FSUCML Real-time and Continuous Seawater Monitoring System Report
Annual Report
June 2023 – July 2024

I. Data Set and Research Descriptors

1) Principal investigator(s) and contact information:

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2) Entry verification:

Deployment data are uploaded from the YSI data logger to a Personal Computer. Files are exported from KOR Software as Microsoft Excel comma-separated values (.csv) and uploaded to the Centralized Data Management Office (CDMO), where they undergo automated primary QAQC. All pre- and post-deployment data are removed from the file before uploading. During primary QAQC, data are flagged if missing or falling outside the sensor's range. The edited file is then returned to the FSUCML information manager for secondary QAQC, where it is opened in Microsoft Excel and processed using the CDMO's National Estuarine Research Reserve System (NERR) QAQC Excel macro. The macro inserts the station's codes, creates metadata worksheets for flagged data and summary statistics, and graphs the data for review. It allows the user to apply QAQC flags and codes to the data, remove any overlapping deployment data, append files, and export the resulting data file for upload to the CDMO. Upload after secondary QAQC results in ingestion into the database as provisional plus data, and finally tertiary QAQC by the CDMO and assimilation into the CDMO's authoritative online database. For more information on QAQC flags and codes, see Sections 11 and 12.

3) Research objectives:

The objective of this research is to monitor seawater quality by providing high-frequency data, recorded every 15 minutes, on pH, salinity, temperature, dissolved oxygen, turbidity, and total algae. Within the real-time and continuous seawater monitoring system project, FSU Coastal and Marine Laboratory (CML) includes three stations at three locations across the Bay where this water quality monitoring occurs. The first station is located close to the FSUCML seawater intake and started collecting data on April 26, 2023. However, the deployment from April 26 to June 26, 2023, was considered a test and the readings were not suitable for public release. The second station is at the oyster leases in Alligator Harbor, which started collecting data on June 29, 2023. The final station, located at the oyster leases in Oyster Bay (Spring Creek), began collecting data on May 18, 2023. These data may be used to identify temporal and seasonal trends and any spatial variability between St. George Sound, where FSUCML is located, and other regional water monitoring stations operated by the Apalachicola National Estuarine Research Reserve (ANERR) in the adjacent Apalachicola Bay. This project supplies chemical, physical, and ecological data required for the assessment of marine environmental conditions and the land-ocean interface where FSUCML is located for use by scientists, resource managers, educational groups, and members of the public.

4) Research methods:

The YSI monitoring program was started on April 26, 2023, with installing the FSUCML Seawater Intake station. However, the Alligator Harbor and Oyster Bay stations were installed very close in time. The fourth station came up later in March 2024. The four stations use a YSI EXO3 sonde and a complex system with a datalogger to transmit the data via cellular uplink. The EXO3 sonde is placed near the surface at the four sites. Before deployment, the EXO3 is calibrated for conductivity, dissolved oxygen, depth, turbidity, and pH following the procedures outlined in the YSI Operating and the FSUCML Xylem EXO 3 Multi-Parameter Water Quality Monitoring Procedure SOP Version 1. Lab grade standards are used to calibrate the YSIs.

Conductivity is a one-point calibration performed with the 50 mS/cm YSI conductivity standard. The calibration of pH is performed with two pH standards (pH 7 and pH 10) for two-point calibration. An optical dissolved oxygen sensor is calibrated in air-saturated water. Depth has been set based on the barometric pressure on the day of calibration. Local pressure is measured using a Kestrel 4000 pocket weather tracker unit and the depth offset from zero meters is determined using the tables provided in the Water Quality SOP. The calibration of the turbidity is conducted using a two-point method: 0 NTU with deionized water and 124 NTU with the YSI turbidity standard. Following calibration, a guard is attached to the datalogger to protect the probes. A piece of plastic mesh is placed in the bottom of the guard and another one is attached to the outside of the guard to discourage any creatures from getting to the probes and to minimize fouling. The sondes are then programmed to begin recording data at 07:00:00 AM on the morning of deployment. Data have been collected by sondes at 15-minute intervals (See section 15 for exact date and times). They are placed in a 5-gallon bucket with water to sit overnight. The sonde is checked to ensure proper functioning on the day of the deployment.

