Nature Coast Aquatic Preserve Water Quality Monitoring Program 2021 Report

Prepared by Savanna Barry, Laura Reynolds, Jamie Hammond, Morgan Edwards

September 2, 2021

Background

Aquatic preserves (APs) are established by law as exceptional areas of submerged lands and associated waters that are to be maintained in their natural or existing conditions. The intent is to forever set aside submerged lands with exceptional biological, aesthetic, and scientific values as sanctuaries for the benefit of future generations. The Nature Coast Aquatic Preserve (NCAP) is the newest aquatic preserve and was signed into law (HB 1061) by Governor Ron DeSantis in June 2020. Water quality within the preserve is one of the key monitoring components.

There are multiple factors that can influence water quality including nutrient inputs, chlorophyll-a concentrations, color, environmental context, and major storm events. An increase in nutrient loading has the potential to increase severity of harmful algal blooms and increase light attenuation by fueling chlorophyll-a growth. Water color, a measure of dissolved humic substances, can increase following significant rain events. Increased algal growth and color can shade out submerged vegetation if the event is long-lasting. Large scale storms can lead to erosion and resuspension of sediments, reducing light availability further. Loss of submerged vegetation and sediment resuspension can produce additional nutrient influx. For these reasons, it is critical to maintain a water quality regime that promotes submerged vegetation growth and sustains water clarity.

In an effort to maintain water quality within state waters, numeric nutrient criteria have been established by the Department of Environmental Protection. These criteria set goals for total nitrogen, total phosphorus, and chlorophyll-a based on historical and desired conditions within a waterbody. For estuary segments, the annual geometric mean cannot exceed these criteria more than once in a three-year period. Regular long-term monitoring for nutrients, chlorophyll-a, and physio-chemical parameters will help to determine if the areas within NCAP are meeting numeric nutrient criteria and if there are changes occurring over time. Early detection of changes in nutrient regimes could be the key in mitigating these issues before they cause long-term damage.

Methods

Station selection

There are nine coastal river systems associated with the Nature Coast Aquatic Preserve. These rivers and their estuaries are monitored monthly. There are ten stations within each system for a total of 90 stations (Figure 1, Appendix A). These stations were selected and historically sampled by Tom Frazer’s Project COAST (Jacoby et al., 2015). Shortly after the designation of NCAP, the sampling regime set up by Dr. Frazer was reinstated to provide a continuation of data collected for these areas.

Equipment Calibration

Abiotic parameters are recorded at each site using a handheld YSI ProDSS datalogger. Per the Department of Environmental Protection's Standard Operating Procedure (SOP) manual for surface water sampling, an initial calibration and initial calibration verification are performed on the YSI Pro DSS prior to sampling events followed by a continuing calibration verification after returning from the field. Calibration information is recorded on the Calibration Log. Should any parameters fail to meet acceptance criteria, those parameters would be qualified with a J code. Procedures follow DEP FT1000 – FT1500.

Light attenuation data is collected at each site using LiCor LI-1500 light sensor logger paired with LiCor quantum surface and underwater sensors. The LiCor sensors are factory calibrated and will need to be returned to the manufacturer every two years for a new calibration certificate.

Field Surveys

Using a Garmin GPS, the field team navigates to each of the ten stations for each system. A calibrated YSI is deployed and allowed to settle (stabilize). Water temperature, specific conductivity, salinity, DO mg/L, DO %, and pH, and time (EST) of YSI readings are recorded on the Surface Water Sampling Form. Using a handheld anemometer pointed into the wind, wind speed and direction are recorded, along with a weather code and any useful information on tides or other notable site conditions.

Sample collection containers are seasoned three times and a whole water grab sample is then collected 0.25 m below the water surface. From that sample, a 250 mL bottle labeled with the county, the system, date, and station, is seasoned three times and filled to the bottle neck. That sample is then stored on ice in a cooler. The remaining whole water grab sample is filtered and used to collect a color and chlorophyll sample. The filtering apparatus is seasoned by first filtering 50-100 mL of the water sample, then disconnecting the flask from the filter cup, the contents of the flask are swirled around and discarded. The remaining sample is then filtered and time of filtration recorded. The filtrate is then used to season a 60 mL bottle three times, then the color sample is collected. The color bottle is labeled in the same manner as the nutrient bottle. The color sample is then placed on ice in the cooler. The filter is then gently pulled off of the stopper, folded in half with the sample side in, and placed in P8 filter paper that has been folded in half and labeled in a similar manner as the sample bottles but includes the amount of water filtered. The chlorophyll sample is secured in the P8 by a plastic-coated paperclip and placed in a 500 mL Nalgene with desiccant. The chlorophyll bottle is also stored on ice in the cooler.

The depth pole is used to collect total depth and a secchi disk with marks every 0.1-meter is used to determine the vertical secchi depth. Secchi readings are performed on the shady side of the boat without wearing sunglasses. This information is recorded on the Surface Water Sampling Form.

Light measurements are taken using a LiCor handheld meter with two sensors, one sensor takes a light measurement from the deck, the other is secured to a depth pole and used underwater. Light meter readings are taken at three depths, at the bottom, the middle of the water column, and 0.5 meters from the water surface. If the site is too shallow, all three readings are taken at, or as close as possible to, 0.5 meters below the surface. The handheld meter is set to record a 15 second average for each reading. These readings along with each sensor's multiplier, percent cloud cover and time are recorded on the Light Sampling Form.

Sample Dropoff

Nutrient and chlorophyll-a samples are taken to the Lake Watch laboratory and frozen until analyzed. Color samples are taken to the Reynolds laboratory, stored in the dark and refrigerated until analyzed by COAST staff. Color samples are generally analyzed within 48 hours of sampling.

Color Analysis

The Reynolds laboratory performs color analysis using methods specified by the 2020 Lake Watch SOP. True color is determined spectrophotometrically using a Shimadzu UV1900i set at 465 nm to determine absorbance values. Color samples are pulled out of the refrigerator and allowed to warm to room temperature prior to analysis so as not to fog the cuvette. Premade platinum cobalt standards of known concentration are used to generate a linear regression for the spectrophotometer. The standards used are 0, 10, 20, 30, 40, 50, 100, and 150 platinum cobalt units. Samples outside the standard limits are diluted and reanalyzed to be within the range of standards used. Once the standard curve has been set, the cuvette is rinsed with sample and then refilled and run. Measurements are recorded on the laboratory color datasheet.

Several QC parameters are employed to ensure accuracy of data. Sample blanks are run every ten samples and sample duplicates are run every 20 samples. Once all of the samples have been run, a duplicate and two blanks are run in addition to a standard. The blanks must be ≤ 1 (the MDL), duplicates must not exceed ± 20% of the original value, and the standard must read 90-110% of the standard value. If any of these acceptance criteria or the holding time of 48 hours are not met, data are qualified.

Data Management

Data are entered and QC'd each month by COAST staff into an excel spreadsheet that is saved to a Dropbox. Hard copies of field and lab datasheets are stored in a binder in the Reynolds lab. Nutrient and chlorophyll-a data supplied by the Lake Watch laboratory are copied into the COAST spreadsheet under a new tab. Records of data entry and QC are kept on a separate tab in the workbook. All data collected from March through August 2021 associated with this project was then compiled into a single spreadsheet formatted in accordance with the preferred layout for DEP's Statewide Ecosystem Assessment of Coastal and Aquatic Resources Data Discovery Interface (SEACAR DDI). This file was uploaded into the SEACAR DDI under Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region (Program 5008). A revised version of the Project COAST Standard Operating Procedure document will also be uploaded as a supporting file. Proof of program edits and file uploads are included in the report (Appendix B).

COAST data including color, water temperature, specific conductivity, DO mg/L, DO saturation, and pH are additionally formatted for WIN and uploaded organizations ID 21FLUFSW (University of Florida Soil and Water Sciences Department) and 21FLKWAT (Florida LAKEWATCH Laboratory). Proof of WIN uploads are included in the report (Appendix B).

Data Analysis

Water quality data generated from Project COAST sampling events conducted from March to August 2021 were plotted for visualization using standard boxplots and by plotting data points across latitude. Relationships between water quality parameters were further explored through a Pearson correlation matrix. Finally, relationships between chlorophyll-a and total nitrogen, total phosphorus, color, and the molar N:P ratio were explored with regression analyses. All analyses were carried out in R Studio version 1.4 (R Core Team, 2021).

Results

Field sampling efforts between March and August 2021 resulted in data for all parameters at all stations, representing 540 separate point samples for each parameter. Of these, 480 samples occurred in estuarine waters and the remainder were collected at river stations.

Depths generally ranged from 0.3 m to 4.4 m, depending on sampling location and tidal stage (Figure 2). All systems have a mix of shallow and deep stations and the overall mean ± SD depth across the sampling period and area was 1.9 ± 0.8 m. However, there are mild spatial differences in water depths, with the shallowest overall system being Homosassa and the deepest overall system being Withlacoochee (Figure 2).

Temperature ranged from 16.3 to 31.7 °C (mean ± SD = 25.9 ± 3.3 °C) during the study period. There were minimal spatial differences in temperature, based on examination of the boxplots displayed by system and scatter plot by latitude (Figure 3). Salinity, however, exhibits more obvious spatial patterns, with the four southern systems (associated with Pasco County) having overall higher average salinities (Figure 4). Overall, salinity averaged 21.01 ± 8.73‰ and ranged from 0.07‰ to 35.31‰, showing that this water sampling program captures waters from the entire range of fresh to marine.

Dissolved oxygen was consistent across the sampling area, with most values falling above 4 mg/L (Figure 5). Dissolved oxygen ranged from 2.14 to 12.36 mg/L and the overall mean ± SD value was 6.68 ± 1.49 mg/L. pH values ranged from 7.0 to 8.6 with a mean ± SD of 8.0 ± 0.3. Generally, pH appears to be higher in the southern half of the sampling area (Figure 6).

Total nitrogen values ranged from 40 to 1320 µg/L and had an overall mean ± SD of 427 ± 189. Concentrations of total nitrogen appear to exhibit a mild spatial pattern whereby values are slightly elevated in the central portion of the sampling area (Figure 7). Total phosphorus ranged from 4 to 102 µg/L, with an overall mean ± SD of 17 ± 14 µg/L. Total phosphorus, concentrations appear to generally increase with latitude, with the exception of Anclote and Pithlachascotee, where concentrations resemble those observed farther north (Figure 8).

Color values across the sampling area were generally below 50 but higher values were sometimes observed, especially at river sites (Figure 9). Color values ranged from effectively 0 to 277, with a mean ± SD of 17 ± 27. Chlorophyll-a tended to be low throughout the study area (Figure 10). There were mild increases in mean chlorophyll-a values in the two southern and four northern sampling systems in comparison to the central three systems (Figure 10). In general, chlorophyll-a values ranged from effectively 0 to 26 µg/L, with a mean of 0.7 and SD of 1.9 µg/L. The light extinction coefficient (K_d) appears to have been slightly higher in the northern systems during the sampling period (Figure 11). The mean K_d was 0.93 with a standard deviation of 0.57 and a range of effectively 0 to 4.78.

Exploratory Pearson correlation matrix analysis revealed that, as expected, several water quality variables exhibit mild to moderately strong correlations with each other (Figure 12). For example, color, K_d, total nitrogen, and total phosphorus are all positively correlated. Color and K_d are likewise negatively correlated with salinity (Figure 12).

Results of exploratory regression analyses between chlorophyll-a concentration and total nitrogen, total phosphorus, and color from estuarine stations point largely to total phosphorus as the main influence on chlorophyll concentrations, as total phosphorus was the only main effect that was significant in the multiple regression (Table 1). An analysis of chlorophyll-a at estuarine stations against the molar ratio of nitrogen to phosphorus in the water column revealed a significant negative relationship (Figure 13, Table 2).

Discussion and Conclusions

Each estuarine system included in this monitoring program has unique factors that differentiate it from the others. Visualization of data using summary plots revealed that some water quality variables tend to exhibit spatial variation, while others remain more consistent across the study area. Exploratory analyses presented in this report are preliminary and based only on the first six months of NCAP-Project COAST data. As more data are added, our team will be able to conduct analyses with more confidence and be able to compare new data to historical records.

