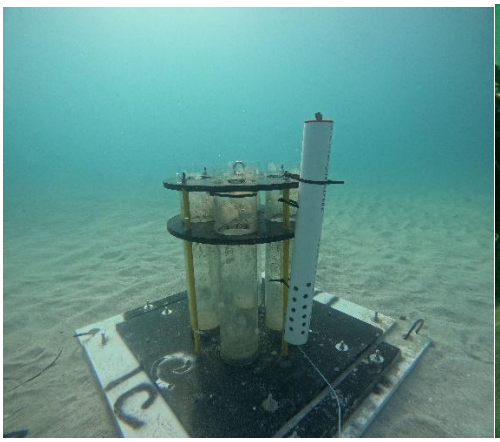
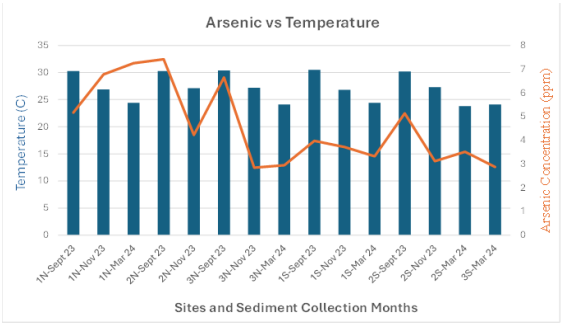
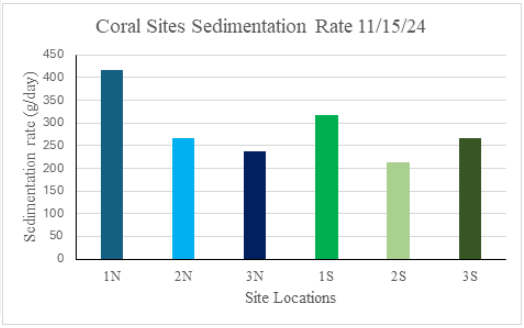
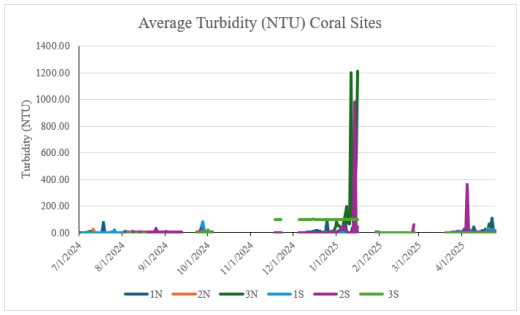
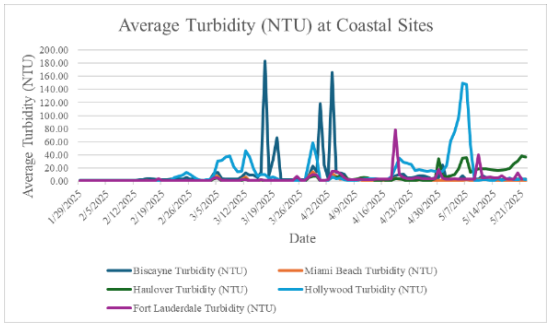
Abiotic Influences Along Southeast Florida Coral Reef Communities











FLORIDA'S CORAL REEF

Final Report

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Management Summary

Statistical analyses of Phase 2 (DEP C2221E) abiotic data from six coral reef sites (1N, 2N, 3N, 1S, 2S, and 3S) examined relationships among temperature, salinity, pressure, relative dissolved oxygen (RDO), pH, turbidity, and heavy metal concentrations in sediment trap samples. Monthly averages revealed positive correlations between temperature and salinity (2N, 1S, 2S) and between pH and turbidity (2N, 3N, 2S), while negative correlations were found between temperature and both RDO and pH, and between pressure and RDO. Northern sites (1N, 2N, 3N) showed stronger negative correlations between salinity, pressure, RDO, turbidity, and heavy metals, with 1N exhibiting unique patterns, including negative correlations between temperature and both aluminum and arsenic. Temperature was consistently and positively associated with metal burden (PLI), ecological risk (PER), and overall metal accumulation (GEO), though enrichment factors (Ef) often decreased.

Abiotic data at the six coal sites also showed seasonal trends, with higher temperatures in summer and increased turbidity and sedimentation during storms. Site 1N had the highest sedimentation rates in the fall- winter months.

The five coastal sites (FL, HW, HL, MB, BC) showed stable abiotic trends, though MB had the highest sedimentation rate and BC the highest turbidity values.

These findings will help locate, characterize, and identify specific threats to Florida's Coral Reef communities relating to environmental conditions and sedimentation. It will build on the understanding and conduct evidence mapping of the deleterious impacts of different known chronic and acute water quality stressors (e.g., turbidity, sedimentation) on coral physiological and reproductive processes. This monitoring of abiotic information will act as baselines and reference points from which disturbances can be detected, and impacts from disturbances, restoration, and recovery initiatives can be compared against. It can also determine if any climate stressors and harmful environmental co-factors might be impacting Florida's Coral Reef.

Executive Summary

Statistical analyses were performed correlating Phase 2 (DEP C2221E) abiotic data (turbidity, pH, temperature, salinity, and dissolved oxygen levels) at 6 coral reef sites (1N, 2N, 3N, 1S, 2S, and 3S) as well as the mean Phase 2 abiotic data with the heavy metal sediment trap concentrations and ecological indices (pollution load index (PLI), potential ecological risk (PER), geo-accumulation (GEO), and enrichment factor (E_F)). Abiotic data collected via Aqua TROLL 600 sondes (temperature, salinity, pressure, dissolved oxygen, pH, and turbidity) and sedimentation rates were collected at the 6 coral reef sites. Five additional instrument platforms were created and deployed along the coastline between Government Cut Inlet, Miami, Hillsborough Inlet, and Pompano (FL, HW, HL, MB, and BC) collecting abiotic data.

Statistical Analyses. Positive correlations were observed between temperature and salinity (2N, 1S, 2S) and between pH and turbidity (2N, 3N, 2S). Negative correlations between temperature and both relative dissolved oxygen (RDO) and pH, and between pressure and RDO, aligned with expected patterns of oxygen solubility. Median abiotic data were correlated with sediment heavy metal concentrations from sediment traps collected at three time periods and ecological indices (PLI, PER, GEO, Ef). Sites 1N, 2N, and 3N showed stronger negative correlations between salinity, pressure, RDO, and turbidity with heavy metals. Site 1N exhibited distinct correlations, including negative associations between temperature and aluminum/arsenic and positive between arsenic and pressure, RDO, pH, and turbidity. Temperature showed consistent positive correlations with metal burden (PLI), ecological risk (PER), and accumulation (GEO), particularly at northern sites. Pressure (as a proxy for depth) generally correlated negatively with ecological indices, especially nearshore, while higher RDO was associated with reduced metal levels. Turbidity patterns varied, with northern sites showing negative correlations with indices, while 2S exhibited the reverse. These results underscore the complex site-specific dynamics influencing metal behavior in reef sediments and support the importance of continued localized environmental monitoring.

Sedimentation and Abiotic Data at Coral Reef Sites 1N, 2N, 3N, 1S, 2S, and 3S. The sedimentation data indicate that sedimentation was low during the summer months (2.16 -4.15 g/day) and significantly higher rates from September through April (123–387 g/day), with site 1N experiencing the highest winter sedimentation. These increases aligned with low-pressure storm events recorded between November 2023 and March 2024. Abiotic parameters were within expected ranges, though temperature peaked at 37.4°C in summer and turbidity spiked during storm events.

Sedimentation and Abiotic Data at Coastal Line Sites FL, HW, HL, MB, and BC. At the five coastal sites sedimentation rates varied, with HL showing the lowest (16.68 g/day) and MB the highest (39.22 g/day). Abiotic data were generally stable, but turbidity levels fluctuated, with BC exhibiting the highest average and peak turbidity values.

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List of Acronyms
1N (Reef North Location 1)
2N (Reef North Location 2)
3N (Reef North Location 3)
1S (Reef South Location 1)
2S (Reef South Location 2)
3S (Reef South Location 3)
FL (Fort Lauderdale)
HW (Hollywood)
HL (Haulover)
MB (Miami Beach)
BC (Biscayne)

1. INTRODUCTION

Protecting perilous coral reef communities in the marine environment is of extreme environmental and economic importance. Healthy coral reefs, where half of all federally managed fisheries reside, support jobs and businesses through tourism and recreation (Riegl and Dodge, 2008). A suite of environmental conditions impact coral community survivability (Riegl et al., 2009; Hay and Rasher, 2010).

1.1 Statistics (abiotic data and heavy metals)

Statistical analysis and correlations of Phase 2 (DEP C2221E) abiotic data (turbidity, pH, temperature, salinity, and dissolved oxygen levels) can help characterize and identify specific threats to Florida's Coral Reef communities by relating to changes of oceanographic and environmental conditions which include sedimentation rates, temperature, conductivity (salinity), pressure, dissolved oxygen, pH, and turbidity. It will build on our understanding and conduct evidence mapping of the deleterious impacts of different known chronic and acute water quality stressors (e.g., turbidity, sedimentation) on coral physiological and reproductive processes. This monitoring of abiotic information will act as baselines and reference points from which disturbances can be detected, and impacts from disturbances, restoration, and recovery initiatives can be compared against. It can also determine if any climate stressors and harmful environmental co-factors might be impacting Florida's Coral Reef.

Statistical analysis of Phase 2 abiotic data from 6 coral reef sites with the heavy metal sediment trap concentrations and ecological indices (geo-accumulation, pollution load, potential ecological risk, enrichment factor) can also help characterize and identify specific threats to Florida's Coral Reef communities. There is limited information on heavy metal contaminated marine sediment effects on benthic organisms (TEL and PEL values) and none for stony and soft coral. During port dredging projects, sediment can get resuspended to the coral reef and if the sediment has heavy metal contaminants, it can affect coral health. Knowing possible contaminant sources and concentrations could help improve reef health management.

The data will identify any conditional changes that are occurring at the coral reef sites and baseline conditions that could be compared with future dredging or weather events. Abiotic data are of importance since any significant changes to the water quality conditions may correlate with an increase of heavy metals availability (Wear and Thurber, 2015; Shah and Lovell 2011). Since water quality is affected by complex factors like human activities and weather events, its continuous sampling and monitoring is of critical importance to coral health.

This information can be valuable for implementing targeted management and remediation strategies to mitigate sediment pollution and evaluate any future changes that might be occurring due to environmental changes and/or anthropogenic influences.

1.2 Sedimentation and Abiotic data at Six Coral Reef Sites

Coral reefs are among the most diverse and productive ecosystems on the planet, providing vital habitats for numerous marine species and serving as critical barriers against coastal erosion and storm damage (Odum & Odum, 1955; Moberg & Folke, 1999). However, these ecosystems are increasingly threatened by various environmental stressors, including sedimentation, turbidity, temperature, pH, and dissolved oxygen. Sedimentation is the process by which sediment particles settle out of water and accumulate on the seabed. Excessive sedimentation can have detrimental effects on coral reefs by smothering corals, blocking sunlight necessary for photosynthesis, and interfering with their feeding and reproductive behaviors (Duckworth et al., 2017; Tuttle et al. 2020; Roger & Ramos-Scharron 2022). Sedimentation can arise from natural processes such as erosion, as well as human activities such as coastal development, agriculture, and dredging. Sedimentation can physically smother coral reefs, covering coral colonies and preventing polyps from feeding and obtaining sunlight for photosynthesis. This process can lead to coral mortality and a decline in coral cover (Rogers, 1990; Jones et al., 2019). Fine sediment particles suspended in the water column can reduce light penetration to the seafloor, limiting the depth at which corals can thrive and hindering the photosynthetic activity of symbiotic algae (zooxanthellae) living within coral tissues (López-Londoño et al., 2021). This reduced light availability, compounded with the energetic costs of sediment removal, can weaken coral health and growth (Junjie et al., 2014). Sediment particles can also abrade and damage coral tissue, making corals more susceptible to diseases and predation (Riegl, 1995). Chronic exposure to sedimentation can weaken coral colonies over time (Jones et al., 2020), making them less resilient to other stressors such as rising sea temperatures and ocean acidification. Accumulation of sediment can alter the physical structure of coral reefs, filling in crevices and interstitial spaces important for coral settlement, recruitment, and shelter for various reef organisms (Tuttle et al. 2020).

Turbidity, on the other hand, refers to the cloudiness or haziness of water caused by suspended particles, such as sediment, organic matter, and plankton. High turbidity levels can reduce light penetration into the water column, which is essential for the growth of coral zooxanthellae that provides corals with energy through photosynthesis. Many coral species rely on synchronized mass spawning events for reproduction, which are often triggered by environmental cues such as lunar cycles and water temperature. Turbidity can disrupt these cues, leading to mismatches in spawning timing and reduced reproductive success (Jones et al., 2015). Additional consequences of suspended sediment on the reproductive success of corals include decreased fertilization due to removal of sperm from surface waters (Ricardo et al., 2015) and decreased larval settlement and survivorship (Babcock & Smith, 2002). High turbidity levels can influence the composition and abundance of coral reef communities by favoring certain species over others. Some organisms may thrive in turbid conditions, while others, particularly those dependent on light for photosynthesis or visual cues for feeding and reproduction, may decline (Jordán-Garza et al., 2017).

Temperature, pH, and dissolved oxygen also play a critical role in shaping the health and survival of coral reefs. One of the most immediate and visible impacts of

temperature change on coral reefs is coral bleaching. Zooxanthellae provide coral with nutrients and give them their vibrant colors. However, when water temperatures rise too high, corals become stressed, causing them to expel these algae. As a result, the corals turn white or pale, known as coral bleaching (Kleppel et al., 1989). Without their algae, corals lose their primary source of food and become more susceptible to disease and mortality. Elevated temperatures can also weaken corals' immune systems, making them more susceptible to diseases (Palmer et al., 2011). When water temperatures are higher than normal, pathogens that harm corals can thrive and spread more easily (Ward et al., 2007). As a result, coral reefs may experience more frequent and severe disease outbreaks, further endangering their health and resilience. Temperature also influences the growth rates and reproductive success of corals. Warmer waters can accelerate coral growth in some cases, but excessively high temperatures can hinder growth and reproduction (Rodolfo-Metalpa et al., 2008; Crabbe, 2008). Changes in temperature can also disrupt the timing of spawning events, which are crucial for the replenishment of coral populations (Keith et al., 2016).

Rising temperatures also exacerbate the effects of ocean acidification (pH lowers), another consequence of increased carbon dioxide levels in the atmosphere. Acidification makes it harder for corals to build their calcium carbonate skeletons, which are essential for their structure and growth (Anthony et al., 2008). Combined with the stresses of higher temperatures, ocean acidification poses a significant threat to coral reef ecosystems.

Temperature also has a significant influence on the dissolved oxygen levels in the ocean and, consequently, on coral reefs. Generally, colder water can hold more dissolved oxygen than warmer water. This is because colder water molecules are more tightly packed, allowing for greater oxygen solubility. As water temperature increases, its capacity to hold dissolved oxygen decreases. Therefore, warmer oceans tend to have lower dissolved oxygen levels. Temperature gradients within the ocean can lead to thermal stratification, where warmer, less dense surface waters sit atop cooler, denser waters below. This stratification can create a barrier that inhibits the mixing of oxygen-rich surface waters with deeper waters. As a result, deep waters may become oxygen-depleted, especially in areas with limited water circulation (Garcia-Soto et al., 2021). This phenomenon is particularly problematic for coral reefs located in areas prone to thermal stratification, as it can reduce the availability of oxygen to reef organisms. Coral reefs rely on dissolved oxygen for respiration. When dissolved oxygen levels decrease, corals may experience stress or suffocation, particularly during periods of high biological activity or temperature-induced stress, such as coral bleaching events (Nelson & Altieri, 2019). Changes in temperature can influence biological processes that affect dissolved oxygen levels. For example, warmer temperatures can accelerate metabolic rates in marine organisms (Gillooly et al., 2001), leading to increased oxygen consumption. Additionally, temperature-induced stressors, such as coral bleaching, can disrupt reef ecosystems and lead to the release of organic matter, which consumes oxygen as it decomposes, further reducing dissolved oxygen levels.

An indirect effect of turbidity and temperature is changes to dissolved oxygen. Turbidity reduces the amount of light available for photosynthesis by aquatic plants, algae, and phytoplankton. This decrease in photosynthetic activity can lead to lower rates of oxygen production during daylight hours. Organic matter, such as dead algae or plant material trapped within turbid water, may undergo microbial decomposition, a process that consumes oxygen and increases carbon dioxide concentrations. This increased respiration rate can deplete dissolved oxygen levels in the water. Turbid water may inhibit the exchange of gases, including oxygen and carbon dioxide, between the atmosphere and the aquatic environment (Schmidt et al., 2019). Reduced gas exchange can further contribute to decreased dissolved oxygen levels, particularly in stagnant or poorly ventilated water bodies. Persistent turbidity and the associated depletion of dissolved oxygen can lead to hypoxic (low oxygen) or anoxic (absence of oxygen) conditions in aquatic ecosystems, which can stress or suffocate aquatic organisms and lead to fish kills or declines in biodiversity (Hughes et al., 2020). Weber et al. (2012) demonstrated that turbidity with as little as 0.3% organic matter enriched sediment leads to microbially induced anoxia and reduced pH, resulting in coral death within 15-48 hours.

Corals are sensitive organisms that require specific environmental conditions to thrive, and salinity plays a crucial role in their health. Changes in salinity can stress corals, making them more susceptible to diseases and bleaching events (Coles and Jokiel, 1992; Ding D-S et al., 2022). Changes in salinity, such as those caused by heavy rainfall or drought, can lead to coral mortality. Salinity affects water density, which in turn affects water movement and circulation patterns within coral reef ecosystems (Smyth, K. & Elliott, M. 2016). Proper water circulation is essential for transporting nutrients, oxygen, and other vital substances to corals and other reef organisms. Changes in salinity can disrupt these patterns, leading to localized stress or even death of corals and other reef inhabitants (Smyth, K. & Elliott, M. 2016). Corals maintain proper cellular function by regulating their internal salt concentrations. They do this through a process called osmoregulation. Fluctuations in external salinity can disrupt this delicate balance, leading to osmotic stress (Dias, M. et al. 2019). Changes in salinity can also affect the distribution and abundance of other reef organisms, such as algae. Some species may be more tolerant of fluctuations in salinity than others, leading to shifts in community composition and ecosystem dynamics. For example, certain species of algae may outcompete corals in low-salinity environments, leading to a decline in coral cover and diversity (Vieira, C. et al 2016).

Understanding these dynamics is crucial for assessing the impacts of climate change and human activities on coral reefs and implementing conservation strategies to mitigate these effects.

2. METHODOLOGY

Permits for sediment collection and placement of sediment traps with sondes were provided by Broward County (Environmental Resource License # DF24-1103), Department of Regulatory and Economic Resources (Miami-Dade County) (# EAA2024-

0018), and Florida Department of Environmental Protection (# 06-427980-001,002-EE and 13-0447895-001-EE).

2.1 Statistics

Statistical analyses were conducted in R v. 4.4.0 (2024 release), IBS SPSS 29 (2022 release), and in Microsoft Excel 365 Version 2504 (2025 release). Statistical significance was determined as $p < 0.05$. Rank-Correlations using medians of non-parametric data were performed. Statistical analyses were performed on the abiotic data (turbidity, pH, pressure, temperature, salinity, and dissolved oxygen levels) at 6 coral reef sites from Phase 2 of FDEP project (agreement # C2221E). Statistical analyses and correlations were also performed on the abiotic data (turbidity, pH, pressure, temperature, salinity, and dissolved oxygen levels) with the heavy metal sediment trap concentrations and ecological indices (geo-accumulation, pollution load, potential ecological risk, enrichment factor) at 6 coral reef sites from Phase 2 of FDEP project (agreement #C2221E).

2.2 Sedimentation Rates

Sediment was collected from 11 sediment traps (Fig. 1) every 2-3 months by the dive team at six reef sites approximately 1.5 km north (1N, 2N, 3N) and south (1S, 2S, 3S) of the inlet to Port Everglades and at five coastlines locations along the (FL, HW, HL, MB, and BC) north and south of Port Everglades (Fig. 2 and Table 1). The sediments were placed in 5-gallon bucket for the total weight per sediment trap and sedimentation rates were calculated as grams per day.

Figure 1. Constructed platform with ST-30 sediment trap and Aqua TROLL 600 sonde.

Table 1. Locations and depth of sediment traps and AquaTroll 600 sondes in latitude and longitude.

Location	LatDD	LonDD	Depth
1N	26.11003°	-80.10068°	20 ft
2N	26.11013°	-80.09835°	24 ft
3N	26.11085°	-80.09067°	42 ft
1S	26.07578°	-80.10707°	13 ft
2S	26.07471°	-80.09802°	30 ft
3S	26.07441°	-80.09429°	39 ft
Fort Lauderdale (FL)	26.14424°	-80.09626°	33 ft
Hollywood (HW)	26.03259°	-80.10706°	25 ft
Haulover (HL)	25.91383°	-80.11127°	20 ft
Miami Beach (MB)	25.78978°	-80.10708°	26 ft
Biscayne (BC)	25.70626°	-80.11450°	24 ft

Figure 2. Coastal South Florida (Fort Lauderdale/Miami) map of the existing deployed sediment traps and sensor locations. North Coral Reef Tract 1 (1N), North Coral Reef Tract 2 (2N), North Coral Reef Tract 3 (3N), South Coral Reef Tract 1 (1S), South Coral Reef Tract 2 (2S), South Coral Reef Tract 3 (3S), Fort Lauderdale (FL), Hollywood (HW), Haulover (HL), Miami Beach (MB), and Biscayne (BC).

2.3 Collection of Abiotic Data from Aqua TROLL 600 Sondes and Calibrations

In-Situ Aqua TROLL 600 multiparameter sondes outfitted with temperature, conductivity (salinity), pressure, dissolved oxygen, pH, and turbidity sensors were mounted on anchored platforms at six reef sites (1N, 2N, 3N, 1S, 2S, 3S) and at five coastal locations (FL, HW, HL, MB, and BC) north and south of Port Everglades (Fig. 1 and Table 1). Water chemistry data, including temperature, conductivity (salinity), pressure, dissolved oxygen, pH, and turbidity, were recorded hourly by each of the 11 sondes. Sonde sensors were calibrated, and data downloaded to an Android phone every 1-2 months. All calibrations were performed according to the standard quality assurance plan for DEP agreement. The data were then extracted into Excel spreadsheets.

3. RESULTS/DISCUSSION

3.1 Statistical Analysis Abiotic Data (temperature, conductivity (salinity), pressure, dissolved oxygen, pH, and turbidity) at Coral Reef Locations (1N, 2N, 3N, 1S, 2S, and 3S)

All abiotic data from Phase II 2024 (FDEP agreement C2221E) were averaged as daily, monthly, and quarterly numbers. Spearman rank correlation tests were performed for the abiotic data (temperature, conductivity (salinity), pressure, dissolved oxygen, pH, and turbidity) collected at 6 coral reef locations (1N, 2N, 3N, 1S, 2S, and 3S).

Tables 2-22 showcase the Spearman's rank (rho) daily, monthly, and quarterly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024 with the yellow highlight numbers indicating significant p-values. Overall, the monthly average statistical data provided the best information (Table 21) and the data discussed is only for the correlations that were significant in the correct direction at all sites.

Correlation analyses were conducted among all measured abiotic variables, including temperature, salinity, pressure, relative dissolved oxygen (RDO), pH, and turbidity. Significant positive correlations were identified between temperature and salinity, as well as between pH and turbidity. Specifically, positive correlations between temperature and salinity were observed at locations 2N, 1S, and 2S, while positive correlations between pH and turbidity were found at locations 2N, 3N, and 2S. The concurrent increase in temperature and salinity during the summer months may be attributed to enhanced evaporation, reduced freshwater input, or increased runoff and erosion following rainfall events. Similarly, the observed positive relationship between turbidity and pH could be associated with reduced CO_2 solubility or an increase in carbonate ion concentration during high turbidity events.

Significant negative correlations were also observed. Temperature exhibited negative correlations with both RDO and pH, and pressure was negatively correlated with RDO. At locations 2N, 1S, and 2S, significant negative correlations between temperature and RDO were identified, whereas locations 1N, 1S, and 2S showed significant negative correlations between temperature and pH. These results align with expected patterns: as

water temperature increases, oxygen solubility decreases, leading to lower RDO levels. The concurrent decrease in pH with rising temperature may reflect increased acidity due to enhanced CO_2 concentrations, possibly resulting from biological activity or increased runoff during rainfall events. Additionally, significant negative correlations between pressure and RDO at locations 2N, 1S, and 2S support the expected decline in oxygen availability with increasing depth.

Table 2. Site 1N Spearman's rank (rho) daily correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	.489**	-.593**	-0.027	-.787**	-.380**
	Sig. (2-tailed)	.	<.001	<.001	0.642	<.001	<.001
	N	306	306	306	306	243	221
Sal	Correlation Coefficient	.489**	1	-.191**	0.08	-0.033	-.392**
	Sig. (2-tailed)	<.001	.	<.001	0.163	0.608	<.001
	N	306	306	306	306	243	221
Pres	Correlation Coefficient	-.593**	-.191**	1	0.027	.659**	.194**
	Sig. (2-tailed)	<.001	<.001	.	0.643	<.001	0.004
	N	306	306	306	306	243	221
RDO	Correlation Coefficient	-0.027	0.08	0.027	1	.573**	-.615**
	Sig. (2-tailed)	0.642	0.163	0.643	.	<.001	<.001
	N	306	306	306	306	243	221
pH	Correlation Coefficient	-.787**	-0.033	.659**	.573**	1	-0.042
	Sig. (2-tailed)	<.001	0.608	<.001	<.001	.	0.604
	N	243	243	243	243	243	158
Turb	Correlation Coefficient	-.380**	-.392**	.194**	-.615**	-0.042	1
	Sig. (2-tailed)	<.001	<.001	0.004	<.001	0.604	.
	N	221	221	221	221	158	221
** Correlation is significant at the 0.01 level (2-tailed).							

Table 3. Site 1N Spearman's rank (rho) monthly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	0.559	-.783**	-0.161	-.818**	-0.467
	Sig. (2-tailed)	.	0.059	0.003	0.618	0.004	0.205
	N	12	12	12	12	10	9
Sal	Correlation Coefficient	0.559	1	-0.385	0.028	0.018	-0.233
	Sig. (2-tailed)	0.059	.	0.217	0.931	0.96	0.546
	N	12	12	12	12	10	9
Pres	Correlation Coefficient	-.783**	-0.385	1	0.112	0.6	0.317
	Sig. (2-tailed)	0.003	0.217	.	0.729	0.067	0.406
	N	12	12	12	12	10	9
RDO	Correlation Coefficient	-0.161	0.028	0.112	1	0.588	-.733*
	Sig. (2-tailed)	0.618	0.931	0.729	.	0.074	0.025
	N	12	12	12	12	10	9
pH	Correlation Coefficient	-.818**	0.018	0.6	0.588	1	0.143
	Sig. (2-tailed)	0.004	0.96	0.067	0.074	.	0.76
	N	10	10	10	10	10	7
Turb	Correlation Coefficient	-0.467	-0.233	0.317	-.733*	0.143	1
	Sig. (2-tailed)	0.205	0.546	0.406	0.025	0.76	.
	N	9	9	9	9	7	9
** Correlation is significant at the 0.01 level (2-tailed).							
* Correlation is significant at the 0.05 level (2-tailed).							

Table 4. Site 1N Spearman's rank (rho) quarterly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	1.000**	-0.4	0.2	-1.000**	-0.8
	Sig. (2-tailed)	.	.	0.6	0.8	.	0.2
	N	4	4	4	4	4	4
Sal	Correlation Coefficient	1.000**	1	-0.4	0.2	-1.000**	-0.8
	Sig. (2-tailed)	.	.	0.6	0.8	.	0.2
	N	4	4	4	4	4	4
Pres	Correlation Coefficient	-0.4	-0.4	1	0	0.4	0.8
	Sig. (2-tailed)	0.6	0.6	.	1	0.6	0.2
	N	4	4	4	4	4	4
RDO	Correlation Coefficient	0.2	0.2	0	1	-0.2	-0.4
	Sig. (2-tailed)	0.8	0.8	1	.	0.8	0.6
	N	4	4	4	4	4	4
pH	Correlation Coefficient	-1.000**	-1.000**	0.4	-0.2	1	0.8
	Sig. (2-tailed)	.	.	0.6	0.8	.	0.2
	N	4	4	4	4	4	4
Turb	Correlation Coefficient	-0.8	-0.8	0.8	-0.4	0.8	1
	Sig. (2-tailed)	0.2	0.2	0.2	0.6	0.2	.
	N	4	4	4	4	4	4
** Correlation is significant at the 0.01 level (2-tailed).							

Table 5. Site 2N Spearman's rank (rho) daily correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	.729**	.296**	-.745**	-.290**	-.409**
	Sig. (2-tailed)	.	<.001	<.001	<.001	<.001	<.001
	N	263	263	263	263	263	263
Sal	Correlation Coefficient	.729**	1	.235**	-.580**	-.291**	-.301**
	Sig. (2-tailed)	<.001	.	<.001	<.001	<.001	<.001
	N	263	263	263	263	263	263
Pres	Correlation Coefficient	.296**	.235**	1	-.625**	-.141*	-.123*
	Sig. (2-tailed)	<.001	<.001	.	<.001	0.022	0.046
	N	263	263	263	263	263	263
RDO	Correlation Coefficient	-.745**	-.580**	-.625**	1	.352**	.323**
	Sig. (2-tailed)	<.001	<.001	<.001	.	<.001	<.001
	N	263	263	263	263	263	263
pH	Correlation Coefficient	-.290**	-.291**	-.141*	.352**	1	.804**
	Sig. (2-tailed)	<.001	<.001	0.022	<.001	.	<.001
	N	263	263	263	263	263	263
Turb	Correlation Coefficient	-.409**	-.301**	-.123*	.323**	.804**	1
	Sig. (2-tailed)	<.001	<.001	0.046	<.001	<.001	.
	N	263	263	263	263	263	263
** Correlation is significant at the 0.01 level (2-tailed).							
* Correlation is significant at the 0.05 level (2-tailed).							

Table 6. Site 2N Spearman's rank (rho) monthly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	.818**	0.406	-.782**	-0.164	-0.248
	Sig. (2-tailed)	.	0.004	0.244	0.008	0.651	0.489
	N	10	10	10	10	10	10
Sal	Correlation Coefficient	.818**	1	0.467	-.770**	-0.358	-0.248
	Sig. (2-tailed)	0.004	.	0.174	0.009	0.31	0.489
	N	10	10	10	10	10	10
Pres	Correlation Coefficient	0.406	0.467	1	-.745*	-0.03	-0.018
	Sig. (2-tailed)	0.244	0.174	.	0.013	0.934	0.96
	N	10	10	10	10	10	10
RDO	Correlation Coefficient	-.782**	-.770**	-.745*	1	0.382	0.455
	Sig. (2-tailed)	0.008	0.009	0.013	.	0.276	0.187
	N	10	10	10	10	10	10
pH	Correlation Coefficient	-0.164	-0.358	-0.03	0.382	1	.867**
	Sig. (2-tailed)	0.651	0.31	0.934	0.276	.	0.001
	N	10	10	10	10	10	10
Turb	Correlation Coefficient	-0.248	-0.248	-0.018	0.455	.867**	1
	Sig. (2-tailed)	0.489	0.489	0.96	0.187	0.001	.
	N	10	10	10	10	10	10
** Correlation is significant at the 0.01 level (2-tailed).							
* Correlation is significant at the 0.05 level (2-tailed).							

Table 7 Site 2N Spearman's rank (rho) quarterly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	1.000**	0.6	-0.8	-0.4	-0.2
	Sig. (2-tailed)	.	.	0.4	0.2	0.6	0.8
	N	4	4	4	4	4	4
Sal	Correlation Coefficient	1.000**	1	0.6	-0.8	-0.4	-0.2
	Sig. (2-tailed)	.	.	0.4	0.2	0.6	0.8
	N	4	4	4	4	4	4
Pres	Correlation Coefficient	0.6	0.6	1	-0.8	0.4	0.2
	Sig. (2-tailed)	0.4	0.4	.	0.2	0.6	0.8
	N	4	4	4	4	4	4
RDO	Correlation Coefficient	-0.8	-0.8	-0.8	1	0.2	0.4
	Sig. (2-tailed)	0.2	0.2	0.2	.	0.8	0.6
	N	4	4	4	4	4	4
pH	Correlation Coefficient	-0.4	-0.4	0.4	0.2	1	0.8
	Sig. (2-tailed)	0.6	0.6	0.6	0.8	.	0.2
	N	4	4	4	4	4	4
Turb	Correlation Coefficient	-0.2	-0.2	0.2	0.4	0.8	1
	Sig. (2-tailed)	0.8	0.8	0.8	0.6	0.2	.
	N	4	4	4	4	4	4
** Correlation is significant at the 0.01 level (2-tailed).							

Table 8. Site 3N Spearman's rank (rho) daily correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	.155*	.248**	-.516**	-0.064	-.210**
	Sig. (2-tailed)	.	0.011	<.001	<.001	0.318	<.001
	N	268	268	268	268	249	268
Sal	Correlation Coefficient	.155*	1	-.244**	-.389**	-.534**	-.374**
	Sig. (2-tailed)	0.011	.	<.001	<.001	<.001	<.001
	N	268	268	268	268	249	268
Pres	Correlation Coefficient	.248**	-.244**	1	-.337**	.407**	.560**
	Sig. (2-tailed)	<.001	<.001	.	<.001	<.001	<.001
	N	268	268	268	268	249	268
RDO	Correlation Coefficient	-.516**	-.389**	-.337**	1	.201**	-.224**
	Sig. (2-tailed)	<.001	<.001	<.001	.	0.001	<.001
	N	268	268	268	268	249	268
pH	Correlation Coefficient	-0.064	-.534**	.407**	.201**	1	.540**
	Sig. (2-tailed)	0.318	<.001	<.001	0.001	.	<.001
	N	249	249	249	249	249	249
Turb	Correlation Coefficient	-.210**	-.374**	.560**	-.224**	.540**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	.
	N	268	268	268	268	249	268
* Correlation is significant at the 0.05 level (2-tailed).							
** Correlation is significant at the 0.01 level (2-tailed).							