During transportation for deployment and retrieval, the sonde is wrapped in a wet, white towel and transported to the field using a large, vented cooler cushioned with styrofoam. During deployment and retrieval of the sondes, measurements of dissolved oxygen concentrations and percent saturation, salinity, temperature, turbidity, and pH are taken at the sites using a hand-held YSI ProDSS instrument. EXO3 sondes are deployed on a PVC tube with a locking cap. Large holes are cut in the tube where the probes are located to ensure adequate water circulation. Every five to six weeks, the sondes are retrieved, data downloaded, and the instruments are cleaned, and inspected. Freshly calibrated units are deployed simultaneously, minimizing or eliminating data gaps in the collection intervals. Data is recorded in Eastern Time, without the application of daylight-saving time.

All four sondes are connected to a Campbell CR310 and DL310 Datalogger, transmitting real-time water quality data every 15 minutes. Upon receipt by the FSUCML, the data undergoes the same automated primary QAQC process detailed in Section 2 above. The "real-time" telemetry data become part of the provisional dataset until undergoing secondary and tertiary QAQC. This data can be accessed at the website https://cloud.xylem.com.

5) Site location and character:

Florida State University Coastal and Marine Laboratory (FSUCML) is located ~ 80 km south of Tallahassee, Florida. This area is well-known for both diffuse seeps near the coast, originating from an unconfined aquifer, and submarine springs further offshore, coming from a confined karstic aquifer. The area sits on a layered dolomite and limestone platform that is home to the Floridan Aquifer, considered one of the most prolific aquifers in the world. This aquifer is covered by an unconfined aquifer with clay, silt, and sand, which is recharged locally by precipitation. Annual mean rainfall for the region is ~150 cm, but in 2006 and 2007 it was considerably lower with values of 87 and 62 cm, respectively (Santos et al., 2009), resulting in extensive drought in the area. Peak rainfall is typically from June to October, while the lowest precipitation rates occur in November/December and March/May. The tides in the area are mixed and semi-diurnal with an average range of 0.85 m. The seafloor is characterized by a gently sloping topography away from the coast, resulting in a water depth of ~2 m as far as 1000 m offshore (Cable et al., 1997; Lambert and Burnett, 2003). FSUCML includes a total of 82 acres, with 70 acres on the north side of US Highway 98 and 12 on the south. The totality of FSUCML's infrastructure is located on the seaward side of US 98 with a dredged channel and boat

basin acting as a divider. Of the acreage north of US 98, nearly 36 acres are forested and 17 acres contain long-leaf pine habitat that is being restored.

The seawater intake (SI) station is located 300 m offshore of the FSUCML at latitude 29° 54.799"N and longitude 84° 30.697"W. The station was built in a single piling, 3 m tall, in 2023 at a sampling depth of 2.4 m with the depth sonde at 0.3 meters above the bottom sediment. The ocean depth at the seawater intake ranged between 0.5 and 2.7 m. The tides are mixed and range from 1.2 to 2.5 meters. Salinity ranges from 29 to 33 psu and is influenced by the creek and rainfall in the area. The bottom type is silty mud.

The Alligator Harbor (AH) station is located at latitude 29° 55.145" N and longitude 84° 24.576" W. The station was built, in a single piling, in 2023 in oyster farming where the FSUCML has a lease to conduct research. The ABSI program has been using the lease for an oyster hatchery. In 2022, ABSI started deployment of the hatchery spat cages. At the sampling site, the depth is about 1.7 meters, and the depth probes are located 0.3 meters above the bottom sediment. The salinity range is from 27 to 35 psu. The bottom type is shell hash.

The station at Oyster Bay (OB) is located at a latitude of 30° 3.187" N and a longitude of 84° 20.279" W in oyster farming. The station was built, in a single piling, in April 2023 to collaborate with oyster farmers in different studies applied to the subject. At the sampling site, the depth is about 1.5 meters, and the depth probes are located 0.3 meters above the bottom sediment. The bottom type is shell hash. The salinity range is from 28 to 32 psu.