At a very high level, data collected so far exhibit many expected patterns. For example, color is negatively correlated with salinity, a pattern expected because color is generated through decomposition of terrestrial organic matter. The associated substances, sometimes referred to as chromophoric dissolved organic matter (i.e., color), wash into rivers and out to the coast, where they diminish in concentration as they mix with saline waters. Many of the highest values observed for total nitrogen, total phosphorus, and chlorophyll-a were derived from river stations. This is also an example of a pattern we expect, as nutrients in estuarine systems tend to primarily derive from land-based sources that runoff to rivers first before reaching the coast. A final example is that total phosphorus appears to vary with latitude, such that it generally increases from south to north for the bulk of the study area, and it appears to be a key variable influencing chlorophyll-a concentrations (Table 1). These patterns related to total phosphorus have been repeatedly documented for subsets of this coastline (Hoyer at al., 2002, Jacoby et al., 2015, Barry et al., 2017) and it was therefore expected that we would observe a similar pattern in our sampling program.

In 2021, our team reinstated the valuable Project COAST sampling program, enabling continued documentation of the vibrant and diverse systems of the Nature Coast Aquatic Preserve. Data from the reinstated sampling effort will provide important information that can be compared to historical values and aid in linking patterns observed for SAV metrics to environmental factors. However, these initial exploratory analyses are based on only six months of data and therefore should be interpreted with caution. Our power to interpret patterns that may robustly inform decision-making will be improved over time with the addition of subsequent months and years of data. Furthermore, the analyses undertaken herein represent only a subset of those possible. For example, we did not perform any multivariate statistics and we have not yet examined current data in relation to historical values or against numeric nutrient criteria targets, given that new data have not yet captured one annual cycle. Looking ahead, we anticipate that new insights will emerge through collaboration with partners and DEP staff, who may conduct further analyses using raw data available through the WIN and SEACAR portals.

References Cited

Barry SC, Jacoby CA, Frazer TK (2017) Environmental influences on growth and morphology of *Thalassia testudinum*. Mar Ecol Prog Ser 570:57–70. https://doi.org/10.3354/meps12112

Hoyer MV, Frazer TK, Notestein SK, Canfield DE Jr (2002) Nutrient, chlorophyll, and water clarity relationships in Florida's nearshore coastal waters with comparisons to freshwater lakes. Can J Fish Aquat Sci 59: 1024−1031.

Jacoby CA., Frazer TK, Edwards MA, Frost JR (2015) Water quality characteristics of the nearshore Gulf coast waters adjacent to Citrus, Hernando and Levy Counties: Project COAST 1997-2014. Final Report. Brooksville, FL: Southwest Florida Water Management District.

R Core Team (2021) R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/

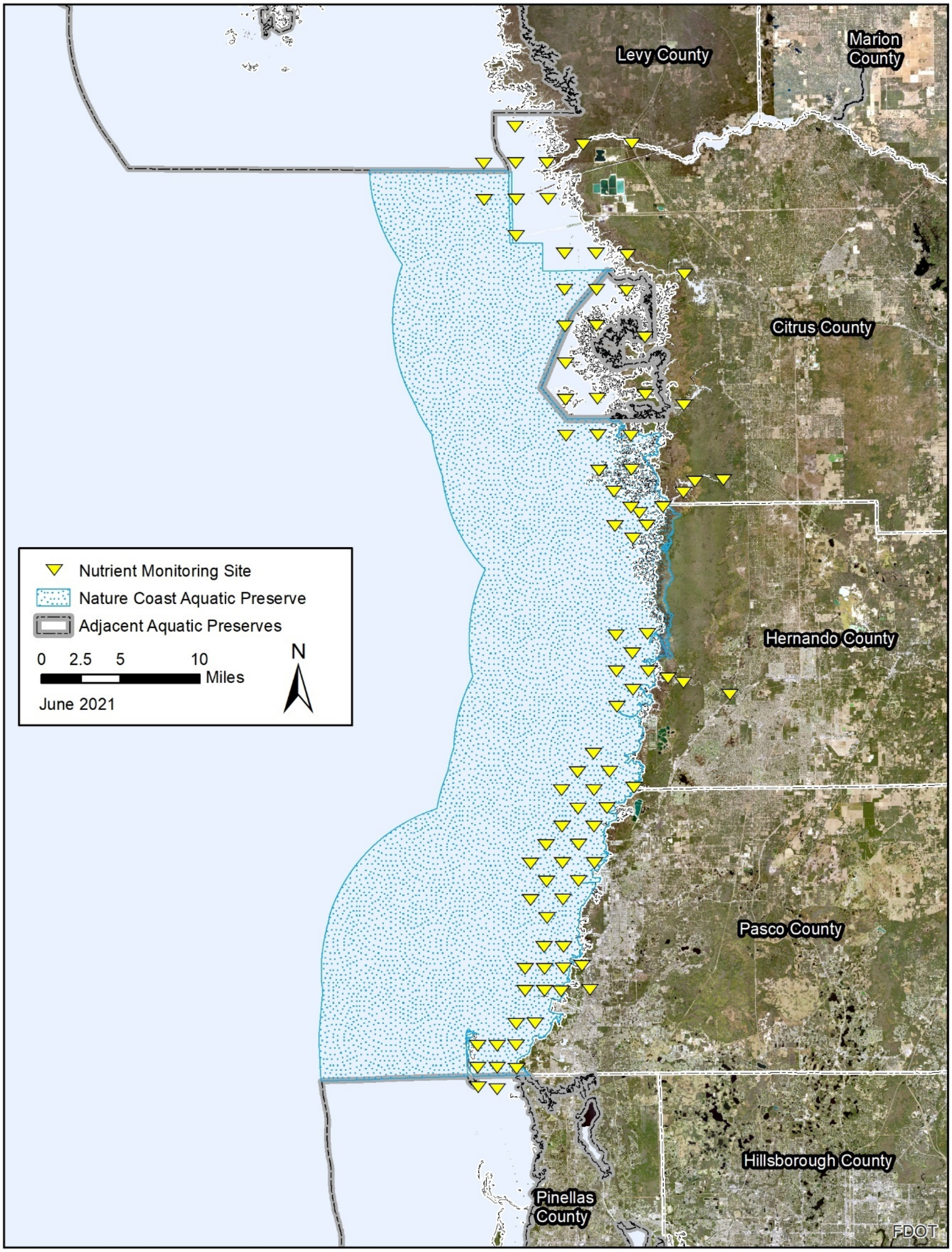


Figure 1. Map of the 90 sampling stations included in the Nature Coast Aquatic Preserve's water quality monitoring program, Project COAST.

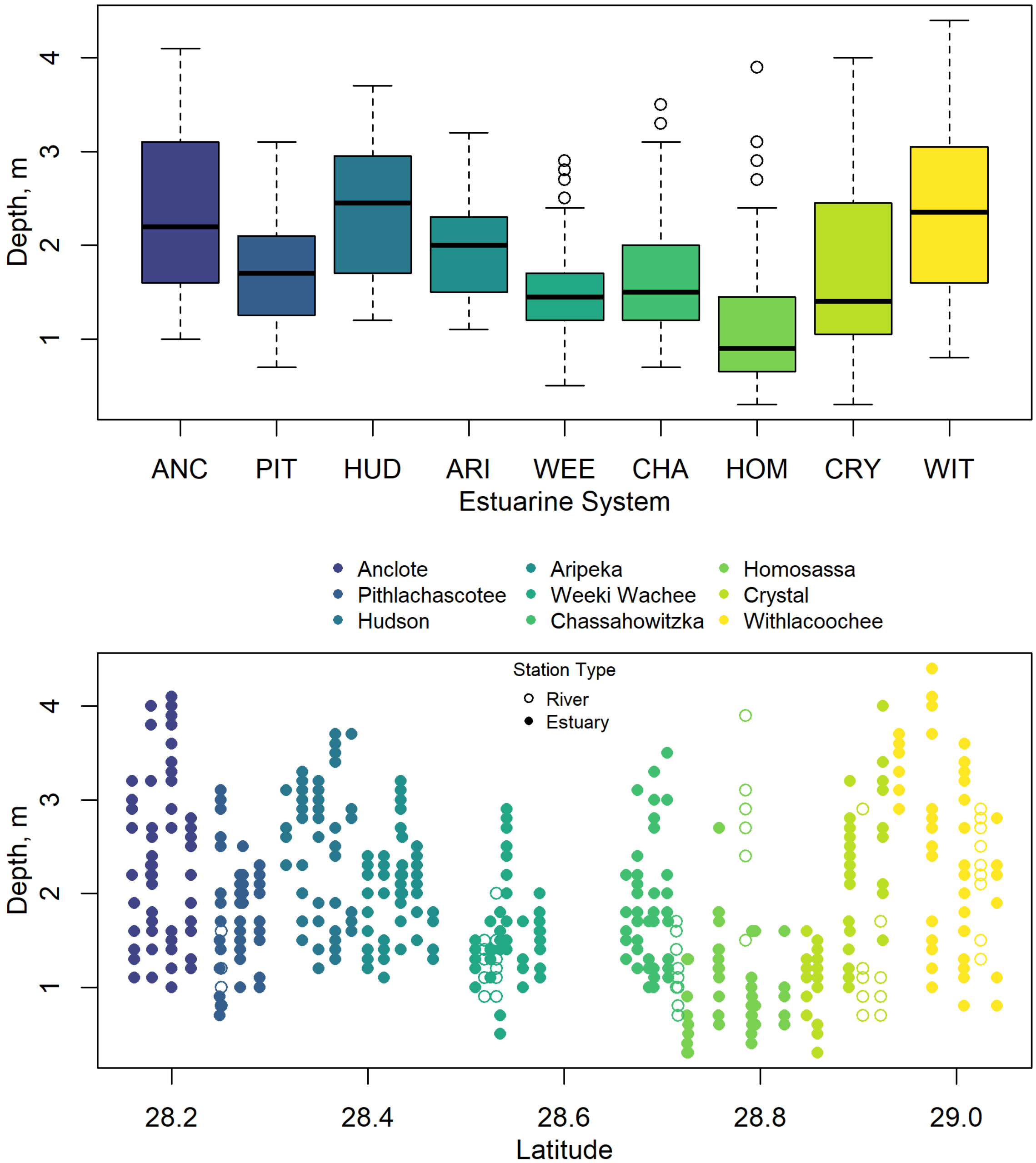


Figure 2. Depth data collected during Project COAST sampling events from March to August 2021. ANC = Anclote, PIT = Pithlachascotee, HUD = Hudson, ARI = Aripeka, WEE = Weeki Wachee, CHA = Chassahowitzka, HOM = Homosassa, CRY = Crystal, WIT = Withlacoochee. In the lower panel, open circles indicate river stations, closed circles indicate estuarine stations.