Table 9. Site 3N Spearman's rank (rho) monthly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	-0.13	0.021	-0.448	0.045	-0.242
	Sig. (2-tailed)	.	0.688	0.948	0.145	0.894	0.449
	N	12	12	12	12	11	12
Sal	Correlation Coefficient	-0.13	1	-0.025	-0.539	-.655*	-0.067
	Sig. (2-tailed)	0.688	.	0.94	0.07	0.029	0.837
	N	12	12	12	12	11	12
Pres	Correlation Coefficient	0.021	-0.025	1	-0.42	0.355	.704*
	Sig. (2-tailed)	0.948	0.94	.	0.175	0.285	0.011
	N	12	12	12	12	11	12
RDO	Correlation Coefficient	-0.448	-0.539	-0.42	1	0.091	-0.322
	Sig. (2-tailed)	0.145	0.07	0.175	.	0.79	0.307
	N	12	12	12	12	11	12
pH	Correlation Coefficient	0.045	-.655*	0.355	0.091	1	.700*
	Sig. (2-tailed)	0.894	0.029	0.285	0.79	.	0.016
	N	11	11	11	11	11	11
Turb	Correlation Coefficient	-0.242	-0.067	.704*	-0.322	.700*	1
	Sig. (2-tailed)	0.449	0.837	0.011	0.307	0.016	.
	N	12	12	12	12	11	12
* Correlation is significant at the 0.05 level (2-tailed).							

Table 10. Site 3N Spearman's rank (rho) quarterly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	-0.8	0	0.2	0	-0.4
	Sig. (2-tailed)	.	0.2	1	0.8	1	0.6
	N	4	4	4	4	4	4
Sal	Correlation Coefficient	-0.8	1	-0.4	-0.4	-0.4	0.2
	Sig. (2-tailed)	0.2	.	0.6	0.6	0.6	0.8
	N	4	4	4	4	4	4
Pres	Correlation Coefficient	0	-0.4	1	-0.4	1.000**	0.8
	Sig. (2-tailed)	1	0.6	.	0.6	.	0.2
	N	4	4	4	4	4	4
RDO	Correlation Coefficient	0.2	-0.4	-0.4	1	-0.4	-0.8
	Sig. (2-tailed)	0.8	0.6	0.6	.	0.6	0.2
	N	4	4	4	4	4	4
pH	Correlation Coefficient	0	-0.4	1.000**	-0.4	1	0.8
	Sig. (2-tailed)	1	0.6	.	0.6	.	0.2
	N	4	4	4	4	4	4
Turb	Correlation Coefficient	-0.4	0.2	0.8	-0.8	0.8	1
	Sig. (2-tailed)	0.6	0.8	0.2	0.2	0.2	.
	N	4	4	4	4	4	4
** Correlation is significant at the 0.01 level (2-tailed).							

Table 11. Site 1S Spearman's rank (rho) daily correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	.627**	0.077	-.507**	-.621**	-.247**
	Sig. (2-tailed)	.	<.001	0.153	<.001	<.001	<.001
	N	346	346	346	346	346	346
Sal	Correlation Coefficient	.627**	1	-.194**	0.071	-.738**	-.609**
	Sig. (2-tailed)	<.001	.	<.001	0.189	<.001	<.001
	N	346	346	346	346	346	346
Pres	Correlation Coefficient	0.077	-.194**	1	-.292**	-0.036	.300**
	Sig. (2-tailed)	0.153	<.001	.	<.001	0.507	<.001
	N	346	346	346	346	346	346
RDO	Correlation Coefficient	-.507**	0.071	-.292**	1	0.018	-.357**
	Sig. (2-tailed)	<.001	0.189	<.001	.	0.739	<.001
	N	346	346	346	346	346	346
pH	Correlation Coefficient	-.621**	-.738**	-0.036	0.018	1	.535**
	Sig. (2-tailed)	<.001	<.001	0.507	0.739	.	<.001
	N	346	346	346	346	346	346
Turb	Correlation Coefficient	-.247**	-.609**	.300**	-.357**	.535**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	.
	N	346	346	346	346	346	346
** Correlation is significant at the 0.01 level (2-tailed).							

Table 12. Site 1S Spearman's rank (rho) monthly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	.587*	0.014	-.587*	-.692*	-0.119
	Sig. (2-tailed)	.	0.045	0.966	0.045	0.013	0.713
	N	12	12	12	12	12	12
Sal	Correlation Coefficient	.587*	1	-0.224	0.203	-.713**	-0.552
	Sig. (2-tailed)	0.045	.	0.484	0.527	0.009	0.063
	N	12	12	12	12	12	12
Pres	Correlation Coefficient	0.014	-0.224	1	-0.07	-0.231	0.399
	Sig. (2-tailed)	0.966	0.484	.	0.829	0.471	0.199
	N	12	12	12	12	12	12
RDO	Correlation Coefficient	-.587*	0.203	-0.07	1	0.042	-0.524
	Sig. (2-tailed)	0.045	0.527	0.829	.	0.897	0.08
	N	12	12	12	12	12	12
pH	Correlation Coefficient	-.692*	-.713**	-0.231	0.042	1	0.462
	Sig. (2-tailed)	0.013	0.009	0.471	0.897	.	0.131
	N	12	12	12	12	12	12
Turb	Correlation Coefficient	-0.119	-0.552	0.399	-0.524	0.462	1
	Sig. (2-tailed)	0.713	0.063	0.199	0.08	0.131	.
	N	12	12	12	12	12	12
* Correlation is significant at the 0.05 level (2-tailed).							
** Correlation is significant at the 0.01 level (2-tailed).							

Table 13. Site 1S Spearman's rank (rho) quarterly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	0.4	0	-0.8	-0.4	0
	Sig. (2-tailed)	.	0.6	1	0.2	0.6	1
	N	4	4	4	4	4	4
Sal	Correlation Coefficient	0.4	1	-0.8	0.2	-1.000**	-0.8
	Sig. (2-tailed)	0.6	.	0.2	0.8	.	0.2
	N	4	4	4	4	4	4
Pres	Correlation Coefficient	0	-0.8	1	-0.4	0.8	1.000**
	Sig. (2-tailed)	1	0.2	.	0.6	0.2	.
	N	4	4	4	4	4	4
RDO	Correlation Coefficient	-0.8	0.2	-0.4	1	-0.2	-0.4
	Sig. (2-tailed)	0.2	0.8	0.6	.	0.8	0.6
	N	4	4	4	4	4	4
pH	Correlation Coefficient	-0.4	-1.000**	0.8	-0.2	1	0.8
	Sig. (2-tailed)	0.6	.	0.2	0.8	.	0.2
	N	4	4	4	4	4	4
Turb	Correlation Coefficient	0	-0.8	1.000**	-0.4	0.8	1
	Sig. (2-tailed)	1	0.2	.	0.6	0.2	.
	N	4	4	4	4	4	4
** Correlation is significant at the 0.01 level (2-tailed).							

Table 14. Site 2S Spearman's rank (rho) daily correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	.688**	.359**	-.738**	-.578**	-.263**
	Sig. (2-tailed)	.	<.001	<.001	<.001	<.001	<.001
	N	316	316	316	316	228	256
Sal	Correlation Coefficient	.688**	1	.159**	-.495**	-.439**	-.314**
	Sig. (2-tailed)	<.001	.	0.005	<.001	<.001	<.001
	N	316	316	316	316	228	256
Pres	Correlation Coefficient	.359**	.159**	1	-.471**	-0.018	.532**
	Sig. (2-tailed)	<.001	0.005	.	<.001	0.791	<.001
	N	316	316	316	316	228	256
RDO	Correlation Coefficient	-.738**	-.495**	-.471**	1	.141*	-0.073
	Sig. (2-tailed)	<.001	<.001	<.001	.	0.034	0.243
	N	316	316	316	316	228	256
pH	Correlation Coefficient	-.578**	-.439**	-0.018	.141*	1	.884**
	Sig. (2-tailed)	<.001	<.001	0.791	0.034	.	<.001
	N	228	228	228	228	228	176
Turb	Correlation Coefficient	-.263**	-.314**	.532**	-0.073	.884**	1
	Sig. (2-tailed)	<.001	<.001	<.001	0.243	<.001	.
	N	256	256	256	256	176	256
** Correlation is significant at the 0.01 level (2-tailed).							
* Correlation is significant at the 0.05 level (2-tailed).							

Table 15. Site 2S Spearman's rank (rho) monthly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	.783**	0.343	-.832**	-.636*	-0.37
	Sig. (2-tailed)	.	0.003	0.276	<.001	0.048	0.293
	N	12	12	12	12	10	10
Sal	Correlation Coefficient	.783**	1	0.196	-0.545	-0.345	-0.442
	Sig. (2-tailed)	0.003	.	0.542	0.067	0.328	0.2
	N	12	12	12	12	10	10
Pres	Correlation Coefficient	0.343	0.196	1	-.664*	0.03	0.624
	Sig. (2-tailed)	0.276	0.542	.	0.018	0.934	0.054
	N	12	12	12	12	10	10
RDO	Correlation Coefficient	-.832**	-0.545	-.664*	1	0.261	-0.042
	Sig. (2-tailed)	<.001	0.067	0.018	.	0.467	0.907
	N	12	12	12	12	10	10
pH	Correlation Coefficient	-.636*	-0.345	0.03	0.261	1	.952**
	Sig. (2-tailed)	0.048	0.328	0.934	0.467	.	<.001
	N	10	10	10	10	10	8
Turb	Correlation Coefficient	-0.37	-0.442	0.624	-0.042	.952**	1
	Sig. (2-tailed)	0.293	0.2	0.054	0.907	<.001	.
	N	10	10	10	10	8	10
** Correlation is significant at the 0.01 level (2-tailed).							
* Correlation is significant at the 0.05 level (2-tailed).							

Table 16. Site 2S Spearman's rank (rho) quarterly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	1.000**	0.4	-0.6	-0.4	-0.4
	Sig. (2-tailed)	.	.	0.6	0.4	0.6	0.6
	N	4	4	4	4	4	4
Sal	Correlation Coefficient	1.000**	1	0.4	-0.6	-0.4	-0.4
	Sig. (2-tailed)	.	.	0.6	0.4	0.6	0.6
	N	4	4	4	4	4	4
Pres	Correlation Coefficient	0.4	0.4	1	-0.4	-0.4	0.4
	Sig. (2-tailed)	0.6	0.6	.	0.6	0.6	0.6
	N	4	4	4	4	4	4
RDO	Correlation Coefficient	-0.6	-0.6	-0.4	1	-0.4	-0.4
	Sig. (2-tailed)	0.4	0.4	0.6	.	0.6	0.6
	N	4	4	4	4	4	4
pH	Correlation Coefficient	-0.4	-0.4	-0.4	-0.4	1	0.6
	Sig. (2-tailed)	0.6	0.6	0.6	0.6	.	0.4
	N	4	4	4	4	4	4
Turb	Correlation Coefficient	-0.4	-0.4	0.4	-0.4	0.6	1
	Sig. (2-tailed)	0.6	0.6	0.6	0.6	0.4	.
	N	4	4	4	4	4	4
** Correlation is significant at the 0.01 level (2-tailed).							

Table 17. Site 3S Spearman's rank (rho) daily correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	.783**	-.493**	.310**	-.466**	0.037
	Sig. (2-tailed)	.	<.001	<.001	<.001	<.001	0.596
	N	250	250	250	250	210	207
Sal	Correlation Coefficient	.783**	1	-.319**	0.095	-.431**	-.291**
	Sig. (2-tailed)	<.001	.	<.001	0.135	<.001	<.001
	N	250	250	250	250	210	207
Pres	Correlation Coefficient	-.493**	-.319**	1	-.524**	.709**	-.297**
	Sig. (2-tailed)	<.001	<.001	.	<.001	<.001	<.001
	N	250	250	250	250	210	207
RDO	Correlation Coefficient	.310**	0.095	-.524**	1	-.473**	.218**
	Sig. (2-tailed)	<.001	0.135	<.001	.	<.001	0.002
	N	250	250	250	250	210	207
pH	Correlation Coefficient	-.466**	-.431**	.709**	-.473**	1	-.173*
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	.	0.014
	N	210	210	210	210	210	202
Turb	Correlation Coefficient	0.037	-.291**	-.297**	.218**	-.173*	1
	Sig. (2-tailed)	0.596	<.001	<.001	0.002	0.014	.
	N	207	207	207	207	202	207
** Correlation is significant at the 0.01 level (2-tailed).							
* Correlation is significant at the 0.05 level (2-tailed).							

Table 18. Site 3S Spearman's rank (rho) monthly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	0.69	-0.286	0.143	-0.31	-0.095
	Sig. (2-tailed)	.	0.058	0.493	0.736	0.456	0.823
	N	8	8	8	8	8	8
Sal	Correlation Coefficient	0.69	1	0.071	-0.119	-0.119	-0.643
	Sig. (2-tailed)	0.058	.	0.867	0.779	0.779	0.086
	N	8	8	8	8	8	8
Pres	Correlation Coefficient	-0.286	0.071	1	-.810*	0.619	-.714*
	Sig. (2-tailed)	0.493	0.867	.	0.015	0.102	0.047
	N	8	8	8	8	8	8
RDO	Correlation Coefficient	0.143	-0.119	-.810*	1	-0.405	0.476
	Sig. (2-tailed)	0.736	0.779	0.015	.	0.32	0.233
	N	8	8	8	8	8	8
pH	Correlation Coefficient	-0.31	-0.119	0.619	-0.405	1	-0.524
	Sig. (2-tailed)	0.456	0.779	0.102	0.32	.	0.183
	N	8	8	8	8	8	8
Turb	Correlation Coefficient	-0.095	-0.643	-.714*	0.476	-0.524	1
	Sig. (2-tailed)	0.823	0.086	0.047	0.233	0.183	.
	N	8	8	8	8	8	8
* Correlation is significant at the 0.05 level (2-tailed).							

Table 19. Site 3S Spearman's rank (rho) quarterly correlation data of temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU) from 07/01/2023-06/30/2024. The yellow highlight indicates significant p-values.

		Temp	Sal	Pres	RDO	pH	Turb
Temp	Correlation Coefficient	1	1.000**	0.5	-0.5	0.5	-0.5
	Sig. (2-tailed)	.	.	0.667	0.667	0.667	0.667
	N	3	3	3	3	3	3
Sal	Correlation Coefficient	1.000**	1	0.5	-0.5	0.5	-0.5
	Sig. (2-tailed)	.	.	0.667	0.667	0.667	0.667
	N	3	3	3	3	3	3
Pres	Correlation Coefficient	0.5	0.5	1	-1.000**	1.000**	-1.000**
	Sig. (2-tailed)	0.667	0.667	.	.	.	.
	N	3	3	3	3	3	3
RDO	Correlation Coefficient	-0.5	-0.5	-1.000**	1	-1.000**	1.000**
	Sig. (2-tailed)	0.667	0.667	.	.	.	.
	N	3	3	3	3	3	3
pH	Correlation Coefficient	0.5	0.5	1.000**	-1.000**	1	-1.000**
	Sig. (2-tailed)	0.667	0.667	.	.	.	.
	N	3	3	3	3	3	3
Turb	Correlation Coefficient	-0.5	-0.5	-1.000**	1.000**	-1.000**	1
	Sig. (2-tailed)	0.667	0.667	.	.	.	.
	N	3	3	3	3	3	3
* Correlation is significant at the 0.05 level (2-tailed).							

Table 20. Daily summary of the direction of significant correlations across all sites from 07/01/2023-06/30/2024. Data highlighted in yellow represents correlations that were consistently significant in the correct direction at all sites. Temp = temperature, Sal = salinity, Pres = pressure, Turb = turbidity.

Daily	1N	2N	3N	1S	2S	3S
Temp-Sal	Positive	Positive	Positive	Positive	Positive	Positive
Temp-Pres	Negative	Positive	Positive		Positive	Negative
Temp-RDO		Negative	Negative	Negative	Negative	Positive
Temp-pH	Negative	Negative		Negative	Negative	Negative
Temp-Turb	Negative	Negative	Negative	Negative	Negative	
Sal-Pres	Negative	Positive	Negative	Negative	Positive	Negative
Sal-RDO		Negative	Negative		Negative	
Sal-pH		Negative	Negative	Negative	Negative	Negative
Sal-Turb	Negative	Negative	Negative	Negative	Negative	Negative
Pres-RDO		Negative	Negative	Negative	Negative	Negative
Pres-pH	Positive		Positive			Positive
Pres-Turb			Positive	Positive	Positive	Negative
RDO-pH	Positive	Positive	Positive		Positive	Negative
RDO-Turb	Negative	Positive	Negative	Negative		Positive
pH-Turb		Positive	Positive	Positive	Positive	Negative

Table 21. Monthly summary of the direction of significant correlations across all sites from 07/01/2023-06/30/2024. Data highlighted in yellow represents correlations that were consistently significant in the correct direction at all sites. Temp = temperature, Sal = salinity, Pres = pressure, Turb = turbidity.

Monthly	1N	2N	3N	1S	2S	3S
Temp-Sal		Positive		Positive	Positive	
Temp-Pres	Negative					
Temp-RDO		Negative		Negative	Negative	
Temp-pH	Negative			Negative	Negative	
Temp-Turb						
Sal-Pres						
Sal-RDO		Negative				
Sal-pH			Negative	Negative		
Sal-Turb						
Pres-RDO		Negative			Negative	Negative
Pres-pH						
Pres-Turb			Positive			Negative
RDO-pH						
RDO-Turb	Negative					
pH-Turb		Positive	Positive		Positive	

Table 22. Quarterly summary of the direction of significant correlations across all sites from 07/01/2023-06/30/2024. Data highlighted in yellow represents correlations that were consistently significant in the correct direction at all sites. Temp = temperature, Sal = salinity, Pres = pressure, Turb = turbidity.

Quarterly	1N	2N	3N	1S	2S	3S
Temp-Sal	Positive	Positive			Positive	Positive
Temp-Pres						
Temp-RDO						
Temp-pH	Negative					
Temp-Turb						
Sal-Pres						
Sal-RDO						
Sal-pH	Negative			Negative		
Sal-Turb						
Pres-RDO						Negative
Pres-pH			Positive			Positive
Pres-Turb				Positive		Negative
RDO-pH						Negative
RDO-Turb						Positive
pH-Turb						Negative

3.2 Statistical Analysis of Abiotic Data (temperature, conductivity (salinity), pressure, relative dissolved oxygen, pH, and turbidity) with Heavy Metals from Sediment Traps at Coral Reef Locations (1N, 2N, 3N, 1S, 2S, and 3S)

All median abiotic data (temperature, conductivity (salinity), pressure, dissolved oxygen, pH, and turbidity) from Phase II 2024 (DEP agreement C2221E) were calculated and correlated with the heavy metal concentrations in the sediment from the sediment traps for September 2023, November 2023 and March 2024 (Table 23). The median abiotic data used was during the time periods (July-September 2023, September – November 2023, and November - March 2024). The 3S location did not record abiotic data for the September 2023 or November 2023 time periods so that left just one data point for the March 2024 period. That data was not used since we could not CTRATES correlations on one data point. The 2N location also had no abiotic data for the March 2024 period but the rest of the data was used with two time periods (September 2023 or November 2023).

Temperature (Temp) and Heavy Metals

Temperature mostly shows positive correlations across all metals and locations (especially metals like Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, V, Zn) with notable exception for Al and As which show negative correlations at the 1N location, suggesting that higher temperatures may reduce Al and As levels in that location. Warmer waters tend to enhance metal solubility and mobility, increasing their binding to sediment particles. However, in locations like 1N, some metals like Al and As may bind to particulates or precipitate out at higher temperatures.

Salinity (Sal) and Heavy Metals

Salinity consistently had negative correlations for all the metals at 2N, while the 2S location had positive correlations for most of the metals (Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sn, and Zn). In the north location, increasing salinity may reduce metal concentrations in the sediment, possibly due to flocculation or adsorption processes while at the south location higher salinity might be enhancing metal availability, potentially from saltwater intrusion mobilizing metals from sediments.

Pressure (Pres) and Heavy Metals

There are strong negative correlations at 1N and 2N with all the metals (except for As at 1N which has a positive correlation and with Cd where there was no correlation). Positive correlations were determined at the 3N location (Al, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, V, and Zn). Decreased pressure (depth) in 1N and 2N might be associated with higher metal concentrations while 3N, where the pressure (depth) is higher, the metal concentrations are lower. This could be due to their proximity to the coast and port, runoff, and sedimentation from the port.

Relative Dissolved Oxygen (RDO) and Heavy Metals

There are widespread negative RDO correlations across nearly all metals and locations with the only exception being for As at the 1N location, which is positively correlated. Higher oxygen levels can retain metals in the sediment as precipitated oxides which increase the metals in the sediment and are less water soluble while anoxia or low-oxygen conditions can mobilize metals (via reduction reactions) and reduce the metal concentrations in the sediment.

pH and Heavy Metals

The pH has mostly negative correlations at 1N (except for As) and positive at 2N (for all the metals) and 3N (for As, Cd, and Sn). Low pH (less basicity/higher acidity) enhances metal solubility, so increases in pH may reduce metal concentrations (negative correlations). However, some metals can form soluble complexes at higher pH, possibly explaining positive correlations at some sites. The pH changes in the ocean are very small so some of these inconsistencies could be due to malfunctioning pH sensors as well.

Turbidity (turb) and Heavy Metals

Negative correlations were observed at 1N and 2N for all the metals (except for As at the 1N location) while positive correlations were observed sites 3N (for As, Cd, and Sn), 1S (Al, Cd, Cu, Mn, Mo, Ni, and Pb) and for all the metals at 2S. In the 1N and 2N sites, higher turbidity may indicate that sediment in the trap comes from locations with less heavy metal concentrations or may help release heavy metals from sediment into the water. A the 3N, 1S, and 2S the sediment might be coming from more contaminated areas such as the port.

Spatial Patterns by Region

Overall, the northern sites (1N, 2N, 3N) have stronger negative correlations with salinity, pressure, Rdo, and turbidity. 1N tends to have some unique patterns: Temp-Al and Temp-As are negative, Pres–As, Rdo-As, pH-As, and Turb-As positive, unlike most other sites.

The southern sites (1S, 2S, 3S) have fewer overall correlations (many NA especially in 3S due to missing abiotic data). When present, the correlations are often positive, particularly for temperature, salinity, and turbidity.

Table 23. Summary of the direction of significant correlations between abiotic data (Temp = temperature, Sal = salinity, Pres = pressure, Turb = turbidity) and sediment heavy metal concentrations (Al, As, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sn, V, and Zn) across all sites from 07/01/2023-06/30/2024. NA or blank cells: no correlations were found.

		1N	2N	3N	1S	2S	3S
Temp-Al		Neg	Pos	Pos		Pos	NA
Temp-As		Neg	Pos		Pos		NA
Temp-Cd			Pos				NA
Temp-Co		Pos	Pos	Pos	Pos	Pos	NA
Temp-Cu		Pos	Pos	Pos		Pos	NA
Temp-Fe		Pos	Pos	Pos	Pos	Pos	NA
Temp-Mn		Pos	Pos	Pos		Pos	NA
Temp-Mo		Pos	Pos	Pos		Pos	NA
Temp-Ni		Pos	Pos	Pos		Pos	NA
Temp-Pb		Pos	Pos	Pos		Pos	NA
Temp-Se		Pos	Pos	Pos	Pos	Pos	NA
Temp-Sn		Pos	Pos		Pos	Pos	NA
Temp-V		Pos	Pos	Pos	Pos		NA
Temp-Zn		Pos	Pos	Pos	Pos	Pos	NA
Sal-Al			Neg			Pos	NA
Sal-As			Neg				NA

Sal-Cd			Neg				NA
Sal-Co			Neg			Pos	NA
Sal-Cu			Neg			Pos	NA
Sal-Fe			Neg			Pos	NA
Sal-Mn			Neg			Pos	NA
Sal-Mo			Neg			Pos	NA
Sal-Ni			Neg			Pos	NA
Sal-Pb			Neg			Pos	NA
Sal-Se			Neg			Pos	NA
Sal-Sn			Neg			Pos	NA
Sal-V			Neg				NA
Sal-Zn			Neg			Pos	NA
Pres-Al		Neg	Neg	Pos			NA
Pres-As		Pos	Neg				NA
Pres-Cd			Neg				NA
Pres-Co		Neg	Neg	Pos			NA
Pres-Cu		Neg	Neg	Pos			NA
Pres-Fe		Neg	Neg	Pos			NA
Pres-Mn		Neg	Neg	Pos			NA

Pres-Mo		Neg	Neg	Pos			NA
Pres-Ni		Neg	Neg	Pos			NA
Pres-Pb		Neg	Neg	Pos			NA
Pres-Se		Neg	Neg	Pos			NA
Pres-Sn		Neg	Neg				NA
Pres-V		Neg	Neg	Pos			NA
Pres-Zn		Neg	Neg	Pos			NA
Rdo-Al		Neg	Neg	Neg		Neg	NA
Rdo-As		Pos	Neg		Neg		NA
Rdo-Cd			Neg				NA
Rdo-Co		Neg	Neg	Neg	Neg	Neg	NA
Rdo-Cu		Neg	Neg	Neg		Neg	NA
Rdo-Fe		Neg	Neg	Neg	Neg	Neg	NA
Rdo-Mn		Neg	Neg	Neg		Neg	NA
Rdo-Mo		Neg	Neg	Neg		Neg	NA
Rdo-Ni		Neg	Neg	Neg		Neg	NA
Rdo-Pb		Neg	Neg	Neg		Neg	NA
Rdo-Se		Neg	Neg	Neg	Neg	Neg	NA
Rdo-Sn		Neg	Neg		Neg	Neg	NA

Rdo-V		Neg	Neg	Neg	Neg		NA
Rdo-Zn		Neg	Neg	Neg	Neg	Neg	NA
pH-Al		Neg	Pos				NA
pH-As		Pos	Pos	Pos			NA
pH-Cd			Pos	Pos			NA
pH-Co		Neg	Pos				NA
pH-Cu		Neg	Pos				NA
pH-Fe		Neg	Pos				NA
pH-Mn		Neg	Pos				NA
pH-Mo		Neg	Pos				NA
pH-Ni		Neg	Pos				NA
pH-Pb		Neg	Pos				NA
pH-Se		Neg	Pos				NA
pH-Sn		Neg	Pos	Pos			NA
pH-V		Neg	Pos				NA
pH-Zn		Neg	Pos				NA
turb-Al		Neg	Neg		Pos	Pos	NA
turb-As		Pos	Neg	Pos		Pos	NA
turb-Cd		Neg	Neg	Pos	Pos	Pos	NA

turb-Co		Neg	Neg			Pos	NA
turb-Cu		Neg	Neg		Pos	Pos	NA
turb-Fe		Neg	Neg			Pos	NA
turb-Mn		Neg	Neg		Pos	Pos	NA
turb-Mo		Neg	Neg		Pos	Pos	NA
turb-Ni		Neg	Neg		Pos	Pos	NA
turb-Pb		Neg	Neg		Pos	Pos	NA
turb-Se		Neg	Neg			Pos	NA
turb-Sn		Neg	Neg	Pos		Pos	NA
turb-V		Neg	Neg			Pos	NA
turb-Zn		Neg	Neg			Pos	NA

3.4. Statistical Analysis of Abiotic Data (temperature, conductivity (salinity), pressure, dissolved oxygen, pH, and turbidity) with ecological indices (Geoaccumulation (GEO), Pollution Load Index (PLI), Potential Ecological Risk (PER) and Enrichment Factor (EF_{FE} and EF_{Al})).

All median abiotic data (temperature, conductivity (salinity), pressure, dissolved oxygen, pH, and turbidity) from Phase II 2024 (DEP agreement C2221E) were calculated and correlated with the ecological indices calculated from the heavy metals concentrations in the sediment from the sediment traps at the six coral reef locations (1N, 2N, 3N, 1S, 2S, and 3S) for September 2023, November 2023 and March 2024 (Table 24)

The abiotic data used were the median calculated during the time periods (July-September 2023, September – November 2023, and November - March 2024). The 3S location did not record abiotic data for the September 2023 or November 2023 time periods so that left just one data point for the March 2024 period. That data was not used since we could not correlate on one data point. The 2N location also had no abiotic data for the March 2024 period but the rest of the data was used with two time periods (September 2023 or November 2023).

Table 24 dictates the environmental correlations between heavy metal indices Pollution Load Index (PLI), Potential Ecological Risk (PER), Geoaccumulation Index (GEO) and, Enrichment Factor (EF_{Al} = Enrichment Factor based off of Al, EF_{Fe} = Enrichment Factor based off of Fe) and environmental parameters (temperature, conductivity (salinity), pressure, dissolved oxygen, pH, and turbidity) across six sampling sites:1N, 2N, 3N, 1S, 2S, 3S.

Temperature Correlations

Temperature exhibits strong and consistent positive correlations with PLI across all sites (excluding 3S where data is not available), suggesting that elevated temperatures may enhance the total heavy metal burden in sediments. Similarly, positive temperature associations with PER at sites 2N and 1S imply increased ecological risk under warmer conditions.

The Geoaccumulation Index (GEO) shows near-universal positive correlations with temperature across metals such as Al, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, V, Zn, especially at northern sites (1N–3N) and at 2S. This reflects that temperature facilitates metal accumulation, possibly through increased weathering or enhanced rainfall. However, arsenic (As) shows both positive and negative correlations depending on the site, indicating complex geochemical behavior.

In contrast, Enrichment Factors (Ef) often correlate negatively with temperature, especially for metals like Cd, Pb, Se, Sn, and V at most northern sites. This suggests that although metal concentrations may rise (based off the GEO), their enrichment relative to natural baselines may drop, potentially due to dilution effects or shifts in sediment sources.

Salinity Correlations

Salinity shows site-dependent and variable effects on metal indices. At 2N, salinity is negatively correlated with both PLI and PER, and with most GEO values, indicating that higher salinity might reduce metal accumulation, perhaps competition with other ions in the sediments. In contrast, 2S shows positive correlations with GEO, suggesting a reverse trend where higher salinity enhances metal accumulation, likely via desorption or remobilization processes.

Ef values are more mixed: for example, EF_{Al} and EF_{FE} for metals like As, Cd, and Pb tend to increase with salinity at 2N, suggesting increased anthropogenic enrichment. However, at 2S, many of these show negative correlations, indicating possible dilution or geochemical suppression of heavy metal bioavailability. These contrasting behaviors indicate the complexity of salinity's role in coastal sediment chemistry.

Pressure (depth) Correlations

Pressure (depth) exhibits mostly negative correlations with both PLI and PER, especially at 1N and 2N sites. The GEO values for several metals (Al, Co, Cu, Fe, Ni, Zn) also show negative pressure correlations at 1N and 2N, suggesting that pressure may be related to distance near the shoreline. The smaller the depth (lower pressure) the higher the heavy metal concentrations in the sediment which could be due to runoff from the port and or nearby canals.

However, Ef indices show a more mixed pattern. For example, EF_{Al} values for As, Cd, Co, and Pb generally show positive correlations with pressure at northern sites, indicating a localized anthropogenic influence due to the closer distance to the shore and port and possible surface runoff.

Relative Dissolved Oxygen (Rdo) Correlations

Rdo shows consistently negative correlations with the Pollution Load Index (PLI) across nearly all sites (1N–2S). This suggests that higher oxygen levels are associated with lower overall metal pollution in sediments, possibly because oxygen promotes the stabilization of metals in less bioavailable or insoluble forms (e.g. metal oxides). Similarly, PER values also tend to decrease with higher Rdo levels, indicating lower ecological risk in more oxygenated environments.

For the Geoaccumulation Index (GEO), the data show strong negative correlations between Rdo and most metals, such as Al, Fe, Co, Cu, Mn, Ni, Pb, and Zn. This implies that metal accumulation in sediments is greater under low-oxygen conditions, possibly due to enhanced reduction reactions or remobilization of metals from oxic to anoxic layers. In oxygen-rich environments, metals may bind with oxides or organic matter and become less available or mobile.

An exception is arsenic (As), which shows some positive correlation with Rdo at select sites (e.g., 1N), reflecting its complex redox behavior. Arsenic can become more mobile in oxic or suboxic conditions depending on its valence state and mineral associations.

The enrichment factors (EF_{Al} and EF_{Fe}) show mostly positive correlations with Rdo for metals like As, Cd, Mn, Se, Sn, and V at several sites. This suggests that

oxygenated conditions may enhance the apparent anthropogenic enrichment of certain metals, possibly because oxygen increases particle reactivity, trapping more metals from external sources. However, not all Ef correlations are positive. Some metals, such as Cu and Fe under EfFe, show negative Rdo correlations, indicating that metal enrichment may decrease in oxygen-rich sediments possibly due to immobilization in oxide forms or reduced external input under calmer conditions.

pH Correlations

The effect of pH is mixed across the indices and metals. At site 2N, PLI and PER show positive correlations, indicating that slightly higher alkaline conditions might enhance metal accumulation. GEO values show positive correlations with pH for many metals, particularly at 2N, suggesting that metals may be less mobile under slightly higher basic conditions, thus remaining in sediments.

However, Ef indices are generally negatively correlated with pH particularly for metals like Cd, Pb, and As, indicating reduced anthropogenic enrichment under higher pH. This could be due to the precipitation of metal hydroxides or reduced desorption from particles in more alkaline conditions.

Turbidity Correlations

Turbidity shows negative correlations with PLI and PER at northern sites (1N and 2N), but positive correlations at 2S. This likely reflects differing sediment compositions or hydrodynamic conditions. In the GEO dataset, turbidity generally correlates negatively with metal accumulation at northern sites, but positively at 2S, reinforcing the spatial variability in geochemical behavior.

Ef indices show complex responses: in general, northern sites (1N–3N) show positive correlations between turbidity and Ef for many metals (As, Mn, Sn), indicating sediment resuspension or surface runoff as a contributor to anthropogenic metal input. However, 2S often exhibits negative Ef correlations, suggesting either dilution by cleaner sediments or differing sediment sources.

Summary

The environmental parameters and particularly temperature, salinity, dissolved oxygen, and turbidity strongly influence the behavior of heavy metals in the sediments, affecting both their total concentrations and ecological indices (PLI, PER, GEO) and their anthropogenic enrichment (Ef). Temperature generally increases metal accumulation and risk, while salinity and dissolved oxygen effects vary between northern and southern sites. The complexity and site-specificity of these relationships underscore the importance of localized environmental monitoring to understand and manage sediment contamination risks.

Table 24. Summary of the direction of significant correlations between abiotic data (Temp = temperature, Sal = salinity, Pres = pressure, Turb = turbidity) and sediment ecological indices (geoacummulation (GEO), pollution load index (PLI), potential ecological risk (PER), and enrichment factors (Ef_{Al} and Ef_{Fe}) for all the heavy metals (Al, As, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, Se, Sn, V, and Zn) across all sites from 07/01/2023-06/30/2024. NA or blank cells: no correlations were found. Neg = negative correlation, pos = positive correlation).