Station Code	Station Name	Location	Active Dates
SI	Seawater Intake	29° 54.799'N 084° 30.697'W	2023-Present
AH	Alligator Harbor	29° 55.145'N 084° 24.576'W	2023-Present
OB	Oyster Bay	30° 3.187'N 084° 20.279'W	2023-Present

6) Data collection period:

Seawater Intake				
04/26/2023	16:00	06/28/2023	14:15	Test deployment, no data
06/28/2023	14:30	08/23/2023	08:45	
08/23/2023	09:00	09/20/2023	10:45	
09/20/2023	10:55	10/26/2023	08:50	
10/26/2023	09:00	11/30/2023	14:20	
11/30/2023	14:27	01/10/2024	12:39	
01/10/2024	12:55	02/13/2024	13:15	
02/13/2024	13:22	03/14/2024	11:08	
03/14/2024	11:15	04/17/2024	13:05	
04/17/2024	13:10	05/21/2024	12:42	
05/21/2024	12:53	06/10/2024	11:51	
06/10/2024	12:06	07/01/2024	11:59	

Alligator Harbor				
06/29/2023	12:51	08/23/2023	12:14	
08/23/2023	12:22	09/25/2023	12:05	
09/25/2023	12:14	10/26/2023	09:30	
10/26/2023	09:45	11/30/2023	13:29	
11/30/2023	13:38	01/10/2024	13:22	
01/10/2024	13:32	02/13/2024	13:51	
02/13/2024	13:59	03/20/2024	13:55	
03/20/2024	14:07	04/25/2024	11:24	
04/25/2024	11:29	05/30/2024	09:32	
05/30/2024	09:43	07/01/2024	11:20	
Oyster Bay				
05/18/2023	09:00	07/11/2023	09:24	No telemetry data
07/11/2023	10:00	08/23/2023	10:44	
08/23/2023	10:50	09/27/2023	09:50	
09/27/2023	10:02	10/10/2023	13:00	Deployment stopped early
10/10/2023	13:15	11/13/2023	14:48	
11/13/2023	14:54	12/14/2023	14:45	
12/14/2023	14:50	01/23/2024	14:02	
01/23/2024	14:12	02/27/2024	14:17	
02/27/2024	14:25	03/20/2024	10:22	Deployment stopped early
03/20/2024	10:35	04/25/2024	09:48	
04/25/2024	09:53	05/22/2024	10:07	

7) Distribution:

According to the FSUCML Policy, the FSUCML Seawater Monitoring System program retains the right to analyze, synthesize, and publish summaries of the data. The PI retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and FSUCML site, where the data were collected, will be contacted, and fully acknowledged in any subsequent publications in which any part of the data is used. The dataset included within this package is only as good as the quality assurance and quality control procedures described by the enclosed metadata reporting statement. The user assumes all responsibility for any subsequent use or misuse of the data in further analyses or comparisons. FSUCML does not assume liability to the recipient or any third parties and will not indemnify the recipient for any losses resulting from the use of this dataset.

Requested citation format:
Florida State University Coastal and Marine Laboratory (FSUCML). Real-time and Continuous Seawater Monitoring System. Data accessed from the FSUCML website: https://marinelab.fsu.edu/research/seawater-monitoring-system/; accessed June 20, 2024.

FSUCML water quality data and metadata can be obtained online at the FSUCML – Seawater Monitoring System website (https://marinelab.fsu.edu/research/seawater-monitoring-system/).

8) Associated research and projects:

Grubbs lab at FSUCML: One of the major foci of our research is examining the drivers of fish community structure over space and time in the Apalachicola Bay – St. George Sound region. We have nearly a decade of year-round monitoring data concerning the larger bony fishes and sharks that use the area near the FSUCML. The most influential abiotic drivers include temperature, salinity, dissolved oxygen, and turbidity. In addition, it is widely recognized (and often ignored) that nutrient and phytoplankton dynamics are major bottom-up biotic drivers of fish community and population dynamics. Continuous monitoring of these parameters will be invaluable in refining these models as this research continues and will also be an asset in future grant proposals to fund this line of research.