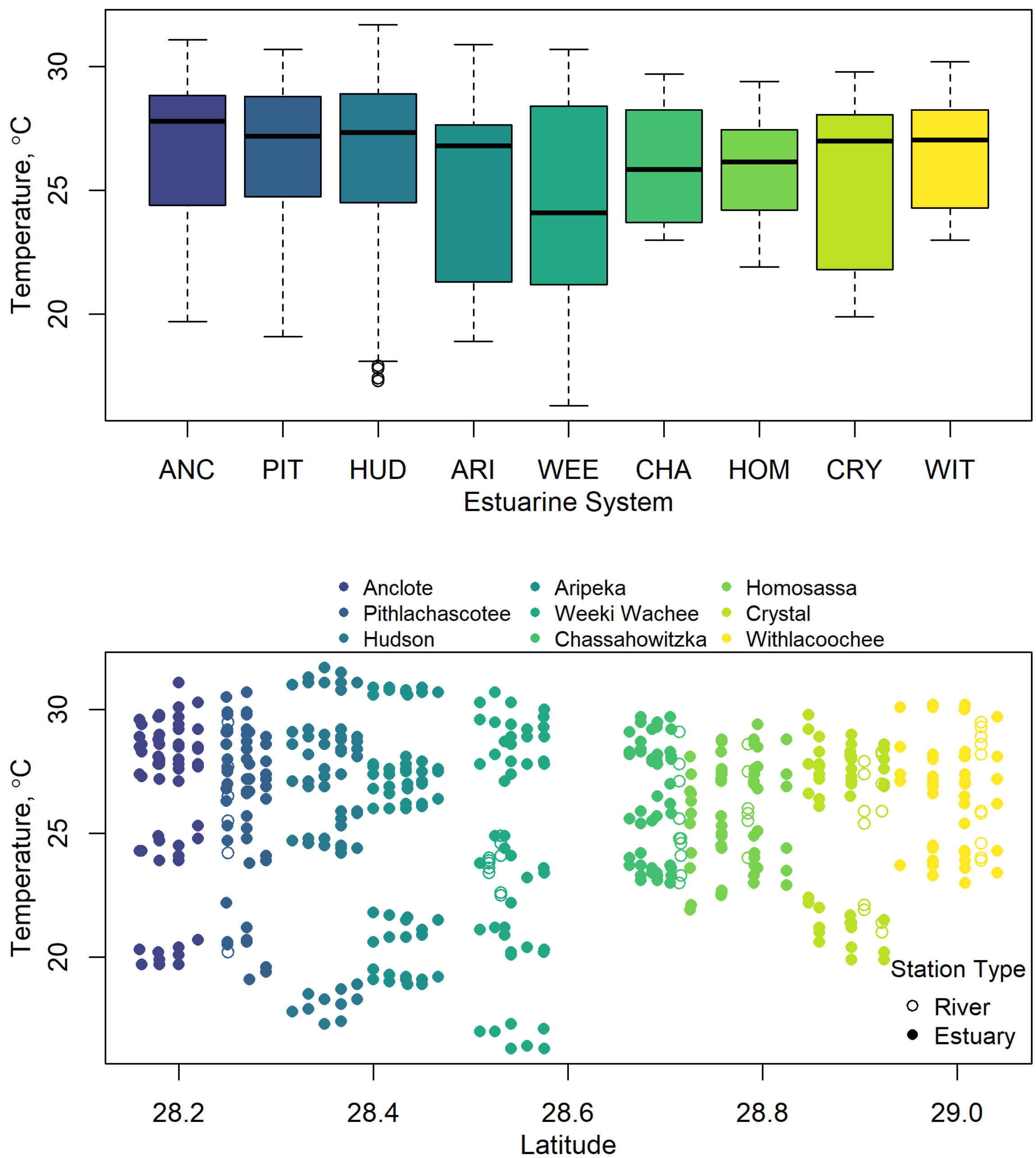
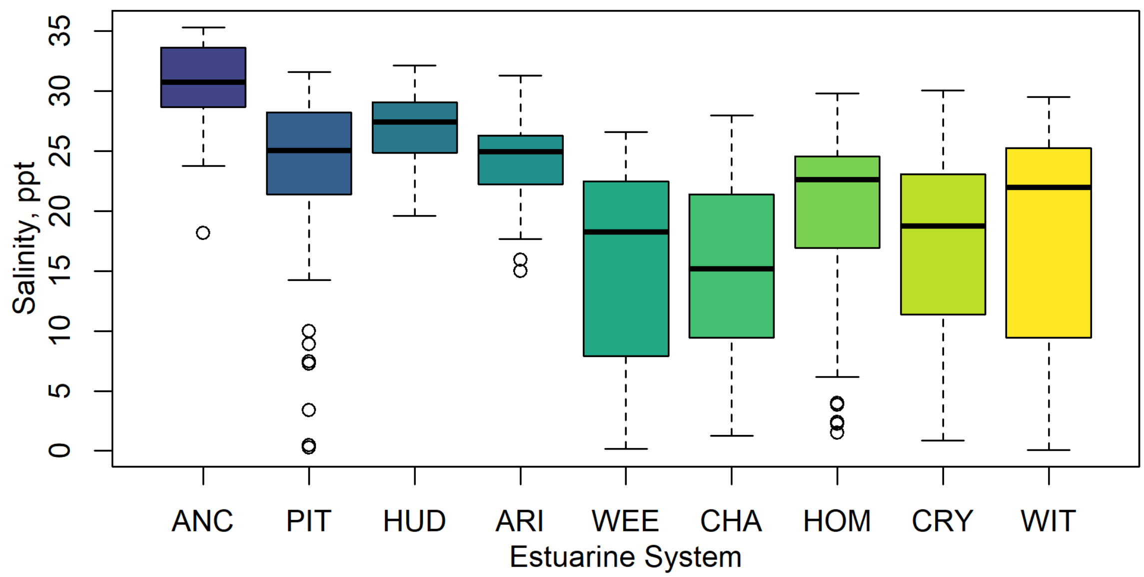


Figure 3. Temperature data collected during Project COAST sampling events from March to August 2021. ANC = Anclote, PIT = Pithlachascotee, HUD = Hudson, ARI = Aripeka, WEE = Weeki Wachee, CHA = Chassahowitzka, HOM = Homosassa, CRY = Crystal, WIT = Withlacoochee. In the lower panel, open circles indicate river stations, closed circles indicate estuarine stations.



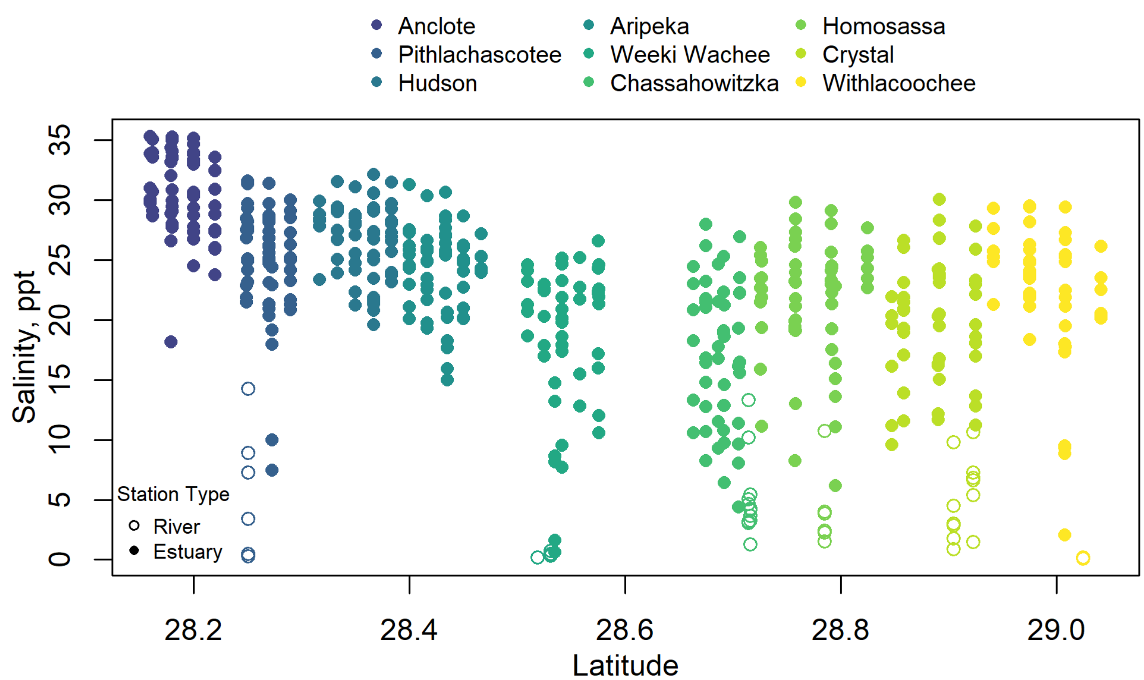


Figure 4. Salinity data collected during Project COAST sampling events from March to August 2021. ANC = Anclote, PIT = Pithlachascotee, HUD = Hudson, ARI = Aripeka, WEE = Weeki Wachee, CHA = Chassahowitzka, HOM = Homosassa, CRY = Crystal, WIT = Withlacoochee. In the lower panel, open circles indicate river stations, closed circles indicate estuarine stations.

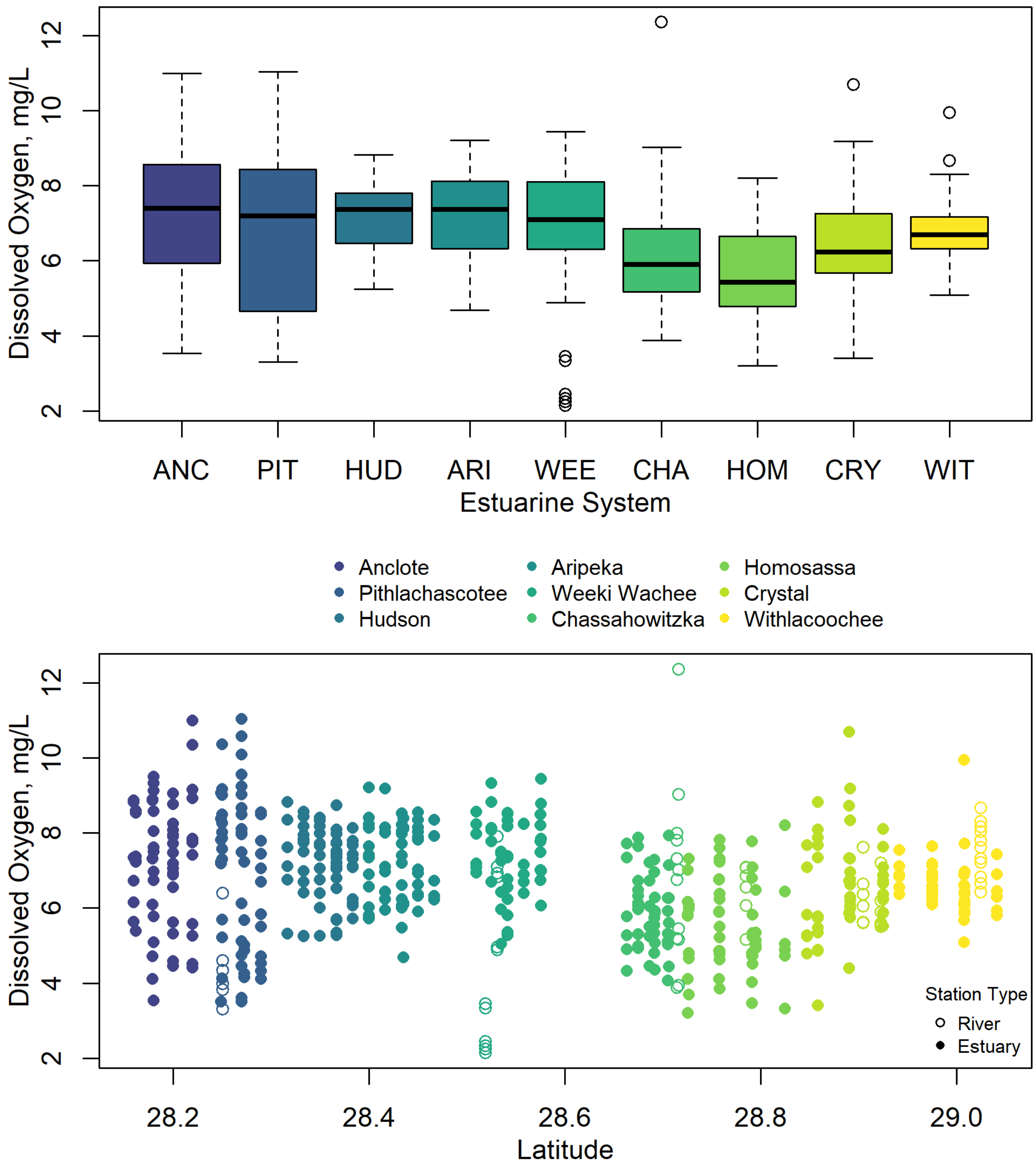


Figure 5. Dissolved oxygen data collected during Project COAST sampling events from March to August 2021. ANC = Anclote, PIT = Pithlachascotee, HUD = Hudson, ARI = Aripeka, WEE = Weeki Wachee, CHA = Chassahowitzka, HOM = Homosassa, CRY = Crystal, WIT = Withlacoochee. In the lower panel, open circles indicate river stations, closed circles indicate estuarine stations.