	1N	2N	3N	1S	2S	3S
Temp-PLI	Pos	Pos	Pos	Pos	Pos	NA
Sal-PLI		Neg			Pos	NA
Pres-PLI	Neg	Neg	Pos			NA
Rdo-PLI	Neg	Neg	Neg	Neg	Neg	NA
pH-PLI	Neg	Pos				NA
Turb-PLI	Neg	Neg			Pos	NA
Temp-PER		Pos		Pos		NA
Sal-PER		Neg				NA
Pres-PER		Neg				NA
Rdo-PER		Neg		Neg		NA
pH-PER		Pos	Pos			NA
Turb-PER	Neg	Neg	Pos		Pos	NA
Geo Al- Temp	Pos	Pos	Pos		Pos	NA
Geo As- Temp	Neg	Pos		Pos		NA
Geo Cd- Temp		Pos				NA

Geo Co-Temp	Pos	Pos	Pos		Pos	NA
Geo Cu-Temp	Pos	Pos	Pos		Pos	NA
Geo Fe-Temp	Pos	Pos	Pos	Pos	Pos	NA
Geo Mn- Temp	Pos	Pos	Pos		Pos	NA
Geo Mo-Temp	Pos	Pos	Pos		Pos	NA
Geo Ni-Temp	Pos	Pos	Pos		Pos	NA
Geo Pb-Temp	Pos	Pos	Pos		Pos	NA
Geo Se-Temp	Pos	Pos	Pos	Pos	Pos	NA
Geo Sn-Temp	Pos	Pos		Pos	Pos	NA
Geo V-Temp	Pos	Pos	Pos	Pos		NA
Geo Zn-Temp	Pos	Pos	Pos		Pos	NA
Ef_{Al} As-Temp	Neg	Neg	Neg		Neg	NA
Ef_{Al} Cd-Temp	Neg	Neg	Neg	Pos	Neg	NA
Ef_{Al} Co-Temp	Neg	Neg				NA
Ef_{Al} lCu-Temp		Pos	Pos			NA
Ef_{Al} Fe-Temp	Neg	Neg	Neg			NA
Ef_{Al} Mn-Temp	Neg	Neg	Neg		Neg	NA
Ef_{Al} Mo-Temp		Pos	Pos		Neg	NA
Ef_{Al} Ni-Temp	Neg	Neg	Neg			NA

Ef_{Al} Pb-Temp	Neg	Neg		Pos		NA
Ef_{Al} Se-Temp	Neg	Neg	Neg		Neg	NA
Ef_{Al} Sn-Temp	Neg	Neg	Neg		Neg	NA
Ef_{Al} V-Temp	Neg	Neg	Neg		Neg	NA
Ef_{Al} Zn-Temp		Neg	Pos			NA
Ef_{Fe} Al-Temp	Pos	Pos	Pos			NA
Ef_{Fe} As-Temp	Neg	Neg	Neg		Neg	NA
Ef_{Fe} Cd-Temp	Neg	Neg	Neg		Neg	NA
Ef_{Fe} Co-Temp		Neg				NA
Ef_{Fe} Cu-Temp	Pos	Pos	Pos		Pos	NA
Ef_{Fe} Mn-Temp	Neg	Pos	Neg	Neg	Neg	NA
Ef_{Fe} Mo-Temp	Pos	Pos	Pos		Pos	NA
Ef_{Fe} Ni-Temp	Pos	Pos	Pos		Pos	NA
Ef_{Fe} Pb-Temp	Pos	Pos	Pos			NA
Ef_{Fe} Se-Temp		Pos	Neg			NA
Ef_{Fe} Sn-Temp	Pos	Pos		Neg		NA
Ef_{Fe} V-Temp	Neg	Pos	Pos	Pos		NA
Ef_{Fe} Zn-Temp	Pos	Pos	Pos		Pos	NA
Geo Al- Sal		Neg			Pos	NA

Geo As- Sal		Neg				NA
Geo Cd- Sal		Neg				NA
Geo Co-Sal		Neg			Pos	NA
Geo Cu-Sal		Neg			Pos	NA
Geo Fe-Sal		Neg			Pos	NA
Geo Mn- Sal		Neg			Pos	NA
Geo Mo-Sal		Neg			Pos	NA
Geo Ni-Sal		Neg			Pos	NA
Geo Pb-Sal		Neg			Pos	NA
Geo Se-Sal		Neg			Pos	NA
Geo Sn-Sal		Neg			Pos	NA
Geo V-Sal		Neg				NA
Geo Zn-Sal		Neg			Pos	NA
Ef_{Al} As-Sal		Pos			Neg	NA
Ef_{Al} Cd-Sal		Pos			Neg	NA
Ef_{Al} Co-Sal		Pos				NA
Ef_{Al} Cu-Sal		Neg		Pos		NA
Ef_{Al} Fe-Sal		Pos		Pos		NA
Ef_{Al} Mn-Sal		Pos			Neg	NA

Ef_{Al} Mo-Sal		Neg			Neg	NA
Ef_{Al} Ni-Sal		Pos				NA
Ef_{Al} Pb-Sal		Pos	Neg			NA
Ef_{Al} Se-Sal		Pos		Pos	Neg	NA
Ef_{Al} Sn-Sal		Pos			Neg	NA
Ef_{Al} V-Sal		Pos		Pos	Neg	NA
Ef_{Al} Zn-Sal		Pos		Pos		NA
Ef_{Fe} Al-Sal		Neg		Neg		NA
Ef_{Fe} As-Sal		Pos			Neg	NA
Ef_{Fe} Cd-Sal		Pos		Neg	Neg	NA
Ef_{Fe} Co-Sal	Pos	Pos				NA
Ef_{Fe} Cu-Sal		Neg		Neg	Pos	NA
Ef_{Fe} Mn-Sal		Neg			Neg	NA
Ef_{Fe} Mo-Sal		Neg			Pos	NA
Ef_{Fe} Ni-Sal		Neg			Pos	NA
Ef_{Fe} Pb-Sal		Neg				NA
Ef_{Fe} Se-Sal		Neg				NA
Ef_{Fe} Sn-Sal		Neg				NA
Ef_{Fe} V-Sal		Neg				NA

Ef_{Fe} Zn-Sal		Neg			Pos	NA
Geo Al- Pres	Neg	Neg	Pos			NA
Geo As- Pres	Pos	Neg				NA
Geo Cd- Pres		Neg				NA
Geo Co-Pres	Neg	Neg	Pos			NA
Geo Cu-Pres	Neg	Neg	Pos			NA
Geo Fe-Pres	Neg	Neg	Pos			NA
Geo Mn- Pres	Neg	Neg	Pos			NA
Geo Mo-Pres	Neg	Neg	Pos			NA
Geo Ni-Pres	Neg	Neg	Pos			NA
Geo Pb-Pres	Neg	Neg	Pos			NA
Geo Se-Pres	Neg	Neg	Pos			NA
Geo Sn-Pres	Neg	Neg				NA
Geo V-Pres	Neg	Neg	Pos			NA
Geo Zn-Pres	Neg	Neg	Pos			NA
Ef_{Al} As-Pres	Pos	Pos	Neg			NA
Ef_{Al} Cd-Pres	Pos	Pos	Neg			NA
Ef_{Al} Co-Pres	Pos	Pos				NA
Ef_{Al} Cu-Pres		Neg	Pos	Pos		NA

Ef_{Al} Fe-Pres	Pos	Pos	Neg	Pos		NA
Ef_{Al} Mn-Pres	Pos	Pos	Neg			NA
Ef_{Al} Mo-Pres		Neg	Pos			NA
Ef_{Al} Ni-Pres	Pos	Pos	Neg		Pos	NA
Ef_{Al} Pb-Pres	Pos	Pos				NA
Ef_{Al} Se-Pres	Pos	Pos	Neg	Pos		NA
Ef_{Al} Sn-Pres	Pos	Pos	Neg			NA
Ef_{Al} V-Pres	Pos	Pos	Neg	Pos		NA
Ef_{Al} Zn-Pres		Pos	Pos	Pos		NA
Ef_{Fe} Al-Pres	Neg	Neg	Pos	Neg		NA
Ef_{Fe} As-Pres	Pos	Pos	Neg			NA
Ef_{Fe} Cd-Pres	Pos	Pos	Neg	Neg		NA
Ef_{Fe} Co-Pres		Pos				NA
Ef_{Fe} Cu-Pres	Neg	Neg	Pos	Neg		NA
Ef_{Fe} Mn-Pres	Pos	Neg	Neg			NA
Ef_{Fe} Mo-Pres	Neg	Neg	Pos			NA
Ef_{Fe} Ni-Pres	Neg	Neg	Pos			NA
Ef_{Fe} Pb-Pres	Neg	Neg	Pos			NA
Ef_{Fe} Se-Pres		Neg	Neg			NA

Ef_{Fe} Sn-Pres	Neg	Neg				NA
Ef_{Fe} V-Pres	Pos	Neg	Pos			NA
Ef_{Fe} Zn-Pres	Neg	Neg	Pos			NA
Geo Al- Rdo	Neg	Neg	Neg		Neg	NA
Geo As- Rdo	Pos	Neg		Neg		NA
Geo Cd- Rdo		Neg				NA
Geo Co-Rdo	Neg	Neg	Neg		Neg	NA
Geo Cu-Rdo	Neg	Neg	Neg		Neg	NA
Geo Fe-Rdo	Neg	Neg	Neg	Neg	Neg	NA
Geo Mn- Rdo	Neg	Neg	Neg		Neg	NA
Geo Mo-Rdo	Neg	Neg	Neg		Neg	NA
Geo Ni-Rdo	Neg	Neg	Neg		Neg	NA
Geo Pb-Rdo	Neg	Neg	Neg		Neg	NA
Geo Se-Rdo	Neg	Neg	Neg	Neg	Neg	NA
Geo Sn-Rdo	Neg	Neg		Neg	Neg	NA
Geo V-Rdo	Neg	Neg	Neg	Neg		NA
Geo Zn-Rdo	Neg	Neg	Neg		Neg	NA
Ef_{Al} As-Rdo	Pos	Pos	Pos		Pos	NA
Ef_{Al} Cd-Rdo	Pos	Pos	Pos	Neg	Pos	NA

Ef_{Al} Co-Rdo	Pos	Pos				NA
Ef_{Al} Cu-Rdo		Neg	Neg			NA
Ef_{Al} Fe-Rdo	Pos	Pos	Pos			NA
Ef_{Al} Mn-Rdo	Pos	Pos	Pos		Pos	NA
Ef_{Al} Mo-Rdo		Neg	Neg		Pos	NA
Ef_{Al} Ni-Rdo	Pos	Pos	Pos			NA
Ef_{Al} Pb-Rdo	Pos	Pos		Neg		NA
Ef_{Al} Se-Rdo	Pos	Pos	Pos		Pos	NA
Ef_{Al} Sn-Rdo	Pos	Pos	Pos		Pos	NA
Ef_{Al} V-Rdo	Pos	Pos	Pos		Pos	NA
Ef_{Al} Zn-Rdo		Pos	Neg			NA
Ef_{Fe} Al-Rdo	Neg	Neg	Neg			NA
Ef_{Fe} As-Rdo	Pos	Pos	Pos		Pos	NA
Ef_{Fe} Cd-Rdo	Pos	Pos	Pos		Pos	NA
Ef_{Fe} Co-Rdo		Pos				NA
Ef_{Fe} Cu-Rdo	Neg	Neg	Neg		Neg	NA
Ef_{Fe} Mn-Rdo	Pos	Neg	Pos	Pos	Pos	NA
Ef_{Fe} Mo-Rdo	Neg	Neg	Neg		Neg	NA
Ef_{Fe} Ni-Rdo	Neg	Neg	Neg		Neg	NA

Ef_{Fe} Pb-Rdo	Neg	Neg	Neg			NA
Ef_{Fe} Se-Rdo		Neg	Pos			NA
Ef_{Fe} Sn-Rdo	Neg	Neg		Pos		NA
Ef_{Fe} V-Rdo	Pos	Neg	Neg	Neg		NA
Ef_{Fe} Zn-Rdo	Neg	Neg	Neg		Neg	NA
Geo Al- pH	Neg	Pos				NA
Geo As- pH	Pos	Pos	Pos			NA
Geo Cd- pH		Pos	Pos			NA
Geo Co-pH	Neg	Pos				NA
Geo Cu-pH	Neg	Pos				NA
Geo Fe-pH	Neg	Pos				NA
Geo Mn- pH	Neg	Pos				NA
Geo Mo-pH	Neg	Pos				NA
Geo Ni-pH	Neg	Pos				NA
Geo Pb-pH	Neg	Pos				NA
Geo Se-pH	Neg	Pos				NA
Geo Sn-pH	Neg	Pos	Pos			NA
Geo V-pH	Neg	Pos				NA
Geo Zn-pH	Neg	Pos				NA

Ef_{Al} As-pH	Pos	Neg				NA
Ef_{Al} Cd-pH	Pos	Neg				NA
Ef_{Al} Co-pH	Pos	Neg	Neg			NA
Ef_{Al} Cu-pH		Pos		Neg		NA
Ef_{Al} Fe-pH	Pos	Neg		Neg		NA
Ef_{Al} Mn-pH	Pos	Neg				NA
Ef_{Al} Mo-pH		Pos				NA
Ef_{Al} Ni-pH	Pos	Neg			Neg	NA
Ef_{Al} Pb-pH	Pos	Neg				NA
Ef_{Al} Se-pH	Pos	Neg		Neg		NA
Ef_{Al} Sn-pH	Pos	Neg				NA
Ef_{Al} V-pH	Pos	Neg		Neg		NA
Ef_{Al} Zn-pH		Neg		Neg		NA
Ef_{Fe} Al-pH	Neg	Pos		Pos		NA
Ef_{Fe} As-pH	Pos	Neg				NA
Ef_{Fe} Cd-pH	Pos	Neg		Pos		NA
Ef_{Fe} Co-pH		Neg	Neg			NA
Ef_{Fe} Cu-pH	Neg	Pos		Pos		NA
Ef_{Fe} Mn-pH	Pos	Pos				NA

Ef_{Fe} Mo-pH	Neg	Pos				NA
Ef_{Fe} Ni-pH	Neg	Pos				NA
Ef_{Fe} Pb-pH	Neg	Pos				NA
Ef_{Fe} Se-pH		Pos				NA
Ef_{Fe} Sn-pH	Neg	Pos	Pos			NA
Ef_{Fe} V-pH	Pos	Pos				NA
Ef_{Fe} Zn-pH	Neg	Pos				NA
Geo Al- Turb	Neg	Neg		Neg	Pos	NA
Geo As- Turb	Pos	Neg	Pos		Pos	NA
Geo Cd- Turb	Neg	Neg	Pos	Neg	Pos	NA
Geo Co-Turb	Neg	Neg			Pos	NA
Geo Cu-Turb	Neg	Neg			Pos	NA
Geo Fe-Turb	Neg	Neg			Pos	NA
Geo Mn- Turb	Neg	Neg			Pos	NA
Geo Mo-Turb	Neg	Neg		Neg	Pos	NA
Geo Ni-Turb	Neg	Neg		Neg	Pos	NA
Geo Pb-Turb	Neg	Neg		Neg	Pos	NA
Geo Se-Turb	Neg	Neg			Pos	NA
Geo Sn-Turb	Neg	Neg	Pos		Pos	NA

Geo V-Turb	Neg	Neg			Pos	NA
Geo Zn-Turb	Neg	Neg			Pos	NA
Ef_{Al} As-Turb	Pos	Pos		Pos	Neg	NA
Ef_{Al} Cd-Turb	Pos	Pos			Neg	NA
Ef_{Al} Co-Turb	Pos	Pos	Neg	Pos	Neg	NA
Ef_{Al} Cu-Turb	Neg	Neg			Neg	NA
Ef_{Al} Fe-Turb	Pos	Pos			Neg	NA
Ef_{Al} Mn-Turb	Pos	Pos		Pos	Neg	NA
Ef_{Al} Mo-Turb	Neg	Neg		Neg	Pos	NA
Ef_{Al} Ni-Turb	Pos	Pos		Neg	Neg	NA
Ef_{Al} Pb-Turb	Pos	Pos			Neg	NA
Ef_{Al} Se-Turb	Pos	Pos			Neg	NA
Ef_{Al} Sn-Turb	Pos	Pos		Pos	Neg	NA
Ef_{Al} V-Turb	Pos	Pos			Neg	NA
Ef_{Al} Zn-Turb	Neg	Pos			Neg	NA
Ef_{Fe} Al-Turb	Neg	Neg			Pos	NA
Ef_{Fe} As-Turb	Pos	Pos		Neg	Neg	NA
Ef_{Fe} Cd-Turb	Pos	Pos			Neg	NA
Ef_{Fe} Co-Turb	Pos	Pos	Neg	Neg	Neg	NA

Ef_{Fe} Cu-Turb	Neg	Neg			Pos	NA
Ef_{Fe} Mn-Turb	Pos	Neg			Neg	NA
Ef_{Fe} Mo-Turb	Neg	Neg		Neg	Pos	NA
Ef_{Fe} Ni-Turb	Neg	Neg		Neg	Pos	NA
Ef_{Fe} Pb-Turb	Neg	Neg		Neg	Pos	NA
Ef_{Fe} Se-Turb	Neg	Neg		Neg	Pos	NA
Ef_{Fe} Sn-Turb	Neg	Neg	Pos		Pos	NA
Ef_{Fe} V-Turb	Pos	Neg			Pos	NA
Ef_{Fe} Zn-Turb	Neg	Neg		Neg	Pos	NA

3.5. Sedimentation Rates and Abiotic Data at Coral Reef Locations (1N, 2N, 3N, 1S, 2S, and 3S)

Sedimentation rates were determined every 78-137 days using the sediment traps located at the six reef sites. The total weight of the sediment was determined and divided by the number of collection days to calculate the rate as g/day.

The sedimentation data exhibited in Table 25 and Figs. 3-6 indicate that sedimentation was low during the summer months between May-September, ranging between 2.16 g/day at 1N to 4.15 g/day at 1S. The months between September to November and November to April had much higher rates, between 123 g/day – 387 g/day. The 1N location had the overall highest rates during the winter months.

Specific low pressure storm events were recorded beginning in November 2023 and occurred sporadically into March 2024. During the months of November 2023 – January 2024 increase wave action was evidenced by accumulation of benthic sediment covering the instrument platforms at these times and observing the historic wind, precipitation and temperature data available at: https://www.wunderground.com/history/monthly/us/fl/fort-lauderdale/KFLL/date/2024-1.

Table 25. Sedimentation rates in g/day for each of the six coral reef sites (1N, 2N, 3N, 1S, 2S, and 3S) for each period (dates).

Dates	1N	2N	3N	1S	2S	3S
5/18/23 - 9/13/23	2.16	2.53	3.24	4.15	2.24	2.83
9/13/23 - 11/29/23	341	141	157	228	139	278
11/29/23 - 04/12/24	387	123	193	169	152	245

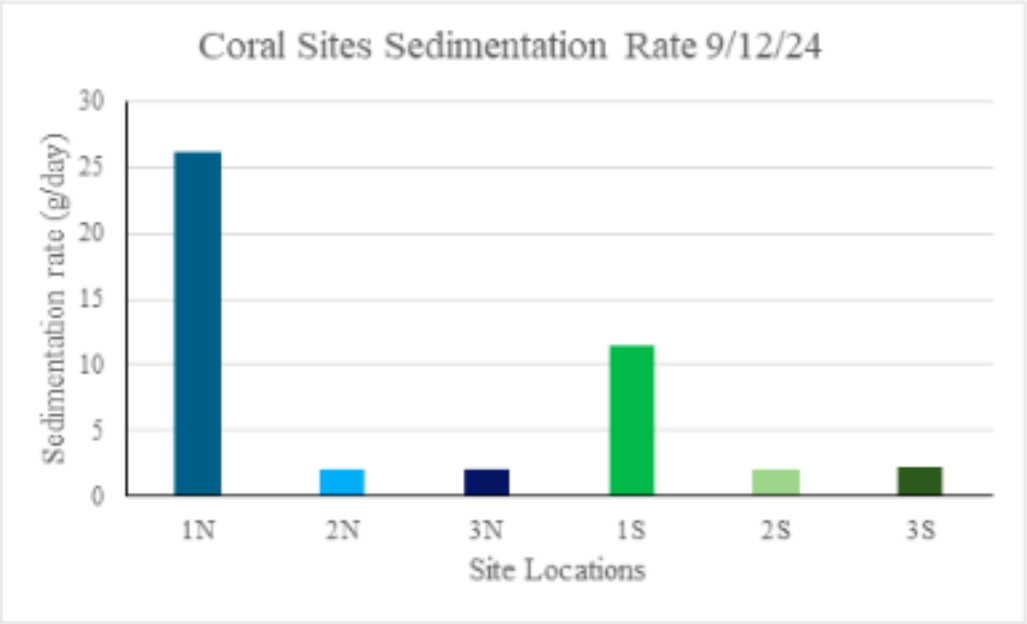

Figure 3. Sedimentation rates from all six coral locations: 1N, 2N, 3N, 1S, 2S, and 3S. Sediment tubes were deployed for 153 days for all six sites: 4/12/24 – 9/12/24.

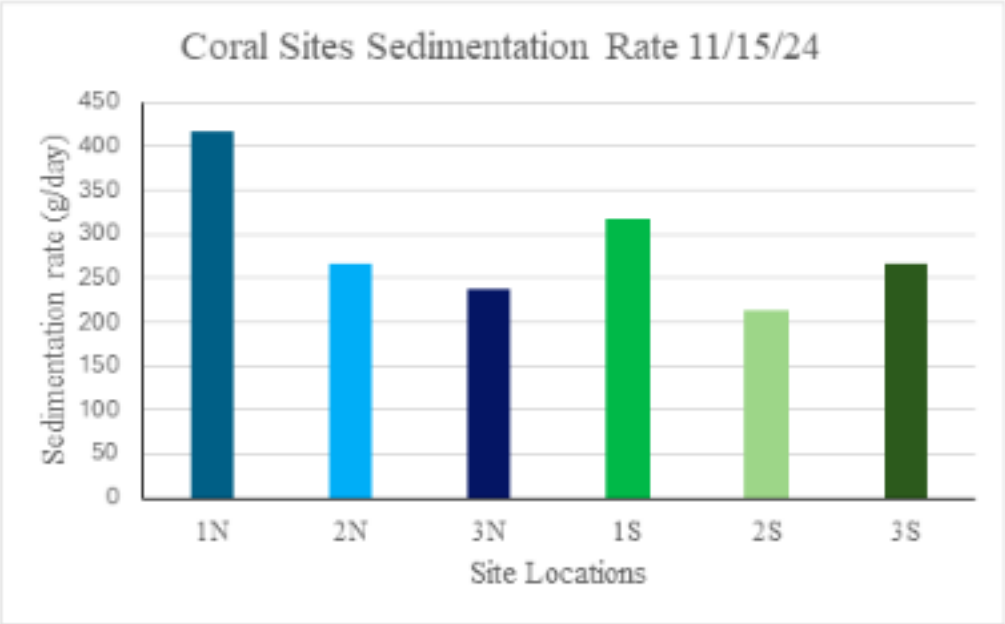

Figure 4. Sedimentation rates from all six coral locations: 1N, 2N, 3N, 1S, 2S, and 3S. Sediment tubes were deployed for 64 days for all six sites: 9/12/24 – 11/15/24.

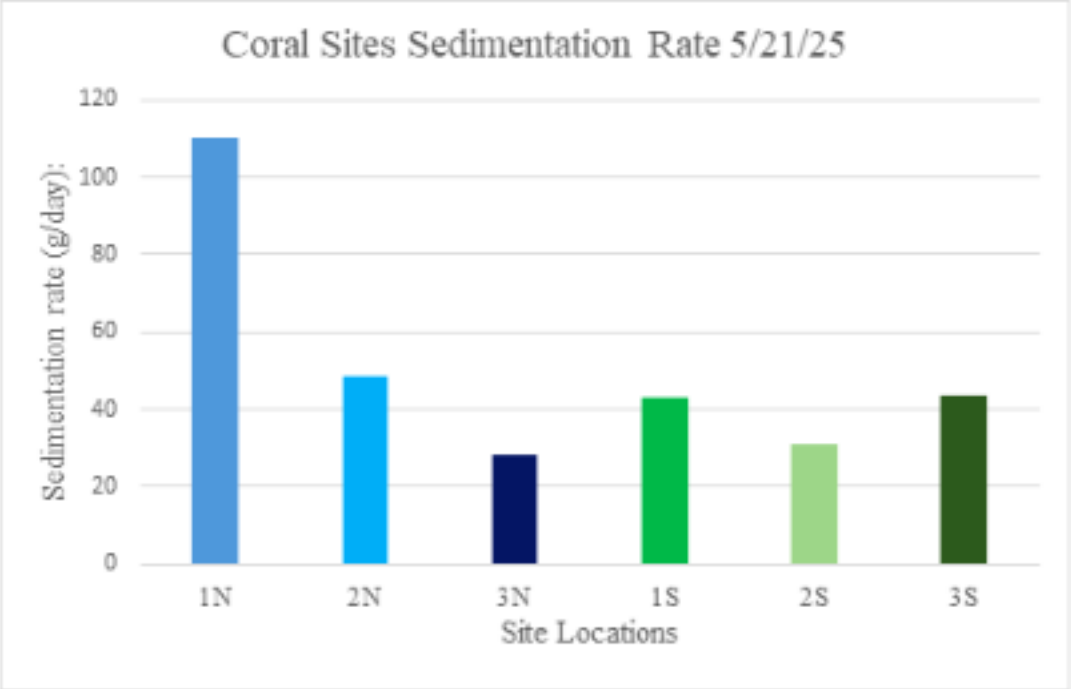

Figure 5. Sedimentation rates from all six coral locations: 1N, 2N, 3N, 1S, 2S, and 3S. Sediment tubes were deployed for 187 days for all six sites: 11/15/24 – 5/21/25.

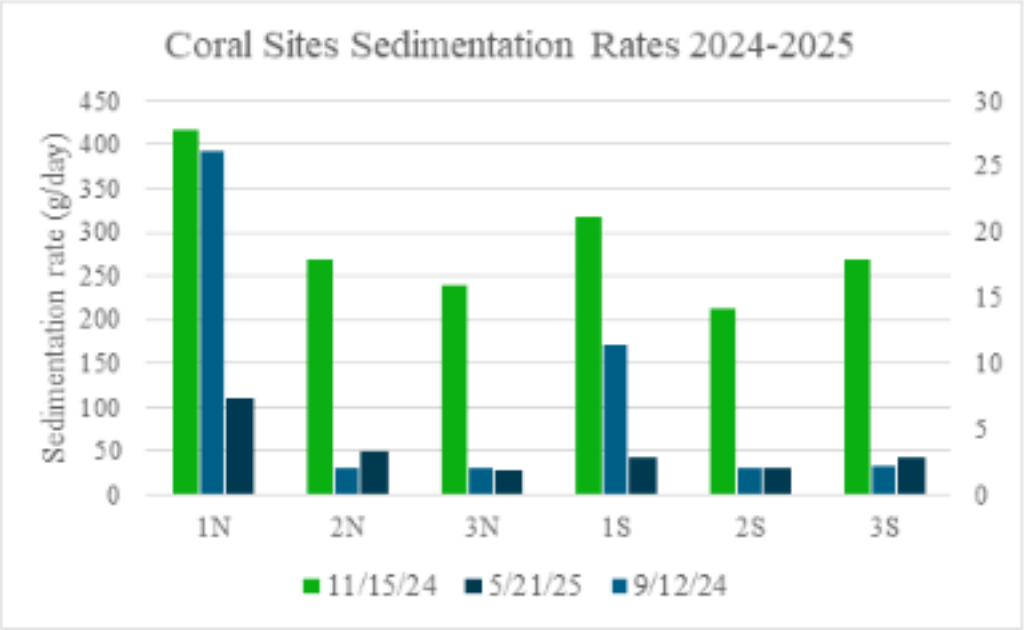

Figure 6. Sedimentation rates calculated 9/12/24, 11/15/24, and 5/21/25 from all six coral locations; 1N, 2N, 3N, 1S, 2S, and 3S. Sediment tubes were deployed for 153 days for all six sites: 4/12/24 – 9/12/24. Sediment tubes were deployed for 64 days for all six sites: 9/12/24 – 11/15/24. Sediment tubes were deployed for 187 days for all six sites: 11/15/24 – 5/21/25.

Hourly water chemistry data were collected at six reef sites to assess spatial and temporal variability in key abiotic parameters. Tables 26–41 present the full range and mean values for each site, along with summarized daily and weekly data for temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO; mg/L), pH, and turbidity (NTU). Site depths ranged from 18 to 46.5 feet, with tidal variation generally less than 1 foot.

Although a range of water quality parameters were recorded, the primary variables of interest in this study included temperature, salinity, pressure, dissolved oxygen, pH, and turbidity. These abiotic factors provided critical insight into both the physical environment of reef ecosystems and potential influences on biological production, such as coral species distribution and health. Overall, the six variables showed broadly consistent patterns and intercorrelations across the six study sites.

Benthic temperature ranged from 20.9–31.4°C at the northern sites and 19.6–37.4°C at the southern sites, with the highest values observed between June and September, exceeding temperatures in other months by 3–5°C (Fig. 7). Salinity varied from 14.6 to 40.1 PSU in the north and from 7.06-40.4 PSU in the south. Northern nearshore sites exhibited more pronounced fluctuations in salinity, likely due to the greater influence of freshwater runoff during precipitation events (Fig. 8).

Pressure readings remained stable within each site, varying primarily in response to depth and tidal cycles (Fig. 9). As expected, dissolved oxygen concentrations were inversely related to temperature (Figs. 7 and 10). RDO values ranged from 3.63–8.64 mg/L in the north and 1.12–9.52 mg/L in the south, indicating generally moderate to high oxygen saturation across sites (Fig. 10).

Ocean pH remained relatively consistent, with values ranging from 7.70-9.01 at northern sites and 7.48-9.05 at southern sites. The lowest pH values were recorded at site 1S, likely reflecting increased acidity due to coastal runoff during storm events (Fig. 11).

Turbidity values were strongly influenced by environmental conditions, particularly low-pressure storm systems that increased wave energy and sediment resuspension. NTU values ranged from 0-6,166 at northern sites and 0-12,114 at southern sites, with peak turbidity occurring during January storm events (Fig. 12). Turbidity, measured in nephelometric turbidity units (NTU), reflects the concentration of suspended particles based on light scattering versus transmission in the water column.

Natural variability in turbidity is expected due to interactions between surface and bottom currents, the nearshore countercurrent, and the offshore Florida Current. Additional drivers include tidal fluctuations, coastal runoff, sediment input from rainfall, and high wind events. These influences can be further evaluated using data from regional tide gauges and precipitation records maintained by the South Florida Water Management District.

Combining turbidity data with sediment trap analyses will support future investigations into particle size distribution and sediment dynamics, particularly in the context of dredging activities.

Occasional gaps in data collection or anomalous readings were attributed to U.S. Naval operations that required temporary removal of instrumentation, as well as minor technical issues with sensor equipment. These interruptions were minimal and did not significantly impact the overall data integrity.

Table 26. Range and mean values for each of the abiotic conditions from 1 July 2024 to 24 April 2025 at the reef sites 1N, 2N, and 3N. RDO is relative dissolved oxygen.

	1N		2N		3N	
	Range	**Mean**	**Range**	**Mean**	**Range**	**Mean**
Temperature (°C)	21.7-31.3	27.5	20.9-31.4	27.0	22.3-31.0	26.9
pH (pH)	8.11-8.48	8.27	7.70-8.50	8.28	8.06-9.01	8.28
RDO (mg/L)	4.52-8.02	6.15	3.63-8.64	5.99	4.97-8.57	6.17
Turbidity (NTU)	0-3447	6.22	0-2640	1.62	0-6166	31.67
Salinity (PSU)	14.6-39.6	36.1	17.2-37.9	36.9	20.9-40.1	38.9
Pressure (psi)	7.03-10.05	8.40	9.25-27.3	17.3	6.66-20.5	19.0

Table 27. Range and mean values for each of the abiotic conditions from 1 July 2024 to 24 April 2025 at the reef sites 1S, 2S, and 3S. RDO is relative dissolved oxygen.