Breithaupt lab at FSUCML: The research in my lab is primarily focused on the cycling of carbon, nitrogen, and phosphorus in coastal, intertidal habitats. I utilize regional water quality data, such as those collected by ANERR, to inform our understanding of the stocks and fluxes of key parameters and to assess the influence of intertidal and upland environments on nearshore water quality. Gaining continuous, real-time insights into coastal water conditions near CML, unaffected by the Apalachicola River, will provide a necessary context for understanding regional biogeochemical processes. Additionally, while the ISCO autosamplers will be used to collect data for CML once every month, they will be available for other auto-sampling times (and even locations) during the rest of the month. Having these tools available for the collection of dissolved organic and inorganic carbon concentrations near CML, as well as in tidal creeks of the mainland and barrier islands, would provide a valuable complement to the existing research tools available for my research, and will expand on the utility of regional investigations that researchers in my lab can address.

Huettel Lab at FSU-EOAS: The Huettel lab specializes in coastal biogeochemical processes, focusing on carbon and nutrient cycles. The data produced by the planned monitoring system will be integrated into ongoing studies of benthic production and respiration designed to determine the role of waves and bottom currents for the cycles of matter in the coastal Gulf. Within the framework of a Northern Gulf Institute-funded project, Huettel has operated a monitoring transect extending 29 km in a southeastern direction from the coast off St. Teresa, FL, to K-Tower, a retired US Air Force tower that now is used as a hydrographic and meteorological measurement station. The monitoring program quantified the coastal gradients of salinity, temperature, nutrients, chlorophyll, and oxygen from 5 to 18 m depth, the water column (Santema et al. 2015 Cont Shelf Res, 104, 104-119), as well as the bottom boundary layer (Santema et al. 2018 Estuarine Coastal and Shelf Science, 212, 273-285), were included in that study. This program concluded in 2011. Comparing the data collected a decade ago with the new data generated by the proposed system will provide valuable insights into the development of chemical and physical conditions in the northeastern coastal Gulf.

Burgess Lab at FSU-Biology: The research program of the Burgess lab centers heavily around knowing the timescales of variability in environmental conditions that affect the fitness of organisms living in seagrass and oyster/marsh habitats off the FSUCML. Long-term continuously recorded data on multiple parameters are needed to perform spectral analyses that inform us of the 'predictability' of environmental fluctuations. Whether the environment fluctuates predictably or unpredictably influences the fitness of organisms that have evolved different 'strategies' to cope with environmental change. Furthermore, we study suspension-feeding animals that actively filter the water to feed on phytoplankton, so information on nutrients and phytoplankton is crucial to quantify variability in food abundance and quality. We also would like to grow live, filter-feeding, animals at the FSUCML using the flow-through seawater system that contains raw water with live phytoplankton. Currently, we lack a means to monitor the local environmental conditions at the seawater intake, so we have limited information on why our organisms suddenly die in the tanks. Having real-time data on water quality will be crucial to get early warnings so we can adjust the seawater intake to a recirculation option (which is not ideal, but suitable for short periods). Our NSF-funded work at the FSUCML relies on improving the facilities at the FSUCML.

FSU ABSI: The Apalachicola Bay System Initiative (ABSI), funded by Triumph Gulf Coast and the FSU Office of Research, has constructed a hatchery for oysters to support research into oyster biology, ecology, and restoration practices. Successful operation of the hatchery requires a dependable and high-quality supply of running seawater. The equipment requested from this proposal is complementary to those investments, but not duplicated. Furthermore, the data collected by equipment proposed here will complement efforts by the ABSI in Apalachicola Bay and nearby estuaries. The data will fill critical gaps in their overall environmental monitoring program and will be invaluable to ABSI scientists and hatchery staff. A letter of support from Dr. Sandra Brooke, ABSI principal investigator, is provided in Appendix V.

II. Physical Structure Descriptors

9) Sensor specifications:

YSI EXO 3 Sonde:

Parameter: Temperature
Units: Celsius (C)
Sensor Type: Thermistor
Model#: 599827
Range: -5 to 50°C
Accuracy: ± 0.2°C
Resolution: 0.001°C

Parameter: Conductivity
Units: milli-Siemens per cm (mS/cm)
Sensor Type: 4-electrode cell with auto-ranging
Model#: 599827
Range: 0 to 100 mS/cm
Accuracy: ± 1% of reading or 0.002 mS/cm, whichever is greater
Resolution: 0.0001 mS/cm to 0.01 mS/cm (range dependent)

