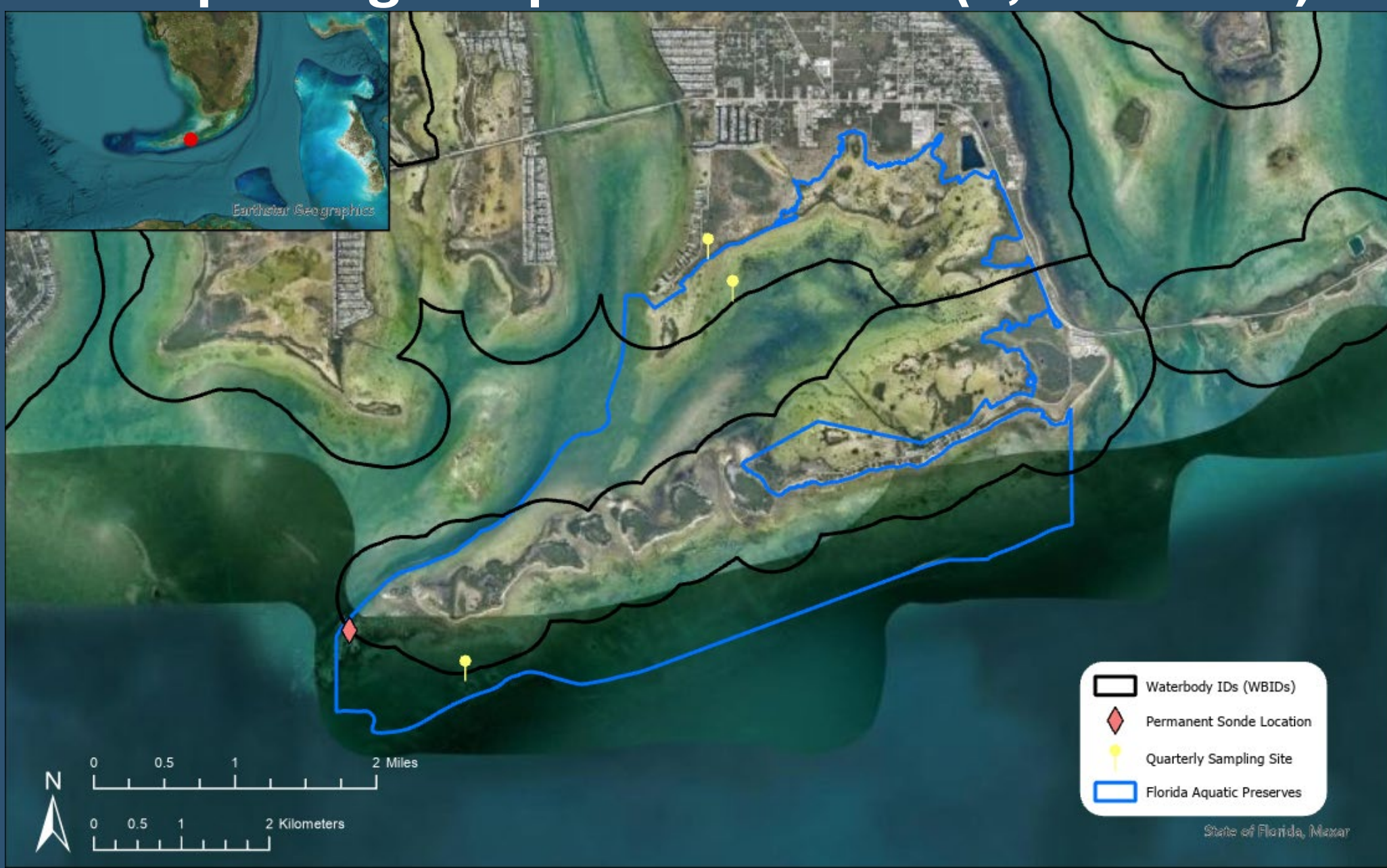
Lignumvitae Key Aquatic Preserve (6,700 acres)