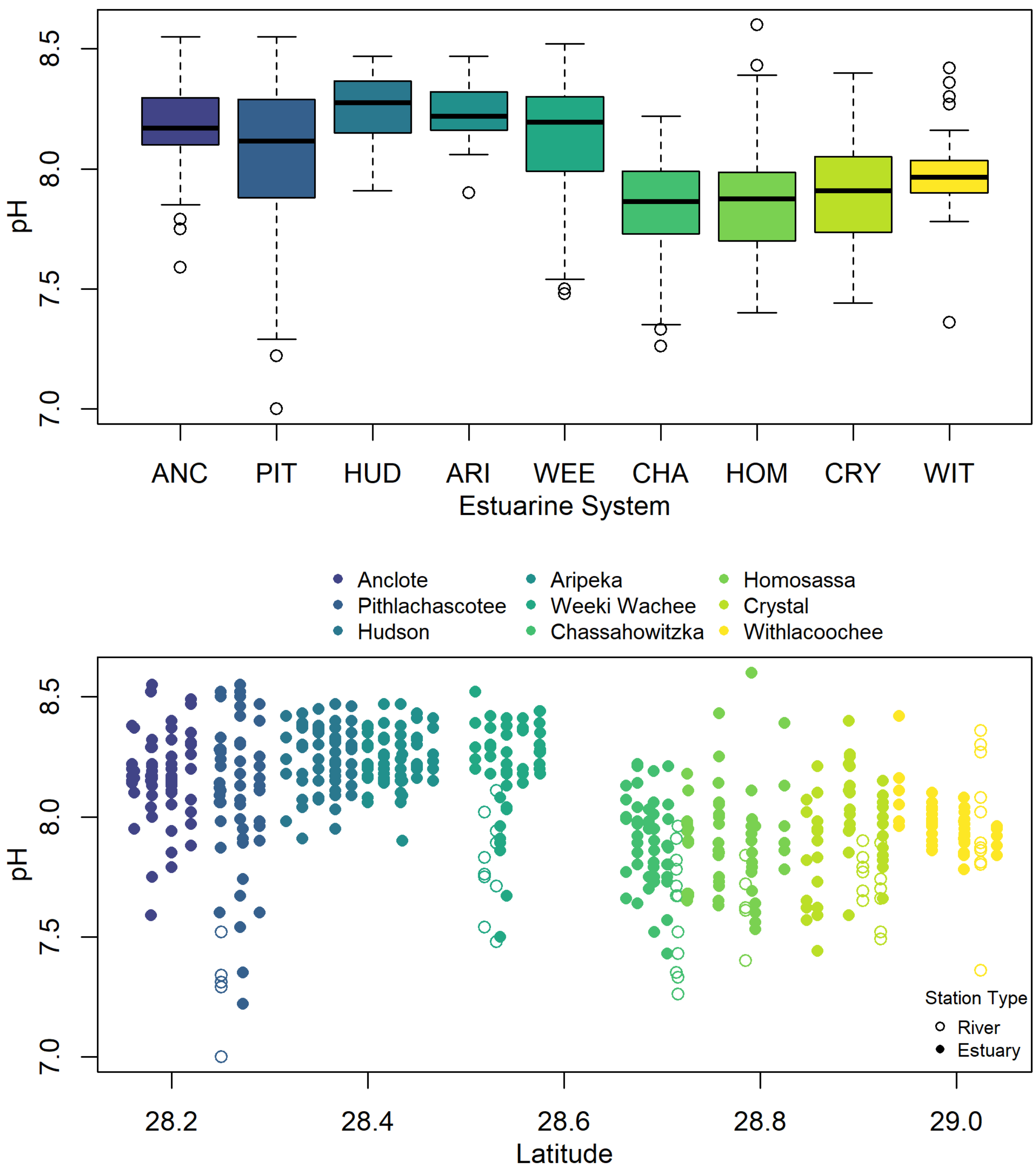


Figure 6. pH data collected during Project COAST sampling events from March to August 2021. ANC = Anclote, PIT = Pithlachascotee, HUD = Hudson, ARI = Aripeka, WEE = Weeki Wachee, CHA = Chassahowitzka, HOM = Homosassa, CRY = Crystal, WIT = Withlacoochee. In the lower panel, open circles indicate river stations, closed circles indicate estuarine stations.

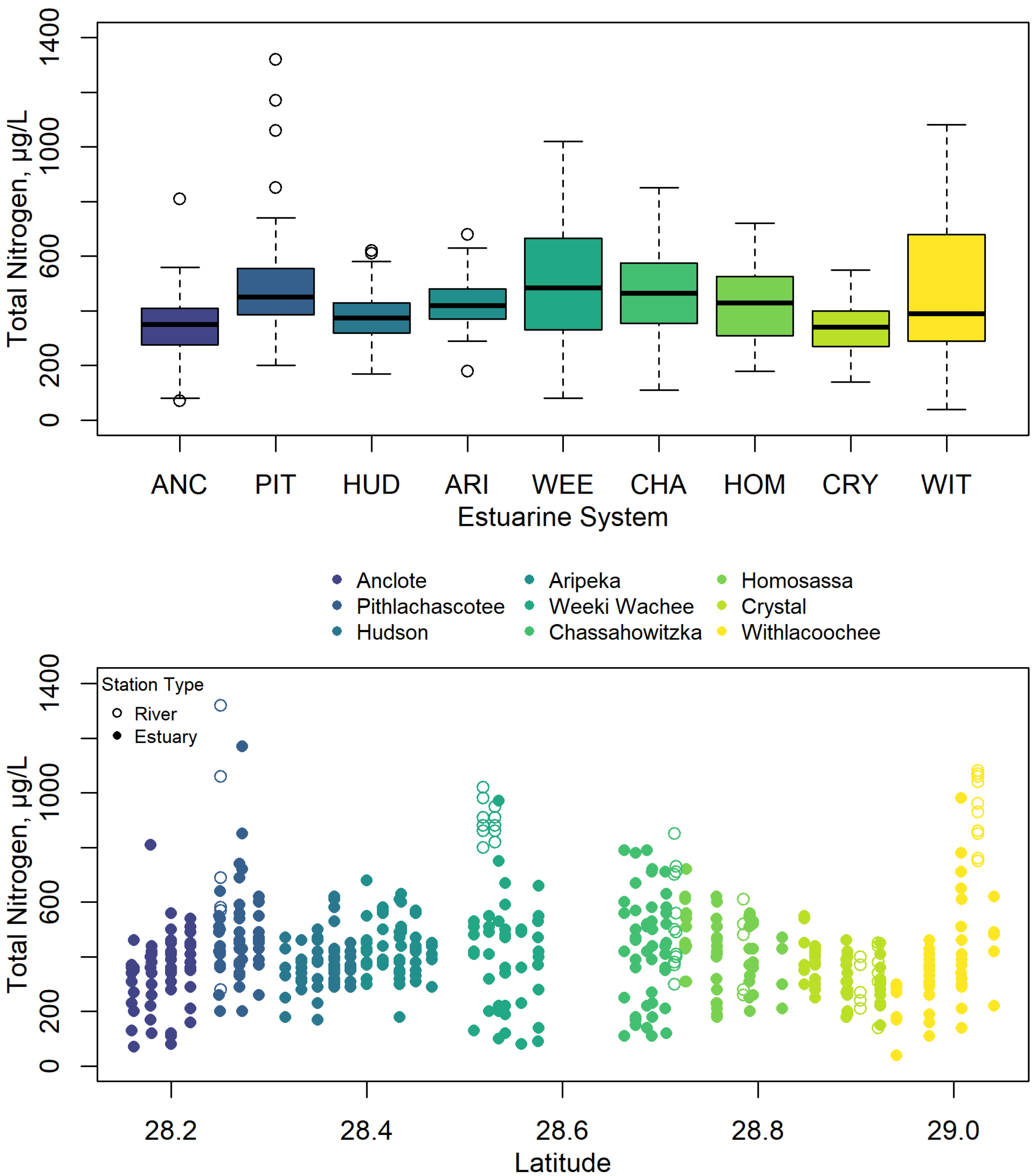


Figure 7. Total nitrogen data collected during Project COAST sampling events from March to August 2021. ANC = Anclote, PIT = Pithlachascotee, HUD = Hudson, ARI = Aripeka, WEE = Weeki Wachee, CHA = Chassahowitzka, HOM = Homosassa, CRY = Crystal, WIT = Withlacoochee. In the lower panel, open circles indicate river stations, closed circles indicate estuarine stations.

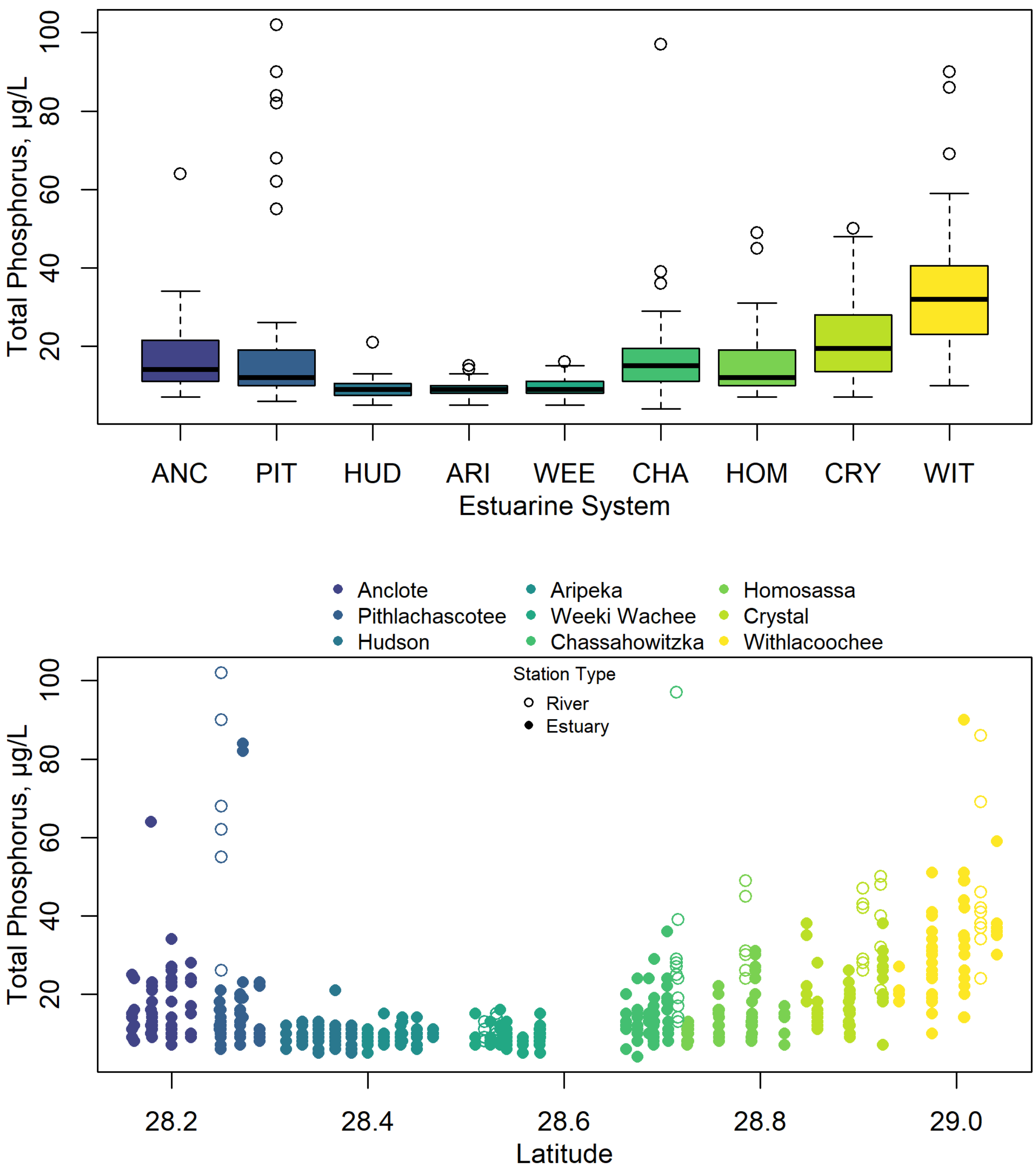


Figure 8. Total phosphorus data collected during Project COAST sampling events from March to August 2021. ANC = Anclote, PIT = Pithlachascotee, HUD = Hudson, ARI = Aripeka, WEE = Weeki Wachee, CHA = Chassahowitzka, HOM = Homosassa, CRY = Crystal, WIT = Withlacoochee. In the lower panel, open circles indicate river stations, closed circles indicate estuarine stations.