Parameter: Salinity
Units: practical salinity units (psu)/parts per thousand (ppt)
Sensor Type: Calculated from conductivity and temperature
Range: 0 to 70 psu/ppt
Accuracy: ± 2% of the reading or 0.2 ppt, whichever is greater
Resolution: 0.01 psu/ppt

Parameter: Dissolved Oxygen % saturation
Sensor Type: Optical probe w/ mechanical cleaning
Model#: 599100-01
Range: 0 to 500% air saturation
Accuracy: 0-200% air saturation: ± 1% of the reading or 1% air saturation, whichever is greater, 200-500% air saturation: ± 5% or reading
Resolution: 0.1% air saturation

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature, and salinity)
Units: % Saturation, milligrams/Liter (mg/L)
Sensor Type: Optical, luminescence lifetime
Model#: 599100-01
Range: 0 to 500% air sat, 0 to 50 mg/L

Accuracy: 0-200% = ±1% reading or 1%, air sat., whichever is greater; 200-500% = ±5% reading; 0-20 mg/L = ± 0.1 mg/L or 1% of the reading, whichever is greater; 20 to 50 mg/L = ± 5% of the reading
Resolution: 0.1% air sat, 0.01 mg/L

Parameter: Non-vented Level - Shallow (Depth)
Units: feet or meters (ft or m)
Sensor Type: Stainless steel strain gauge
Range: 0 to 33 ft (10 m)
Accuracy: ± 0.013 ft or ± 0.004 m)
Resolution: 0.001 ft (0.001 m)

Parameter: pH
Units: pH units
Sensor Type: Glass combination electrode
Model#: 577602 (un-guarded)
Range: 0 to 14 units
Accuracy: ± 0.1 units within ± 10° of calibration temperature, ± 0.2 units for entire temperature range
Resolution: 0.01 units

Parameter: Turbidity
Units: formazin nephelometric units (FNU)/ Nephelometric Turbidity Units (NTU)
Sensor Type: Optical, 90-degree scatter
Model#: 599101-01
Range: 0 to 4000 FNU/NTU
Accuracy: 0 to 999 FNU = 0.3 FNU or ± 2% of reading (whichever is greater); 1000 to 4000 FNU = ± 5% of reading
Resolution: 0 to 999 FNU = 0.01 FNU, 1000 to 4000 FNU = 0.1 FNU/NTU

Parameter: Total Algae-PE (Chlorophyll and Phycoerythrin)
Units: Micrograms per Liter (µg/L), Relative Fluorescence Units (RFU)
Sensor Type: Optical, fluorescence
Model#: 599103-01
Range: Chlorophyll = 0-100 RFU, 0-400 µg/l chlorophyll; BGA-PE: 0-100 RFU, 0-280 µg/l
Accuracy:
Resolution: Chlorophyll = 0,01 RFU, 0,01 µg/l chlorophyll; BGA-PE: 0,01 RFU, 0,01 µg/l

Salinity Units Qualifier:
The EXO sondes report practical salinity units (psu). These units are essentially the same as ppt and for FSUCML purposes are understood to be equivalent, however, psu is considered the more appropriate designation. The FSUCML System will assign psu as a unit for salinity.

Turbidity Qualifier:
EXO sondes report turbidity in formazin nephelometric units (FNU). These units are essentially the same as nephelometric turbidity units (NTU) but indicate a difference in sensor methodology, for FSUCML purposes they will be considered equivalent. The FSUCML System will use FNU/NTU as the designated units for all turbidity data.

10. Coded variable definitions:

Sampling Station:	Sampling site code:	Station code:
FSUCML Seawater Intake	SI	cmlsiwq
Alligator Harbor	AH	cmlahwq
Oyster Bay	OB	cmlobwq

11) QAQC flag definitions:

QAQC flags provide documentation of the data and are applied to individual data points by insertion into the parameter's associated flag column (header preceded by an F_). During primary automated QAQC (performed by the CDMO macro), -5, -4, and -2 flags are applied automatically to indicate data that is missing and above or below the sensor range. All remaining data are then flagged 0, passing initial QAQC checks. During secondary and tertiary QAQC 1, -3, and 5 flags may be used to note data as suspect, rejected due to QAQC, or corrected.