	1S		2S		3S	
	Range	**Mean**	**Range**	**Mean**	**Range**	**Mean**
Temperature (°C)	22.1-37.4	28.3	22.7-34.2	26.5	19.6-31.1	27.0
pH (pH)	7.48-8.56	8.25	8.15-9.05	8.30	7.90-8.50	8.30
RDO (mg/L)	2.60-9.04	6.61	1.12-7.24	6.41	4.55-9.52	6.76
Turbidity (NTU)	0-2145	4.18	0-12114	12.44	0-872	40.4
Salinity (PSU)	15.0-38.5	37.05	7.06-40.3	37.1	25.5-40.4	38.4
Pressure (psi)	5.45-23.11	7.77	11.7-15.0	13.4	9.51-18.7	17.2

Table 28. Daily averages data logged from the Coral 1N site over the period 07/01/24-04/24/25. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Date	Temperature	Salinity	Pressure	RDO	pH	Turbidity
7/1/2024	29.7	37.7	8.39	5.82	8.22	1.56
7/2/2024	29.8	38.0	8.35	6.09	8.24	1.61
7/3/2024	30.1	38.0	8.35	6.37	8.25	1.59
7/4/2024	30.3	38.0	8.32	6.24	8.24	1.64
7/5/2024	30.3	38.0	8.31	5.87	8.23	1.66
7/6/2024	30.3	37.3	8.35	6.07	8.24	1.64
7/7/2024	30.4	37.8	8.35	6.06	8.24	1.67
7/8/2024	30.1	38.0	8.37	6.04	8.24	1.63
7/9/2024	29.8	38.3	8.36	5.79	8.24	1.57
7/10/2024	30.0	38.1	8.35	5.91	8.24	1.62
7/11/2024	29.8	37.9	8.35	5.85	8.24	1.60
7/12/2024	29.6	38.0	8.41	5.90	8.25	1.67
7/13/2024	29.8	38.0	8.36	5.92	8.25	1.64
7/14/2024	30.1	37.9	8.33	5.91	8.25	1.73
7/15/2024	30.3	38.1	8.36	6.04	8.26	1.85
7/16/2024	30.2	38.0	8.28	6.22	8.26	1.73
7/17/2024	30.2	38.1	8.25	6.24	8.26	1.91
7/18/2024	30.0	38.1	8.20	6.46	8.27	77.5
7/19/2024	29.9	38.0	8.21	6.25	8.27	1.69
7/20/2024	30.0	38.0	8.18	6.04	8.26	1.72
7/21/2024	30.1	38.1	8.27	5.98	8.26	1.71
7/22/2024	30.2	38.3	8.36	5.77	8.26	1.77
7/23/2024	30.4	38.2	8.42	5.57	8.25	1.75
7/24/2024	30.5	38.0	8.38	5.92	8.26	3.02
7/25/2024	30.7	38.2	8.35	5.96	8.27	3.08
7/26/2024	30.7	38.1	8.32	6.23	8.28	1.96
7/27/2024	30.5	38.3	8.30	6.11	8.28	1.78
7/28/2024	30.4	38.3	8.27	5.83	8.27	1.78
7/29/2024	30.2	38.2	8.28	5.92	8.27	2.31
7/30/2024	30.4	38.2	8.21	6.03	8.28	1.86
7/31/2024	30.3	38.1	8.23	6.12	8.28	1.74
8/1/2024	30.4	37.9	8.24	6.24	8.28	1.74
8/2/2024	30.3	37.9	8.23	6.10	8.28	2.94
8/3/2024	30.3	37.8	8.23	5.53	8.26	11.6
8/4/2024	30.1	37.2	8.21	5.57	8.24	7.17
8/5/2024	29.4	37.7	8.16	5.75	8.27	3.41
8/6/2024	28.7	38.0	8.19	5.86	8.28	2.33
8/7/2024	28.9	38.0	8.16	6.00	8.29	1.91

8/8/2024	29.2	38.0	8.14	5.76	8.28	1.94
8/9/2024	29.1	38.0	8.28	5.60	8.32	1.85
8/10/2024	29.7	37.8	8.25	5.78	8.33	1.91
8/11/2024	30.3	37.9	8.22	5.97	8.35	1.97
8/12/2024	30.5	38.1	8.20	6.03	8.37	2.04
8/13/2024	30.6	38.0	8.15	6.02	8.36	2.03
8/14/2024	30.7	38.1	8.17	6.00	8.37	2.03
8/15/2024	30.8	38.0	8.21	5.87	8.36	2.08
8/16/2024	30.7	37.4	8.23	5.74	8.35	2.13
8/17/2024	30.4	37.9	8.31	5.96	8.38	2.16
8/18/2024	30.5	38.1	8.35	6.05	8.39	2.12
8/19/2024	30.2	38.2	8.34	5.91	8.39	2.12
8/20/2024	30.0	38.0	8.31	5.88	8.39	2.10
8/21/2024	30.0	38.0	8.29	5.71	8.38	2.11
8/22/2024	30.0	38.1	8.30	5.70	8.38	2.11
8/23/2024	29.8	37.7	8.32	5.59	8.36	2.17
8/24/2024	29.8	37.6	8.40	5.40	8.4	2.31
8/25/2024	29.6	37.8	8.46	5.90	8.4	2.08
8/26/2024	29.7	37.7	8.43	6.00	8.4	2.58
8/27/2024	29.8	37.6	8.44	5.83	8.4	2.22
8/28/2024	30.0	37.4	8.46	5.81	8.4	2.19
8/29/2024	30.2	37.6	8.52	5.34	8.4	2.20
8/30/2024	30.2	37.3	8.49	5.47	8.4	3.00
8/31/2024	30.3	37.4	8.49	5.15	8.4	2.51
9/1/2024	30.2	37.5	8.50	5.50	8.4	8.88
9/2/2024	30.1	37.5	8.41	5.39	8.4	2.20
9/3/2024	30.1	37.4	8.45	5.60	8.40	2.19
9/4/2024	30.1	37.1	8.48	5.67	8.40	2.22
9/5/2024	30.2	37.1	8.42	5.49	8.39	2.37
9/6/2024	30.3	36.9	8.45	5.72	8.41	2.25
9/7/2024	30.4	37.0	8.50	5.97	8.43	2.33
9/8/2024	30.7	37.1	8.61	6.00	8.44	2.35
9/9/2024	30.7	37.3	8.62	5.77	8.43	2.35
9/10/2024	30.5	37.2	8.58	5.52	8.42	2.33
9/11/2024	30.7	37.3	8.60	5.66	8.44	2.36
9/12/2024	30.7	37.4	8.62	5.42	8.43	2.41
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9/23/2024	31.3	37.3	8.54	6.29	8.24	6.29
9/24/2024	31.2	37.1	8.67	5.81	8.22	5.81
9/25/2024	30.9	37.0	8.72	5.48	8.21	5.48
9/26/2024	30.1	35.6	8.71	5.65	8.16	5.65
9/27/2024	29.8	37.3	8.54	5.87	8.21	5.87
9/28/2024	29.9	37.6	8.50	5.97	8.21	5.97
9/29/2024	29.6	37.7	8.48	6.07	8.21	6.07
9/30/2024	29.7	37.7	8.51	6.15	8.21	6.15
10/1/2024	29.8	37.6	8.51	6.14	8.21	6.14
10/2/2024	29.6	37.6	8.54	5.99	8.20	5.99
10/3/2024	30.0	37.4	8.57	5.91	8.20	5.91
10/4/2024	30.0	37.2	8.56	5.48	8.18	5.48
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11/18/2024	27.1	37.2	8.51	5.97	8.18	0.24
11/19/2024	26.8	37.3	8.44	5.95	8.18	0.18
11/20/2024	26.5	37.3	8.41	6.04	8.18	0.14
11/21/2024	26.2	37.1	8.33	6.09	8.16	0.17
11/22/2024	25.4	37.1	8.14	6.12	8.17	0.36
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12/5/2024	24.1	36.8	8.33	6.62	8.22	0.11
12/6/2024	24.7	36.8	8.35	6.75	8.22	0.19
12/7/2024	24.9	36.9	8.34	6.47	8.21	0.60
12/8/2024	24.6	36.9	8.33	6.48	8.21	0.26

12/9/2024	25.0	36.8	8.35	6.32	8.20	0.33
12/10/2024	25.2	36.7	8.27	6.29	8.18	0.41
12/11/2024	25.1	36.7	8.21	6.39	8.18	6.48
12/12/2024	24.4	36.6	8.26	6.36	8.17	3.26
12/13/2024	23.0	36.4	8.31	6.53	8.15	7.16
12/14/2024	23.6	33.3	8.38	6.69	8.18	5.97
12/15/2024	24.5	28.5	8.58	6.83	8.18	11.2
12/16/2024	24.6	29.1	8.59	6.82	8.17	12.6
12/17/2024	24.9	29.7	8.46	6.73	8.17	15.7
12/18/2024	25.3	32.9	8.47	6.29	8.15	18.9
12/19/2024	25.7	32.9	8.41	6.45	8.17	13.3
12/20/2024	25.3	30.6	8.35	6.70	8.17	13.4
12/21/2024	24.6	35.1	8.44	6.70	8.18	7.99
12/22/2024	23.9	32.4	8.49	6.92	8.20	1.20
12/23/2024	24.3	30.6	8.49	6.76	8.19	0.63
12/24/2024	24.5	32.7	8.50	6.58	8.18	1.20
12/25/2024	24.0	35.9	8.54	6.56	8.18	93.4
12/26/2024	24.4	35.4	8.55	6.57	8.18	1.62
12/27/2024	24.7	31.6	8.53	6.31	8.16	3.05
12/28/2024	24.7	28.8	8.54	6.54	8.16	6.14
12/29/2024	24.1	28.9	8.40	6.64	8.15	9.00
12/30/2024	24.4	32.6	8.43	6.32	8.16	5.48
12/31/2024	25.0	34.8	8.42	6.45	8.20	6.14
1/1/2025	24.9	35.6	8.37	6.32	8.19	4.65
1/2/2025	24.6	35.9	8.44	6.72	8.20	3.77
1/3/2025	24.4	35.1	8.39	6.70	8.21	5.48
1/4/2025	23.7	35.3	8.43	6.64	8.21	2.87
1/5/2025	23.8	35.2	8.42	6.57	8.21	3.35
1/6/2025	24.2	35.0	8.33	6.48	8.20	1.80
1/7/2025	23.7	34.9	8.33	6.58	8.20	89.1
1/8/2025	23.1	34.3	8.35	6.94	8.22	1.54
1/9/2025	22.7	34.2	8.30	6.80	8.22	1.91
1/10/2025	22.4	34.4	8.39	6.92	8.23	1.96
1/11/2025	23.2	34.9	8.29	6.76	8.22	2.13
1/12/2025	23.0	33.2	8.33	6.95	8.23	39.3
1/13/2025	23.4	33.0	8.30	6.74	8.22	2.65
1/14/2025	23.3	33.9	8.32	6.74	8.22	3.62
1/15/2025	22.8	34.5	8.36	6.73	8.22	7.42
1/16/2025	22.5	30.8	8.42	6.79	8.20	8.68
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1/29/2025	23.5	34.15	8.09	6.64	8.4	7.79
1/30/2025	23.3	37.69		7.91	8.4	7.33
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3/20/2025	24.6	36.7	22.73	6.82	8.19	1.06
3/21/2025	24.0	36.3	22.86	6.42	8.19	0.00
3/22/2025	23.7	36.4	22.90	6.69	8.20	0.02
3/23/2025	23.9	35.4	22.92	6.74	8.20	0.00
3/24/2025	24.2	34.6	22.93	6.60	8.18	0.01
3/25/2025	24.6	35.4	22.92	6.43	8.18	0.04
3/26/2025	24.6	35.4	22.93	6.50	8.19	3.28
3/27/2025	25.0	36.0	22.97	6.64	8.18	1.27
3/28/2025	24.5	36.6	22.98	6.39	8.16	5.10
3/29/2025	24.2	34.5	22.97	6.47	8.14	7.26
3/30/2025	24.2	36.1	22.85	6.18	8.13	3.70
3/31/2025	24.2	31.3	22.89	6.29	8.12	5.37
4/1/2025	24.7	33.6	22.90	6.42	8.17	7.95
4/2/2025	25.3	33.8	22.90	6.53	8.15	27.65
4/3/2025	25.8	35.2	22.90	6.33	8.13	18.39
4/4/2025	25.8	36.0	22.93	6.06	8.11	22.21
4/5/2025	26.1	36.0	22.91	6.05	8.11	10.98
4/6/2025	26.1	36.4	22.91	6.06	8.10	12.31
4/7/2025	26.3	36.3	22.83	6.18	8.12	9.97
4/8/2025	26.1	35.4	22.90	5.96	8.14	5.09
4/9/2025	25.8	35.0	22.99	6.07	8.13	43.86
4/10/2025	25.7	35.2	23.07	6.19	8.14	10.98

4/11/2025	25.8	35.9	23.04	6.13	8.15	7.02
4/12/2025	25.8	36.2	23.05	6.31	8.16	7.34
4/13/2025	25.4	35.4	23.08	6.54	8.16	5.77
4/14/2025	25.5	35.6	23.05	6.37	8.17	9.16
4/15/2025	25.7	32.8	22.98	6.50	8.17	13.65
4/16/2025	25.6	35.6	23.01	7.78	8.19	12.35
4/17/2025	25.6		23.03	8.03	8.18	26.60
4/18/2025	25.4		23.07	7.93	8.17	14.89
4/19/2025	25.3		23.01	7.79	8.16	23.57
4/20/2025	25.2		22.98	7.69	8.14	21.88
4/21/2025	25.2		22.93	7.63	8.14	32.49
4/22/2025	25.2		22.94	8.05	8.17	109.02
4/23/2025	25.4		22.94	8.04	8.18	11.50
4/24/2025	25.4		21.70	7.89	8.16	17.69

Table 29. Monthly averages data logged from the Coral 1N site over the period July 2024 – April 2025. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Month	Temperature	Salinity	Pressure	RDO	pH	Turbidity
Jul-24	30.2	38.0	8.32	6.02	8.26	4.26
Aug-24	30.0	37.8	8.30	5.79	8.34	2.68
Sep-24	30.3	37.2	8.55	5.75	8.33	4.08
Oct-24	29.9	37.5	8.54	5.88	8.20	5.88
Nov-24	26.4	37.2	8.38	6.03	8.17	0.196
Dec-24	24.6	33.6	8.42	6.56	8.18	9.10
Jan-25	23.5	34.6	11.12	6.85	8.23	10.9
Feb-25	23.8	0.0130	28.4	-0.17	8.31	
Mar-25	24.29	35.31	22.91	6.50	8.17	2.33
Apr-25	25.59	35.28	22.94	6.83	8.15	20.15

Table 30. Daily averages data logged from the Coral 1S site over the period 07/01/24-04/24/25. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Date	Temperature	Salinity	Pressure	RDO	pH	Turbidity
7/1/2024						
7/2/2024	30.7	35.4	6.76	7.14	8.49	1.70
7/3/2024	30.7	35.9	6.98	6.41	8.47	1.74
7/4/2024	30.4	36.4	6.98	6.64	8.48	1.69
7/5/2024	30.9	36.3	7.02	6.86	8.47	1.75
7/6/2024	30.7	36.5	7.03	6.10	8.44	1.72
7/7/2024	30.3	36.8	7.04	6.15	8.45	1.65
7/8/2024	30.0	37.1	7.03	5.98	8.44	1.56
7/9/2024	30.3	37.0	7.02	5.78	8.42	1.63
7/10/2024	29.8	36.9	7.02	5.79	8.44	1.56
7/11/2024	29.6	36.9	7.07	6.03	8.44	1.52
7/12/2024	29.9	36.8	7.03	6.83	8.47	1.55
7/13/2024	30.4	36.4	7.00	6.37	8.44	1.66
7/14/2024	30.4	36.8	6.99	6.13	8.43	1.68
7/15/2024	30.5	36.7	6.94	6.58	8.45	1.71
7/16/2024	30.8	36.7	6.92	6.67	8.45	1.77
7/17/2024	30.9	36.7	6.86	6.47	8.44	1.78
7/18/2024	30.6	36.7	6.87	6.42	8.44	1.70
7/19/2024	30.6	36.8	6.84	6.41	8.45	1.73
7/20/2024	30.7	36.8	6.93	6.28	8.45	1.78
7/21/2024	30.3	37.1	6.99	5.51	8.42	1.69
7/22/2024	30.3	36.8	7.08	6.11	8.43	1.72
7/23/2024	30.5	36.7	7.08	6.22	8.43	1.85
7/24/2024	30.8	37.0	7.03	6.23	8.43	1.81
7/25/2024	30.9	36.8	6.96	6.27	8.44	24.1
7/26/2024	31.0	37.2	6.95	6.18	8.44	1.78
7/27/2024	30.7	37.3	6.91	5.93	8.44	1.71
7/28/2024	30.5	37.3	6.91	6.06	8.44	1.66
7/29/2024	30.5	37.1	6.87	6.05	8.44	1.66
7/30/2024	30.8	37.0	6.88	6.56	8.45	1.71
7/31/2024	30.7	36.8	6.88	6.45	8.45	1.70
8/1/2024	31.0	36.7	6.90	6.15	8.43	1.76
8/2/2024	30.7	36.7	6.90	5.66	8.41	3.72
8/3/2024	30.0	36.4	6.89	5.75	8.41	5.79
8/4/2024	29.8	36.4	6.83	5.61	8.40	2.28

8/5/2024	29.0	37.0	6.83	5.86	8.43	1.41
8/6/2024	29.0	37.0	6.79	6.04	8.44	1.34
8/7/2024	29.2	36.4	6.74	5.69	8.42	1.49
8/8/2024	29.4	37.2	6.83	5.63	8.30	1.14
8/9/2024	29.9	37.1	6.80	6.01	8.32	1.09
8/10/2024	30.1	37.0	6.78	6.20	8.33	1.14
8/11/2024	30.8	37.0	6.73	6.42	8.34	
8/12/2024	31.0	37.0	6.71	6.40	8.34	
8/13/2024	31.1	37.0	6.74	6.36	8.35	
8/14/2024	31.1	37.0	6.75	6.07	8.34	
8/15/2024	30.6	36.5	6.82	5.83	8.33	
8/16/2024	30.4	36.5	6.87	6.15	8.35	
8/17/2024	30.4	37.0	6.90	5.91	8.35	
8/18/2024	30.4	37.2	6.90	5.73	8.35	
8/19/2024	30.3	37.0	6.86	5.72	8.34	
8/20/2024	30.3	36.9	6.84	5.90	8.35	
8/21/2024	30.1	36.9	6.87	5.29	8.31	1.96
8/22/2024	30.0	36.6	6.88	4.95	8.29	1.96
8/23/2024	29.8	36.4	6.98	5.66	8.32	2.35
8/24/2024	29.7	36.5	7.02	6.14	8.34	3.34
8/25/2024	29.9	36.6	6.98	6.17	8.33	
8/26/2024	29.9	36.5	6.98	6.14	8.33	
8/27/2024	30.1	36.2	7.04	5.64	8.31	
8/28/2024	30.0	36.1	7.08	5.40	8.30	
8/29/2024	30.1	36.0	7.04	5.38	8.32	
8/30/2024	30.1	36.0	7.03	5.20	8.31	
8/31/2024	29.4	36.0	7.01	5.67	8.31	
9/1/2024	29.4	36.0	6.98	5.68	8.30	
9/2/2024	29.8	36.0	7.00	5.87	8.32	
9/3/2024	30.0	35.8	7.01	5.84	8.32	
9/4/2024	30.4	35.8	6.98	5.83	8.32	
9/5/2024	30.5	35.7	7.00	5.88	8.32	
9/6/2024	30.7	35.9	7.10	5.86	8.33	
9/7/2024	30.8	35.9	7.15	5.91	8.34	
9/8/2024	30.8	36.3	7.13	5.80	8.35	
9/9/2024	30.8	36.4	7.11	5.44	8.35	
9/10/2024	30.7	36.1	9.74	5.72	8.36	0
9/11/2024	30.6	35.9	7.09	5.50	8.33	
9/12/2024	30.6	35.9	7.09	5.50	8.33	
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9/23/2024	31.3	36.1	21.9		8.45	0.00588
9/24/2024	31.1	35.9	22.0		8.43	0.388
9/25/2024	30.7	35.7	22.0		8.37	6.94
9/26/2024	29.7	34.9	22.0		8.38	42.3
9/27/2024	29.7	36.1	21.9	6.37	8.38	81.3
9/28/2024	29.8	36.5	21.8	5.93	8.36	20.2
9/29/2024	29.9	36.8	21.8	6.55	8.38	4.61
9/30/2024	29.9	36.9	21.9	6.64	8.38	7.91
10/1/2024	30.0	36.8	21.9	6.65	8.37	8.07
10/2/2024	30.0	36.8	21.9	6.78	8.37	0.772
10/3/2024	29.9	36.8	21.9	6.90	8.39	0.136
10/4/2024	29.8	36.2	21.5	6.33	8.35	1.03
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11/18/2024	26.0	36.7	7.16	6.93	8.19	0.00
11/19/2024	25.4	36.8	7.15	7.06	8.22	0.00
11/20/2024	25.2	37.0	7.07	6.89	8.21	0.00
11/21/2024	26.2	37.2	7.00	6.84	8.22	0.00
11/22/2024	26.0	33.9	6.37	6.55	8.24	0.000156
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12/4/2024						
12/5/2024	25.4	37.9	6.96	7.30	8.05	0.00

12/6/2024	25.5	37.9	6.98	7.12	8.04	0.00
12/7/2024	25.3	37.6	7.01	7.00	8.03	0.00
12/8/2024	24.7	37.4	6.97	7.25	8.03	0.00
12/9/2024	24.3	37.2	6.97	7.22	8.02	0.00
12/10/2024	24.0	37.3	6.90	7.26	8.02	0.00
12/11/2024	24.5	37.7	6.85	7.18	8.03	0.00
12/12/2024	24.3	37.6	6.90	6.97	8.02	0.20
12/13/2024	23.8	37.3	7.00	7.12	8.01	0.26
12/14/2024	23.9	37.3	7.06	7.19	8.00	0.46
12/15/2024	24.8	37.5	7.14	7.23	8.00	1.88
12/16/2024	24.8	37.4	7.15	7.18	8.00	0.41
12/17/2024	25.1	37.4	7.08	6.88	7.99	0.51
12/18/2024	25.0	37.2	7.03	7.09	7.98	0.00
12/19/2024	25.4	37.3	6.99	7.29	7.99	0.70
12/20/2024	25.6	37.4	6.94	7.08	7.97	0.01
12/21/2024	24.9	37.3	7.01	7.55	8.00	0.10
12/22/2024	24.4	37.3	7.07	7.27	7.99	1.72
12/23/2024	24.1	37.2	7.05	7.32	7.99	6.43
12/24/2024	24.3	37.2	7.07	7.24	7.99	7.15
12/25/2024	24.7	36.9	7.09	7.09	7.99	0.00
12/26/2024	24.5	37.2	7.14	7.25	8.00	0.00
12/27/2024	24.6	36.9	7.11	7.01	7.98	0.00
12/28/2024	24.0	36.8	7.08	7.11	7.97	1.04
12/29/2024	23.6	37.1	6.99	7.27	7.97	7.37
12/30/2024	24.1	37.1	7.00	7.36	7.98	2.83
12/31/2024	24.6	37.1	7.00	7.08	7.97	0.42
1/1/2025	24.7	36.9	6.95	7.29	7.98	2.07
1/2/2025	24.6	36.6	7.01	7.31	7.98	4.35
1/3/2025	24.7	36.5	6.97	7.25	7.99	4.16
1/4/2025	24.0	36.3	7.01	7.39	8.01	3.87
1/5/2025	24.3	36.6	7.03	7.14	8.00	1.60
1/6/2025	23.3	37.2	6.93	7.35	8.01	0.02
1/7/2025	23.1	37.1	6.92	7.72	8.03	11.0
1/8/2025	23.1	37.2	6.93	7.73	8.04	0.10
1/9/2025	23.2	37.4	6.89	7.46	8.04	0.00
1/10/2025	22.5	37.4	6.96	7.34	8.04	0.02
1/11/2025	22.5	37.5	6.87	7.35	8.04	0.02
1/12/2025	22.9	37.4	6.91	7.37	8.03	0.38
1/13/2025	22.7	37.3	6.90	7.61	8.04	0.27
1/14/2025	23.3	37.5	6.91	7.23	8.03	0.62
1/15/2025	23.1	37.2	6.97	7.21	8.03	5.04

1/16/2025	23.0	37.3	6.98	6.78	8.01	3.16
1/17/2025						
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1/29/2025	23.4	38.0	6.79	7.80	8.42	0.000
1/30/2025	23.6	38.0	6.73	7.20	8.41	0.000
1/31/2025	23.5	37.9	6.65	7.16	8.40	0.000
2/1/2025	23.8	37.8	6.58	7.19	8.39	0.000
2/2/2025	24.2	37.8	6.57	7.06	8.37	0.000
2/3/2025	24.5	37.7	6.55	7.08	8.36	0.000
2/4/2025	24.6	37.5	6.60	7.21	8.21	0.000
2/5/2025	24.7	37.5	6.62	7.42	8.07	0.000
2/6/2025	24.7	37.6	6.63	7.33	8.07	0.000
2/7/2025	24.6	37.4	6.60	7.36	8.07	0.000
2/8/2025	24.6	37.4	6.68	7.59	8.09	0.235
2/9/2025	24.8	37.3	6.74	6.96	8.06	0.145
2/10/2025	24.9	37.3	6.70	7.01	8.06	0.000
2/11/2025	25.0	37.3	6.75	6.97	8.06	0.040
2/12/2025	25.0	37.6	6.73	7.01	8.06	0.000
2/13/2025	25.5	37.8	6.74	6.89	8.05	0.008
2/14/2025	25.5	37.7	6.74	6.94	8.06	0.000
2/15/2025	25.2	37.5	6.73	6.83	8.04	0.000
2/16/2025	25.3	37.7	6.73	6.70	8.04	0.025
2/17/2025	24.6	37.7	6.68	6.44	8.03	0.049
2/18/2025	24.3	37.4	6.67	6.74	8.03	0.092
2/19/2025	24.4	37.3	6.66	6.71	8.03	0.019
2/20/2025	24.5	37.4	6.70	6.80	8.05	0.126
2/21/2025	23.8	37.3	6.72	6.85	8.05	0.170
2/22/2025	23.3	37.4	6.77	7.07	8.06	0.073
2/23/2025	23.4	37.4	6.85	6.94	8.06	0.325
2/24/2025	22.8	37.3	6.90	6.78	8.05	0.715
2/25/2025	22.9	35.7	6.01	6.74	8.07	1.94

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3/20/2025	24.44	38.00	6.67	7.10	8.34	0.01
3/21/2025	24.19	38.37	6.80	6.98	8.36	0.08
3/22/2025	23.92	38.15	6.81	7.05	8.36	0.13
3/23/2025	23.99	38.08	6.83	7.17	8.37	0.02
3/24/2025	23.96	38.05	6.83	7.09	8.36	0.20
3/25/2025	24.41	38.02	6.81	6.86	8.34	0.21
3/26/2025	24.68	37.89	6.79	6.90	8.34	0.23
3/27/2025	25.06	37.79	6.81	7.08	8.34	0.44
3/28/2025	24.74	37.65	6.84	6.75	8.32	9.69
3/29/2025	24.08	37.78	6.86	6.73	8.31	13.31
3/30/2025	23.81	37.85	6.80	6.66	8.30	13.49
3/31/2025	24.00	37.70	6.88	6.71	8.30	6.33
4/1/2025	24.76	37.49	6.90	6.67	8.31	4.71
4/2/2025	25.49	37.44	6.89	6.71	8.31	7.50
4/3/2025	26.02	37.45	6.92	6.62	8.30	12.21
4/4/2025	26.24	37.44	6.94	6.48	8.29	14.35
4/5/2025	26.18	37.36	6.91	6.52	8.28	17.81
4/6/2025	26.31	37.40	6.87	6.60	8.29	19.32
4/7/2025	26.41	37.47	6.78	6.67	8.29	17.16

4/8/2025	26.43	37.42	6.81	6.25	8.29	4.52
4/9/2025	26.07	37.45	6.92	6.18	8.30	2.45
4/10/2025	25.73	37.39	7.03	6.32	8.31	5.15
4/11/2025	25.73	37.28	7.01	6.32	8.31	3.67
4/12/2025	25.92	37.33	7.00	6.57	8.32	5.51
4/13/2025	25.47	37.40	7.05	6.80	8.34	3.82
4/14/2025	25.46	37.48	7.03	7.05	8.35	2.18
4/15/2025	25.54	37.47	6.97	7.09	8.35	2.85
4/16/2025	25.87	37.62	6.99	6.78	8.33	5.58
4/17/2025	25.98	37.31	7.01	6.83	8.33	7.67
4/18/2025	25.86	37.32	7.05	7.09	8.35	16.17
4/19/2025	25.75	37.06	7.02	6.67	8.32	27.22
4/20/2025	25.38	37.16	6.99	6.57	8.31	33.48
4/21/2025	25.25	37.17	6.96	6.65	8.31	19.26
4/22/2025	25.44	36.97	6.91	6.71	8.31	19.55
4/23/2025	25.65	37.05	6.91	6.75	8.32	23.94
4/24/2025	25.89	37.04	6.68	6.89	8.32	17.52

Table 31. Monthly averages data logged from the Coral 1S site over the period July 2024 – April 2025. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Month	Temperature	Salinity	Pressure	RDO	pH	Turbidity
Jul-24	30.5	36.8	6.97	6.28	8.45	2.47
Aug-24	30.2	36.7	6.88	5.86	8.35	2.16
Sep-24	30.3	36.0	13.1	5.91	8.35	18.2
Oct-24	29.9	36.6	21.8	6.66	8.37	2.50
Nov-24	25.7	36.6	7.00	6.88	8.22	0.0000194
Dec-24	24.6	37.3	7.02	7.18	8.00	1.17
Jan-25	23.4	37.2	6.91	7.35	8.08	1.93
Feb-25	24.4	37.4	6.67	6.98	8.10	0.158
Mar-25	24.26	37.95	6.82	6.91	8.34	3.91
Apr-25	25.78	37.34	6.95	6.65	8.31	12.08

Table 32. Daily averages data logged from the Coral 2N site over the period 07/01/24-04/24/25. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Date	Temperature	Salinity	Pressure	RDO	pH	Turbidity
7/1/2024	29.7	36.9	25.6	5.44	8.12	0.00
7/2/2024	29.8	37.1	25.6	5.52	8.13	0.00
7/3/2024	30.0	37.2	25.6	5.47	8.12	0.00233
7/4/2024	30.1	37.1	25.6	5.54	8.12	0.00
7/5/2024	30.2	37.1	25.6	5.30	8.11	0.00
7/6/2024	30.2	37.2	25.6	5.49	8.13	3.24
7/7/2024	30.1	37.1	25.6	5.31	8.12	0.0159
7/8/2024	30.0	37.0	25.6	5.51	8.13	0.00
7/9/2024	29.6	37.3	25.6	5.34	8.13	0.00
7/10/2024	29.9	37.2	25.6	5.42	8.13	0.0249
7/11/2024	29.8	37.1	25.6	5.28	8.13	27.5
7/12/2024	29.6	37.1	25.6	5.39	8.14	0.00
7/13/2024	29.8	37.1	25.6	5.38	8.14	0.00
7/14/2024	30.0	37.0	25.6	5.47	8.14	0.00
7/15/2024	30.2	37.2	25.6	5.57	8.15	0.00
7/16/2024	30.1	37.0	25.5	5.73	8.15	
7/17/2024	30.0	37.1	25.5	5.68	8.15	
7/18/2024	29.7	37.1	25.4	5.70	8.15	
7/19/2024	29.7	36.8	25.4	5.58	8.15	
7/20/2024	29.8	37.1	25.4	5.50	8.15	
7/21/2024	30.0	37.0	25.5	5.41	8.15	
7/22/2024	30.2	37.3	25.6	5.25	8.15	
7/23/2024	30.3	37.2	25.7	5.11	8.14	
7/24/2024	30.4	37.1	25.6	5.42	8.16	
7/25/2024	30.6	37.3	25.6	5.57	8.16	
7/26/2024	30.6	37.2	25.5	5.58	8.16	
7/27/2024	30.2	37.3	25.5	5.64	8.17	
7/28/2024	30.1	37.4	25.5	5.11	8.15	
7/29/2024	30.1	37.3	25.5	5.48	8.17	
7/30/2024	30.2	37.2	25.4	5.48	8.16	
7/31/2024	30.0	37.2	25.5	5.49	8.16	
8/1/2024	30.3	37.0	25.5	5.64	8.18	
8/2/2024	30.0	37.2	25.5	5.53	8.17	
8/3/2024	30.2	37.0	25.4	5.20	8.16	
8/4/2024	30.0	36.6	25.5	5.04	8.14	
8/5/2024	29.1	37.0	25.4	5.25	8.17	

8/6/2024	28.5	37.1	25.4	5.44	8.18	
8/7/2024	28.8	37.0	25.4	5.35	8.17	
8/8/2024	29.2	37.0	25.3	5.30	8.17	
8/9/2024	29.1	37.1	25.5	5.02	8.26	
8/10/2024	29.8	37.0	25.5	5.26	8.27	
8/11/2024	30.2	37.1	25.5	5.38	8.28	
8/12/2024	30.4	37.2	25.4	5.50	8.30	
8/13/2024	30.5	37.1	25.4	5.39	8.29	
8/14/2024	30.6	37.1	25.4	5.50	8.30	
8/15/2024	30.5	37.1	25.4	5.48	8.30	
8/16/2024	30.5	36.6	25.5	5.24	8.29	
8/17/2024	30.3	37.1	25.5	5.53	8.32	
8/18/2024	30.4	37.2	25.6	5.42	8.32	
8/19/2024	29.9	37.2	25.6	5.28	8.31	
8/20/2024	30.0	37.1	25.5	5.11	8.31	
8/21/2024	29.9	37.1	25.5	4.99	8.30	
8/22/2024	29.8	37.2	25.5	5.13	8.31	
8/23/2024	29.8	36.9	25.6	4.95	8.30	
8/24/2024	29.6	36.9	25.6	5.12	8.32	
8/25/2024	29.6	36.9	25.7	5.37	8.33	
8/26/2024	29.5	36.9	25.7	5.46	8.33	
8/27/2024	29.7	36.8	25.7	5.37	8.33	
8/28/2024	30.0	36.6	25.7	5.37	8.33	
8/29/2024	30.3	36.7	25.8	5.08	8.34	
8/30/2024	30.2	36.5	25.7	5.08	8.34	
8/31/2024	30.3	36.6	25.7	4.66	8.33	
9/1/2024	30.2	36.7	25.7	5.06	8.36	
9/2/2024	30.0	36.7	25.7	4.97	8.35	
9/3/2024	30.0	36.5	25.7	5.12	8.36	
9/4/2024	30.0	36.3	25.7	5.06	8.36	
9/5/2024	30.1	36.3	25.6	5.02	8.36	
9/6/2024	30.3	36.0	25.7	5.28	8.37	
9/7/2024	30.4	36.2	25.7	5.37	8.39	
9/8/2024	30.6	36.2	25.8	5.43	8.40	
9/9/2024	30.6	36.4	25.8	5.19	8.40	
9/10/2024	30.6	36.2	25.8	5.03	8.39	
9/11/2024	30.6	36.4	25.8	5.25	8.41	
9/12/2024	30.7	35.4	25.4	4.93	8.39	
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9/23/2024	31.2	35.7	25.9	6.61	8.49	0.00914
9/24/2024	31.1	35.6	26.0	6.33	8.47	0.0439
9/25/2024	30.8	35.6	26.0	6.14	8.45	0.389
9/26/2024	30.1	34.8	25.9	6.00	8.40	19.0
9/27/2024	29.8	36.0	25.8	6.38	8.44	20.3
9/28/2024	29.8	36.0	25.8	6.52	8.45	0.000
9/29/2024	29.4	36.1	25.8	6.37	8.44	0.0608
9/30/2024	29.5	36.1	25.8	6.32	8.43	0.00
10/1/2024	29.7	36.0	25.8	6.31	8.43	0.0533
10/2/2024	29.5	36.0	25.8	6.42	8.44	0.00
10/3/2024	30.0	35.8	25.9	6.29	8.44	0.00
10/4/2024	29.7	34.6	24.5	6.11	8.41	0.0199
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11/12/2024						
11/13/2024						
11/14/2024						
11/15/2024						
11/16/2024						
11/17/2024						
11/18/2024	27.2	36.2	11.0	5.52	8.01	0.00
11/19/2024	26.9	36.3	11.0	5.49	8.01	0.00
11/20/2024	26.6	36.3	10.9	5.53	8.01	0.00
11/21/2024	26.4	36.2	10.8	5.52	8.01	0.00
11/22/2024	25.6	34.7	10.4	5.62	8.00	0.00
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11/28/2024						
11/29/2024						
11/30/2024						
12/1/2024						
12/2/2024						
12/3/2024						
12/4/2024						
12/5/2024	24.4	36.5	10.9	6.01	8.16	0.00
12/6/2024	24.7	36.5	10.9	5.77	8.15	0.00