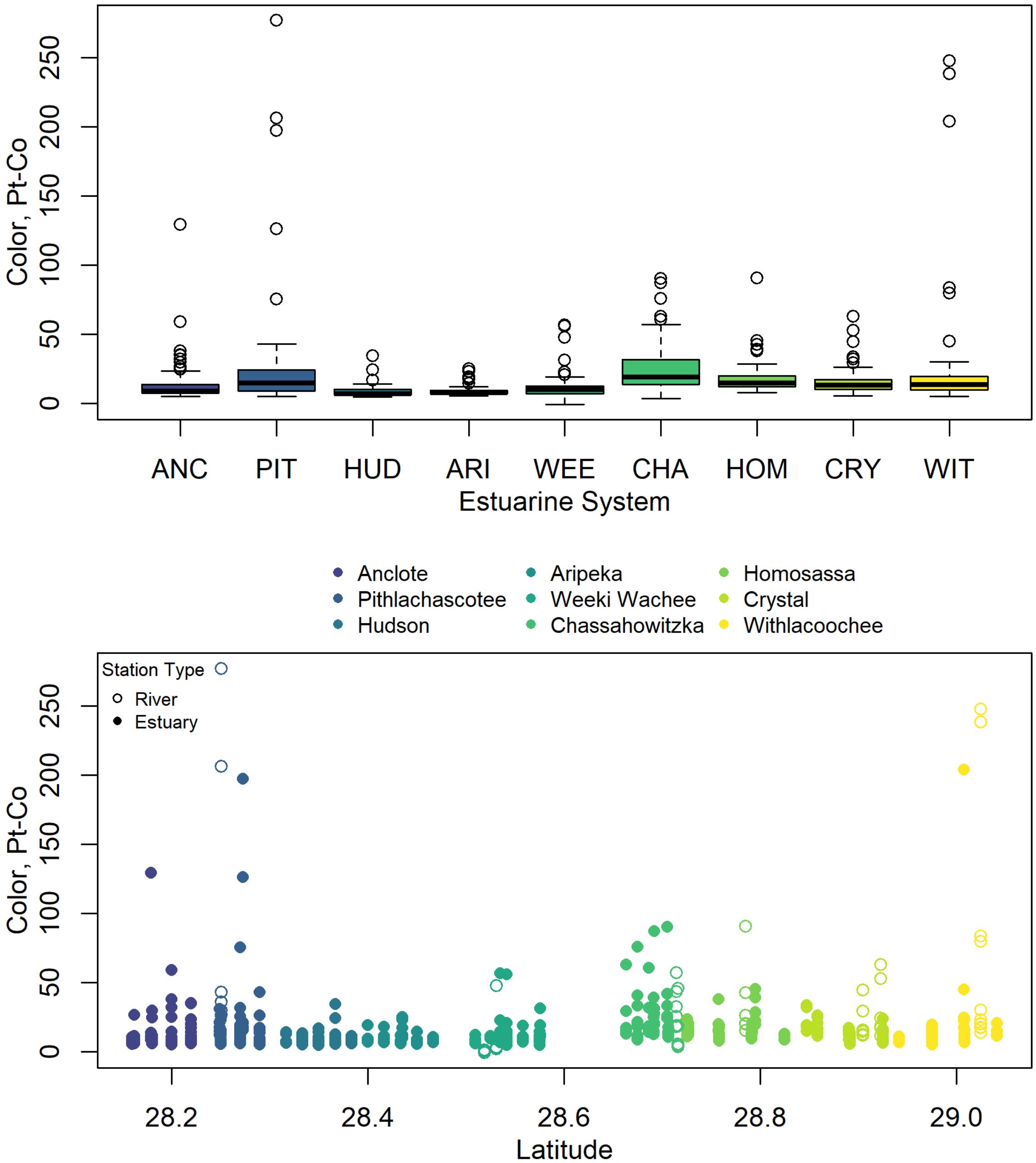


Figure 9. Color data collected during Project COAST sampling events from March to August 2021. ANC = Anclote, PIT = Pithlachascotee, HUD = Hudson, ARI = Aripeka, WEE = Weeki Wachee, CHA = Chassahowitzka, HOM = Homosassa, CRY = Crystal, WIT = Withlacoochee. In the lower panel, open circles indicate river stations, closed circles indicate estuarine stations.

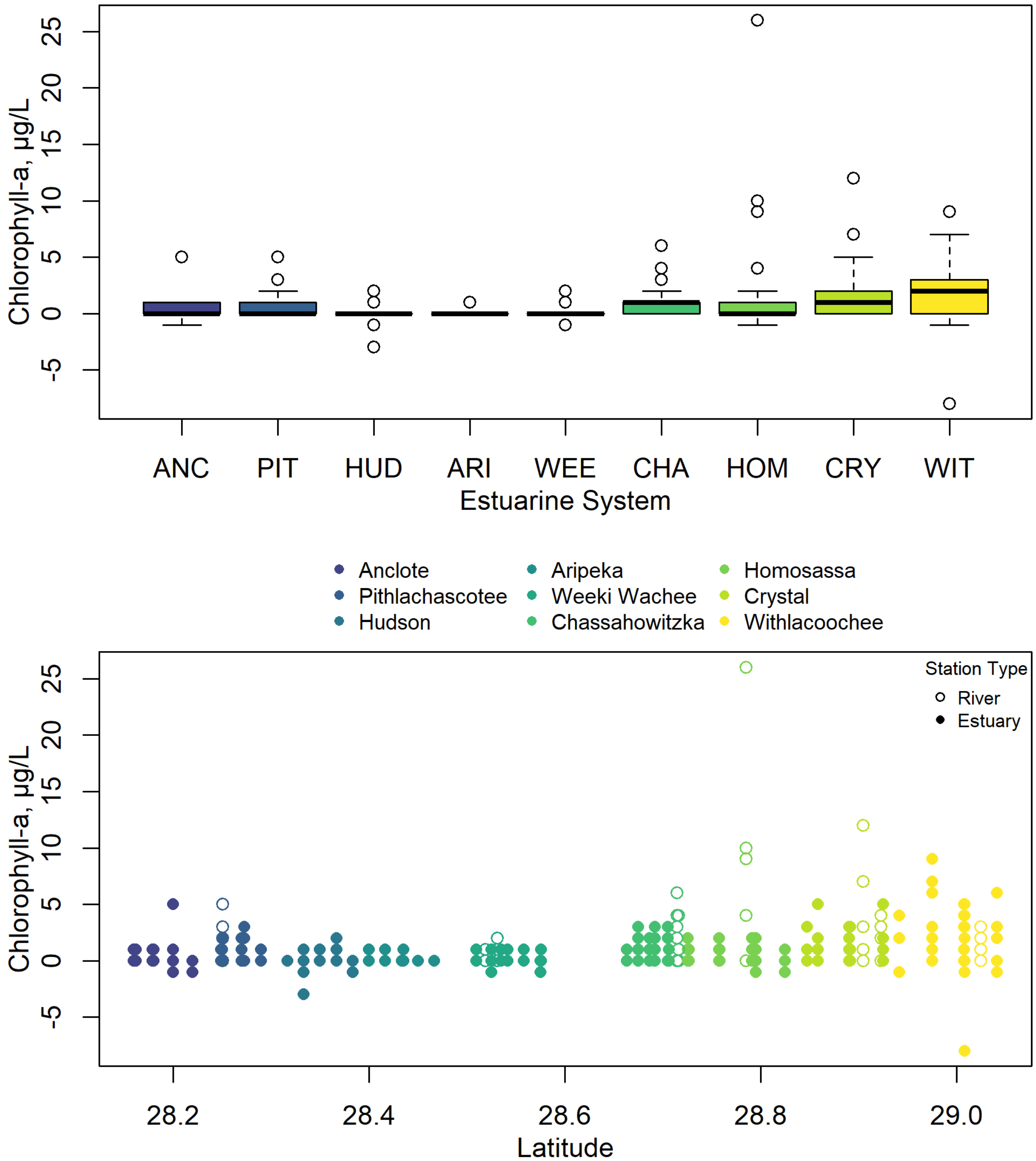


Figure 10. Chlorophyll-a data collected during Project COAST sampling events from March to August 2021. ANC = Anclote, PIT = Pithlachascotee, HUD = Hudson, ARI = Aripeka, WEE = Weeki Wachee, CHA = Chassahowitzka, HOM = Homosassa, CRY = Crystal, WIT = Withlacoochee. In the lower panel, open circles indicate river stations, closed circles indicate estuarine stations.

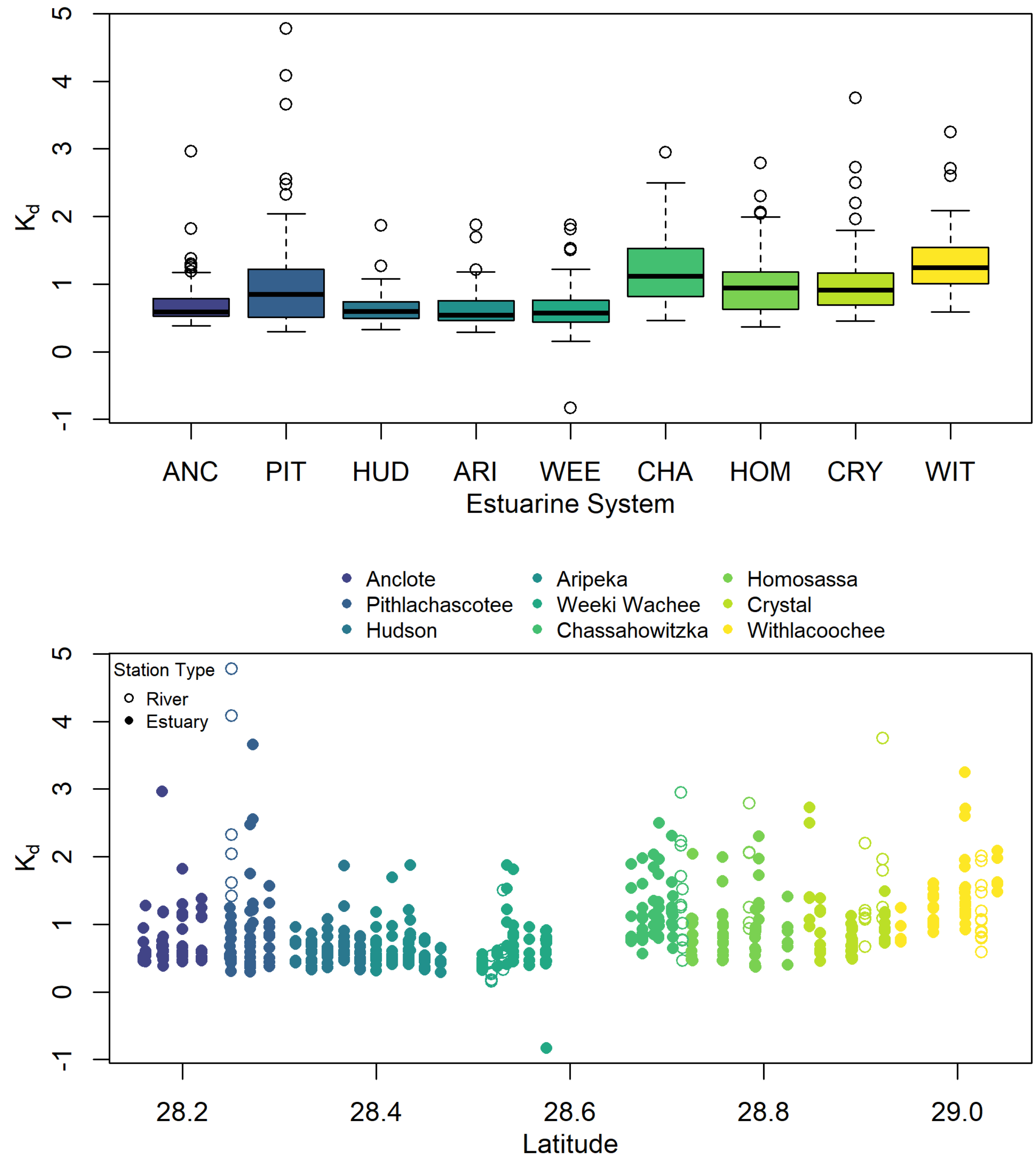


Figure 11. Light extinction coefficient calculated from data collected during Project COAST sampling events from March to August 2021. ANC = Anclote, PIT = Pithlachascotee, HUD = Hudson, ARI = Aripeka, WEE = Weeki Wachee, CHA = Chassahowitzka, HOM = Homosassa, CRY = Crystal, WIT = Withlacoochee. In the lower panel, open circles indicate river stations, closed circles indicate estuarine stations.