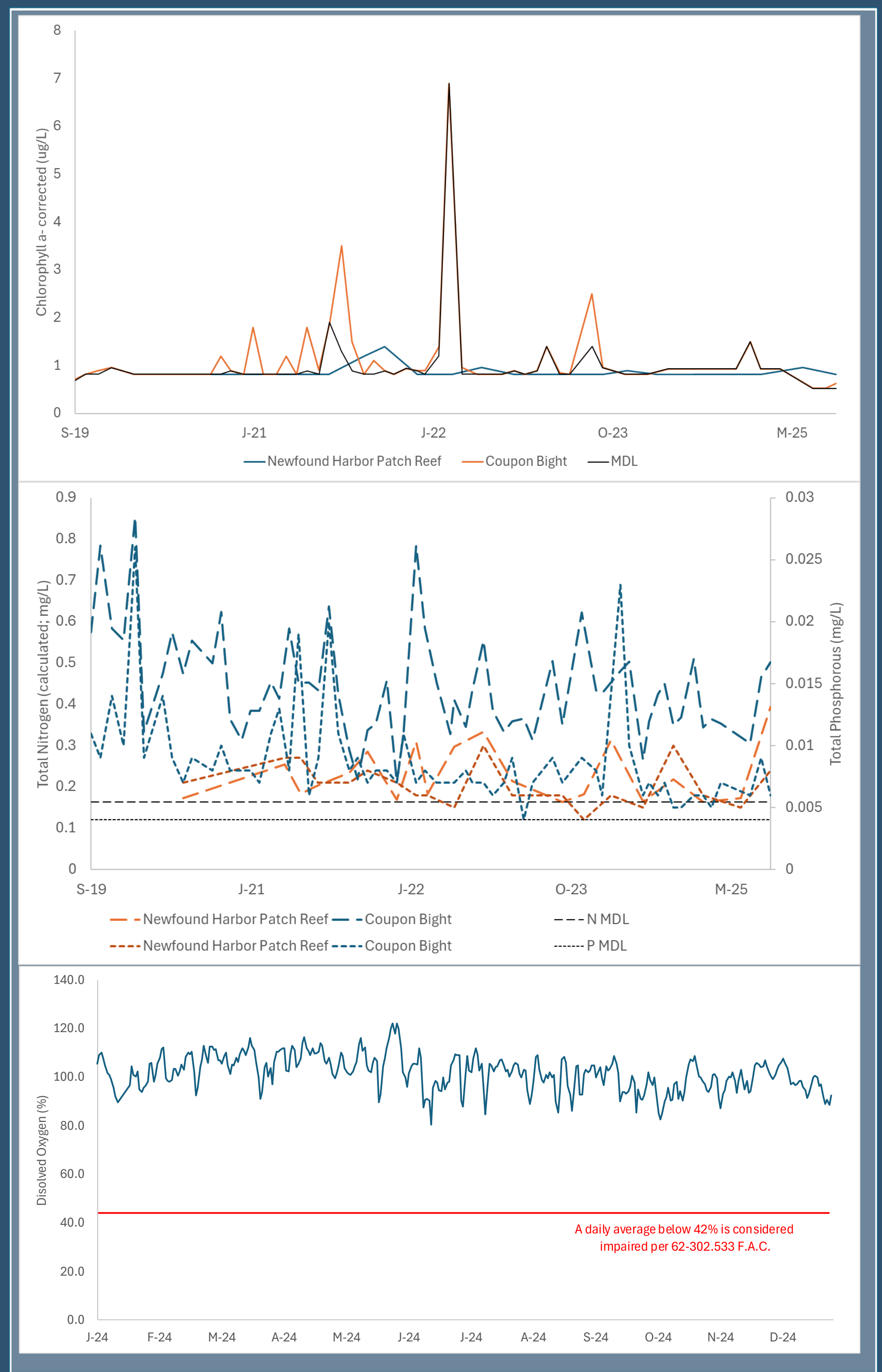
- Four sites sampled quarterly and one sonde station
- Featuring telemetry and weather station with live data accessible here: <https://bit.ly/LKAPmonitoringstation>