12/7/2024	25.1	36.6	11.0	5.85	8.16	0.00
12/8/2024	24.8	36.6	10.9	5.92	8.17	0.00
12/9/2024	25.2	36.5	10.9	5.72	8.17	0.00
12/10/2024	25.5	36.6	10.8	5.74	8.17	0.00
12/11/2024	25.2	36.4	10.8	5.82	8.15	0.55
12/12/2024	24.4	36.4	10.8	5.83	8.16	0.01
12/13/2024	23.4	36.3	10.9	5.94	8.15	0.24
12/14/2024	24.3	36.5	11.0	5.94	8.19	0.07
12/15/2024	25.2	36.6	11.0	6.07	8.18	0.64
12/16/2024	25.0	36.6	11.0	5.92	8.17	0.02
12/17/2024	25.4	36.6	11.0	5.77	8.19	0.03
12/18/2024	25.5	36.4	10.9	5.59	8.16	0.00
12/19/2024	25.7	36.4	10.9	5.73	8.19	0.00
12/20/2024	25.4	36.3	10.9	5.81	8.18	0.00
12/21/2024	24.7	36.0	10.9	5.95	8.19	0.38
12/22/2024	24.3	36.4	11.0	6.03	8.22	0.00
12/23/2024	24.7	36.5	11.0	5.86	8.21	0.03
12/24/2024	24.7	36.3	11.0	5.80	8.19	8.80
12/25/2024	24.4	36.3	11.0	5.86	8.20	0.00
12/26/2024	24.6	36.2	11.1	5.87	8.20	0.00
12/27/2024	24.8	36.2	11.0	5.62	8.19	0.00
12/28/2024	24.7	36.4	11.0	5.71	8.22	1.07
12/29/2024	24.2	36.3	10.9	5.74	8.18	0.31
12/30/2024	24.3	36.5	10.9	5.65	8.18	0.00
12/31/2024	25.0	36.6	10.9	5.96	8.22	0.00
1/1/2025	24.9	36.5	10.9	5.84	8.21	0.00
1/2/2025	24.6	36.5	10.9	6.03	8.22	0.00
1/3/2025	24.5	36.6	10.9	6.12	8.24	0.00
1/4/2025	24.0	36.5	10.9	5.98	8.24	0.00
1/5/2025	23.6	36.6	10.9	5.94	8.24	0.00
1/6/2025	24.3	36.4	10.8	5.86	8.25	0.00
1/7/2025	23.9	36.4	10.8	5.96	8.25	0.00
1/8/2025	23.2	36.5	10.9	6.16	8.27	0.00
1/9/2025	22.9	36.6	10.8	6.07	8.27	0.00
1/10/2025	22.7	36.5	10.9	6.11	8.27	0.00
1/11/2025	23.4	36.5	10.8	6.18	8.27	0.00
1/12/2025	23.2	36.4	10.8	6.19	8.27	0.00
1/13/2025	23.5	36.5	10.8	6.14	8.27	0.00
1/14/2025	23.5	36.5	10.8	6.25	8.28	0.00
1/15/2025	22.9	36.5	10.9	6.09	8.27	0.19
1/16/2025	22.6	36.5	10.8	6.01	8.27	0.00

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1/28/2025						
1/29/2025	23.5	37.6	10.6	7.38	8.36	0.00
1/30/2025	23.4	37.5	10.6	7.37	8.36	0.00
1/31/2025	23.5	37.5	10.5	7.03	8.35	0.00
2/1/2025	23.6	37.5	10.5	6.90	8.36	0.00
2/2/2025	23.9	37.4	10.5	7.04	8.36	0.00
2/3/2025	23.9	37.4	10.4	6.98	8.36	0.00
2/4/2025	24.1	37.3	10.5	7.06	8.37	0.00
2/5/2025	24.2	37.4	10.5	7.11	8.37	0.00
2/6/2025	24.2	37.4	10.5	7.09	8.38	0.00
2/7/2025	24.4	37.4	10.5	7.28	8.39	0.00
2/8/2025	24.5	37.4	10.6	7.16	8.40	0.00
2/9/2025	24.7	37.4	10.6	6.90	8.39	0.00
2/10/2025	24.6	37.4	10.6	6.82	8.39	0.00
2/11/2025	24.7	37.4	10.6	6.80	8.39	0.00
2/12/2025	24.7	37.4	10.6	6.81	8.39	0.00
2/13/2025	24.8	37.4	10.6	6.83	8.40	0.00
2/14/2025	24.7	37.4	10.6	6.70	8.39	0.00
2/15/2025	24.8	37.2	10.6	6.85	8.40	0.00
2/16/2025	24.4	37.4	10.6	6.70	8.39	0.00
2/17/2025	24.0	37.4	10.5	6.64	8.39	0.00
2/18/2025	24.1	37.4	10.5	6.89	8.40	0.00
2/19/2025	24.3	37.3	10.5	6.75	8.40	0.00
2/20/2025	24.3	37.2	10.6	6.76	8.40	0.00
2/21/2025	23.6	37.3	10.6	6.82	8.40	1.88
2/22/2025	23.1	37.3	10.7	6.93	8.40	0.00
2/23/2025	23.8	37.4	10.8	6.93	8.42	0.00
2/24/2025	23.8	37.3	10.8	6.76	8.41	3.23
2/25/2025	23.5	34.1	8.22	6.87	8.42	9.21
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3/15/2025						
3/16/2025						
3/17/2025						
3/18/2025						
3/19/2025						
3/20/2025	24.55	37.81	10.46	7.06	8.33	0.00
3/21/2025	24.12	37.82	10.65	6.76	8.33	0.00
3/22/2025	23.75	37.80	10.65	6.91	8.34	0.00
3/23/2025	23.90	37.80	10.68	6.98	8.35	0.00
3/24/2025	24.25	37.72	10.67	6.92	8.35	0.00
3/25/2025	24.57	37.75	10.65	6.91	8.36	0.00
3/26/2025	24.57	37.73	10.63	6.71	8.35	0.00
3/27/2025	24.96	37.72	10.65	6.91	8.35	0.00
3/28/2025	24.73	37.66	10.67	6.87	8.34	1.19
3/29/2025	24.32	37.56	10.64	6.73	8.32	8.23
3/30/2025	24.24	37.54	10.65	6.55	8.31	1.43
3/31/2025	24.09	37.52	10.70	6.43	8.30	0.06
4/1/2025	24.67	37.52	10.72	6.59	8.34	0.00
4/2/2025	25.26	37.42	10.72	6.80	8.34	0.08
4/3/2025	25.61	37.36	10.71	6.73	8.33	1.87
4/4/2025	25.83	37.22	10.72	6.42	8.30	1.85
4/5/2025	25.96	37.32	10.70	6.40	8.30	3.03
4/6/2025	26.07	37.36	10.68	6.44	8.30	1.61
4/7/2025	26.07	37.48	10.59	6.46	8.32	0.79
4/8/2025	26.11	37.53	10.62	6.33	8.33	3.30

4/9/2025	25.89	37.44	10.70	6.42	8.33	0.04
4/10/2025	25.79	37.44	10.82	6.53	8.34	1.66
4/11/2025	25.72	37.38	10.81	6.42	8.33	2.21
4/12/2025	25.78	37.41	10.79	6.60	8.34	0.12
4/13/2025	25.47	37.52	10.84	6.80	8.35	0.01
4/14/2025	25.52	37.51	10.82	6.66	8.35	0.04
4/15/2025	25.64	37.48	10.76	6.72	8.35	0.27
4/16/2025	25.76	37.59	10.78	6.94	8.38	0.73
4/17/2025	25.87	37.55	10.81	6.98	8.37	2.76
4/18/2025	25.78	37.42	10.86	6.79	8.36	3.51
4/19/2025	25.62	37.53	10.78	6.77	8.36	10.12
4/20/2025	25.57	37.34	10.74	6.41	8.34	15.28
4/21/2025	25.52	37.33	10.74	6.69	8.35	17.78
4/22/2025	25.52	37.39	10.70	6.78	8.36	20.22
4/23/2025	25.57	37.41	10.68	6.76	8.37	16.31
4/24/2025	25.69	37.39	10.67	6.75	8.37	17.14

Table 33. Monthly averages data logged from the Coral 2N site over the period July 2024 – April 2025. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Month	Temperature	Salinity	Pressure	RDO	pH	Turbidity
Jul-24	30.0	37.1	25.6	5.46	8.14	2.05
Aug-24	29.9	37.0	25.5	5.27	8.27	
Sep-24	30.3	36.1	25.8	5.58	8.40	5.69
Oct-24	29.6	36.0	25.8	6.34	8.44	0.0133
Nov-24	26.6	36.1	10.9	5.53	8.01	0
Dec-24	24.8	36.4	10.9	5.83	8.18	0.45
Jan-25	23.6	36.7	10.8	6.25	8.27	0.01
Feb-25	24.2	37.2	10.5	6.90	8.39	0.573
Mar-25	24.32	37.70	10.65	6.80	8.34	0.97
Apr-25	25.68	37.43	10.74	6.63	8.34	4.82

Table 34. Daily averages data logged from the Coral 2S site over the period 07/01/24-04/24/25. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Date	Temperature	Salinity	Pressure	RDO	pH	Turbidity
7/1/2024						
7/2/2024						
7/3/2024						
7/4/2024						
7/5/2024						
7/6/2024						
7/7/2024						
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7/10/2024						
7/11/2024						
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7/28/2024						
7/29/2024						
7/30/2024						
7/31/2024						
8/1/2024						
8/2/2024						
8/3/2024	30.4	36.7	13.5	5.29	8.25	3.31
8/4/2024	30.0	36.2	13.3	5.08	8.23	4.35
8/5/2024	29.2	36.8	13.3	5.39	8.26	4.35

8/6/2024	28.3	37.0	13.3	5.52	8.27	2.43
8/7/2024	28.7	36.9	13.3	5.51	8.27	2.70
8/8/2024	29.2	36.9	13.3	5.44	8.27	9.82
8/9/2024	29.3	37.3	13.2	5.25	8.26	2.79
8/10/2024	29.7	37.3	13.2	5.43	8.29	2.96
8/11/2024	30.3	37.4	13.2	5.76	8.32	3.16
8/12/2024	30.4	37.4	13.2	5.42	8.31	3.20
8/13/2024	30.4	37.4	13.1	5.55	8.32	3.25
8/14/2024	30.5	37.4	13.1	5.68	8.33	3.38
8/15/2024	30.3	37.4	13.2	5.65	8.33	3.25
8/16/2024	30.0	37.1	13.2	5.34	8.32	3.21
8/17/2024	30.3	37.3	13.3	5.61	8.35	4.78
8/18/2024	30.2	37.4	13.3	5.50	8.35	3.27
8/19/2024	29.8	37.4	13.3	5.36	8.34	3.28
8/20/2024	29.7	37.3	13.3	5.12	8.33	3.33
8/21/2024	29.7	37.3	13.3	5.16	8.33	3.35
8/22/2024	29.4	37.3	13.3	5.17	8.33	3.26
8/23/2024	29.6	37.1	13.3	5.02	8.29	3.38
8/24/2024	29.7	37.0	13.4	5.29	8.30	3.38
8/25/2024	29.6	36.9	13.4	5.48	8.29	32.0
8/26/2024	29.5	37.0	13.4	5.54	8.29	3.39
8/27/2024	29.7	36.9	13.4	5.65	8.30	3.45
8/28/2024	30.1	36.9	13.4	5.43	8.29	3.62
8/29/2024	30.3	36.9	13.5	5.32	8.29	3.70
8/30/2024	30.2	36.8	13.5	5.38	8.31	3.71
8/31/2024	30.1	36.7	13.4	5.24	8.29	3.75
9/1/2024	29.8	36.5	13.5	5.14	8.27	3.66
9/2/2024	30.0	36.7	13.4	5.21	8.30	3.72
9/3/2024	29.9	36.7	13.4	5.17	8.29	3.70
9/4/2024	30.0	36.6	13.4	5.24	8.29	3.73
9/5/2024	30.1	36.7	13.4	5.52	8.31	3.81
9/6/2024	30.2	36.6	13.4	5.35	8.30	4.53
9/7/2024	30.3	37.0	13.5	5.45	8.32	3.94
9/8/2024	30.6	36.9	13.6	5.36	8.34	4.05
9/9/2024	30.6	37.0	13.6	5.27	8.37	4.04
9/10/2024	30.7	37.0	13.5	5.31	8.40	4.07
9/11/2024	30.7	37.2	13.6	5.26	8.39	4.14
9/12/2024	30.7	37.2	13.6	4.89	8.37	4.52
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9/22/2024						
9/23/2024	31.1	36.6	13.7	6.47	8.41	2.90
9/24/2024	31.0	36.5	13.8	6.16	8.40	2.89
9/25/2024	30.8	36.4	13.8	5.91	8.38	2.85
9/26/2024	30.2	35.8	13.7	6.57	8.34	34.5
9/27/2024	29.7	36.7	13.7	6.62	8.36	8.74
9/28/2024	29.6	36.8	13.6	6.12	8.37	2.52
9/29/2024	29.3	36.9	13.6	5.78	8.37	2.44
9/30/2024	29.3	36.8	13.6	6.25	8.36	2.46
10/1/2024	29.4	36.7	13.6	6.54	8.36	2.54
10/2/2024	29.5	36.7	13.6	6.53	8.36	2.58
10/3/2024	29.6	36.6	13.7	6.85	8.38	2.64
10/4/2024	29.7	35.1	12.4	6.40	8.35	2.69
10/5/2024						
10/6/2024						
10/7/2024						
10/8/2024						
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11/12/2024						
11/13/2024						
11/14/2024						
11/15/2024						
11/16/2024						
11/17/2024						
11/18/2024	27.0	37.2	13.8	6.59	8.26	0.00
11/19/2024	26.8	37.1	13.6	6.64	8.26	0.00
11/20/2024	26.0	36.9	13.5	6.66	8.25	0.00
11/21/2024	26.9	37.1	13.5	6.52	8.25	0.00
11/22/2024	27.0	32.2	11.6	6.65	8.28	0.00
11/23/2024						
11/24/2024						
11/25/2024						
11/26/2024						
11/27/2024						
11/28/2024						
11/29/2024						
11/30/2024						
12/1/2024						
12/2/2024						
12/3/2024						
12/4/2024						
12/5/2024	25.8	37.5	13.4	7.24	8.33	0.00
12/6/2024	26.0	37.5	13.4	6.82	8.31	0.00

12/7/2024	25.8	37.4	13.4	6.80	8.30	0.00
12/8/2024	25.6	37.4	13.4	6.83	8.30	0.00
12/9/2024	25.3	37.3	13.4	6.82	8.29	0.00
12/10/2024	25.5	37.5	13.3	6.79	8.30	0.00
12/11/2024	25.3	37.4	13.3	6.85	8.29	0.00
12/12/2024	24.8	37.3	13.4	6.84	8.29	0.00
12/13/2024	24.8	37.2	13.4	6.85	8.28	0.00
12/14/2024	25.4	37.3	13.5	6.83	8.29	0.00
12/15/2024	25.6	37.3	13.5	6.87	8.28	0.63
12/16/2024	25.3	36.8	13.6	6.95	8.28	0.00
12/17/2024	25.7	37.4	13.6	6.81	8.28	0.00
12/18/2024	25.6	37.3	13.5	6.76	8.27	0.00
12/19/2024	25.6	37.3	13.5	6.95	8.28	0.00
12/20/2024	25.8	37.4	13.4	6.92	8.29	0.00
12/21/2024	25.4	37.3	13.5	6.87	8.29	0.00
12/22/2024	25.2	37.4	13.6	6.89	8.29	0.00
12/23/2024	25.0	37.4	13.5	6.88	8.30	0.00
12/24/2024	25.1	37.3	13.6	6.83	8.29	0.00
12/25/2024	25.3	37.3	13.6	6.80	8.29	0.00
12/26/2024	25.1	37.4	13.6	6.76	8.29	0.00
12/27/2024	25.1	37.4	13.6	6.79	8.29	0.00
12/28/2024	24.6	37.3	13.6	6.78	8.28	9.31
12/29/2024	24.3	37.4	13.5	6.76	8.27	0.00
12/30/2024	24.5	37.3	13.5	6.78	8.28	0.00
12/31/2024	24.8	35.3	13.5	6.87	8.29	0.00
1/1/2025	24.9	37.4	13.4	6.86	8.30	1.98
1/2/2025	25.0	37.3	13.5	6.85	8.30	12.2
1/3/2025	25.1	37.3	13.5	6.87	8.30	16.8
1/4/2025	24.8	37.3	13.5	6.94	8.31	27.1
1/5/2025	24.8	37.4	13.5	6.89	8.32	37.5
1/6/2025	24.2	37.3	13.4	6.94	8.31	54.4
1/7/2025	24.1	37.3	13.4	6.98	8.31	22.9
1/8/2025	24.1	37.3	13.4	7.01	8.32	2.78
1/9/2025	23.8	37.3	13.4	7.03	8.32	0.00
1/10/2025	23.5	37.4	13.5	6.94	8.32	0.00
1/11/2025	23.1	37.2	13.4	7.06	8.32	0.00
1/12/2025	23.6	37.2	13.4	7.09	8.33	0.00
1/13/2025	23.4	37.1	13.4	7.23	8.33	0.00
1/14/2025	23.7	37.1	13.4	7.01	8.33	983
1/15/2025	23.4	36.8	13.4	7.00	8.32	0.00
1/16/2025	23.5	37.0	13.4	6.80	8.32	42.8

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1/23/2025						
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1/25/2025						
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1/27/2025						
1/28/2025						
1/29/2025	23.6	37.6	13.4	7.25	8.39	0.000
1/30/2025	23.6	37.5	13.3	6.96	8.29	0.008
1/31/2025	23.5	37.8	13.2	7.03	8.29	6.85
2/1/2025	23.6	37.8	13.2	7.00	8.28	0.000
2/2/2025	23.8	37.6	13.1	6.97	8.28	0.000
2/3/2025	23.9	37.6	13.1	6.96	8.27	0.010
2/4/2025	24.0	37.4	13.2	7.00	8.27	0.000
2/5/2025	24.2	37.4	13.2	7.11	8.27	0.000
2/6/2025	24.3	37.1	13.2	7.11	8.27	0.000
2/7/2025	24.3	37.1	13.2	7.02	8.27	0.000
2/8/2025	24.3	36.5	13.3	7.06	8.27	0.020
2/9/2025	24.5	36.8	13.3	6.89	8.27	0.003
2/10/2025	24.5	37.0	13.3	6.80	8.27	0.000
2/11/2025	24.6	37.0	13.3	6.81	8.26	0.000
2/12/2025	24.6	37.4	13.3	6.68	8.27	0.014
2/13/2025	24.7	37.3	13.3	6.76	8.26	0.015
2/14/2025	24.4	37.4	13.3	6.68	8.26	0.000
2/15/2025	24.6	37.4	13.3	6.77	8.26	0.002
2/16/2025	24.6	37.4	13.3	6.68	8.26	0.006
2/17/2025	23.8	37.2	13.2	6.73	8.26	0.001
2/18/2025	24.1	37.3	13.2	6.77	8.27	0.000
2/19/2025	24.3	37.2	13.2	6.78	8.27	0.017
2/20/2025	24.4	37.2	13.2	6.80	8.27	0.000
2/21/2025	24.1	37.2	13.3	6.84	8.28	0.000
2/22/2025	24.0	37.4	13.3	6.85	8.28	0.011
2/23/2025	23.9	37.3	13.4	6.84	8.28	0.000
2/24/2025	23.7	37.3	13.4	6.75	8.28	0.017
2/25/2025	23.9	34.9	11.5	6.71	8.30	60.9
2/26/2025						

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2/28/2025						
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3/17/2025						
3/18/2025						
3/19/2025						
3/20/2025	24.47	38.02	13.10	6.83	8.32	2.47
3/21/2025	24.19	37.69	13.20	6.90	8.33	2.42
3/22/2025	24.08	37.57	13.21	7.02	8.34	2.43
3/23/2025	24.22	37.77	13.24	6.89	8.33	2.45
3/24/2025	24.38	37.72	13.25	6.99	8.33	2.56
3/25/2025	24.54	37.68	13.24	6.80	8.32	2.62
3/26/2025	24.75	37.58	13.24	6.82	8.31	2.85
3/27/2025	25.19	37.53	13.27	6.75	8.31	2.90
3/28/2025	24.83	37.42	13.27	6.70	8.30	4.92
3/29/2025	24.39	37.48	13.28	6.47	8.28	6.54
3/30/2025	24.27	37.13	13.17	6.36	8.26	4.91
3/31/2025	24.21	36.66	13.23	6.42	8.26	3.24
4/1/2025	24.90	37.26	13.22	6.62	8.30	3.17
4/2/2025	25.31	36.87	13.20	6.79	8.30	3.41
4/3/2025	25.68	36.30	13.23	6.62	8.28	5.88
4/4/2025	25.88	36.20	13.22	6.55	8.27	364.05
4/5/2025	26.06	35.90	13.23	6.44	8.26	5.30
4/6/2025	26.18	35.75	13.22	6.44	8.25	4.73
4/7/2025	26.29	36.19	13.15	6.51	8.27	4.11
4/8/2025	26.23	37.00	13.21	6.26	8.29	3.96

4/9/2025	26.12	36.56	13.30	6.40	8.29	3.94
4/10/2025	25.91	36.60	13.42	6.46	8.29	4.16
4/11/2025	26.04	36.56	13.37	6.57	8.31	4.58
4/12/2025	26.06	37.06	13.36	6.63	8.31	3.93
4/13/2025	25.76	36.66	13.39	6.65	8.31	3.87
4/14/2025	25.70	36.32	13.36	6.69	8.31	3.88
4/15/2025	25.84	36.81	13.30	6.79	8.31	3.97
4/16/2025	26.00	36.38	13.33	6.87	8.32	4.20
4/17/2025	26.07	36.29	13.33	6.81	8.32	4.21
4/18/2025	25.90	36.71	13.37	6.81	8.33	4.25
4/19/2025	25.77	36.19	13.33	6.62	8.31	5.15
4/20/2025	25.63	36.40	13.28	6.79	8.32	4.88
4/21/2025	25.65	36.31	13.26	6.76	8.32	4.66
4/22/2025	25.79	36.42	13.25	6.77	8.31	4.49
4/23/2025	25.89	36.49	13.25	7.05	8.33	4.49
4/24/2025	25.82	36.51	13.31	6.75	8.32	4.55

Table 35. Monthly averages data logged from the Coral 2S site over the period July 2024 – April 2025. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Month	Temperature	Salinity	Pressure	RDO	pH	Turbidity
Jul-24						
Aug-24	29.8	37.1	13.3	5.40	8.30	4.61
Sep-24	30.2	36.7	13.6	5.65	8.35	5.36
Oct-24	29.5	36.3	13.3	6.58	8.36	2.61
Nov-24	26.7	36.4	13.3	6.61	8.26	0.00
Dec-24	25.3	37.3	13.5	6.85	8.29	0.37
Jan-25	24.0	37.3	13.4	6.99	8.32	63.6
Feb-25	24.2	37.2	13.2	6.86	8.27	2.44
Mar-25	24.46	37.50	13.23	6.74	8.31	3.40
Apr-25	25.85	36.49	13.29	6.65	8.30	19.67

Table 36. Daily averages data logged from the Coral 3N site over the period 07/01/24-04/24/25. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Date	Temperature	Salinity	Pressure	RDO	pH	Turbidity
7/1/2024	29.6	39.8	19.1	5.96	8.20	0.31
7/2/2024	29.5	39.9	19.1	6.03	8.21	0.40
7/3/2024	29.6	39.9	19.1	6.11	8.21	0.29
7/4/2024	29.6	39.9	19.0	6.17	8.21	0.11
7/5/2024	29.7	39.9	19.0	6.16	8.21	0.34
7/6/2024	29.6	39.9	19.1	6.21	8.21	0.59
7/7/2024	29.6	39.9	19.1	6.18	8.21	1.02
7/8/2024	29.5	39.9	19.1	6.31	8.22	5.00
7/9/2024	29.2	40.0	19.1	6.27	8.22	9.01
7/10/2024	29.6	40.0	19.1	6.07	8.21	1.20
7/11/2024	29.7	39.9	19.1	6.12	8.22	0.00
7/12/2024	29.5	39.9	19.1	6.15	8.22	0.00
7/13/2024	29.6	39.9	19.1	6.14	8.22	0.00
7/14/2024	29.8	40.0	19.1	6.14	8.22	0.00
7/15/2024	29.3	40.0	19.1	6.15	8.22	0.00
7/16/2024	29.5	40.0	19.0	6.25	8.23	0.00
7/17/2024	29.2	40.0	19.0	6.34	8.23	0.00
7/18/2024	28.7	39.9	18.9	6.40	8.23	0.00
7/19/2024	29.2	39.9	18.9	6.19	8.23	0.00
7/20/2024	29.2	39.9	18.9	6.16	8.23	0.00
7/21/2024	29.8	39.9	19.0	6.15	8.23	0.00
7/22/2024	30.1	40.1	19.1	6.04	8.23	0.00
7/23/2024	30.1	40.0	19.1	6.04	8.23	0.00
7/24/2024	30.2	40.0	19.1	6.31	8.25	0.00
7/25/2024	30.2	40.0	19.1	6.23	8.24	0.00
7/26/2024	30.3	39.9	19.0	6.17	8.24	0.00
7/27/2024	29.7	40.0	19.0	6.48	8.25	0.00
7/28/2024	29.1	40.0	19.0	6.21	8.24	0.00
7/29/2024	29.0	40.0	19.0	6.33	8.25	0.00
7/30/2024	29.0	39.9	18.9	6.34	8.25	0.00
7/31/2024	28.5	39.8	19.0	6.27	8.25	0.00
8/1/2024	29.1	39.8	19.0	6.31	8.25	0.00
8/2/2024	29.3	39.8	19.0	6.33	8.25	0.00
8/3/2024	30.0	39.8	18.9	6.00	8.25	0.00
8/4/2024	29.2	39.8	19.0	6.10	8.25	0.00

8/5/2024	28.5	39.8	18.9	5.93	8.24	0.00
8/6/2024	28.0	39.8	18.9	6.02	8.25	0.00
8/7/2024	28.7	39.7	18.9	6.19	8.25	0.00
8/8/2024	29.0	39.7	18.7	5.93	8.25	0.00
8/9/2024	29.1	39.9	18.9	5.99	8.25	
8/10/2024	29.8	39.9	18.9	6.10	8.27	0.00
8/11/2024	30.1	39.9	18.8	6.12	8.27	0.00
8/12/2024	29.9	40.0	18.8	6.06	8.27	
8/13/2024	30.0	40.0	18.8	6.14	8.27	
8/14/2024	29.6	40.0	18.8	6.36	8.27	
8/15/2024	29.3	39.9	18.8	6.18	8.26	
8/16/2024	29.4	39.7	18.8	6.09	8.26	
8/17/2024	30.1	39.9	18.9	6.18	8.28	
8/18/2024	29.2	39.9	19.0	6.18	8.28	
8/19/2024	29.2	39.9	19.0	5.88	8.26	
8/20/2024	29.3	39.8	18.9	5.80	8.26	
8/21/2024	29.2	39.8	18.9	5.92	8.27	
8/22/2024	29.0	39.8	18.9	5.68	8.25	
8/23/2024	29.4	39.7	18.9	5.68	8.25	
8/24/2024	29.0	39.7	19.0	5.98	8.27	
8/25/2024	29.0	39.7	19.1	6.30	8.29	
8/26/2024	29.0	39.6	19.0	6.14	8.28	
8/27/2024	29.5	39.5	19.0	6.17	8.28	
8/28/2024	30.1	39.4	19.1	6.08	8.28	
8/29/2024	30.3	39.4	19.1	5.98	8.30	
8/30/2024	30.2	39.4	19.1	5.95	8.30	
8/31/2024	30.3	39.5	19.1	5.78	8.30	
9/1/2024	30.3	39.5	19.1	5.68	8.30	
9/2/2024	30.1	39.6	19.0	5.87	8.30	
9/3/2024	29.9	39.5	19.0	5.77	8.29	
9/4/2024	29.6	39.4	19.1	5.80	8.29	
9/5/2024	29.9	39.3	19.0	6.00	8.31	
9/6/2024	30.0	39.2	19.1	6.08	8.31	
9/7/2024	30.2	39.1	19.1	6.15	8.33	
9/8/2024	30.5	39.1	19.2	6.07	8.33	
9/9/2024	30.5	39.2	19.2	5.90	8.32	
9/10/2024	30.7	39.1	19.2	5.99	8.34	
9/11/2024	30.6	39.4	19.2	6.02	8.33	
9/12/2024	30.5	38.6	18.1	5.86	8.32	
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9/23/2024	31.0	36.9	19.4	6.61	8.36	0.00
9/24/2024	30.9	36.9	19.4	6.28	8.34	0.00
9/25/2024	30.8	36.7	19.4	6.30	8.33	0.00
9/26/2024	30.3	36.5	19.4	6.18	8.31	8.26
9/27/2024	29.6	37.2	19.3	6.48	8.31	10.69
9/28/2024	29.3	37.1	19.2	6.41	8.30	0.11
9/29/2024	28.8	37.2	19.2	6.40	8.29	0.04
9/30/2024	29.0	36.9	19.3	6.45	8.30	0.10
10/1/2024	29.2	36.9	19.3	6.43	8.29	0.42
10/2/2024	29.3	37.0	19.3	6.41	8.30	0.86
10/3/2024	29.7	36.9	19.3	6.53	8.31	1.20
10/4/2024	29.2	36.0	15.9	6.45	8.29	1.19
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11/13/2024						
11/14/2024						
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11/16/2024						
11/17/2024						
11/18/2024	27.4	37.2	19.4	5.71	8.22	0.00
11/19/2024	27.1	37.2	19.4	5.69	8.21	0.00
11/20/2024	26.9	37.2	19.3	5.72	8.21	0.00
11/21/2024	26.9	37.1	19.2	5.75	8.20	0.00
11/22/2024	26.6	35.6	18.0	5.74	8.22	0.00
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11/29/2024						
11/30/2024						
12/1/2024						
12/2/2024						
12/3/2024						
12/4/2024						
12/5/2024	25.5	37.6	19.1	6.15	8.29	0.00

12/6/2024	26.2	37.5	19.1	5.93	8.27	0.00
12/7/2024	25.9	37.5	19.1	5.91	8.27	0.00
12/8/2024	25.5	37.5	19.1	5.92	8.27	0.00
12/9/2024	25.7	37.5	19.1	5.91	8.26	0.00
12/10/2024	25.7	37.5	19.0	5.87	8.26	0.00
12/11/2024	25.5	37.5	19.0	5.91	8.26	0.00
12/12/2024	24.9	37.4	19.0	5.94	8.25	0.07
12/13/2024	24.4	37.4	19.1	5.99	8.26	0.68
12/14/2024	25.7	37.5	19.2	5.91	8.26	0.17
12/15/2024	25.7	37.6	19.2	5.98	8.27	1.78
12/16/2024	25.7	37.6	19.2	5.92	8.27	0.23
12/17/2024	25.9	37.5	19.1	5.93	8.27	0.21
12/18/2024	25.7	37.5	19.1	5.86	8.26	0.00
12/19/2024	25.8	37.4	19.1	6.00	8.26	0.00
12/20/2024	25.7	37.4	19.1	5.95	8.26	0.00
12/21/2024	25.3	37.4	19.1	6.05	8.27	0.00
12/22/2024	25.1	37.4	19.2	6.03	8.27	0.33
12/23/2024	25.4	37.5	19.1	5.96	8.27	4.71
12/24/2024	25.3	37.4	19.2	6.00	8.26	8.14
12/25/2024	25.1	37.4	19.2	5.95	8.25	0.00
12/26/2024	25.2	37.4	19.2	5.96	8.25	0.00
12/27/2024	25.3	37.4	19.2	5.89	8.25	0.00
12/28/2024	25.0	37.4	19.2	5.93	8.24	0.01
12/29/2024	24.6	37.2	19.1	5.94	8.24	2.68
12/30/2024	24.5	36.6	19.1	5.98	8.23	20.27
12/31/2024	24.9	36.5	19.1	5.92	8.25	44.31
1/1/2025	24.9	37.0	19.0	5.96	8.25	79.95
1/2/2025	24.9	36.9	19.1	6.07	8.25	52.94
1/3/2025	25.4	36.5	19.0	5.97	8.26	48.88
1/4/2025	24.5	37.4	19.1	6.03	8.26	39.49
1/5/2025	24.7	37.1	19.1	6.05	8.27	29.18
1/6/2025	24.7	36.6	19.0	6.04	8.27	81.03
1/7/2025	24.3	36.4	19.0	6.15	8.27	133.06
1/8/2025	24.0	36.4	19.0	6.14	8.27	195.96
1/9/2025	23.7	36.5	19.0	6.09	8.27	72.98
1/10/2025	23.8	36.5	19.0	6.11	8.27	67.41
1/11/2025	23.8	36.4	18.9	6.11	8.27	1202.79
1/12/2025	23.8	36.4	19.0	6.23	8.27	114.97
1/13/2025	23.8	36.4	19.0	6.16	8.27	204.37
1/14/2025	23.6	36.4	19.0	6.22	8.27	274.09
1/15/2025	23.4	36.3	19.0	6.16	8.27	535.72

1/16/2025	23.1	36.3	18.9	5.99	8.26	1212.74
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1/29/2025	23.5	39.2	18.8	6.64	8.31	0.39
1/30/2025	23.5	39.2	18.8	6.63	8.32	0.40
1/31/2025	23.5	39.3	18.7	6.57	8.32	0.38
2/1/2025	23.5	39.3	18.6	6.57	8.32	0.40
2/2/2025	23.6	39.3	18.6	6.56	8.32	0.40
2/3/2025	23.6	39.4	18.6	6.53	8.32	0.40
2/4/2025	23.8	39.3	18.6	6.57	8.31	0.42
2/5/2025	23.9	39.3	18.7	6.54	8.31	0.42
2/6/2025	24.0	39.3	18.7	6.60	8.32	0.43
2/7/2025	24.1	39.3	18.7	6.55	8.32	0.43
2/8/2025	24.4	39.3	18.7	6.49	8.31	0.47
2/9/2025	24.5	39.3	18.8	6.56	8.31	0.46
2/10/2025	24.4	39.4	18.8	6.49	8.31	0.50
2/11/2025	24.3	39.4	18.8	6.47	8.31	0.49
2/12/2025	24.4	39.4	18.8	6.42	8.31	0.49
2/13/2025	24.4	39.3	18.8	6.48	8.31	0.51
2/14/2025	24.2	39.4	18.8	6.52	8.31	0.54
2/15/2025	24.4	39.4	18.8	6.53	8.31	0.53
2/16/2025	23.9	39.4	18.8	6.42	8.31	0.55
2/17/2025	23.6	39.4	18.7	6.42	8.31	0.53
2/18/2025	23.9	39.4	18.7	6.59	8.32	0.60
2/19/2025	24.1	39.3	18.7	6.46	8.31	0.81
2/20/2025	24.2	39.4	18.7	6.39	8.31	0.62
2/21/2025	24.2	39.4	18.7	6.58	8.33	0.75
2/22/2025	23.9	39.4	18.8	6.58	8.33	0.70
2/23/2025	24.1	39.4	18.9	6.52	8.33	0.62
2/24/2025	23.8	39.4	19.0	6.48	8.32	0.64
2/25/2025	23.8	36.7	13.8	6.46	8.36	2.16