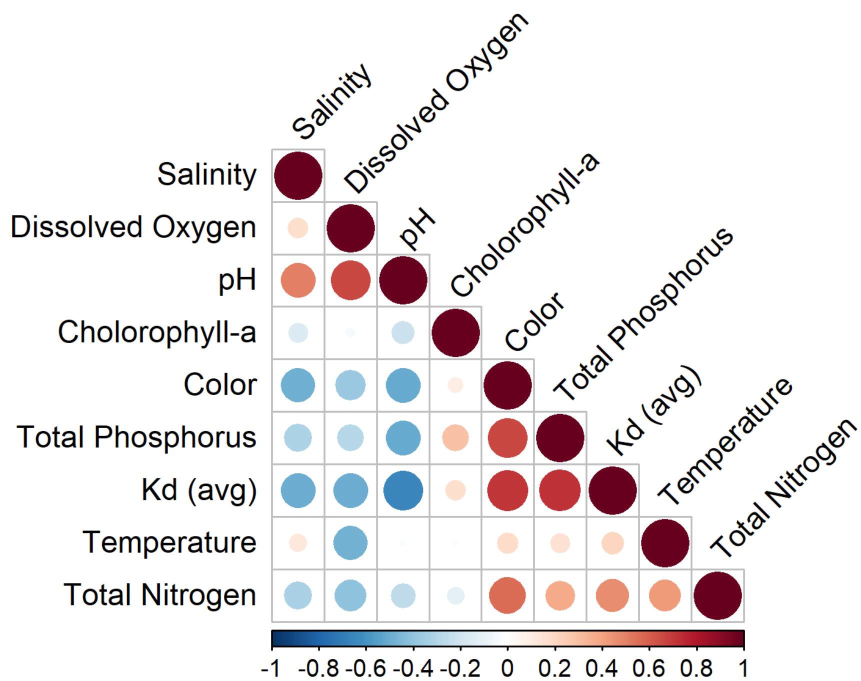


Figure 12. Correlation matrix for all data collected at estuarine stations during Project COAST sampling events from March to August 2021. Larger circles and darker colors indicate a stronger correlation, while the color of the circle indicates the direction of the correlation (red = positive correlation, blue = negative correlation). Kd = light extinction coefficient.

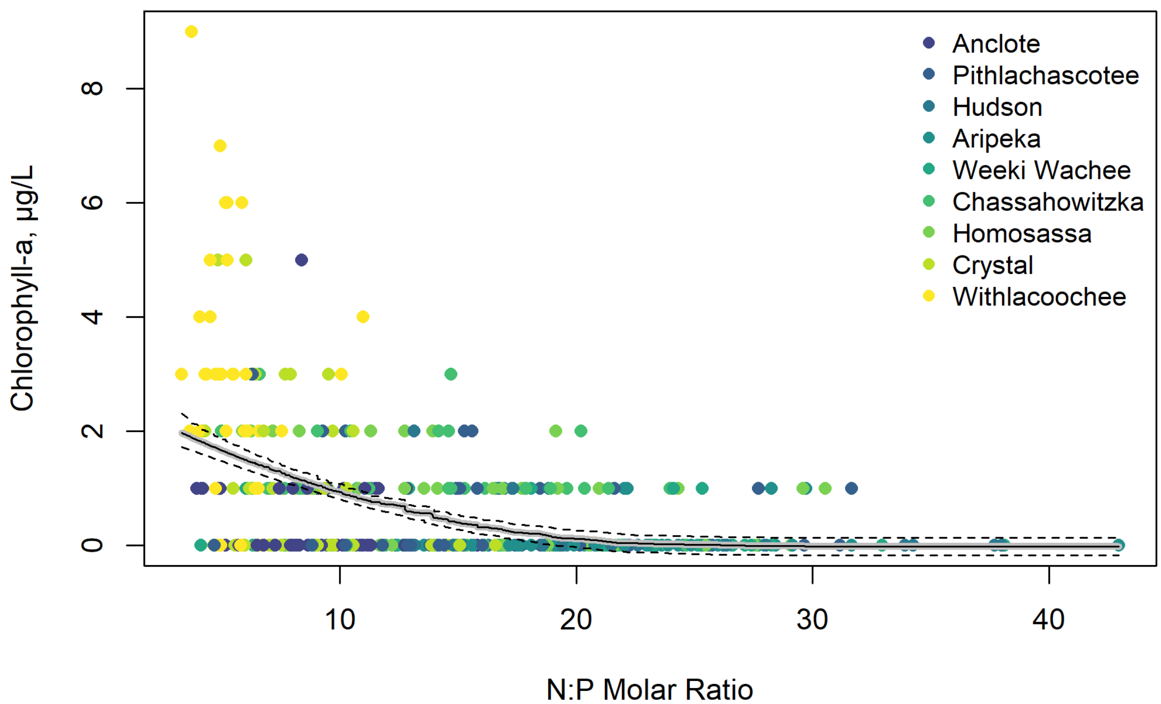


Figure 13. Plot of chlorophyll-a concentrations and N:P molar ratios derived from data collected at estuarine stations during Project COAST sampling events from March to August 2021. The solid line represents the second-order polynomial fit and the dashed lines represent the upper and lower 95% confidence intervals.

Table 1. Results of multiple regression of chlorophyll-a concentration against total nitrogen, total phosphorus, and color concentrations.

	Estimate	Std. Error	t-value	p	Adj. R^2	F
Intercept	-1.1560	0.3103	-3.724	<0.001	0.343	35.69
Total Nitrogen	0.0005	0.0007	0.718	0.473		
Total Phosphorus	0.1941	0.0195	9.943	<0.001		
Color	0.0371	0.0203	1.827	0.068		
Interaction (TN*TP)	-0.0002	<0.0001	-5.527	<0.001		
Interaction (TN*Color)	<0.0001	<0.0001	-0.289	0.772		
Interaction (TP*Color)	-0.0018	0.0004	-4.204	<0.001		
Interaction (TN*TP*Color)	<0.0001	<0.0001	3.883	<0.001		

Table 2. Results of regression of chlorophyll-a concentration against molar N:P ratio.

	Estimate	Std. Error	t-value	p	Adj. R^2	F
Intercept	0.6394	0.0470	13.581	<0.001	0.242	75.02
N:P Ratio	-10.4405	1.0165	-10.271	<0.001		
N:P Ratio, 2nd order	6.7843	1.0165	6.674	<0.001		

Appendix A. Water Quality Monitoring Station Coordinates

COUNTY	SYSTEM	STATION	TYPE	LATITUDE	LONGITUDE	BOTTLE LABEL
Levy	Withlacoochee	1	estuary	29.04165	-82.79182	Cit-Wit
Citrus	Withlacoochee	2	river	29.02483	-82.721	Cit-Wit
Citrus	Withlacoochee	3	river	29.02501	-82.66972	Cit-Wit
Levy	Withlacoochee	4	estuary	29.0083	-82.82525	Cit-Wit
Levy	Withlacoochee	5	estuary	29.00837	-82.79157	Cit-Wit
Levy	Withlacoochee	6	estuary	29.00801	-82.75849	Cit-Wit
Citrus	Withlacoochee	7	estuary	28.975	-82.825	Cit-Wit
Citrus	Withlacoochee	8	estuary	28.97507	-82.79161	Cit-Wit
Citrus	Withlacoochee	9	estuary	28.97504	-82.75831	Cit-Wit
Citrus	Withlacoochee	10	estuary	28.94189	-82.79195	Cit-Wit
Citrus	Crystal	1	estuary	28.925	-82.74167	Cit-Cry
Citrus	Crystal	2	estuary	28.925	-82.70833	Cit-Cry
Citrus	Crystal	3	river	28.92315	-82.67585	Cit-Cry
Citrus	Crystal	4	estuary	28.90497	-82.61655	Cit-Cry
Citrus	Crystal	5	estuary	28.89167	-82.74167	Cit-Cry
Citrus	Crystal	6	estuary	28.89167	-82.70833	Cit-Cry
Citrus	Crystal	7	estuary	28.89054	-82.67733	Cit-Cry
Citrus	Crystal	8	estuary	28.85833	-82.74167	Cit-Cry
Citrus	Crystal	9	estuary	28.8586	-82.70905	Cit-Cry
Citrus	Crystal	10	estuary	28.84748	-82.65846	Cit-Cry
Citrus	Homosassa	1	estuary	28.82472	-82.74168	Cit-Hom
Citrus	Homosassa	2	estuary	28.79139	-82.74198	Cit-Hom
Citrus	Homosassa	3	estuary	28.79175	-82.70855	Cit-Hom
Citrus	Homosassa	4	estuary	28.79488	-82.65847	Cit-Hom
Citrus	Homosassa	5	river	28.78515	-82.6186	Cit-Hom
Citrus	Homosassa	6	estuary	28.75833	-82.74167	Cit-Hom
Citrus	Homosassa	7	estuary	28.75833	-82.70833	Cit-Hom
Citrus	Homosassa	8	estuary	28.75785	-82.67429	Cit-Hom
Citrus	Homosassa	9	estuary	28.72588	-82.70782	Cit-Hom
Citrus	Homosassa	10	estuary	28.72674	-82.67394	Cit-Hom
Citrus	Chassahowitzka	1	river	28.71605	-82.57792	Her-Cha
Citrus	Chassahowitzka	2	river	28.71479	-82.60808	Her-Cha
Citrus	Chassahowitzka	3	estuary	28.70507	-82.62015	Her-Cha
Hernando	Chassahowitzka	4	estuary	28.69209	-82.64131	Her-Cha
Hernando	Chassahowitzka	5	estuary	28.675	-82.65833	Her-Cha
Hernando	Chassahowitzka	6	estuary	28.68671	-82.66588	Her-Cha
Hernando	Chassahowitzka	7	estuary	28.69167	-82.675	Her-Cha
Hernando	Chassahowitzka	8	estuary	28.66333	-82.67333	Her-Cha