-5 Outside High Sensor Range
-4 Outside Low Sensor Range
-3 Data Rejected due to QAQC
-2 Missing Data
-1 Optional Supported Parameter
0 Data Passed Initial QAQC Checks
1 Suspect Data
2 Open - reserved for later flag
3 Calculated data: non-vented depth/level sensor correction for changes in barometric pressure
4 Historical Data: Pre-Auto QAQC
5 Corrected Data

12) QAQC code definitions:

QAQC codes are used in conjunction with QAQC flags to provide further documentation of the data and are also applied by insertion into the associated flag column. There are three (3) different code categories, general, sensor, and comment. General errors document general problems with the deployment or YSI data sonde, sensor errors are sensor specific, and comment codes are used to further document conditions or a problem with the data. Only one general or sensor error and one comment code can be applied to a particular data point, but some comment codes (marked with an * below) can be applied to the entire record in the F_Record column.

General Errors

GIC	No instrument deployed due to ice
GIM	Instrument malfunction
GIT	Instrument recording error; recovered telemetry data
GMC	No instrument deployed due to maintenance/calibration
GNF	Deployment tube clogged / no flow
GOW	Out of water event
GPF	Power failure / low battery
GQR	Data rejected due to QA/QC checks
GSM	See metadata

Sensor Errors

SBO	Blocked optic

SCF	Conductivity sensor failure
SCS	Chlorophyll spike
SDF	Depth port frozen
SDG	Suspect due to sensor diagnostics
SDO	DO suspect
SDP	DO membrane puncture
SIC	Incorrect calibration / contaminated standard
SNV	Negative value
SOW	Sensor out of water
SPC	Post calibration out of range
SQR	Data rejected due to QAQC checks
SSD	Sensor drift
SSM	Sensor malfunction
SSR	Sensor removed / not deployed
STF	Catastrophic temperature sensor failure
STS	Turbidity spike
SWM	Wiper malfunction/loss

Comments

CAB*	Algal bloom
CAF	Acceptable calibration/accuracy error of the sensor
CAP	Depth sensor in water, affected by atmospheric pressure
CBF	Biofouling
CCU	Cause unknown
CDA*	DO hypoxia (<3 mg/L)
CDB*	Disturbed bottom
CDF	Data appear to fit conditions
CFK*	Fishkill
CIP*	Surface ice present at the sample station
CLT*	Low tide
CMC*	In-field maintenance/cleaning
CMD*	Mud in probe guard
CND	New deployment begins
CRE*	Significant rain event
CSM*	See metadata
CTS	Turbidity spike
CVT*	Possible vandalism/tampering
CWD*	Data collected at the wrong depth
CWE*	Significant weather event

13) Post-deployment information:

Seawater Intake						
Deployment Date	DO_pct	SpCond_mS/cm	pH		Turb_NTU	
	(Std: 100%)	(Std: 50@25°)	(Std: 7)	(Std: 10)	(Std: 0)	(Std: 124)
06/28/2023	88.4	50.28	7.01	10.15	0.14	124.30
08/23/2023	101.0	52.21	7.05	10.05	0.83	113.15