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3/19/2025						
3/20/2025	24.3	39.9	18.7	6.55	8.28	0.67
3/21/2025	24.1	39.9	18.8	6.60	8.30	0.66
3/22/2025	24.0	39.9	18.9	6.64	8.31	0.69
3/23/2025	24.1	39.9	18.9	6.60	8.31	0.68
3/24/2025	24.3	39.9	18.9	6.64	8.31	0.70
3/25/2025	24.4	40.0	18.9	6.55	8.31	0.76
3/26/2025	24.7	39.9	18.9	6.45	8.30	0.78
3/27/2025	25.0	39.9	18.9	6.42	8.30	0.84
3/28/2025	24.7	39.9	18.9	6.42	8.30	1.73
3/29/2025	24.5	39.9	18.8	6.43	8.29	2.19
3/30/2025	24.3	39.9	18.8	6.25	8.27	1.33
3/31/2025	24.2	39.7	18.8	6.12	8.26	1.06
4/1/2025	24.7	39.9	18.8	6.28	8.30	0.86
4/2/2025	25.0	39.9	18.8	6.42	8.30	0.89
4/3/2025	25.6	39.9	18.9	6.32	8.30	1.04
4/4/2025	25.7	39.8	18.9	6.29	8.29	1.33
4/5/2025	25.8	39.8	18.9	6.36	8.28	1.54
4/6/2025	25.8	39.8	18.8	6.24	8.29	1.23
4/7/2025	25.7	39.8	18.8	6.19	8.29	1.10

4/8/2025	25.8	39.8	18.8	5.93	8.29	1.11
4/9/2025	25.8	39.8	18.9	6.00	8.29	1.01
4/10/2025	25.7	39.7	19.0	6.07	8.29	1.26
4/11/2025	25.8	39.8	19.0	6.12	8.31	1.06
4/12/2025	25.8	39.8	19.0	6.15	8.31	1.04
4/13/2025	25.6	39.7	19.0	6.15	8.31	1.24
4/14/2025	25.6	39.7	19.0	5.95	8.30	1.11
4/15/2025	25.6	39.7	18.9	5.98	8.31	1.41
4/16/2025	25.7	39.7	18.9	6.08	8.32	1.23
4/17/2025	25.8	39.7	18.9	6.09	8.32	1.31
4/18/2025	25.7	39.7	19.0	6.11	8.33	1.34
4/19/2025	25.6	39.7	18.9	5.94	8.32	2.74
4/20/2025	25.5	39.6	18.9	6.09	8.33	63.65
4/21/2025	25.4	39.6	18.9	6.26	8.34	2.93
4/22/2025	25.5	39.5	18.9	6.15	8.34	9.81
4/23/2025	25.4	39.7	18.9	6.03	8.34	1.49
4/24/2025	25.4	33.0	15.4	6.19	8.36	3.16

Table 37. Monthly averages data logged from the Coral 3N site over the period July 2024 – April 2025. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Month	Temperature	Salinity	Pressure	RDO	pH	Turbidity
Jul-24	29.5	39.9	19.0	6.20	8.23	0.589
Aug-24	29.4	39.8	18.9	6.05	8.27	0.00
Sep-24	30.2	38.4	19.1	6.10	8.32	2.73
Oct-24	29.3	36.9	19.3	6.46	8.30	0.645
Nov-24	27.0	37.0	19.2	5.72	8.21	0.00
Dec-24	25.4	37.4	19.1	5.95	8.26	3.10
Jan-25	24.0	37.0	19.0	6.17	8.27	229
Feb-25	24.0	39.3	18.5	6.51	8.32	0.595
Mar-25	24.39	39.89	18.86	6.47	8.30	1.03
Apr-25	25.59	39.60	18.83	6.14	8.31	4.40

Table 38. Daily averages data logged from the Coral 3S site over the period 07/01/24-04/24/25. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Date	Temperature	Salinity	Pressure	RDO	pH	Turbidity
7/1/2024	29.8	39.8	17.5	6.32		
7/2/2024	29.7	39.7	16.9	6.14		
7/3/2024	29.7	39.9	17.4	6.12		
7/4/2024	29.7	39.9	16.7	5.86		
7/5/2024	29.8	40.0	17.4	6.06		0.00788
7/6/2024	29.6	40.0	17.0	6.09		
7/7/2024	29.7	39.9	17.4	5.57		
7/8/2024	29.5	39.9	16.9	5.67		
7/9/2024	29.3	40.0	17.3	6.20		
7/10/2024	29.7	40.0	17.2	6.20		
7/11/2024	29.7	40.0	17.2	5.76		
7/12/2024	29.5	40.0	17.0	5.46		
7/13/2024	29.8	40.1	17.0	6.27		
7/14/2024	29.9	40.1	17.3	6.28		
7/15/2024	29.4	40.1	17.0	5.81		
7/16/2024	29.6	40.0	17.9	6.77		
7/17/2024	29.3	40.1	17.5	6.94		
7/18/2024	29.0	40.1	17.8	7.45		
7/19/2024	29.4	39.9	17.6	7.30		
7/20/2024	29.4	40.0	17.8	6.87		
7/21/2024	29.8	39.9	17.5	6.96		
7/22/2024	30.1	40.0	17.7	7.82		
7/23/2024	30.2	40.2	17.8	7.28		
7/24/2024	30.4	40.2	17.6	6.93		
7/25/2024	30.3	40.2	17.6	7.15		
7/26/2024	30.3	40.1	17.4	7.57		
7/27/2024	29.8	40.1	17.9	7.11		
7/28/2024	29.3	40.1	17.5	6.72		
7/29/2024	29.3	40.1	17.8	6.86		
7/30/2024	29.2	40.1	17.3	7.36		
7/31/2024	28.1	40.2	18.0	7.02		
8/1/2024	29.3	40.1	17.2	6.83		
8/2/2024	29.6	40.1	17.3	7.00		
8/3/2024	30.1	40.1	17.1	7.53		
8/4/2024	29.5	40.0	17.3	6.66		2.26
8/5/2024	28.7	40.0	17.2	6.72		1.75

8/6/2024	28.1	40.0	17.2	6.76		1.59
8/7/2024	28.6	39.9	17.2	6.92		1.74
8/8/2024	29.1	40.0	17.2	6.87		
8/9/2024	29.2	40.2	17.1	6.67	8.36	
8/10/2024	29.8	40.2	17.0	6.84	8.40	1.84
8/11/2024	30.2	40.3	17.0	7.02	8.41	1.84
8/12/2024	30.2	40.3	17.0	6.72	8.40	
8/13/2024	30.3	40.3	16.9	6.92	8.41	
8/14/2024	30.1	40.3	17.0	7.11	8.42	
8/15/2024	29.6	40.3	17.0	6.89	8.40	1.90
8/16/2024	30.0	40.1	17.0	6.80	8.40	1.94
8/17/2024	30.3	40.2	17.1	6.99	8.42	1.98
8/18/2024	29.9	40.3	17.1	6.86	8.42	
8/19/2024	29.5	40.2	17.1	6.69	8.41	
8/20/2024	29.4	40.2	17.1	6.56	8.40	
8/21/2024	29.4	40.2	17.1	6.57	8.40	1.95
8/22/2024	29.2	40.2	17.1	6.43	8.39	
8/23/2024	29.4	40.0	17.1	6.43	8.39	
8/24/2024	29.5	40.0	17.2	6.78	8.41	
8/25/2024	29.3	39.9	17.3	6.85	8.42	
8/26/2024	29.3	40.0	17.2	6.86	8.42	
8/27/2024	29.6	39.9	17.2	6.88	8.43	
8/28/2024	30.2	39.8	17.3	6.78	8.43	
8/29/2024	30.3	39.8	17.3	6.69	8.44	2.29
8/30/2024	30.3	39.7	17.3	6.78	8.45	
8/31/2024	30.2	39.6	17.3	6.74	8.44	
9/1/2024	30.0	39.5	17.3	6.43	8.42	
9/2/2024	30.1	39.8	17.2	6.60	8.44	
9/3/2024	29.9	39.8	17.3	6.45	8.43	2.35
9/4/2024	29.8	39.7	17.3	6.59	8.44	
9/5/2024	30.0	39.6	17.2	6.83	8.45	
9/6/2024	30.1	39.4	17.3	6.71	8.44	
9/7/2024	30.3	39.5	17.3	6.92	8.46	2.89
9/8/2024	30.6	39.5	17.4	6.75	8.46	
9/9/2024	30.6	39.5	17.4	6.55	8.46	
9/10/2024	30.7	39.4	17.4	6.74	8.48	
9/11/2024	30.7	39.7	17.4	6.65	8.47	
9/12/2024	30.7	39.8	17.1	6.09	8.44	5.90
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9/22/2024						
9/23/2024	31.0	36.8	17.4	6.36	8.24	0.00
9/24/2024	31.0	36.8	17.5	6.12	8.26	0.00
9/25/2024	30.8	36.7	17.5	6.10	8.24	0.00
9/26/2024	30.3	36.5	17.5	5.89	8.22	7.67
9/27/2024	29.6	37.1	17.4	6.19	8.22	8.08
9/28/2024	29.4	37.2	17.3	6.16	8.21	0.0163
9/29/2024	29.0	37.3	17.3	6.15	8.21	0.00
9/30/2024	29.1	37.2	17.4	6.21	8.21	0.00
10/1/2024	29.3	37.0	17.4	6.21	8.21	23.1
10/2/2024	29.2	37.1	17.4	6.10	8.21	0.0199
10/3/2024	29.6	36.9	17.4	6.33	8.22	0.117
10/4/2024	29.5	35.8	15.5	6.09	8.19	0.103
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11/14/2024						
11/15/2024						
11/16/2024						
11/17/2024						
11/18/2024	27.5	37.1	17.3	6.42	8.10	98.7
11/19/2024	27.2	37.1	17.3	6.41	8.12	98.7
11/20/2024	26.8	37.0	17.2	6.41	8.11	98.7
11/21/2024	27.1	37.0	17.2	6.38	8.10	98.7
11/22/2024	25.7	37.0	14.5	7.66	8.14	98.8
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11/25/2024						
11/26/2024						
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11/29/2024						
11/30/2024						
12/1/2024						
12/2/2024						
12/3/2024						
12/4/2024						
12/5/2024	25.7	35.9	17.1	7.06	8.18	98.7
12/6/2024	26.1	36.0	17.1	6.67	8.17	98.8

12/7/2024	25.9	36.0	17.2	6.68	8.17	98.7
12/8/2024	25.7	36.0	17.1	6.70	8.17	98.7
12/9/2024	25.5	36.0	17.1	6.68	8.16	98.7
12/10/2024	25.6	36.1	17.1	6.67	8.16	98.8
12/11/2024	25.4	36.2	17.0	6.70	8.15	98.7
12/12/2024	25.0	36.2	17.1	6.70	8.15	99.2
12/13/2024	25.3	36.3	17.2	6.69	8.15	98.9
12/14/2024	25.8	36.3	17.2	6.65	8.15	100
12/15/2024	25.7	36.3	17.2	6.71	8.15	103
12/16/2024	25.5	36.3	17.2	6.76	8.15	99.7
12/17/2024	25.8	36.4	17.2	6.66	8.15	99.1
12/18/2024	25.8	36.4	17.1	6.65	8.15	98.9
12/19/2024	25.7	36.4	17.1	6.83	8.15	98.8
12/20/2024	25.8	36.4	17.1	6.71	8.15	98.9
12/21/2024	25.5	36.4	17.1	6.70	8.15	98.8
12/22/2024	25.3	36.5	17.2	6.76	8.16	98.8
12/23/2024	25.3	36.5	17.2	6.72	8.16	98.8
12/24/2024	25.3	36.5	17.2	6.67	8.15	98.9
12/25/2024	25.5	36.6	17.2	6.66	8.16	98.9
12/26/2024	25.2	36.6	17.3	6.63	8.15	98.9
12/27/2024	25.1	36.5	17.2	6.68	8.15	98.9
12/28/2024	24.9	36.6	17.2	6.64	8.14	98.9
12/29/2024	24.7	36.6	17.1	6.67	8.14	99.1
12/30/2024	24.7	36.7	17.1	6.70	8.14	98.8
12/31/2024	24.8	36.7	17.1	6.67	8.15	98.8
1/1/2025	24.9	36.7	17.1	6.75	8.15	98.9
1/2/2025	25.1	36.6	17.1	6.70	8.15	98.9
1/3/2025	25.2	36.6	17.1	6.74	8.16	98.9
1/4/2025	24.9	36.6	17.1	6.81	8.16	98.9
1/5/2025	24.9	36.7	17.1	6.78	8.17	98.9
1/6/2025	24.5	36.7	17.0	6.78	8.16	99.0
1/7/2025	24.4	36.8	17.0	6.83	8.17	98.9
1/8/2025	24.3	36.7	17.0	6.86	8.17	98.8
1/9/2025	23.9	36.8	17.0	6.87	8.17	98.8
1/10/2025	23.9	36.8	17.1	6.82	8.17	98.8
1/11/2025	23.6	36.8	17.0	6.88	8.17	103
1/12/2025	23.7	36.8	17.0	6.89	8.17	98.8
1/13/2025	23.5	36.9	17.0	7.02	8.18	98.8
1/14/2025	23.7	37.0	17.0	6.87	8.17	98.8
1/15/2025	23.5	37.0	17.1	6.84	8.17	99.0
1/16/2025	23.6	37.0	17.1	6.80	8.17	98.8

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1/28/2025						
1/29/2025	23.5	37.8	16.9	7.02	8.26	0.897
1/30/2025	23.6	37.7	16.9	6.93	8.25	0.922
1/31/2025	23.5	37.7	16.8	7.00	8.25	0.925
2/1/2025	23.5	37.7	16.7	6.99	8.26	1.02
2/2/2025	23.6	37.7	16.7	6.94	8.25	0.975
2/3/2025	23.7	37.8	16.7	6.93	8.25	0.994
2/4/2025	23.8	37.7	16.7	6.98	8.24	1.03
2/5/2025	24.0	37.7	16.8	7.02	8.24	1.07
2/6/2025	24.1	37.8	16.8	7.01	8.24	1.11
2/7/2025	24.2	37.8	16.7	6.93	8.24	1.23
2/8/2025	24.3	37.8	16.8	7.00	8.24	1.16
2/9/2025	24.4	37.8	16.9	6.89	8.24	1.20
2/10/2025	24.4	37.8	16.8	6.80	8.23	1.17
2/11/2025	24.3	37.8	16.9	6.79	8.23	1.19
2/12/2025	24.5	37.8	16.9	6.76	8.24	1.19
2/13/2025	24.4	37.8	16.9	6.84	8.24	1.17
2/14/2025	24.2	37.8	16.9	6.85	8.23	1.13
2/15/2025	24.4	37.8	16.9	6.86	8.23	1.17
2/16/2025	24.1	37.8	16.8	6.75	8.23	1.10
2/17/2025	23.6	37.8	16.8	6.61	8.22	1.02
2/18/2025	24.0	37.8	16.8	6.88	8.24	1.08
2/19/2025	24.2	37.7	16.8	6.79	8.24	1.12
2/20/2025	24.3	37.8	16.8	6.77	8.23	1.14
2/21/2025	24.1	37.8	16.8	6.87	8.24	1.19
2/22/2025	24.0	37.9	16.9	6.90	8.25	1.15
2/23/2025	23.9	37.9	17.0	6.89	8.25	1.14
2/24/2025	23.9	37.9	17.0	6.83	8.25	1.14
2/25/2025	23.9	36.2	14.1	6.77	8.26	1.63
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3/14/2025						
3/15/2025						
3/16/2025						
3/17/2025						
3/18/2025						
3/19/2025						
3/20/2025	24.28	38.24	16.94	6.92	8.46	0.00
3/21/2025	24.05	38.28	17.00	6.93	8.47	0.00
3/22/2025	23.99	38.27	17.01	7.00	8.48	0.00
3/23/2025	24.11	38.28	17.03	6.98	8.47	0.00
3/24/2025	24.29	38.29	17.04	7.01	8.47	0.00
3/25/2025	24.39	38.32	17.03	6.85	8.47	0.00
3/26/2025	24.66	38.27	17.03	6.82	8.46	0.00
3/27/2025	24.98	38.27	17.06	6.84	8.46	0.00
3/28/2025	24.71	38.27	17.09	6.79	8.45	1.12
3/29/2025	24.41	38.32	17.03	6.66	8.44	1.33
3/30/2025	24.25	38.33	16.99	6.50	8.43	0.23
3/31/2025	24.10	38.10	17.02	6.41	8.40	0.03
4/1/2025	24.69	38.28	17.01	6.67	8.45	0.02
4/2/2025	25.16	38.26	16.99	6.82	8.45	0.00
4/3/2025	25.47	38.23	17.01	6.83	8.44	0.23
4/4/2025	25.69	38.23	17.04	6.74	8.43	0.19
4/5/2025	25.77	38.20	17.03	6.66	8.42	0.16
4/6/2025	25.86	38.25	17.00	6.59	8.42	0.10
4/7/2025	25.90	38.29	16.93	6.54	8.43	0.07
4/8/2025	26.01	38.41	17.00	6.37	8.43	0.01

4/9/2025	25.85	38.31	17.08	6.48	8.44	0.02
4/10/2025	25.70	38.25	17.21	6.50	8.43	0.01
4/11/2025	25.84	38.36	17.15	6.65	8.45	0.01
4/12/2025	25.79	38.37	17.16	6.67	8.45	0.02
4/13/2025	25.55	38.35	17.19	6.69	8.45	0.01
4/14/2025	25.55	38.41	17.16	6.65	8.44	0.02
4/15/2025	25.67	38.43	17.09	6.80	8.44	0.02
4/16/2025	25.72	38.48	17.12	6.84	8.45	0.01
4/17/2025	25.84	38.45	17.12	6.82	8.45	0.02
4/18/2025	25.64	38.48	17.15	6.85	8.45	0.00
4/19/2025	25.58	38.45	17.10	6.73	8.44	0.13
4/20/2025	25.46	38.47	17.06	6.96	8.45	0.03
4/21/2025	25.48	38.50	17.04	6.97	8.45	0.09
4/22/2025	25.52	38.49	17.04	6.91	8.45	0.02
4/23/2025	25.53	38.54	17.05	7.00	8.46	0.00
4/24/2025	25.41	38.54	17.12	6.73	8.45	0.00

Table 39. Monthly averages data logged from the Coral 3S site over the period July 2024 – April 2025. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Month	Temperature	Salinity	Pressure	RDO	pH	Turbidity
Jul-24	29.6	40.0	17.4	6.58		0.00788
Aug-24	29.6	40.1	17.1	6.81	8.41	1.92
Sep-24	30.2	38.5	17.3	6.43	8.36	2.45
Oct-24	29.4	36.7	16.9	6.18	8.21	5.83
Nov-24	26.9	37.0	16.9	6.56	8.11	98.7
Dec-24	25.4	36.3	17.2	6.70	8.15	99.1
Jan-25	24.1	36.9	17.0	6.85	8.18	83.6
Feb-25	24.1	37.7	16.7	6.87	8.24	1.14
Mar-25	24.35	38.27	17.03	6.81	8.46	0.24
Apr-25	25.62	38.37	17.08	6.73	8.44	0.05

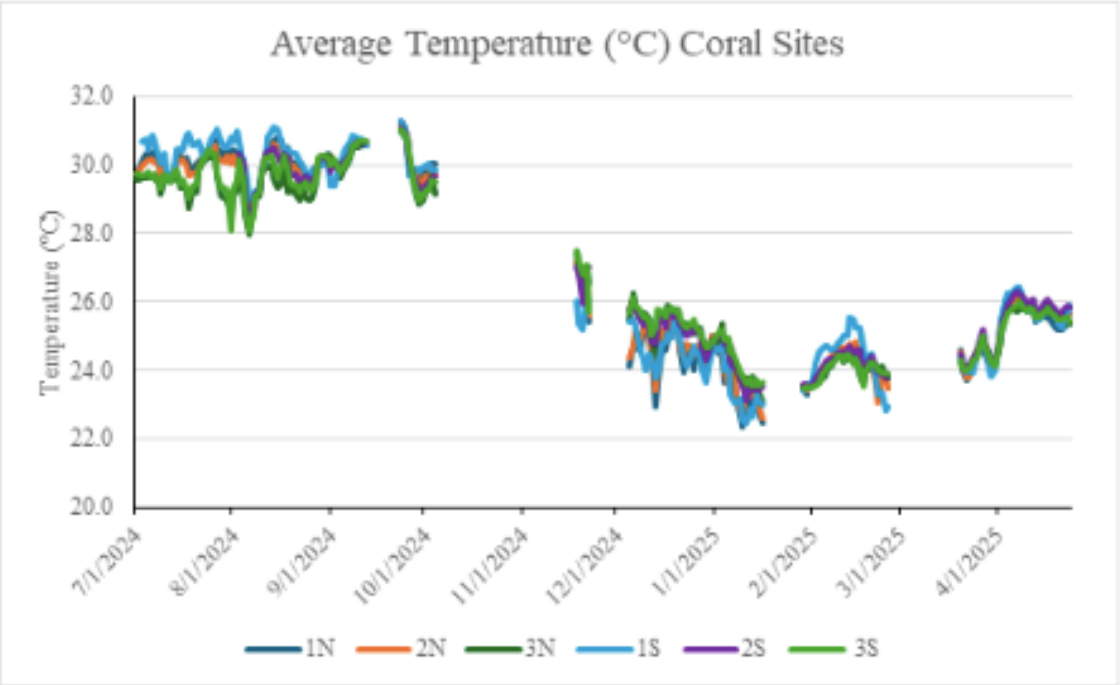

Figure 7. The average daily temperatures (ºC) at all six coral sites (1N, 2N, 3N, 1S, 2S, and 3S) from 07/01/2024 to 04/24/2025.

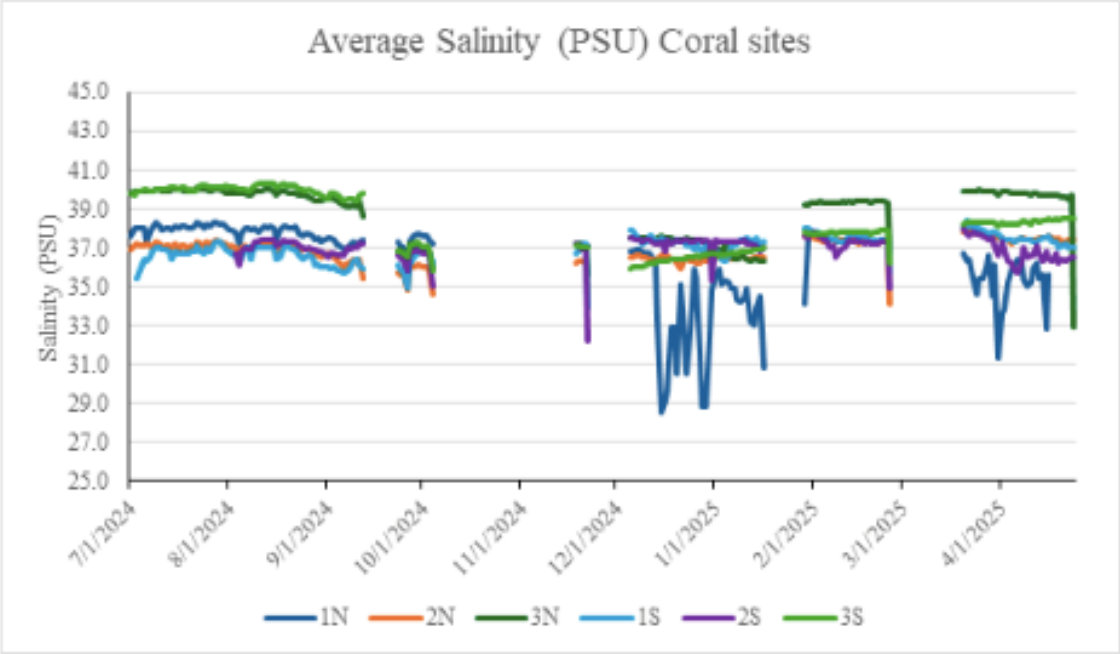

Figure 8. The average daily salinity (PSU) at all six coral sites (1N, 2N, 3N, 1S, 2S, and 3S) from 07/01/2024 to 04/24/2025.

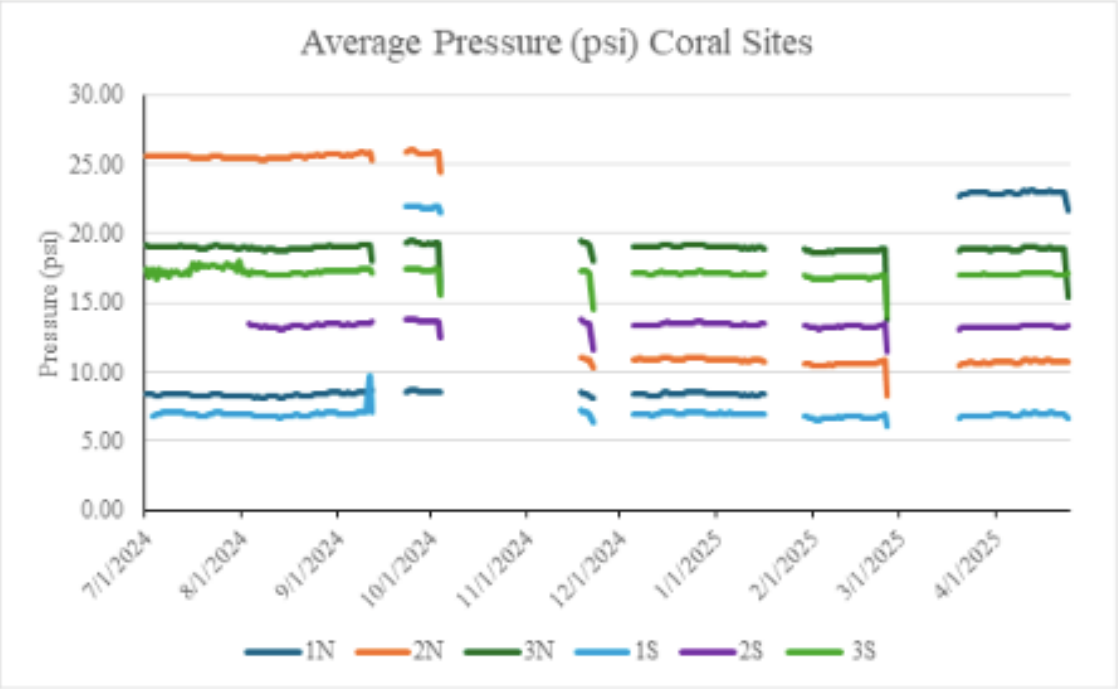

Figure 9. The average daily pressure (psi) at all six coral sites (1N, 2N, 3N, 1S, 2S, and 3S) from 07/01/2024 to 04/24/2025.

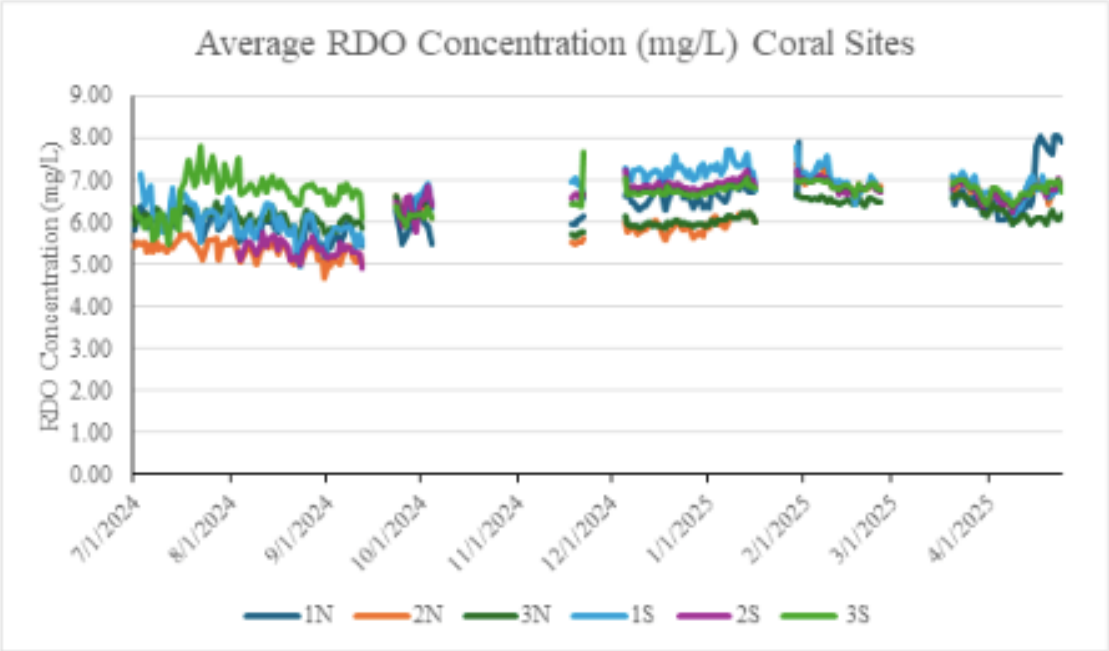

Figure 10. The average daily RDO (Relative Dissolved Oxygen) (mg/L) at all six coral sites (1N, 2N, 3N, 1S, 2S, and 3S) from 07/01/2024 to 04/24/2025.

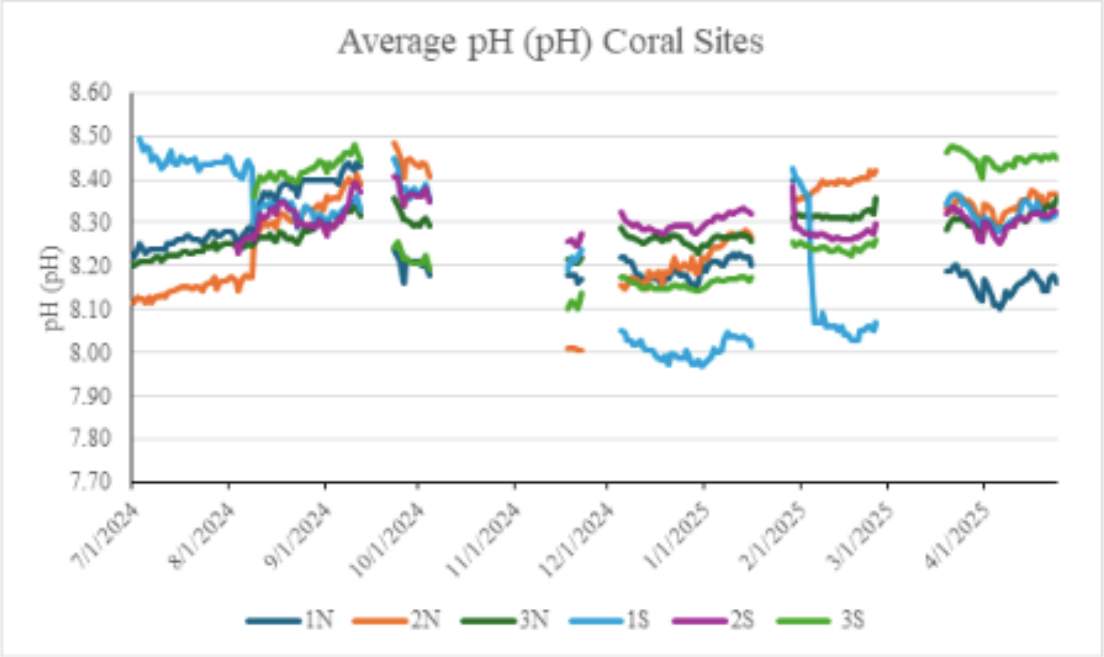

Figure 11. The average daily pH at all six coral sites (1N, 2N, 3N, 1S, 2S, and 3S) from 07/01/2024 to 04/24/2025.

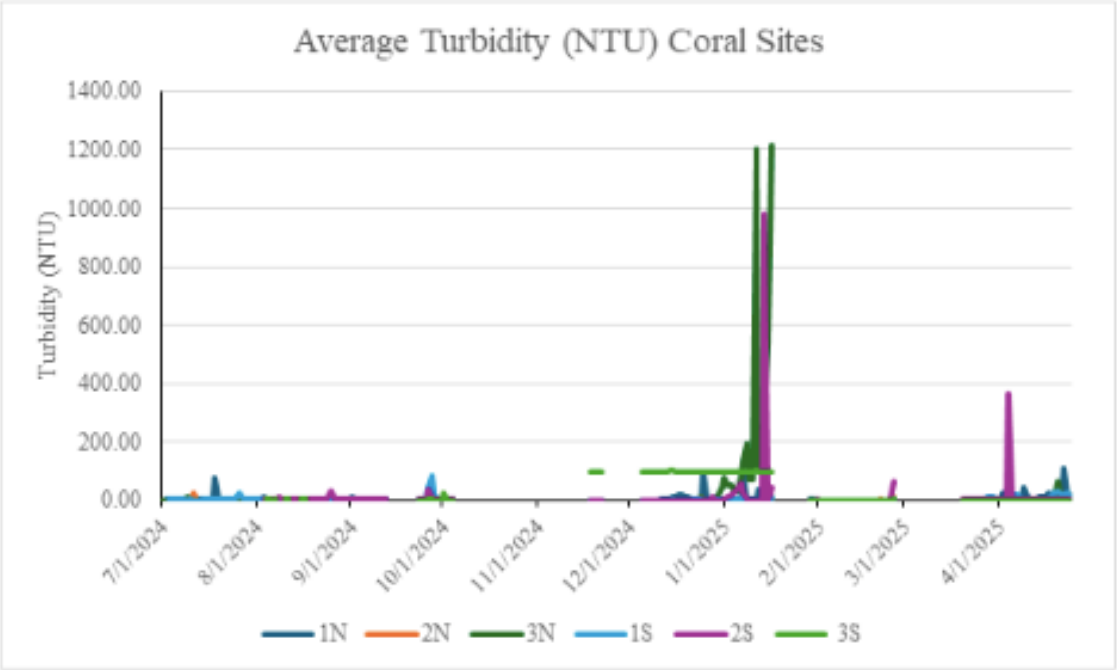

Figure 12. The average daily turbidity (NTU) at all six coral sites (1N, 2N, 3N, 1S, 2S, and 3S) from 07/01/2024 to 04/24/2025.

3.3 Sedimentation Rates and Abiotic Data at Coastal Locations (FL, HW, HL, MB, and BC)

Sedimentation rates were quantified at five coastal locations using sediment traps deployed at each site. Traps were retrieved at intervals ranging from 76 to 120 days. The total mass of sediment collected was measured and normalized by the number of collection days to calculate the sedimentation rate, expressed in grams per day (g/day).

As presented in Table 42 and Figure 13, sedimentation rates varied across sites, with the lowest rate recorded at the HL site (16.68 g/day) and the highest at the MB site (39.22 g/day). Continued monitoring of sedimentation rates is planned to better characterize temporal variability and identify potential drivers of increases or decreases in sediment deposition over time.