Hernando	Chassahowitzka	9	estuary	28.675	-82.69167	Her-Cha
Citrus	Chassahowitzka	10	estuary	28.70643	-82.69254	Her-Cha
Hernando	Weeki Wachee	1	river	28.51906	-82.57413	Her-Wee
Hernando	Weeki Wachee	2	river	28.5309	-82.62199	Her-Wee
Hernando	Weeki Wachee	3	estuary	28.53505	-82.63813	Her-Wee
Hernando	Weeki Wachee	4	estuary	28.54167	-82.65833	Her-Wee
Hernando	Weeki Wachee	5	estuary	28.576	-82.65926	Her-Wee
Hernando	Weeki Wachee	6	estuary	28.55833	-82.675	Her-Wee
Hernando	Weeki Wachee	7	estuary	28.525	-82.675	Her-Wee
Hernando	Weeki Wachee	8	estuary	28.50961	-82.69138	Her-Wee
Hernando	Weeki Wachee	9	estuary	28.54167	-82.69167	Her-Wee
Hernando	Weeki Wachee	10	estuary	28.575	-82.69167	Her-Wee
Hernando	Aripeka	1	estuary	28.45	-82.7	Pas-Ari
Pasco	Aripeka	2	estuary	28.43333	-82.71667	Pas-Ari
Pasco	Aripeka	3	estuary	28.435	-82.67502	Pas-Ari
Pasco	Aripeka	4	estuary	28.41667	-82.73333	Pas-Ari
Pasco	Aripeka	5	estuary	28.41667	-82.70307	Pas-Ari
Pasco	Aripeka	6	estuary	28.4	-82.75	Pas-Ari
Pasco	Aripeka	7	estuary	28.4	-82.71667	Pas-Ari
Hernando	Aripeka	8	estuary	28.46667	-82.71667	Pas-Ari
Hernando	Aripeka	9	estuary	28.45	-82.73333	Pas-Ari
Pasco	Aripeka	10	estuary	28.43333	-82.75	Pas-Ari
Pasco	Hudson	1	estuary	28.38333	-82.76667	Pas-Hud
Pasco	Hudson	2	estuary	28.38333	-82.73333	Pas-Hud
Pasco	Hudson	3	estuary	28.36667	-82.78333	Pas-Hud
Pasco	Hudson	4	estuary	28.36667	-82.75	Pas-Hud
Pasco	Hudson	5	estuary	28.36667	-82.71667	Pas-Hud
Pasco	Hudson	6	estuary	28.35	-82.76667	Pas-Hud
Pasco	Hudson	7	estuary	28.35	-82.73333	Pas-Hud
Pasco	Hudson	8	estuary	28.33333	-82.78333	Pas-Hud
Pasco	Hudson	9	estuary	28.33333	-82.75	Pas-Hud
Pasco	Hudson	10	estuary	28.31667	-82.76667	Pas-Hud
Pasco	Pithlachascotee	1	river	28.25046	-82.72281	Pas-Pit
Pasco	Pithlachascotee	2	estuary	28.2725	-82.731	Pas-Pit
Pasco	Pithlachascotee	3	estuary	28.27	-82.75	Pas-Pit
Pasco	Pithlachascotee	4	estuary	28.27	-82.77	Pas-Pit
Pasco	Pithlachascotee	5	estuary	28.27	-82.79	Pas-Pit
Pasco	Pithlachascotee	6	estuary	28.29	-82.77	Pas-Pit
Pasco	Pithlachascotee	7	estuary	28.29	-82.75	Pas-Pit
Pasco	Pithlachascotee	8	estuary	28.25	-82.77	Pas-Pit
Pasco	Pithlachascotee	9	estuary	28.24903	-82.75306	Pas-Pit
Pasco	Pithlachascotee	10	estuary	28.25	-82.79	Pas-Pit

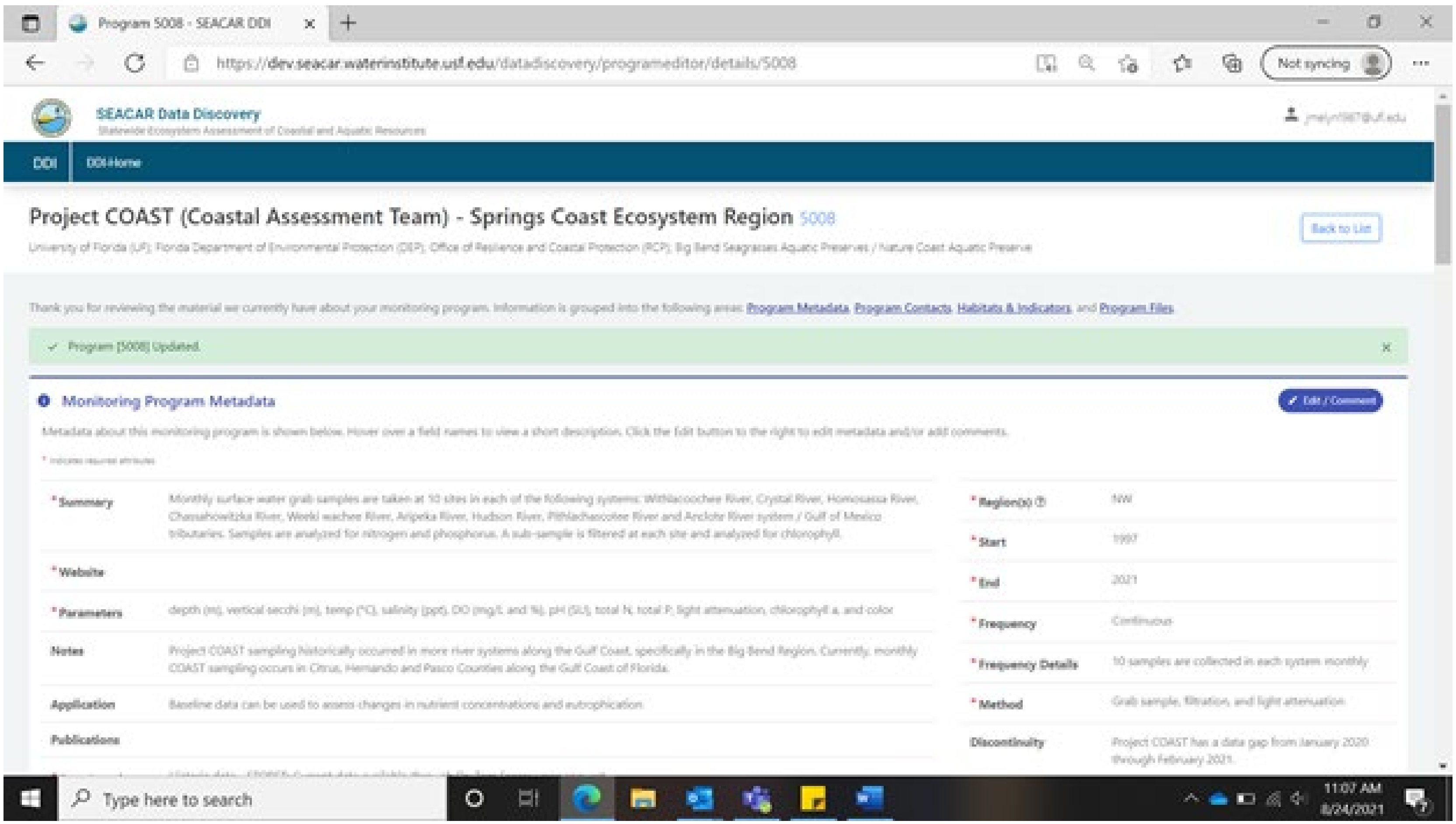
Pasco	Anclote	1	estuary	28.17877	-82.8	Pas-Anc
Pasco	Anclote	2	estuary	28.2	-82.8	Pas-Anc
Pasco	Anclote	3	estuary	28.2	-82.82	Pas-Anc
Pasco	Anclote	4	estuary	28.18	-82.82	Pas-Anc
Pasco	Anclote	5	estuary	28.18	-82.84	Pas-Anc
Pinellas	Anclote	6	estuary	28.16211	-82.84	Pas-Anc
Pinellas	Anclote	7	estuary	28.16	-82.82	Pas-Anc
Pasco	Anclote	8	estuary	28.2	-82.84	Pas-Anc
Pasco	Anclote	9	estuary	28.22	-82.8	Pas-Anc
Pasco	Anclote	10	estuary	28.22	-82.78	Pas-Anc

Appendix B. Data Upload

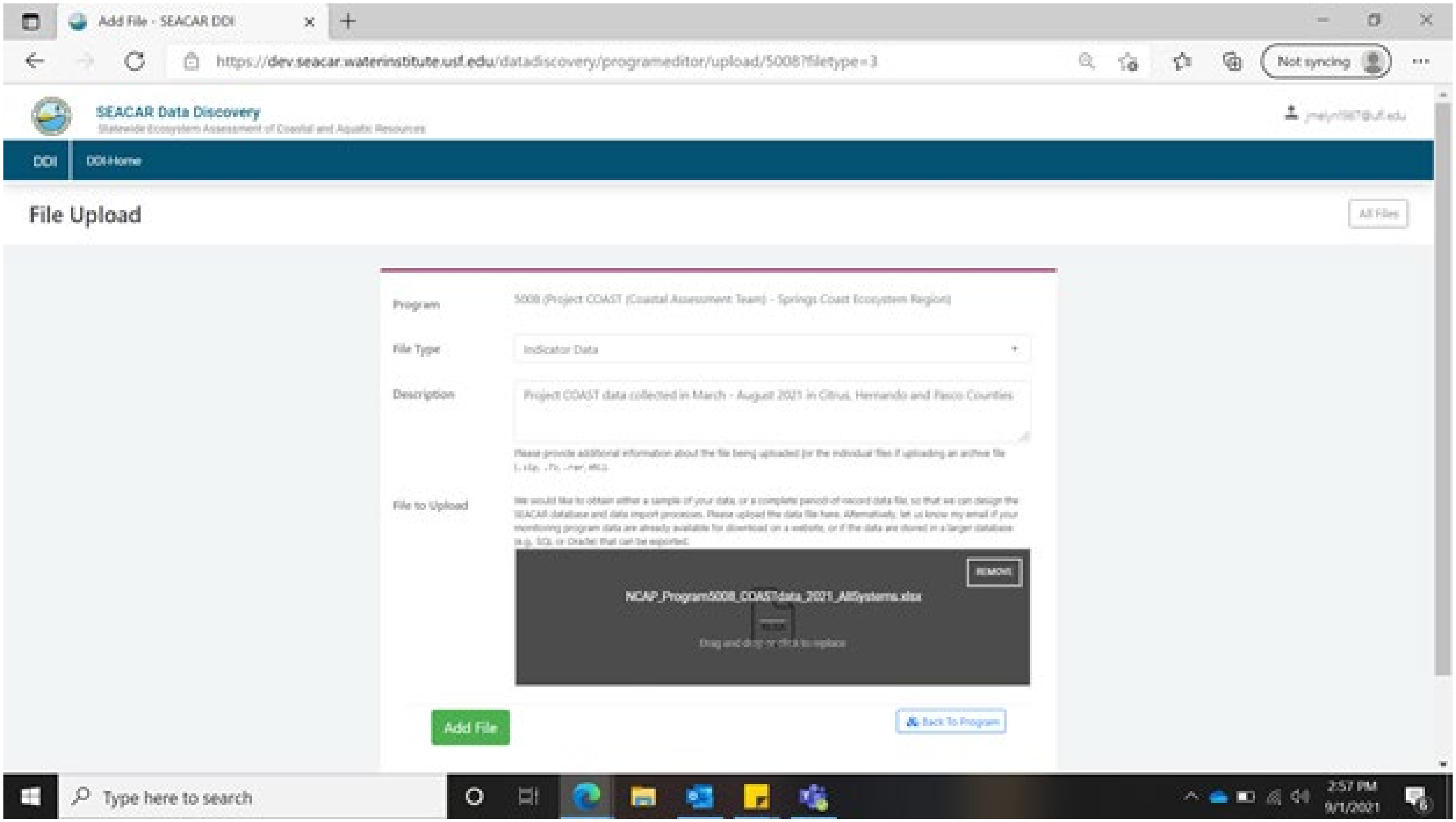
Statewide Ecosystem Assessment of Coastal and Aquatic Resources Data Discovery Interface Upload