09/20/2023	100.4	55.92	6.98	9.87	0.06	133.5
10/26/2023	99.7	51.92	7.17	10.20	0.52	123.23
11/30/2023	99.7	59.85	7.04	9.87	0.95	123.99
01/10/2024	100.6	53.54	7.04	10.11	2.80	123.80
02/13/2024	101.3	49.71	6.95	10.04	0.04	122.83
03/14/2024	100.6	50.40	7.08	9.94	0.03	121.43
04/17/2024	99.6	49.65	7.11	10.14	1.11	124.76
05/21/2024	100.3	49.99	7.02	10.05	0.48	121.79
06/10/2024	100.2	49.65	7.04	10.07	-0.63	124.35
Alligator Harbor						
Deployment Date	DO_pct	SpCond_mS/cm	pH		Turb_NTU	
	(Std: 100%)	(Std: 50@25°)	(Std: 7)	(Std: 10)	(Std: 0)	(Std: 124)
06/28/2023	103.9	50.36	7.00	10.04	0.58	124.28
08/23/2023	100.2	51.89	7.12	10.09	-0.39	119.16
09/25/2023	72.65	55.73	7.02	9.89	0.01	126.29
10/26/2023	99.35	51.80	7.03	10.00	0.70	122.4
11/30/2023	99.40	59.64	7.01	9.87	3.40	125.63
01/10/2024	100.00	54.11	7.05	10.04	0.34	124.45
02/13/2024	99.2	49.95	7.00	9.93	0.14	122.56
03/20/2024	100.4	49.83	7.14	10.14	-1.13	124.82
04/25/2024	100.5	49.82	7.08	10.09	-0.02	123.27
05/30/2024	99.7	49.77	7.04	9.82	1.16	122.82
07/01/2024	98.55	50.18	6.59	6.60	0.15	124.00
Oyster Bay						
Deployment Date	DO_pct	SpCond_mS/cm	pH		Turb_NTU	
	(Std: 100%)	(Std: 50@25°)	(Std: 7)	(Std: 10)	(Std: 0)	(Std: 124)
05/18/2023	101.5	49.51	7.15	10.03	0.54	124.78
07/11/2023	101.2	49.19	7.06	10.13	0.67	130.80
08/23/2023	105.1	53.04	7.08	10.05	0.22	123.06
09/27/2023	99.5	54.82	7.07	10.05	1.30	125.11
10/10/2023	102.3	55.51	7.25	10.24	-0.30	125.10
11/13/2023	100.7	56.23	7.01	10.07	2.40	125.4
12/14/2023	100.3	55.95	6.92	9.88	0.83	124.90
01/23/2024	99.7	49.94	7.11	10.17	0.27	143.10
02/27/2024	100.3	50.09	7.00	9.96	0.87	121.97
03/20/2024	100.4	49.86	7.06	10.03	1.40	123.28
04/25/2024	101.0	49.78	7.13	10.22	1.50	128.30
05/22/2024	100.0	50.02	7.01	9.94	-2.64	121.90

14) Other remarks/notes:

Data are missing due to equipment or associated specific probes not being deployed, equipment failure, time of maintenance or calibration of equipment, or repair/replacement of a sampling station platform. Any NANs in the dataset stand for "not a number" and are the result of low power, disconnected wires, or out-of-range readings. If additional information on missing data is needed, contact the FSUCML information manager.

Turbidity spikes are present throughout the year across all files. These spikes may be due to rain, river discharge, and/ or wind resuspension, among other factors.

Dependent parameters are rejected when either Temp (all parameters but Turbidity with EXOs) or SpCond/Sal (DO mg/L and Depth) are rejected.

The specific conductivity of each station was corrected for temperature effects on the following dates:

SI = 4/26/23 16:00 – 6/28/23 14:30, 8/24/23 9:30 – 2/13/24 13:15
AH = 8/23/23 12:30 – 2/13/24 13:45
OB = 8/23/23 11:00 – 9/29/23 1:15, 10/10/23 13:15 – 1/23/24 14:00

During those dates, C/T probe calibrations were performed using conductivity, which does not regulate temperature, instead of Specific conductivity. Data was corrected using the following formula:

$$\text{Conductivity} = (\text{conductivity at } 25°C) \times (A+Bt+Ct^2)$$

Where t = temperature in C during calibration

Conductivity at 25.00°C	A	B	C
10,000 µSiemens/cm	0.5538	0.0168	0.000042
50,000 µSiemens/cm	0.5666	0.0163	0.000041

Seawater Intake

- 7/16/2023 19:00 – 22:00 Significant rain event in the area 0.8" – >2.0" with strong winds of 17-21 mph.
- 7/22/2023 19:00 – 22:00 Significant rain event in the area 0.8" – >2.0".
- 8/05/2023 13:00 – 19:00 Significant rain event in the area 0.8" – >2.0".
- 8/23/2023 09:00 – 8/24/2023 09:15 Sonde out of the water because sonde cable got caught during deployment.
- 8/26/2023 01:00 – 04:00 Significant rain event in the area 0.8" – >2.0" with strong winds of 19-22 mph.
- 8/29/2023 22:00 – 8/30/2023 05:15 Hurricane Idalia, which impacted the area as a tropical storm, brought increased winds (20 mph) and heavy precipitation (~ 1.2 inches). This resulted in high-level readings.
- 8/30/2023 05:30 – 8/30/2023 13:15 Significant weather event. Hurricane Idalia caused increased winds which led to high-level readings.
- 9/01/2023 10:00 – 13:00 Significant rain event in the area 0.8" – >2.0".
- 9/02/2023 10:00 – 13:00 Significant rain event in the area 0.8" – >2.0".
- 9/12/2023 16:00 – 19:00 Significant rain event in the area 0.8" – >2.0".
- 9/13/2023 3:30 Missing data from sonde and telemetry. The cause is unknown.
- 9/15/2023 16:00 – 19:00 Significant rain event in the area 0.8" – >2.0".
- 10/11/2023 22:00 – 10/12/2023 4:00 Significant weather event, strong winds (20-27 mph) and heavy precipitation (0.8 – 1.5 inches). Sonde went deeper than usual.