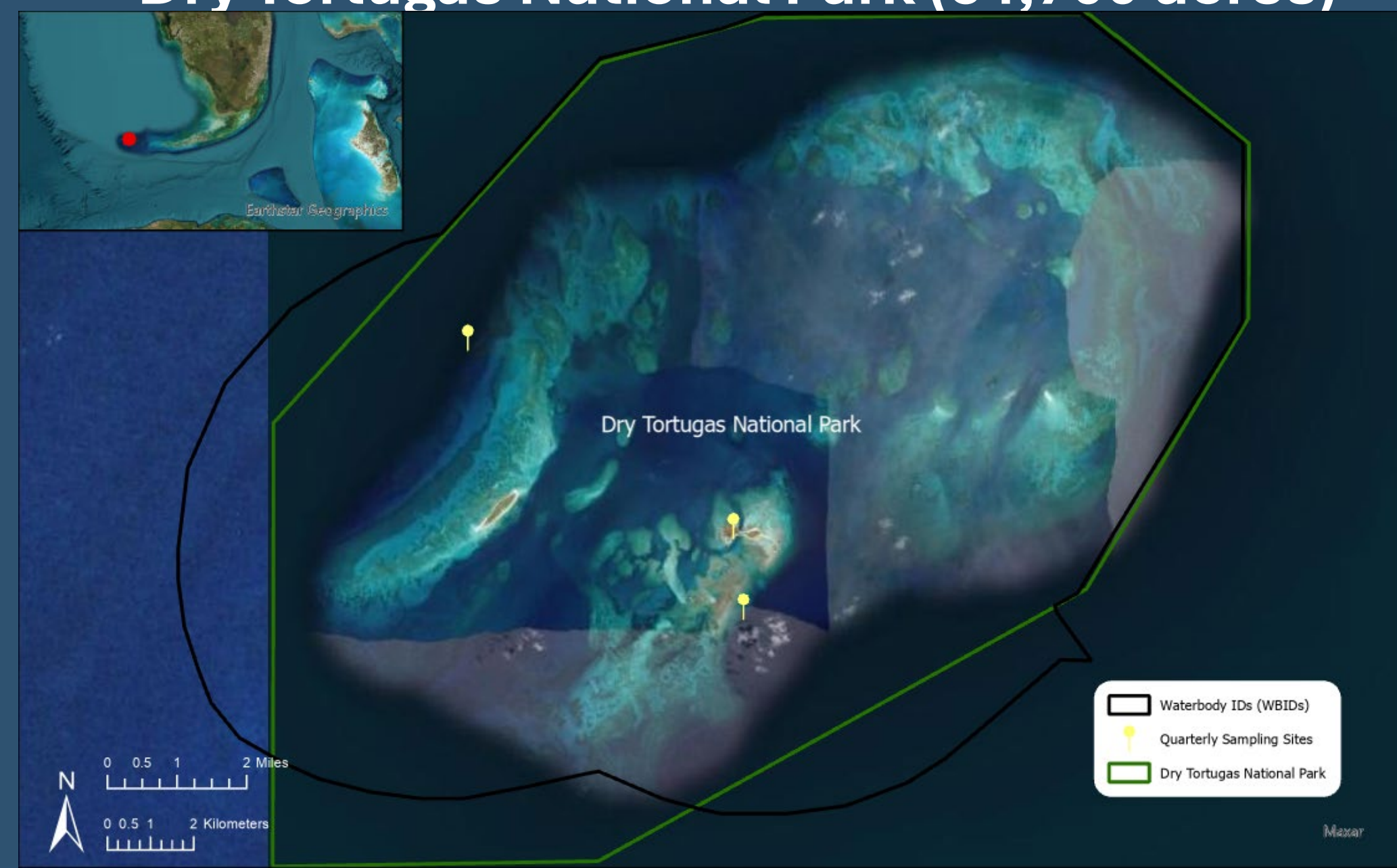
Coupon Bight Aquatic Preserve (5,400 acres)