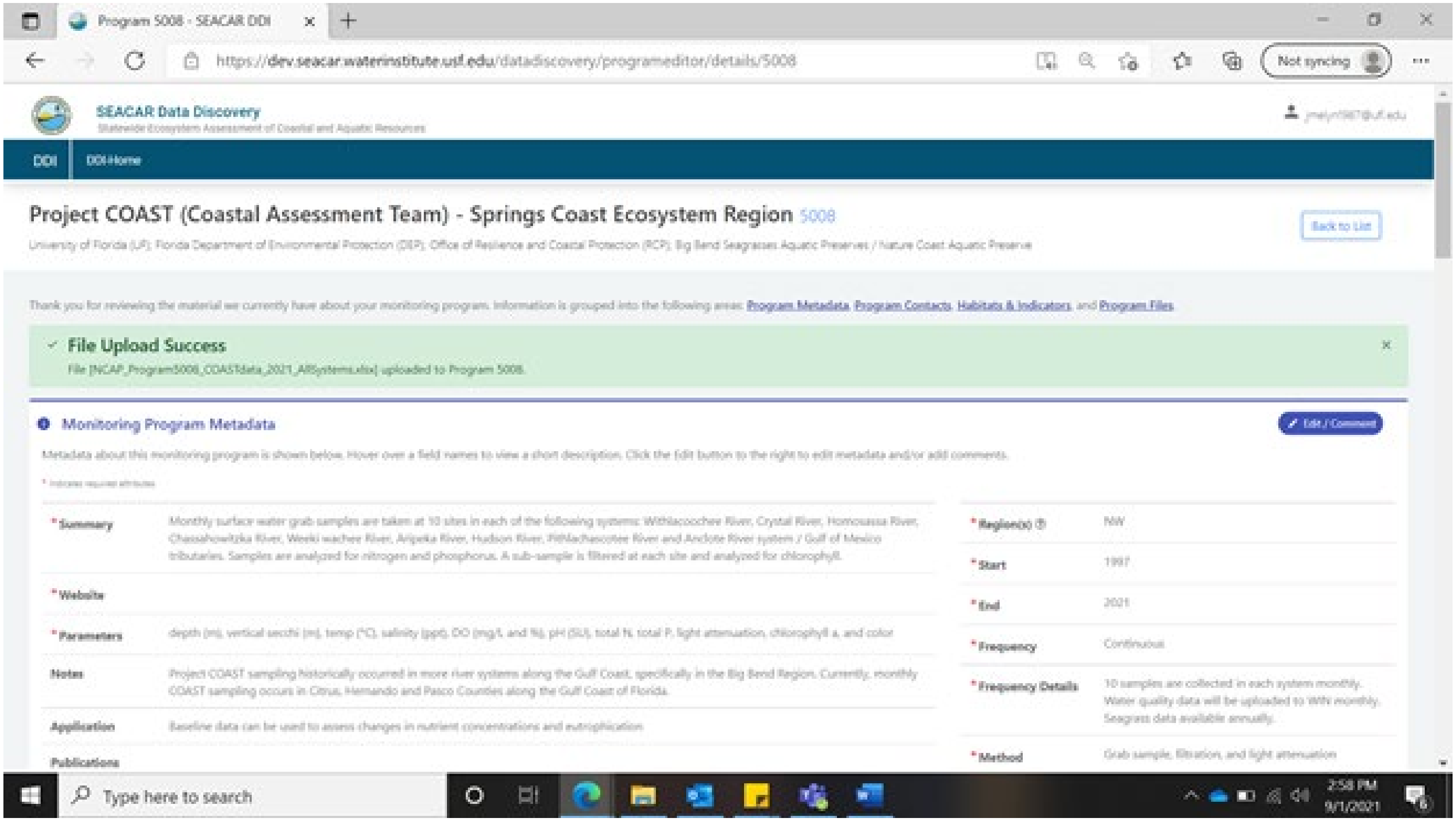
Program 5008 – Nature Coast Aquatic Preserves Project COAST- Water Quality Monitoring

<u>Project COAST Program Page Update:</u> The preexisting page for **Program 5008 – Project COAST – Springs Coast Ecosystem Region** has been updated to include current sampling efforts in the Nature Coast Aquatic Preserve. Various updates have been made throughout the text of this program page.



NCAP COAST Data Upload – Project COAST (Coastal Assessment Team) – Springs Coast Ecosystem Region page has been updated with data collected from March to August 2021. This file has been uploaded to the SEACAR DDI as file name "**NCAP_Program5008_COASTdata_2021_AllSystems**" under the "Indicator Data" section. A definitions tab has also been created for data interpretation.




Program 5008 - SEACAR DDI
https://dev.seacar.waterinstitute.usf.edu/datadiscovery/programeditor/details/5008
Not syncing
SEACAR Data Discovery
Statewide Ecosystem Assessment of Coastal and Aquatic Resources
DDI
DDI Home
Project COAST (Coastal Assessment Team) - Springs Coast Ecosystem Region 5008
University of Florida (UF); Florida Department of Environmental Protection (DEP); Office of Resilience and Coastal Protection (RCP); Big Bend Seagrasses Aquatic Preserves / Nature Coast Aquatic Preserve
Back to List
Thank you for reviewing the material we currently have about your monitoring program. Information is grouped into the following areas: Program Metadata, Program Contacts, Habitats & Indicators, and Program Files.
File Upload Success
File [NCAP_Program5008_COASTdata_2021_AllSystems.xlsx] uploaded to Program 5008.
Monitoring Program Metadata
Edit / Comment
Metadata about this monitoring program is shown below. Hover over a field names to view a short description. Click the Edit button to the right to edit metadata and/or add comments.
* Indicates required attributes
*Summary
Monthly surface water grab samples are taken at 10 sites in each of the following systems: Withlacoochee River, Crystal River, Homosassa River, Chassahowitzka River, Weeki wachee River, Aripeka River, Hudson River, Pithlachascotee River and Anclote River system / Gulf of Mexico tributaries. Samples are analyzed for nitrogen and phosphorus. A sub-sample is filtered at each site and analyzed for chlorophyll.
*Website
*Parameters
depth (m), vertical secchi (m), temp (°C), salinity (ppt), DO (mg/L and %), pH (SU), total N, total P, light attenuation, chlorophyll a, and color
Notes
Project COAST sampling historically occurred in more river systems along the Gulf Coast, specifically in the Big Bend Region. Currently, monthly COAST sampling occurs in Citrus, Hernando and Pasco Counties along the Gulf Coast of Florida.
Application
Baseline data can be used to assess changes in nutrient concentrations and eutrophication
Publications
*Region(s)
NW
*Start
1997
*End
2021
*Frequency
Continuous
*Frequency Details
10 samples are collected in each system monthly. Water quality data will be uploaded to WIN monthly. Seagrass data available annually.
*Method
Grab sample, filtration, and light attenuation
Type here to search
2:58 PM
9/1/2021

Watershed Information Network

Organization 21FLUFSW (University of Florida Soil and Water Sciences Department)

NCAP COAST Data Upload - March through June 2021 (color, DO mg/L, DO saturation, and pH).

21FLUFSW	27751	Activity and Results	Upload	21FLUFSW_pH June 2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021
21FLUFSW	27750	Activity and Results	Upload	21FLUFSW_pH May 2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021
21FLUFSW	27749	Activity and Results	Upload	21FLUFSW_pH April 2021_Pipe3.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021
21FLUFSW	27746	Activity and Results	Upload	21FLUFSW_pH March 2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021
21FLUFSW	27745	Activity and Results	Upload	21FLUFSW_DO Sat_June_2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021
21FLUFSW	27743	Activity and Results	Upload	21FLUFSW_DO Sat_May_2021_Pipe2.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021
21FLUFSW	27740	Activity and Results	Upload	21FLUFSW_DO Sat_April_2021_Pipe4.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021
21FLUFSW	27728	Activity and Results	Upload	21FLUFSW_DO Sat March 2021_Pipe.txt	Migrated	0	6	EDWARDS_M_6	07/27/2021
21FLUFSW	27727	Activity and Results	Upload	21FLUFSW_DO mgL June 2021_Pipe.txt	Migrated	0	6	EDWARDS_M_6	07/27/2021
21FLUFSW	27726	Activity and Results	Upload	21FLUFSW_DO mgL May 2021_Pipe.txt	Migrated	0	6	EDWARDS_M_6	07/27/2021
21FLUFSW	27725	Activity and Results	Upload	21FLUFSW_DO mgL April 2021_Pipe.txt	Migrated	0	6	EDWARDS_M_6	07/27/2021
21FLUFSW	27724	Activity and Results	Upload	21FLUFSW_DO mgL March 2021_Pipe2.txt	Migrated	0	6	EDWARDS_M_6	07/27/2021
21FLUFSW	27722	Activity and Results	Upload	21FLUFSW_Color_June_2021_Pipe3.txt	Migrated	0	6	EDWARDS_M_6	07/27/2021
21FLUFSW	27717	Activity and Results	Upload	21FLUFSW_Color_May_2021_Pipe_2.txt	Migrated	0	6	EDWARDS_M_6	07/27/2021
21FLUFSW	27706	Activity and Results	Upload	21FLUFSW_Color_April_2021_Pipe_3.txt	Migrated	0	6	EDWARDS_M_6	07/27/2021
21FLUFSW	27690	Activity and Results	Upload	21FLUFSW_Color_March_2021_Pipe_2.txt	Migrated	0	6	EDWARDS_M_6	07/27/2021

NCAP COAST Data Upload – March through June 2021 specific conductivity and water temperature.

☐	21FLUFSW	27762	Activity and Results	Upload	21FLUFSW_Temp June 2021_Pipe.txt	Migrating	0	45	EDWARDS_M_6	07/29/2021
☐	21FLUFSW	27761	Activity and Results	Upload	21FLUFSW_Temp May 2021_Pipe.txt	Migrating	0	45	EDWARDS_M_6	07/29/2021
☐	21FLUFSW	27760	Activity and Results	Upload	21FLUFSW_Temp April 2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021
☐	21FLUFSW	27759	Activity and Results	Upload	21FLUFSW_Temp March 2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021
☐	21FLUFSW	27757	Activity and Results	Upload	21FLUFSW_Spec Cond June 2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021
☐	21FLUFSW	27755	Activity and Results	Upload	21FLUFSW_Spec Cond May 2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021
☐	21FLUFSW	27753	Activity and Results	Upload	21FLUFSW_Spec Cond April 2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021
☐	21FLUFSW	27752	Activity and Results	Upload	21FLUFSW_Spec Cond March 2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	07/29/2021

NCAP COAST Data Upload – July 2021 (color, DO mg/L, DO saturation, pH, specific conductivity, and water temperature).

Dataset List

Delete	Org ID	Import File ID	Type	Action	Import File Name	Status	Errors	Days To Purge	Imported By	Created Date
☐	21FLUFSW	27843	Activity and Results	Upload	21FLUFSW_Temp July 2021_Pipe.txt	Migrating	0	45	EDWARDS_M_6	08/03/2021
☐	21FLUFSW	27842	Activity and Results	Upload	21FLUFSW_Spec Cond July 2021_Pipe.txt	Migrating	0	45	EDWARDS_M_6	08/03/2021
☐	21FLUFSW	27841	Activity and Results	Upload	21FLUFSW_pH July 2021_Pipe.txt	Migrating	0	45	EDWARDS_M_6	08/03/2021
☐	21FLUFSW	27840	Activity and Results	Upload	21FLUFSW_DO Sat_July_2021_Pipe.txt	Migrating	0	45	EDWARDS_M_6	08/03/2021
☐	21FLUFSW	27839	Activity and Results	Upload	21FLUFSW_DO mgL July 2021_Pipe.txt	Migrating	0	45	EDWARDS_M_6	08/03/2021
☐	21FLUFSW	27837	Activity and Results	Upload	21FLUFSW_Color_July_2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	08/03/2021

NCAP COAST Data Upload – August 2021 (color, DO mg/L, DO saturation, pH, specific conductivity, and water temperature).

Dataset List

Delete	Org ID	Import File ID	Type	Action	Import File Name	Status	Errors	Days To Purge	Imported By	Created Date
☐	21FLUFSW	28114	Activity and Results	Upload	21FLUFSW_Temp August 2021_Pipe.txt	Migrating	0	45	EDWARDS_M_6	08/17/2021
☐	21FLUFSW	28113	Activity and Results	Upload	21FLUFSW_Spec Cond August 2021_Pipe.txt	Migrating	0	45	EDWARDS_M_6	08/17/2021
☐	21FLUFSW	28112	Activity and Results	Upload	21FLUFSW_pH August 2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	08/17/2021
☐	21FLUFSW	28111	Activity and Results	Upload	21FLUFSW_DO Sat_August_2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	08/17/2021
☐	21FLUFSW	28110	Activity and Results	Upload	21FLUFSW_DO mgL August 2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	08/17/2021
☐	21FLUFSW	28109	Activity and Results	Upload	21FLUFSW_Color_August_2021_Pipe.txt	Migrated	0	8	EDWARDS_M_6	08/17/2021

NCAP COAST Data Upload – March through August 2021 (Lake Watch upload of TN, TP, chlorophyll-a corrected, chlorophyll-a uncorrected, and secchi).

Dataset List

Delete	Org ID	Import File ID	Type	Action	Import File Name	Status	Errors	Days To Purge	Imported By	Created Date
☐	21FLKWAT	28328	Activity and Results	Upload	21FLKWAT_TN Coast for Upload 8-30-21.txt	Migrated	0	8	HORSBURGH_C_1	08/30/2021
☐	21FLKWAT	28235	Activity and Results	Upload	21FLKWAT_WIN Coast Results 8-24-2021 Coast ID4.txt	Migrated	0	2	HORSBURGH_C_1	08/24/2021
☐	21FLKWAT	28223	Monitoring Locations (SW)	Upload	21FLKWAT_Project Coast Site info.txt	Migrated	0	2	HORSBURGH_C_1	08/24/2021