Table 40. Sedimentation rates (g/day) from four coastal sites (Biscayne (BC), Miami (MB), Haulover (HL), and Hollywood (HW)) calculated after collection on 4/8/25. Sediment tubes were deployed for 77 days for BC and MB sites: 1/29/25 – 4/8/25, 76 days for HL and HW site: 1/30/25 – 4/8/25, and 120 days for Fort Lauderdale (FL) site: 1/30/25 – 5/21/25

Dates	BC	MB	HL	HW	FL
4/8/25	28.57	39.22	18.68	33.95	
5/21/25					26.96

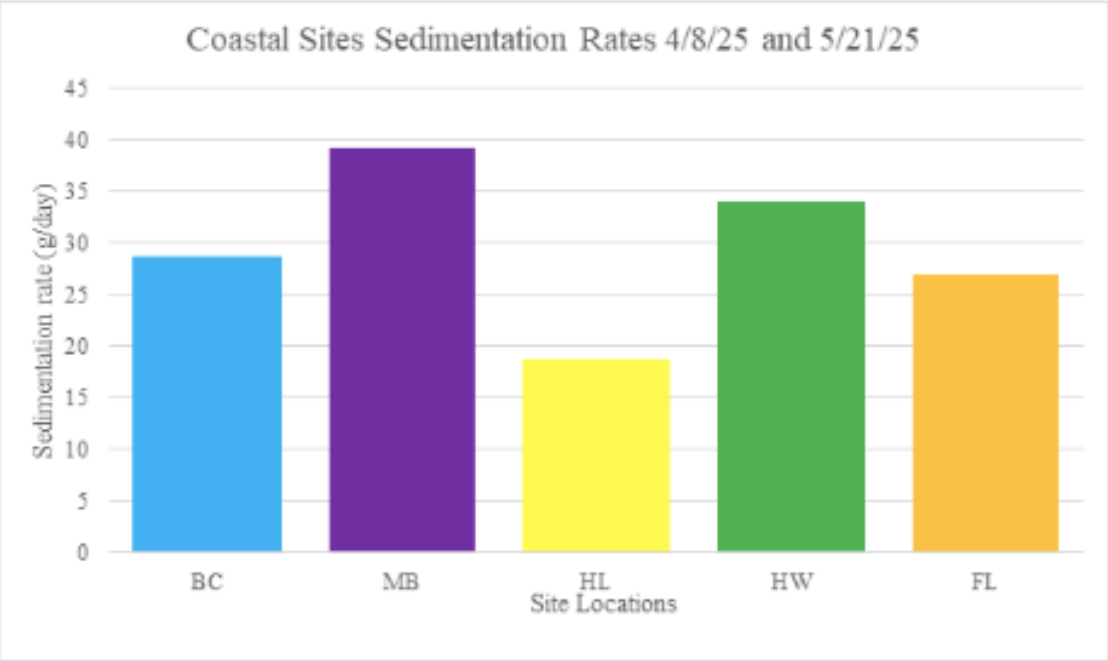

Figure 13. Sedimentation rates (g/day) from five coastal locations; Biscayne Bay (BC), Miami Beach (MB), Haulover (HL), Hollywood (HW), and Fort Lauderdale (FL). Sediment tubes were deployed for 77 days for BC and MB sites: 1/29/25 – 4/8/25, 76 days for HL and HW site: 1/30/25 – 4/8/25, and 120 days for Fort Lauderdale (FL) site: 1/30/25 – 5/21/25.

Water chemistry data were collected at hourly intervals from five coastal monitoring sites using submerged sensors. Site depths ranged from 21 to 32 feet with minimal tidal variation (generally <1 ft). The measured parameters included temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO; mg/L), pH, and turbidity (NTU). Summaries of the daily and weekly abiotic data, including ranges and mean values, are presented in Tables 43–53 and Figures 14–19.

While multiple water quality parameters were monitored, the primary focus of this study was on temperature, salinity, pressure, dissolved oxygen, pH, and turbidity. These variables not only provided a physical characterization of the reef environments but also offered context for patterns in biological production, such as coral species presence and abundance. Overall, the six measured abiotic variables demonstrated relatively consistent correlations across the five sites.

Benthic temperatures across all locations ranged from 21.4-26.0°C, with mean values between 24.0-24.2°C. Salinity ranged from 35.6-42.4 PSU, with mean values between 37.4-41.4 PSU. The FL site recorded the lowest salinity values, while MB had the highest. Notably, the BC site exhibited more pronounced salinity fluctuations, likely due to freshwater input from coastal precipitation and runoff.

Pressure values were stable within each site and primarily reflected variations in depth and tidal fluctuations. As expected, dissolved oxygen concentrations were inversely related to temperature, with warmer waters supporting lower oxygen saturation. RDO values ranged from 5.75-8.94 mg/L, indicating generally high oxygen availability, with site means ranging from 6.64-7.22 mg/L.

The pH values remained relatively stable across the study period and sites, ranging from 7.86-9.33, with site means between 8.25-8.69. The MB site consistently recorded the highest pH values.

Turbidity levels ranged from 0 -1616 NTU, with mean values between 0.72-8.74 NTU. The highest turbidity was observed at the BC site, likely due to its proximity to shore and greater influence from coastal runoff and sediment resuspension.

Periodic gaps in data collection or the occurrence of anomalous readings were primarily due to external factors, including U.S. Naval activity that required the temporary removal of monitoring sondes, as well as occasional minor technical issues with the sensors.

Long-term monitoring of these abiotic parameters is ongoing to better resolve temporal patterns and understand the environmental drivers influencing reef system dynamics.

Table 41. Range and mean values for each of the abiotic conditions from 29 January to 20 May 2025 at the coastal sites BC, MB, HL, HW, and FL. RDO is relative dissolved oxygen.

	BC		MB		HL		HW		FL	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Temperature (°C)	21.5-26.0	24.2	21.4-25.9	24.1	22.7-25.7	24.2	22.6-25.4	24.2	22.0-25.3	24.0
pH(pH)	8.16-8.46	8.36	8.50-9.33	8.69	8.18-8.35	8.26	8.24-8.33	8.28	7.86-8.30	8.25
RDO (mg/L)	6.30-7.94	6.82	6.03-8.94	6.83	6.15-8.47	7.22	5.75-7.55	6.64	6.25-8.82	6.96
Turbidity (NTU)	1.38-1616	8.74	0-75.5	0.720	0-28.2	0.486	0-203	8.37	0.38-374	1.22
Salinity (PSU)	35.6-41.3	40.6	39.0-42.4	41.4	37.6-38.8	38.4	37.4-38.4	37.9	37.0-37.8	37.4
Pressure (psi)	10.1-12.6	11.2	10.7-13.0	11.8	7.53-10.0	8.79	9.86-12.1	11.0	12.9-15.1	14.0

Table 42. Daily averages data logged from the Biscayne (BC) site over the period 01/29/25- 05/22/25. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU).

Date	Temperature	Salinity	Pressure	RDO	pH	Turbidity
1/29/25	22.4	40.3	11.1	7.48	8.37	1.45
1/30/25	22.4	40.3	11.1	7.27	8.37	1.48
1/31/25	22.0	40.1	11.0	7.43	8.38	1.79
2/1/25	22.7	40.2	10.9	7.23	8.37	1.62
2/2/25	23.6	40.2	11.0	7.19	8.37	1.64
2/3/25	24.3	40.3	11.1	7.07	8.36	1.63
2/4/25	24.4	40.3	11.1	7.02	8.35	1.62
2/5/25	24.5	40.3	11.1	6.98	8.35	1.61
2/6/25	24.4	40.4	11.1	6.86	8.35	1.61
2/7/25	24.5	40.4	11.1	6.78	8.34	1.62
2/8/25	24.6	40.4	11.1	6.80	8.34	1.64
2/9/25	24.7	40.0	11.2	6.77	8.32	1.74
2/10/25	24.9	40.1	11.1	6.80	8.32	1.73
2/11/25	24.7	40.3	11.2	6.76	8.33	1.74
2/12/25	25.0	40.3	11.2	6.75	8.34	1.84
2/13/25	25.3	40.6	11.2	6.77	8.37	2.06
2/14/25	25.7	40.8	11.2	6.73	8.38	2.03
2/15/25	25.6	40.7	11.2	6.63	8.38	4.24
2/16/25	25.6	40.9	11.2	6.50	8.37	3.99
2/17/25	25.5	40.9	11.1	6.54	8.36	3.04
2/18/25	25.6	41.0	11.1	6.59	8.36	2.30
2/19/25	25.6	40.9	11.1	6.68	8.35	2.22
2/20/25	25.5	41.0	11.2	6.78	8.40	2.10
2/21/25	24.3	40.8	11.2	6.62	8.33	3.72
2/22/25	23.6	40.8	11.2	6.68	8.33	4.45
2/23/25	23.5	40.8	11.3	6.84	8.34	3.46
2/24/25	23.5	40.9	11.4	6.60	8.34	3.29
2/25/25	23.4	41.0	11.4	6.68	8.37	6.22
2/26/25	23.8	40.5	11.5	6.62	8.32	3.56
2/27/25	24.0	40.5	11.4	6.78	8.32	2.94
2/28/25	24.1	40.6	11.4	6.98	8.34	2.19
3/1/25	24.0	40.8	11.4	7.17	8.37	1.88
3/2/25	24.2	41.0	11.4	7.25	8.40	1.93
3/3/25	24.3	41.0	11.4	7.04	8.38	2.42
3/4/25	24.1	40.9	11.4	6.63	8.35	12.0
3/5/25	24.1	40.9	11.4	6.49	8.33	13.4

3/6/25	23.9	40.8	11.3	6.54	8.34	3.92
3/7/25	23.3	40.6	11.3	6.68	8.34	3.37
3/8/25	23.6	40.8	11.3	6.83	8.35	3.02
3/9/25	23.8	40.9	11.3	6.89	8.37	3.17
3/10/25	24.3	40.9	11.3	6.92	8.38	3.10
3/11/25	23.8	41.0	11.3	6.72	8.39	7.10
3/12/25	23.5	41.1	11.4	6.66	8.43	13.2
3/13/25	23.6	40.9	11.4	6.79	8.42	9.55
3/14/25	24.0	40.6	11.3	6.98	8.38	9.76
3/15/25	24.2	40.5	11.4	6.81	8.37	6.29
3/16/25	24.7	40.7	11.3	6.70	8.41	13.9
3/17/25	24.9	40.3	11.3	6.62	8.40	183
3/18/25	23.6	40.4	11.3	6.66	8.37	9.12
3/19/25	23.7	39.6	11.4	6.78	8.35	33.1
3/20/25	23.9	38.3	11.4	6.70	8.34	66.2
3/21/25	23.6	41.2	11.1	6.83	8.30	2.08
3/22/25	23.4	41.3	11.1	6.91	8.32	2.26
3/23/25	23.7	41.4	11.2	6.80	8.35	2.06
3/24/25	23.9	41.6	11.2	6.99	8.40	2.09
3/25/25	24.3	41.6	11.1	6.89	8.39	2.11
3/26/25	24.5	41.4	11.1	6.75	8.34	2.16
3/27/25	24.8	41.2	11.2	6.71	8.31	2.20
3/28/25	24.5	41.2	11.3	6.64	8.31	8.63
3/29/25	24.1	41.5	11.3	6.39	8.33	23.2
3/30/25	24.2	41.5	11.3	6.27	8.32	14.9
3/31/25	24.7	41.0	11.2	6.33	8.30	119
4/1/25	25.3	41.0	11.2	6.65	8.32	24.8
4/2/25	25.8	41.2	11.2	6.62	8.32	3.95
4/3/25	26.1	41.0	11.2	6.48	8.34	165
4/4/25	26.3	41.5	11.2	6.25	8.36	13.7
4/5/25	26.5	41.6	11.2	6.22	8.38	13.2
4/6/25	26.4	41.3	11.2	6.29	8.35	10.9
4/7/25	26.4	41.3	11.1	6.30	8.32	2.86
4/8/25	26.6	41.5	11.2	6.40	8.36	2.59
4/9/25	26.4	41.4	11.3	6.39	8.35	2.45
4/10/25	26.0	41.2	11.3	6.39	8.35	3.60
4/11/25	26.0	41.2	11.3	6.47	8.36	2.79
4/12/25	25.9	41.1	11.3	6.49	8.36	2.40
4/13/25	25.5	41.2	11.4	6.50	8.36	2.41
4/14/25	25.6	41.2	11.4	6.75	8.38	2.35
4/15/25	25.6	41.3	11.3	6.75	8.39	2.50

4/16/25	25.7	41.3	11.3	6.87	8.40	2.37
4/17/25	25.8	41.4	11.3	6.71	8.40	2.52
4/18/25	25.7	41.3	11.4	6.57	8.39	3.13
4/19/25	25.5	41.3	11.3	6.41	8.39	8.62
4/20/25	25.3	41.4	11.3	6.36	8.40	10.1
4/21/25	25.1	41.5	11.3	6.35	8.42	11.3
4/22/25	25.1	41.9	11.3	6.49	8.45	5.38
4/23/25	25.4	41.7	11.3	6.54	8.45	4.98
4/24/25	25.9	41.3	11.4	6.50	8.43	6.49
4/25/25	25.9	41.5	11.4	6.42	8.43	8.19
4/26/25	25.9	41.7	11.4	6.48	8.44	8.32
4/27/25	26.3	41.5	11.3	6.52	8.44	6.37
4/28/25	26.4	41.6	11.4	6.66	8.46	4.23
4/29/25	26.5	41.5	11.3	6.42	8.44	5.17
4/30/25	26.3	41.6	11.4	6.42	8.44	5.76
5/1/25	26.2	41.6	11.3	6.35	8.44	25.3
5/2/25	26.2	41.5	11.4	6.47	8.45	2.85
5/3/25	26.2	41.6	11.4	6.35	8.46	3.35
5/4/25	26.1	41.8	11.3	6.25	8.47	2.78
5/5/25	26.2	41.7	11.3	6.25	8.47	2.70
5/6/25	26.5	41.8	11.3	6.23	8.50	8.83
5/7/25	27.3	42.1	11.3	6.42	8.54	2.84
5/8/25	27.5	41.6	11.3	6.59	8.52	3.33
5/9/25	27.4	41.6	11.3	6.56	8.51	3.31
5/10/25	27.1	41.6	11.4	6.36	8.50	3.10
5/11/25	27.2	41.6	11.3	6.19	8.51	8.85
5/12/25	27.6	41.6	11.3	6.13	8.54	6.18
5/13/25	27.4	41.4	11.3	6.27	8.54	4.09
5/14/25	27.6	41.3	11.2	6.37	8.56	3.27
5/15/25	27.6	41.3	11.3	6.45	8.56	3.19
5/16/25	27.7	41.3	11.7	6.33	8.55	2.88
5/17/25	28.1	41.3	11.3	6.38	8.58	3.13
5/18/25	28.5	41.1	11.2	6.52	8.60	3.59
5/19/25	29.2	41.3	11.2	6.56	8.63	3.06
5/20/25	29.1	41.3	11.2	6.71	8.61	3.08
5/21/25	28.7	41.3	11.3	6.45	8.59	3.12
5/22/25	28.8	41.4	11.5	6.20	8.59	3.19

Table 43. Monthly averages data logged from the Biscayne (BC) site over the period January 2025 – May 2025. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Month	Temperature	Salinity	Pressure	RDO	pH	Turbidity
Jan-25	22.2	40.2	11.1	7.39	8.37	1.57
Feb-25	24.5	40.6	11.2	6.79	8.35	2.57
Mar-25	24.0	40.6	11.4	6.79	8.37	20.0
Apr-25	25.9	41.4	11.3	6.49	8.39	11.6
May-25	27.5	41.5	11.3	6.39	8.53	4.88

Table 44. Daily averages data logged from the Miami Beach (MB) site over the period 01/29/25-05/22/25. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU).

Date	Temperature	Salinity	Pressure	RDO	pH	Turbidity
1/29/25	23.3	39.1	11.8	7.19	8.61	0.000
1/30/25	23.0	39.2	11.7	7.25	8.68	0.00932
1/31/25	22.7	39.4	11.6	7.28	8.69	0.0916
2/1/25	22.7	39.5	11.5	7.17	8.68	0.0144
2/2/25	23.0	39.5	11.5	7.24	8.68	0.0205
2/3/25	23.9	39.6	11.5	7.15	8.68	0.0380
2/4/25	24.4	40.0	11.6	6.98	8.68	0.108
2/5/25	24.4	40.2	11.6	6.99	8.68	0.00935
2/6/25	24.5	40.3	11.6	6.94	8.67	0.0394
2/7/25	24.5	40.4	11.5	6.79	8.67	0.00368
2/8/25	24.6	40.4	11.6	6.91	8.67	0.00530
2/9/25	24.6	40.5	11.7	7.01	8.68	0.000
2/10/25	24.7	40.6	11.6	6.89	8.67	0.00337
2/11/25	24.7	40.6	11.7	6.80	8.66	0.00687
2/12/25	24.5	40.6	11.7	6.84	8.66	0.0490
2/13/25	24.1	40.8	11.7	6.83	8.67	0.0304
2/14/25	24.3	40.9	11.7	6.63	8.67	0.000
2/15/25	24.7	40.9	11.7	6.70	8.67	1.28
2/16/25	24.9	40.9	11.8	6.55	8.67	0.742
2/17/25	24.4	41.2	11.7	6.52	8.68	0.0293
2/18/25	24.7	41.1	11.7	6.57	8.68	0.0148
2/19/25	25.3	41.2	11.7	6.60	8.68	0.0515
2/20/25	25.1	41.2	11.7	6.73	8.68	0.0687
2/21/25	24.3	41.2	11.8	6.73	8.68	0.340
2/22/25	23.8	41.3	11.8	6.69	8.67	0.0177
2/23/25	23.7	41.3	11.9	6.81	8.68	0.0729
2/24/25	24.0	41.2	12.0	6.64	8.67	0.277
2/25/25	23.6	41.2	12.0	6.71	8.67	0.381
2/26/25	24.2	41.3	12.0	6.81	8.69	0.00472
2/27/25	24.4	41.3	12.0	6.76	8.68	0.00561
2/28/25	24.0	40.8	11.9	6.75	8.68	0.00809
3/1/25	24.4	41.4	12.0	6.78	8.69	0.0979
3/2/25	24.3	41.4	11.9	6.89	8.69	0.0377
3/3/25	24.3	41.6	11.9	7.07	8.73	0.241
3/4/25	24.0	41.5	11.9	6.90	8.73	8.87
3/5/25	24.0	41.6	11.9	6.55	8.70	8.03

3/6/25	24.0	41.6	11.8	6.63	8.70	0.390
3/7/25	23.6	41.7	11.9	6.75	8.70	0.0948
3/8/25	23.7	41.6	11.9	6.91	8.71	0.0642
3/9/25	23.8	41.5	11.8	6.94	8.71	0.0899
3/10/25	24.2	41.7	11.8	6.84	8.71	0.144
3/11/25	23.7	41.9	11.8	6.75	8.72	3.33
3/12/25	23.5	41.8	11.9	6.64	8.71	6.63
3/13/25	23.6	42.1	11.9	6.78	8.76	0.438
3/14/25	23.9	42.2	11.8	7.00	8.77	0.154
3/15/25	24.2	42.0	11.9	6.85	8.74	0.305
3/16/25	24.5	42.0	11.8	6.67	8.72	2.34
3/17/25	24.4	42.0	11.8	6.65	8.72	0.336
3/18/25	23.7	42.0	11.9	6.81	8.72	0.189
3/19/25	23.9	42.0	11.9	6.76	8.71	0.230
3/20/25	24.1	42.0	11.9	6.59	8.70	0.206
3/21/25	24.0	41.7	11.8	6.80	8.21	0.289
3/22/25	23.9	41.7	11.8	6.95	8.22	0.363
3/23/25	23.9	41.7	11.8	6.83	8.21	0.212
3/24/25	24.0	41.8	11.8	6.92	8.24	0.262
3/25/25	24.3	41.8	11.8	6.76	8.23	0.301
3/26/25	24.6	41.7	11.8	6.70	8.22	0.358
3/27/25	24.9	41.7	11.8	6.69	8.21	0.417
3/28/25	24.6	41.7	11.9	6.55	8.21	7.54
3/29/25	24.2	41.7	11.9	6.48	8.19	14.4
3/30/25	24.0	41.9	11.9	6.34	8.20	8.22
3/31/25	24.5	41.7	11.8	6.31	8.20	1.01
4/1/25	25.1	41.7	11.8	6.51	8.20	0.530
4/2/25	25.6	41.6	11.8	6.55	8.20	1.76
4/3/25	25.9	41.5	11.8	6.44	8.20	11.7
4/4/25	26.1	41.4	11.8	6.37	8.19	7.85
4/5/25	26.2	41.6	11.8	6.38	8.20	3.33
4/6/25	26.4	42.0	11.8	6.28	8.23	4.03
4/7/25	26.6	42.2	11.7	6.38	8.23	1.47
4/8/25	26.6	42.0	11.8	6.39	8.22	1.16
4/9/25	26.4	41.9	11.9	6.34	8.22	0.849
4/10/25	26.1	41.8	12.0	6.41	8.22	2.17
4/11/25	26.0	41.7	12.0	6.50	8.23	0.965
4/12/25	26.0	41.7	12.0	6.54	8.23	0.853
4/13/25	25.6	41.8	12.0	6.48	8.23	0.890
4/14/25	25.8	41.8	12.0	6.50	8.23	0.819
4/15/25	25.8	41.7	11.9	6.77	8.24	0.858

4/16/25	25.8	41.8	11.9	6.90	8.25	0.908
4/17/25	25.9	41.8	11.9	6.99	8.25	0.869
4/18/25	25.8	41.8	12.0	6.73	8.25	1.36
4/19/25	25.6	41.8	11.9	6.65	8.25	4.95
4/20/25	25.5	41.8	11.9	6.62	8.24	3.04
4/21/25	25.3	41.8	11.9	6.55	8.24	2.89
4/22/25	25.3	41.8	11.9	6.61	8.24	1.33
4/23/25	25.3	42.0	11.9	6.59	8.26	1.23
4/24/25	25.5	42.2	11.9	6.58	8.28	1.94
4/25/25	25.8	42.2	11.9	6.48	8.27	2.09
4/26/25	26.0	42.2	11.9	6.51	8.27	2.34
4/27/25	26.2	42.1	11.9	6.54	8.27	1.44
4/28/25	26.2	41.9	12.0	6.42	8.25	1.39
4/29/25	26.3	41.9	11.9	6.44	8.25	1.65
4/30/25	26.3	42.0	12.0	6.45	8.26	1.56
5/1/25	26.3	41.9	12.0	6.51	8.26	1.38
5/2/25	26.3	41.9	12.0	6.49	8.26	1.30
5/3/25	26.3	42.0	12.0	6.39	8.25	1.59
5/4/25	26.3	42.0	11.9	6.31	8.25	1.29
5/5/25	26.4	42.0	11.9	6.40	8.26	1.19
5/6/25	26.7	42.0	11.9	6.39	8.25	1.30
5/7/25	27.0	42.3	11.9	6.41	8.28	2.27
5/8/25	27.5	42.6	11.9	6.48	8.32	1.49
5/9/25	27.7	42.4	11.9	6.59	8.31	1.55
5/10/25	27.7	42.6	11.9	6.44	8.32	2.29
5/11/25	27.4	42.5	11.9	6.22	8.29	4.01
5/12/25	27.5	42.4	11.9	6.10	8.28	3.14
5/13/25	27.2	42.1	11.9	6.26	8.28	2.11
5/14/25	27.2	41.9	11.8	6.27	8.28	1.86
5/15/25	27.4	41.8	11.9	6.36	8.29	1.63
5/16/25	27.6	41.8	12.3	6.31	8.28	1.58
5/17/25	27.8	41.8	11.9	6.58	8.29	1.63
5/18/25	28.1	41.8	11.8	6.40	8.30	1.80
5/19/25	29.0	41.8	11.7	6.51	8.34	2.00
5/20/25	29.5	41.9	11.8	6.61	8.36	1.93
5/21/25	29.3	41.9	11.9	6.58	8.33	1.93
5/22/25	28.5	42.0	12.0	6.17	8.29	1.76

Table 45. Monthly averages data logged from the Miami Beach (MB) site over the period January 2025 – May 2025. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU).

Month	Temperature	Salinity	Pressure	RDO	pH	Turbidity
Jan-25	23.0	39.3	11.7	7.24	8.66	0.0336
Feb-25	24.3	40.7	11.7	6.81	8.68	0.129
Mar-25	24.1	41.8	11.9	6.75	8.53	2.12
Apr-25	25.9	41.8	11.9	6.53	8.24	2.27
May-25	27.5	42.1	11.9	6.41	8.29	1.88

Table 46. Daily averages data logged from the Haulover (HL) site over the period 01/30/25- 05/22/25. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU).

Date	Temperature	Salinity	Pressure	RDO	pH	Turbidity
1/30/25	23.5	38.6	8.80	7.70	8.29	0.000
1/31/25	23.5	38.5	8.63	7.47	8.29	0.0866
2/1/25	23.8	38.5	8.58	7.41	8.28	0.000
2/2/25	24.0	38.5	8.58	7.45	8.27	0.0202
2/3/25	24.2	38.5	8.54	7.32	8.26	0.0102
2/4/25	24.0	38.4	8.60	7.22	8.26	0.0267
2/5/25	24.3	38.4	8.61	7.31	8.27	0.0274
2/6/25	24.4	38.4	8.61	7.37	8.27	0.00105
2/7/25	24.7	38.4	8.59	7.27	8.26	0.0136
2/8/25	24.7	38.4	8.66	7.37	8.26	0.000
2/9/25	24.7	38.5	8.72	7.47	8.26	0.00317
2/10/25	24.9	38.5	8.68	7.54	8.27	0.0200
2/11/25	24.9	38.5	8.72	7.43	8.26	0.0373
2/12/25	24.9	38.5	8.71	7.20	8.25	0.0304
2/13/25	24.5	38.5	8.76	7.26	8.26	0.0644
2/14/25	24.6	38.5	8.73	7.18	8.25	0.0115
2/15/25	24.9	38.4	8.71	7.24	8.24	0.436
2/16/25	24.8	38.3	8.70	7.02	8.23	0.346
2/17/25	24.2	38.5	8.65	6.96	8.25	0.0413
2/18/25	24.4	38.4	8.65	7.00	8.24	0.00583
2/19/25	24.7	38.2	8.64	6.89	8.23	0.0421
2/20/25	24.8	38.3	8.67	7.19	8.26	0.0256
2/21/25	24.1	38.4	8.68	7.05	8.24	0.215
2/22/25	23.2	38.4	8.71	7.18	8.25	0.218
2/23/25	23.4	38.4	8.83	7.18	8.25	0.0491
2/24/25	23.3	38.4	8.90	7.21	8.26	0.271
2/25/25	23.5	38.3	8.92	7.17	8.25	0.369
2/26/25	23.9	38.4	8.97	7.20	8.26	0.0602
2/27/25	24.1	38.3	8.94	7.34	8.26	0.0385
2/28/25	24.3	38.3	8.95	7.33	8.26	0.0252
3/1/25	24.4	38.3	8.93	7.34	8.26	0.107
3/2/25	24.4	38.3	8.89	7.25	8.26	0.0745
3/3/25	24.4	38.3	8.87	7.22	8.25	0.117
3/4/25	24.0	38.3	8.94	7.13	8.24	3.81
3/5/25	23.9	38.3	8.93	6.97	8.28	4.87
3/6/25	23.9	38.3	8.91	7.01	8.27	0.428

3/7/25	23.4	38.4	8.95	7.13	8.28	0.162
3/8/25	23.8	38.4	8.93	7.26	8.28	0.0329
3/9/25	24.1	38.4	8.91	7.30	8.28	0.0734
3/10/25	24.3	38.4	8.87	7.17	8.27	0.0423
3/11/25	23.8	38.4	8.89	7.15	8.27	1.63
3/12/25	23.5	38.4	8.95	7.09	8.27	3.56
3/13/25	23.6	38.4	8.92	7.14	8.27	0.907
3/14/25	23.8	38.4	8.90	7.18	8.28	0.574
3/15/25	24.2	38.5	8.97	7.18	8.30	1.24
3/16/25	24.4	38.5	8.90	7.18	8.30	2.63
3/17/25	24.6	38.5	8.85	7.18	8.30	0.607
3/18/25	23.8	38.5	8.96	7.20	8.29	0.270
3/19/25	23.9	38.5	8.97	7.23	8.29	0.0940
3/20/25	24.0	38.5	8.96	7.11	8.28	0.186
3/21/25	24.1	38.2	8.91	7.32	8.32	0.0532
3/22/25	23.7	38.3	8.94	7.32	8.32	0.0582
3/23/25	23.9	38.3	8.95	7.18	8.30	0.182
3/24/25	24.1	38.2	8.95	7.24	8.31	0.143
3/25/25	24.4	38.3	8.92	7.07	8.30	0.0177
3/26/25	24.6	38.2	8.94	7.01	8.31	0.0240
3/27/25	25.0	38.2	8.95	7.17	8.32	0.0273
3/28/25	24.6	38.3	9.02	6.95	8.31	6.27
3/29/25	23.9	38.2	8.86	6.95	8.28	7.60
3/30/25	24.0	38.2	8.87	6.73	8.28	8.04
3/31/25	24.4	37.7	8.88	6.67	8.30	0.719
4/1/25	24.9	38.1	8.85	6.98	8.32	0.134
4/2/25	25.6	37.8	8.84	7.18	8.31	2.03
4/3/25	25.9	37.8	8.88	6.89	8.29	5.98
4/4/25	26.1	38.0	8.87	6.76	8.29	5.49
4/5/25	26.2	38.0	8.85	6.72	8.28	8.25
4/6/25	26.2	38.0	8.82	6.76	8.29	7.75
4/7/25	26.5	38.0	8.79	6.78	8.31	2.90
4/8/25	26.6	38.5	8.84	6.62	8.33	2.35
4/9/25	26.3	38.3	8.95	6.81	8.33	3.10
4/10/25	26.0	38.2	9.01	6.85	8.32	4.99
4/11/25	26.0	38.1	8.99	6.80	8.32	5.49
4/12/25	26.0	38.1	9.00	7.04	8.32	4.82
4/13/25	25.7	38.2	9.04	7.10	8.35	3.58
4/14/25	25.7	38.2	9.02	7.27	8.34	1.08
4/15/25	25.8	38.2	8.95	7.08	8.33	1.07
4/16/25	25.9	38.3	8.97	7.19	8.35	2.61

4/17/25	25.9	38.2	8.99	7.16	8.34	1.02
4/18/25	25.7	38.2	9.02	7.18	8.35	1.91
4/19/25	25.6	38.3	8.96	6.99	8.33	4.22
4/20/25	25.4	38.2	8.95	6.96	8.31	3.87
4/21/25	25.4	38.3	8.90	6.87	8.31	2.60
4/22/25	25.4	38.4	8.91	6.94	8.32	1.10
4/23/25	25.6	38.4	8.91	7.04	8.34	1.23
4/24/25	25.6	38.3	8.91	7.03	8.35	1.99
4/25/25	25.8	38.5	8.91	6.98	8.37	2.43
4/26/25	26.0	38.5	8.95	6.93	8.37	1.80
4/27/25	26.3	38.5	8.93	7.13	8.38	1.12
4/28/25	26.6	38.4	8.99	7.23	8.37	1.85
4/29/25	26.6	38.4	8.96	6.95	8.36	4.46
4/30/25	26.5	38.5	9.01	6.84	8.34	34.4
5/1/25	26.4	38.5	8.99	6.88	8.34	8.41
5/2/25	26.3	38.4	9.01	6.91	8.34	6.63
5/3/25	26.3	38.4	9.02	6.89	8.35	8.75
5/4/25	26.3	38.3	8.95	6.90	8.37	10.1
5/5/25	26.5	38.3	8.98	7.00	8.37	19.0
5/6/25	26.8	38.3	8.93	6.94	8.36	35.5
5/7/25	27.1	38.3	8.93	7.06	8.37	36.0
5/8/25	27.3	38.4	8.89	7.02	8.37	14.1
5/9/25	27.6	38.7	8.85	7.04	8.42	17.2
5/10/25	27.8	38.7	8.89	6.93	8.43	18.9
5/11/25	27.8	38.7	8.94	6.80	8.43	19.3
5/12/25	27.3	38.2	8.92	6.57	8.38	19.0
5/13/25	27.3	38.2	8.90	6.66	8.38	17.8
5/14/25	27.3	38.1	8.88	6.87	8.39	17.1
5/15/25	27.4	38.0	8.96	6.93	8.40	16.5
5/16/25	27.5	38.0	9.38	6.89	8.39	16.9
5/17/25	27.7	38.0	8.92	7.01	8.40	17.6
5/18/25	27.9	38.0	8.82	6.88	8.40	19.4
5/19/25	28.4	37.9	8.76	6.87	8.41	26.8
5/20/25	28.3	37.9	8.77	6.93	8.43	31.0
5/21/25	28.9	37.9	8.85	6.95	8.45	38.7
5/22/25	28.1	38.0	8.99	6.70	8.41	36.8

Table 47. Monthly averages data logged from the Haulover (HL) site over the period January 2025 – May 2025. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU).

Month	Temperature	Salinity	Pressure	RDO	pH	Turbidity
Jan-25	23.5	38.5	8.72	7.59	8.29	0.0433
Feb-25	24.3	38.4	8.71	7.24	8.26	0.0861
Mar-25	24.1	38.3	8.92	7.13	8.29	1.43
Apr-25	25.9	38.2	8.93	6.97	8.33	4.19
May-25	27.4	38.2	8.91	6.89	8.39	21.1

Table 48. Daily averages data logged from the Hollywood (HW) site over the period 01/30/25-05/22/25. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU).