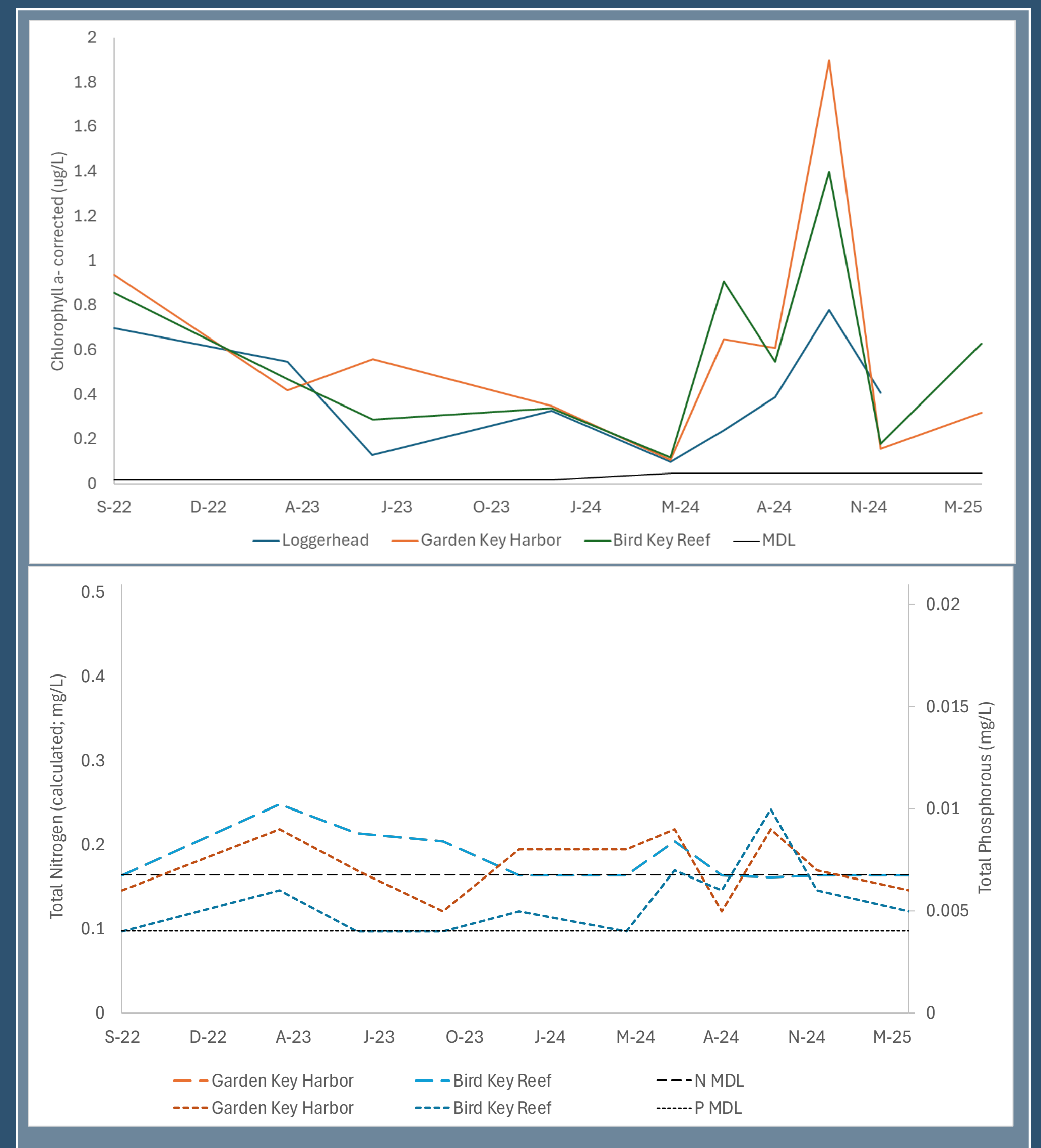
- Three sites sampled quarterly & one sonde station
- Sonde is mounted in high flow channel
- Sampling sites over mixed hardbottom (in bight) and patch reef (offshore)



Dry Tortugas National Park (64,700 acres)



- Two sites sampled quarterly
- Loggerhead site retired - statistically similar to Bird Key Reef
- Isolated but potential impacts from the Mississippi River based on currents



References

- ¹ DEP's Welcome to Watershed Information Network (WIN) <https://prodenv.dep.state.fl.us/DearWin>
- ² DEP's RCP Continuous Water Quality Data <https://floridaapdata.org/>
- ³ Hydrosphere Live Telemetry Dashboard <https://bit.ly/LKAPmonitoringstation>

Acknowledgements

Thank you to DEP's Florida Keys Aquatic Preserves, Florida Keys National Marine and Sanctuary team members past and present. Specifically, Caitlyn Bozza who established the continuous water quality monitoring program and ran it from 2021-23.