Date	Temperature	Salinity	Pressure	RDO	pH	Turbidity
1/30/25	23.6	37.6	10.9	6.96	8.30	0.000
1/31/25	23.5	37.5	10.7	6.95	8.31	0.000
2/1/25	23.7	37.5	10.7	6.73	8.30	0.000
2/2/25	23.9	37.6	10.7	6.83	8.30	0.000
2/3/25	24.2	37.6	10.7	6.73	8.29	0.0118
2/4/25	24.5	37.7	10.7	6.93	8.29	0.00605
2/5/25	24.7	37.7	10.7	6.88	8.29	0.00604
2/6/25	24.8	37.8	10.7	6.74	8.28	0.0219
2/7/25	24.8	37.8	10.7	6.68	8.27	0.0600
2/8/25	24.7	37.7	10.8	6.83	8.28	0.0475
2/9/25	24.7	37.6	10.8	6.72	8.28	0.0696
2/10/25	24.8	37.7	10.8	6.68	8.27	0.102
2/11/25	24.9	37.8	10.9	6.70	8.27	0.140
2/12/25	24.9	37.9	10.9	6.67	8.28	0.164
2/13/25	25.0	37.9	11.0	6.67	8.28	0.229
2/14/25	24.7	37.8	11.0	6.47	8.27	0.155
2/15/25	25.1	37.7	11.0	6.55	8.26	0.613
2/16/25	25.1	37.9	10.9	6.45	8.26	0.432
2/17/25	24.3	37.9	10.9	6.38	8.27	0.182
2/18/25	24.2	37.8	10.9	6.43	8.26	0.222
2/19/25	24.4	37.7	10.9	6.50	8.27	0.337
2/20/25	24.5	37.8	10.9	6.48	8.27	0.428
2/21/25	23.8	37.7	10.9	6.62	8.27	1.62
2/22/25	23.5	37.8	10.9	6.67	8.28	6.12
2/23/25	23.6	37.9	11.1	6.64	8.29	7.80
2/24/25	23.5	38.0	11.1	6.64	8.29	9.01
2/25/25	23.3	37.8	11.2	6.51	8.27	13.9
2/26/25	24.0	37.9	11.2	6.65	8.29	10.1
2/27/25	24.3	37.8	11.2	6.79	8.30	5.99
2/28/25	24.4	37.9	11.2	6.69	8.30	2.61
3/1/25	24.5	38.0	11.2	6.80	8.30	0.811
3/2/25	24.5	38.0	11.1	6.73	8.30	2.48
3/3/25	24.4	37.9	11.1	6.73	8.30	2.46
3/4/25	24.1	38.0	11.1	6.59	8.30	9.35
3/5/25	23.8	37.9	11.0	6.32	8.26	31.2
3/6/25	23.6	37.9	11.0	6.50	8.26	32.1

3/7/25	23.1	38.0	11.1	6.56	8.27	36.9
3/8/25	23.8	38.0	11.1	6.61	8.29	39.0
3/9/25	24.1	38.1	11.1	6.79	8.30	22.2
3/10/25	24.4	38.1	11.0	6.65	8.30	14.1
3/11/25	23.9	38.2	11.1	6.57	8.31	15.1
3/12/25	23.5	38.2	11.1	6.55	8.30	46.9
3/13/25	23.6	38.2	11.1	6.55	8.30	37.4
3/14/25	23.8	38.2	11.0	6.53	8.29	18.6
3/15/25	24.2	38.2	11.1	6.54	8.29	7.76
3/16/25	24.4	38.1	11.1	6.54	8.29	10.6
3/17/25	24.6	38.2	11.0	6.50	8.28	9.80
3/18/25	23.7	38.3	11.1	6.59	8.30	4.87
3/19/25	23.5	38.2	11.1	6.65	8.30	6.34
3/20/25	24.0	38.2	11.1	6.45	8.30	4.11
3/21/25	24.0	38.7	10.9	6.57	8.31	0.624
3/22/25	23.8	38.6	10.9	6.71	8.31	0.582
3/23/25	23.9	38.6	10.9	6.59	8.31	0.611
3/24/25	24.0	38.6	11.0	6.64	8.31	0.631
3/25/25	24.3	38.7	10.9	6.53	8.31	0.683
3/26/25	24.5	38.6	10.9	6.33	8.30	0.730
3/27/25	24.8	38.6	11.0	6.48	8.31	0.904
3/28/25	24.6	38.5	11.1	6.47	8.31	28.9
3/29/25	24.2	38.1	11.0	6.28	8.30	59.0
3/30/25	23.9	38.7	10.9	6.19	8.28	35.0
3/31/25	24.2	38.4	11.0	6.14	8.29	1.05
4/1/25	24.8	38.6	11.0	6.15	8.31	0.865
4/2/25	25.4	38.5	11.0	6.40	8.32	1.26
4/3/25	25.7	38.5	11.0	6.28	8.31	6.63
4/4/25	26.0	38.5	11.0	6.17	8.31	4.61
4/5/25	26.0	38.5	11.0	6.08	8.29	5.29
4/6/25	26.2	38.6	11.0	6.13	8.29	2.82
4/7/25	26.3	38.6	10.9	6.22	8.31	1.63
4/8/25	26.3	38.8	11.0	5.77	8.33	1.59
4/9/25	26.0	38.7	11.1	6.03	8.34	1.62
4/10/25	25.8	38.7	11.2	6.14	8.34	2.87
4/11/25	25.7	38.6	11.1	6.08	8.34	3.47
4/12/25	25.7	38.6	11.1	6.29	8.35	4.51
4/13/25	25.4	38.7	11.2	6.38	8.37	4.28
4/14/25	25.4	38.7	11.1	6.54	8.37	4.16
4/15/25	25.7	39.0	11.1	6.47	8.37	3.43
4/16/25	25.8	39.0	11.1	6.46	8.38	3.19

4/17/25	26.0	38.9	11.1	6.42	8.38	3.20
4/18/25	25.7	38.8	11.1	6.22	8.37	6.47
4/19/25	25.6	38.8	11.1	6.39	8.39	20.5
4/20/25	25.3	38.9	11.1	6.33	8.37	35.1
4/21/25	25.2	39.0	11.1	6.38	8.37	29.1
4/22/25	25.4	39.1	11.0	6.39	8.38	27.3
4/23/25	25.6	39.1	11.0	6.47	8.39	25.6
4/24/25	25.8	39.1	11.0	6.44	8.39	15.9
4/25/25	25.9	39.1	11.0	6.32	8.38	17.7
4/26/25	26.1	39.0	11.1	6.21	8.37	16.6
4/27/25	26.3	38.9	11.1	6.27	8.38	15.3
4/28/25	26.4	38.9	11.1	6.23	8.41	16.4
4/29/25	26.5	38.6	11.1	6.29	8.40	15.0
4/30/25	26.3	38.5	11.1	6.11	8.40	13.5
5/1/25	26.1	38.6	11.1	6.23	8.41	15.3
5/2/25	26.1	38.7	11.1	6.27	8.42	24.2
5/3/25	26.2	38.6	11.1	6.16	8.42	60.9
5/4/25	26.2	38.7	11.1	6.13	8.40	75.3
5/5/25	26.4	38.8	11.1	6.18	8.40	96.4
5/6/25	26.8	38.8	11.0	6.12	8.41	150
5/7/25	27.1	38.9	11.1	6.29	8.43	147
5/8/25	27.4	39.0	11.0	6.43	8.44	55.3
5/9/25	27.3	39.1	11.0	6.49	8.45	1.73
5/10/25	27.4	39.4	11.0	6.18	8.48	1.76
5/11/25	27.9	39.5	11.0	6.12	8.50	2.20
5/12/25	27.6	39.3	11.1	5.97	8.48	2.08
5/13/25	27.3	39.1	11.0	5.94	8.46	1.92
5/14/25	27.5	38.4	11.0	6.23	8.48	1.87
5/15/25	27.7	37.4	11.1	6.05	8.46	4.39
5/16/25	28.1	37.5	11.0	6.19	8.47	1.95
5/17/25	27.7	37.5	11.0	6.22	8.48	3.57
5/18/25	28.0	37.5	10.9	6.22	8.48	4.92
5/19/25	28.1	37.5	10.9	6.19	8.49	2.40
5/20/25	28.1	37.6	10.9	6.20	8.50	2.05
5/21/25	28.0	37.7	11.0	6.09	8.50	4.59
5/22/25	27.6	37.7	11.0	5.91	8.49	2.07

Table 49. Monthly averages data logged from the Hollywood (HW) site over the period January 2025 – May 2025. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Month	Temperature	Salinity	Pressure	RDO	pH	Turbidity
Jan-25	23.5	37.6	10.8	6.95	8.30	0.000
Feb-25	24.4	37.8	10.9	6.65	8.28	2.16
Mar-25	24.1	38.3	11.0	6.54	8.30	15.5
Apr-25	25.8	38.8	11.1	6.27	8.36	10.3
May-25	27.3	38.4	11.0	6.18	8.46	30.7

Table 50. Daily averages data logged from the Fort Lauderdale (FL) site over the period 01/29/25-05/22/25. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), RDO concentration (mg/L), pH (pH), and turbidity (NTU).

Date	Temperature	Salinity	Pressure	RDO	pH	Turbidity
1/29/25	23.0	37.4	13.9	7.61	8.29	0.487
1/30/25	23.3	37.4	13.8	7.41	8.28	0.462
1/31/25	23.4	37.3	13.8	7.25	8.27	0.504
2/1/25	23.6	37.3	13.7	7.00	8.26	0.470
2/2/25	23.9	37.3	13.7	7.06	8.25	0.483
2/3/25	24.1	37.3	13.7	7.07	8.25	0.495
2/4/25	24.2	37.3	13.7	7.03	8.25	0.548
2/5/25	24.3	37.3	13.7	7.18	8.25	0.511
2/6/25	24.2	37.3	13.8	7.10	8.24	0.510
2/7/25	24.3	37.3	13.7	7.16	8.25	0.541
2/8/25	24.4	37.4	13.8	6.93	8.24	0.595
2/9/25	24.7	37.4	13.9	6.99	8.24	0.576
2/10/25	24.8	37.3	13.8	6.96	8.24	0.597
2/11/25	24.7	37.4	13.9	6.88	8.24	0.583
2/12/25	24.5	37.4	13.9	6.75	8.23	0.588
2/13/25	24.9	37.4	13.9	6.86	8.23	0.682
2/14/25	24.7	37.4	13.9	6.85	8.24	0.634
2/15/25	24.9	37.4	13.9	6.88	8.23	0.931
2/16/25	24.7	37.3	14.0	6.74	8.22	0.918
2/17/25	24.0	37.4	13.9	6.74	8.23	0.659
2/18/25	23.8	37.4	13.9	6.79	8.23	4.49
2/19/25	24.3	37.3	13.9	6.87	8.23	0.785
2/20/25	24.3	37.2	13.9	6.73	8.23	0.660
2/21/25	23.6	37.3	13.9	6.87	8.24	0.917
2/22/25	23.1	37.3	14.0	7.06	8.24	0.854
2/23/25	23.9	37.4	14.1	7.06	8.26	0.756
2/24/25	23.6	37.3	14.2	6.84	8.24	0.911
2/25/25	23.9	37.2	14.2	6.74	8.24	1.35
2/26/25	23.7	37.2	14.3	6.99	8.25	0.863
2/27/25	24.1	37.3	14.2	7.15	8.26	0.852
2/28/25	24.3	37.3	14.1	6.98	8.25	0.816
3/1/25	24.5	37.4	14.2	7.02	8.26	0.770
3/2/25	24.5	37.4	14.1	6.89	8.25	0.807
3/3/25	24.4	37.5	14.1	7.01	8.26	0.845
3/4/25	24.0	37.5	14.1	6.90	8.25	4.72
3/5/25	23.9	37.4	14.0	6.74	8.23	5.23

3/6/25	23.8	37.4	14.0	6.75	8.23	1.50
3/7/25	23.3	37.5	14.1	6.93	8.25	1.40
3/8/25	23.8	37.6	14.0	7.08	8.26	1.03
3/9/25	24.2	37.5	14.0	7.00	8.25	1.13
3/10/25	24.3	37.5	14.0	6.87	8.25	1.10
3/11/25	23.5	37.6	14.0	6.81	8.25	2.17
3/12/25	23.2	37.7	14.1	6.99	8.27	2.09
3/13/25	23.3	37.6	14.0	6.99	8.26	1.59
3/14/25	23.8	37.7	14.0	7.16	8.27	1.41
3/15/25	24.1	37.6	14.1	6.99	8.26	1.65
3/16/25	24.4	37.7	14.1	6.86	8.25	2.28
3/17/25	24.4	37.7	14.0	6.84	8.26	1.86
3/18/25	23.7	37.7	14.0	7.03	8.27	1.71
3/19/25	23.6	37.7	14.1	7.08	8.27	1.85
3/20/25	23.8	37.1	13.9	7.11	8.26	1.68
3/21/25	24.1	38.0	14.0	7.01	8.30	1.08
3/22/25	23.8	38.0	14.0	7.21	8.31	1.15
3/23/25	23.8	38.2	14.0	7.13	8.31	1.15
3/24/25	24.1	38.1	14.0	7.09	8.30	1.77
3/25/25	24.5	38.1	14.0	6.77	8.29	7.43
3/26/25	24.6	38.1	14.0	6.74	8.29	1.47
3/27/25	25.0	38.1	14.1	6.82	8.29	1.21
3/28/25	24.6	38.1	14.0	6.70	8.28	6.46
3/29/25	24.1	38.1	14.0	6.64	8.27	10.4
3/30/25	24.1	38.0	13.9	6.62	8.25	9.34
3/31/25	24.3	38.0	13.9	6.54	8.25	1.86
4/1/25	24.7	38.0	13.9	6.60	8.28	1.69
4/2/25	25.3	38.0	14.0	6.96	8.30	2.09
4/3/25	25.6	37.9	14.0	6.51	8.26	15.6
4/4/25	25.8	37.8	13.9	6.50	8.26	15.2
4/5/25	25.8	37.9	14.0	6.38	8.26	11.6
4/6/25	26.0	37.9	13.9	6.43	8.25	5.74
4/7/25	26.1	37.9	13.9	6.56	8.27	2.84
4/8/25	26.0	38.1	13.9	6.35	8.28	2.29
4/9/25	25.8	38.1	14.0	6.35	8.29	2.32
4/10/25	25.6	38.0	14.1	6.57	8.29	3.36
4/11/25	25.7	38.0	14.1	6.46	8.29	2.87
4/12/25	25.7	38.1	14.1	6.69	8.30	2.70
4/13/25	25.4	38.1	14.1	6.88	8.31	2.81
4/14/25	25.5	38.1	14.1	6.75	8.31	2.99
4/15/25	25.5	38.1	14.0	6.73	8.31	3.26

4/16/25	25.7	38.2	14.1	6.92	8.32	2.92
4/17/25	25.8	38.1	14.1	6.81	8.32	3.08
4/18/25	25.7	38.1	14.1	6.81	8.32	4.05
4/19/25	25.6	38.2	14.0	6.71	8.32	78.3
4/20/25	25.2	38.1	14.0	6.55	8.29	10.3
4/21/25	25.3	37.9	14.0	6.51	8.29	5.49
4/22/25	25.4	37.9	14.0	6.67	8.30	4.36
4/23/25	25.7	38.1	14.0	6.67	8.32	4.13
4/24/25	25.7	38.0	14.0	6.66	8.32	4.84
4/25/25	25.9	37.9	14.0	6.59	8.31	5.43
4/26/25	25.9	38.1	14.0	6.59	8.31	4.14
4/27/25	26.1	38.2	14.0	6.57	8.32	4.16
4/28/25	26.4	38.1	14.1	6.64	8.32	4.10
4/29/25	26.5	38.1	14.0	6.60	8.32	4.25
4/30/25	26.4	38.1	14.1	6.61	8.32	18.0
5/1/25	26.2	38.2	14.1	6.66	8.32	4.99
5/2/25	26.2	38.2	14.1	6.57	8.34	3.68
5/3/25	26.3	38.0	14.1	6.61	8.34	3.71
5/4/25	26.4	38.1	14.0	6.35	8.31	3.90
5/5/25	26.4	38.1	14.1	6.35	8.31	3.73
5/6/25	26.7	38.2	14.0	6.48	8.32	3.58
5/7/25	27.0	38.2	14.0	6.54	8.31	3.35
5/8/25	27.1	38.2	14.0	6.79	8.33	3.42
5/9/25	27.0	38.2	13.9	6.78	8.35	3.47
5/10/25	26.7	38.5	13.9	6.55	8.35	40.7
5/11/25	27.2	38.9	14.0	6.39	8.36	5.26
5/12/25	27.6	38.9	14.0	6.15	8.37	5.60
5/13/25	26.8	38.6	14.0	6.46	8.36	6.47
5/14/25	27.3	38.5	14.0	6.63	8.37	5.25
5/15/25	27.3	38.7	14.0	6.57	8.36	4.93
5/16/25	27.8	38.8	14.0	6.49	8.36	8.27
5/17/25	27.5	38.9	13.9	6.57	8.36	4.12
5/18/25	27.5	39.0	13.8	6.57	8.36	3.06
5/19/25	27.6	39.0	13.8	6.59	8.37	2.92
5/20/25	27.3	39.0	13.9	6.33	8.36	13.2
5/21/25	27.2	39.2	13.8	6.17	8.36	3.16

Table 51. Monthly averages data logged from the Fort Lauderdale (FL) site over the period January 2025 – May 2025. The variables recorded are temperature (°C), salinity (PSU), pressure (psi), relative dissolved oxygen (RDO) (mg/L), pH (pH), and turbidity (NTU).

Month	Temperature	Salinity	Pressure	RDO	pH	Turbidity
Jan-25	23.2	37.3	13.8	7.42	8.28	0.485
Feb-25	24.2	37.3	13.9	6.94	8.24	0.842
Mar-25	24.1	37.8	14.0	6.91	8.27	2.58
April-25	25.7	38.0	14.0	6.62	8.30	7.83
May-25	27.0	38.5	14.0	6.51	8.35	6.58

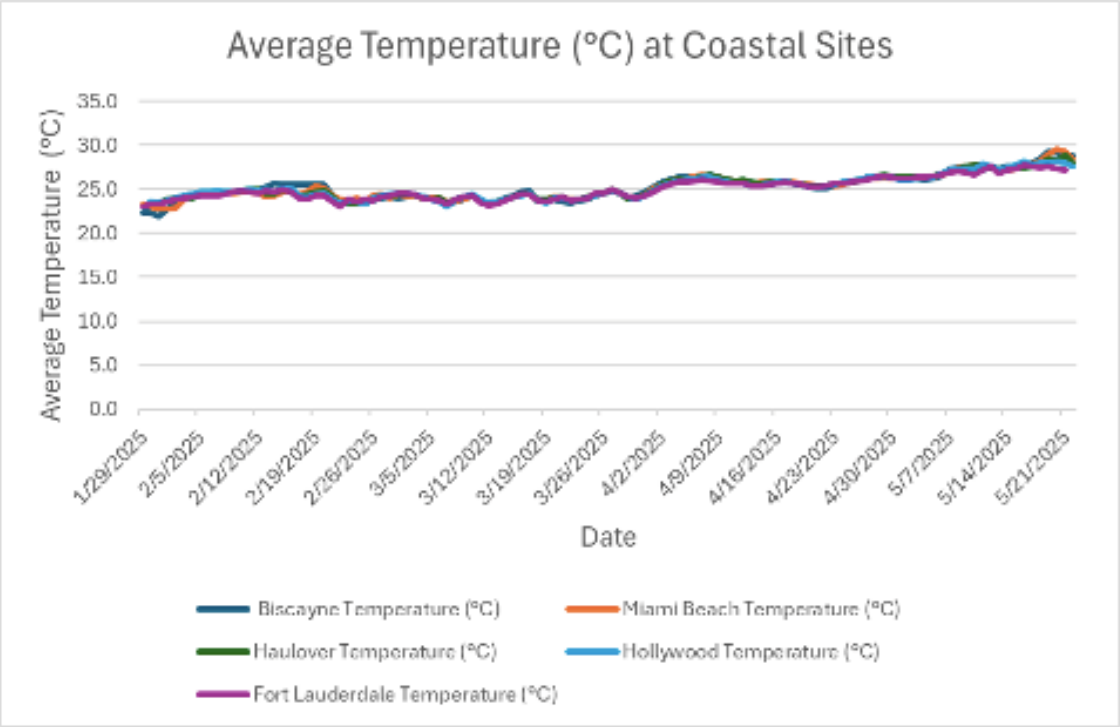

Figure 14. Daily average temperature (ºC) for the five coastal sites (Biscayne, Miami Beach, Haulover, Hollywood, and Fort Lauderdale) from January 29 & 30, 2025 to May 21 & 22, 2025.

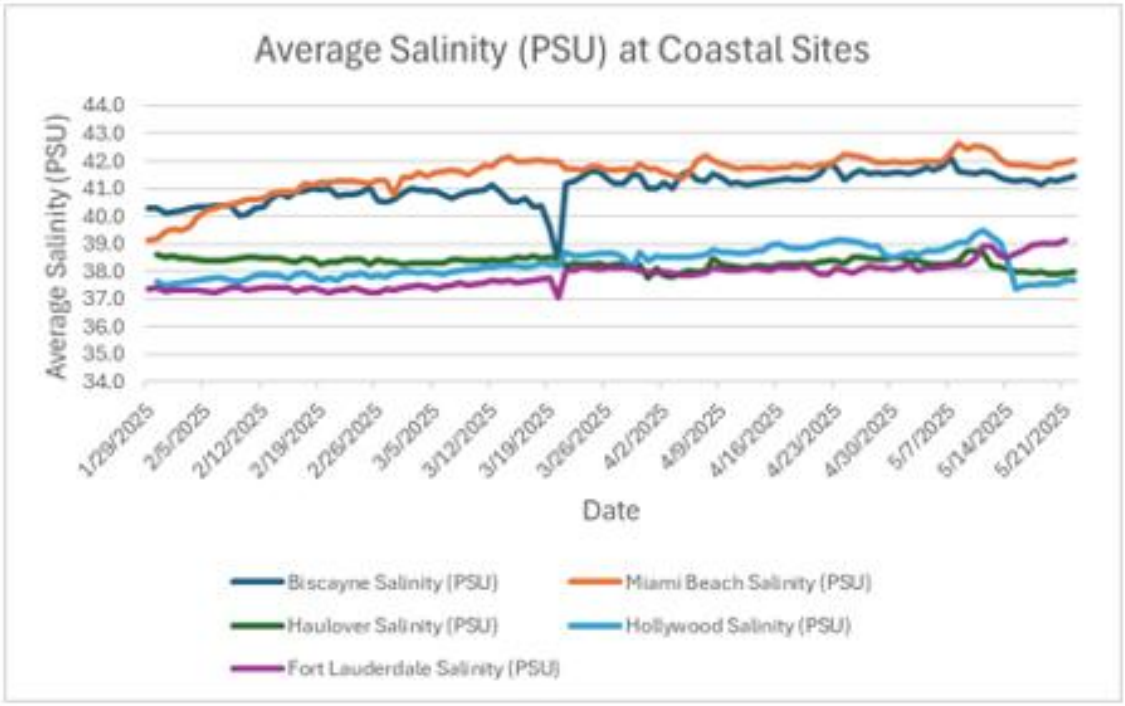

Figure 15. Daily average salinity (PSU) for the five coastal sites (Biscayne, Miami Beach, Haulover, Hollywood, and Fort Lauderdale) from January 29 & 30, 2025 to May 21 & 22, 2025.

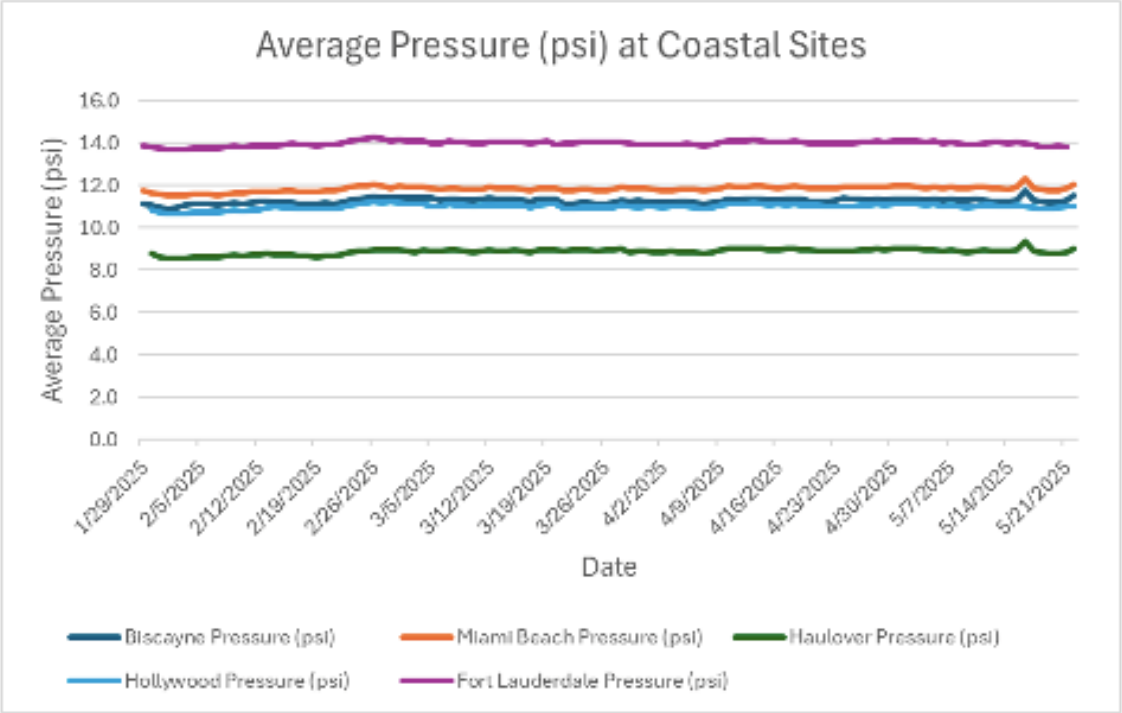

Figure 16. Daily average pressure (psi) for the five coastal sites (Biscayne, Miami Beach, Haulover, Hollywood, and Fort Lauderdale) from January 29 & 30, 2025 to May 21 & 22, 2025.

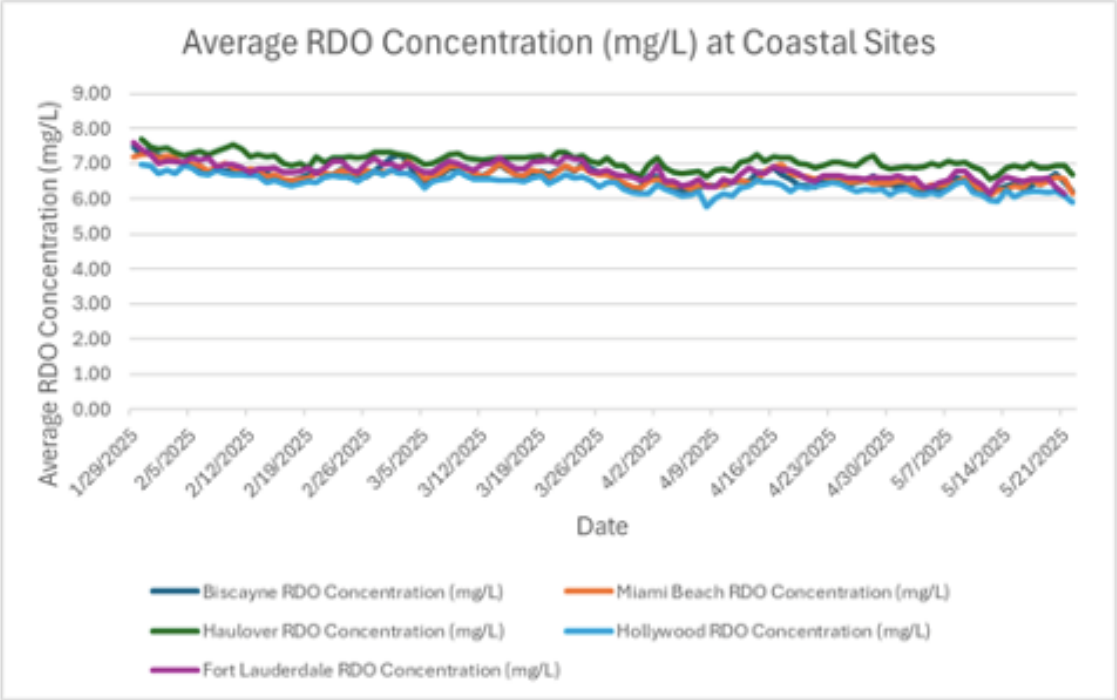

Figure 17. Daily average RDO concentration (mg/L) for the five coastal sites (Biscayne, Miami Beach, Haulover, Hollywood, and Fort Lauderdale) from January 29 & 30, 2025 to May 21 & 22, 2025.

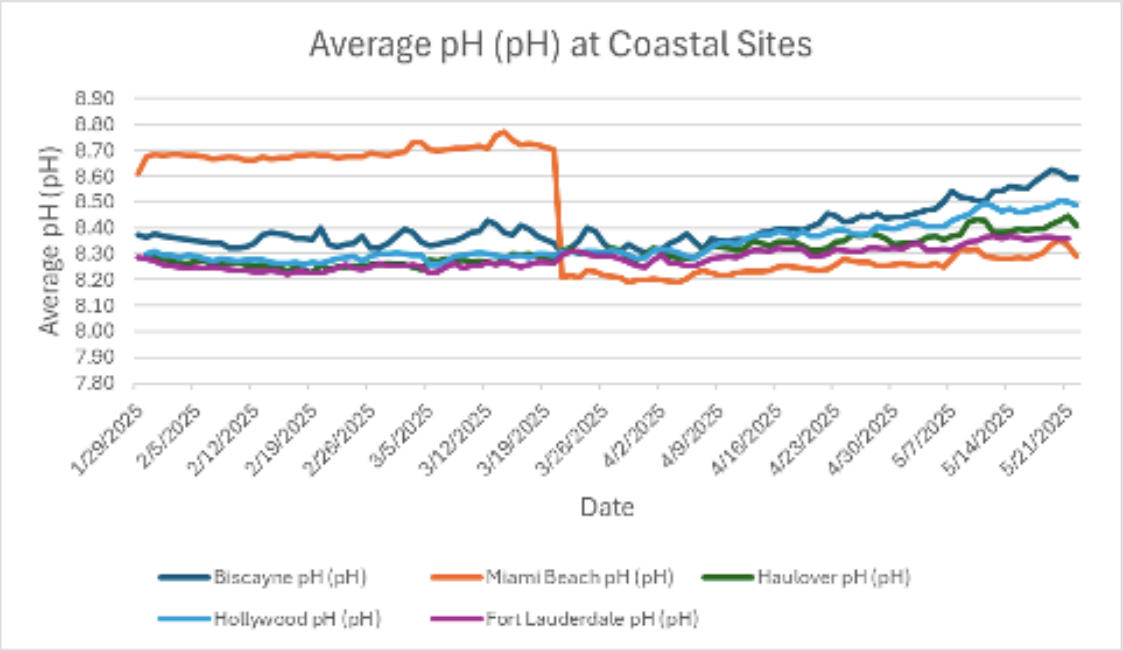

Figure 18. Daily average pH (pH) for the five coastal sites (Biscayne, Miami Beach, Haulover, Hollywood, and Fort Lauderdale) from January 29 & 30, 2025 to May 21 & 22, 2025.

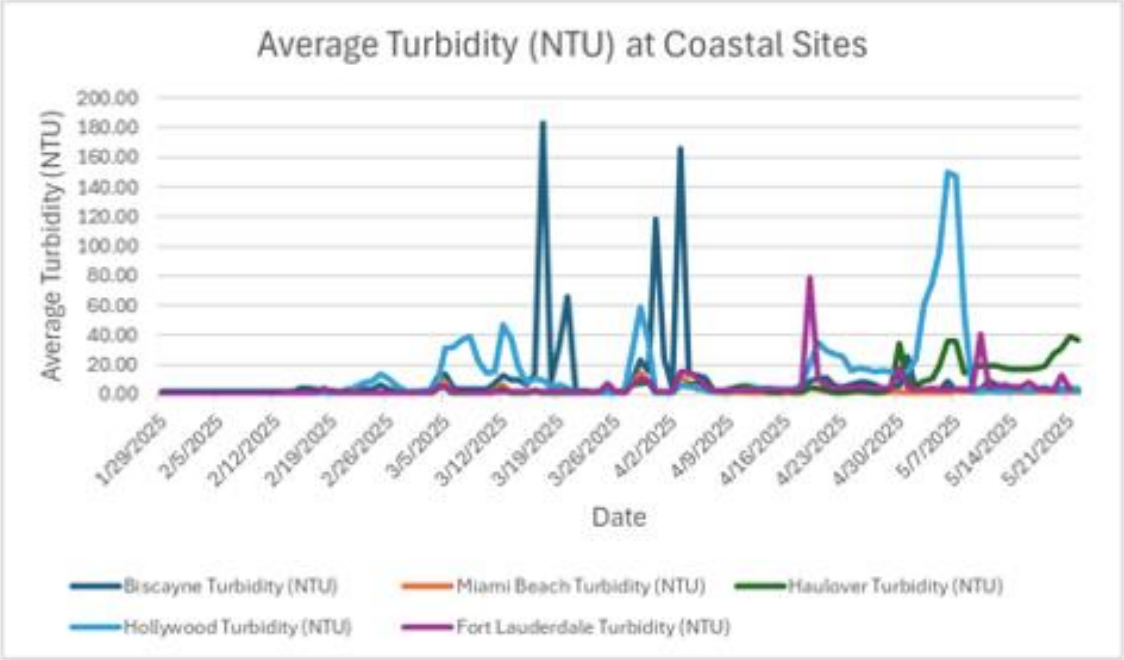

Figure 19. Daily average turbidity (NTU) for the five coastal sites (Biscayne, Miami Beach, Haulover, Hollywood, and Fort Lauderdale) from January 29 & 30, 2025 to May 21 & 22, 2025.

4. CONCLUSIONS AND RECOMMENDATIONS

This study highlights the complex and site-specific interactions between abiotic conditions and sediment-associated heavy metal contamination across coral reef and coastal environments in Southeast Florida. Statistical analyses from Phase II (DEP Agreement C2221E) revealed significant correlations between key abiotic variable (temperature, salinity, pressure, dissolved oxygen (RDO), pH, and turbidity) and ecological indices of sediment quality, including the Pollution Load Index (PLI), Potential Ecological Risk (PER), Geoaccumulation Index (GEO), and Enrichment Factor (Ef). Notably, temperature exhibited strong positive correlations with PLI, PER, and GEO, particularly at northern reef sites (1N, 2N, 3N), indicating elevated metal burden and ecological risk under warmer conditions. Negative correlations between pressure and metal indices suggest nearshore influences, while higher RDO was generally associated with reduced metal accumulation and risk, consistent with known oxygen–metal interactions.

Sedimentation rates varied seasonally, with elevated deposition during storm-prone months (September–April), and site 1N showed the highest winter sedimentation. Coastal monitoring platforms also recorded spatial differences, with the highest turbidity and sedimentation observed at southern sites BC and MB, respectively. The strong variability in turbidity and sediment load linked to storm events reinforces the influence of episodic disturbances on water quality and sediment dynamics.

Given these findings, continuous and high-resolution monitoring is essential to detect temporal and spatial shifts in water quality and sediment contamination. Episodic disturbances such as storms, high temperatures, and runoff events can cause rapid changes in turbidity, dissolved oxygen, and metal loads, all factors that directly impact coral health and reef resilience. Ongoing data collection will not only provide critical baselines for assessing long-term trends and the impacts of climate change but also support timely management responses to acute stress events.

We recommend maintaining and expanding the existing monitoring infrastructure, including the Aqua TROLL 600 sondes and sediment trap deployments, to ensure consistent, multi-seasonal coverage. Integration of abiotic data with biological assessments (e.g., coral recruitment, bleaching, disease) and heavy metal concentrations in the deposited sediment will enhance our understanding of how environmental stressors affect reef ecosystems. To better understand potential land-based sources of heavy metal contamination affecting nearby coral reef ecosystems, sediment sampling from Broward County canals is recommended. This would help identify and quantify heavy metal inputs, particularly those associated with urban runoff, that may be transported toward

adjacent reef habitats. In addition, experimental exposure studies should be conducted in which corals are dosed with environmentally relevant concentrations of metals identified in sediment samples, such as molybdenum (Mo) and manganese (Mn). These controlled assays would provide critical insights into the dose-dependent toxicity thresholds and sublethal effects of specific contaminants, supporting improved risk assessments and management strategies for coral health in urbanized coastal regions.

These efforts will be vital for informing adaptive management strategies, guiding restoration initiatives, and protecting Florida's Coral Reef from both chronic and acute environmental threats.

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