- 10/18/2023 3:15, 3:45, and 8:00 Missing data from sonde and telemetry
- 11/26/2023 13:00 – 16:00 Significant weather event, strong winds (20-27 mph) and heavy precipitation (1.0 – 1.3 inches).
- 12/02/2023 13:00 – 16:00 Significant rain event in the area 1.7" – >2.0".
- 12/03/2023 07:00 – 10:00 Significant rain event in the area 0.6" – 0.8".
- 12/10/2023 14:00 – 17:00 Significant rain event in the area 1.2" – 1.4" with strong winds of 11-15 mph.
- 12/17/2023 02:00 – 08:00 Significant rain event in the area 0.6" – 1.0" with strong winds of 19-24 mph.
- 01/06/2024 03:00 – 07:00 Significant rain event in the area 1.2" – 2.0" with strong winds of 24-26 mph.
- 01/09/2024 14:00 – 17:00 Significant rain event in the area 0.7" – 0.9".
- 01/24/2024 23:00 – 01/25/2024 01:00 Significant rain event in the area 0.9" – 1.0".
- 03/05/2024 14:00 – 23:00 Significant rain event in the area 0.7" – 1.0".
- 03/09/2024 17:00 – 20:00 Significant rain event in the area >1.0".
- 03/27/2024 05:00 – 08:00 Significant rain event in the area 1.6" – >2.0".
- 04/08/2024 08:00 – 11:00 Significant rain event in the area 0.6" – 0.8" with strong winds of 16-21 mph.
- 04/11/2024 08:00 – 11:00 Significant rain event in the area 1.1" – 1.7".
- 05/10/2024 07:00 – 10:00. 14:00 – 17:00. 20:00 – 23:00 Significant weather event. A strong storm generated tornadoes causing winds (20-28 mph) and precipitation (0.4-0.7 inches).
- 05/13/2024 15:00 – 20:00. Significant rain event in the area 0.5" – 1.9" with strong winds of 15-32 mph.
- 05/14/2024 5:00 – 06:00. Significant rain event in the area 0.4" – 0.7" with strong winds of 17-21 mph.
- 06/02/2024 22:00 – 06/203/2024 05:30 Extremely low pH values may be linked to low dissolved oxygen levels.
- 06/10/2024 12:00 Missing data caused by the recovery and deployment of the sonde.
- 06/16/2024 21:00 – 22:00. Significant rain event in the area 0.4" – 0.8".

Alligator Harbor

- 7/16/2023 19:00 – 22:00 Significant rain event in the area 0.8" – >2.0" with strong winds of 14-15 mph.
- 8/05/2023 13:00 – 19:00 Significant rain event in the area 0.8" – >2.0".
- 8/16/2023 19:00 – 22:00 Significant rain event in the area 0.8" – >2.0".
- 8/26/2023 01:00 – 04:00 Significant rain event in the area 0.8" – >2.0".
- 8/29/2023 22:00 – 8/30/2023 16:00 Significant weather event. Hurricane Idalia, which impacted the area as a tropical storm, brought increased winds (20-30 mph) and heavy precipitation (~ 1.7 inches). This resulted in decreased temperature, salinity, and conductivity values. The depth read during this time was the highest (2.38 m).
- 9/01/2023 07:00 – 13:00 Significant rain event in the area 0.8" – >2.0".
- 10/11/2023 22:00 – 10/12/2023 4:00 Significant weather event, strong winds (17-24 mph) and heavy precipitation (1.3 – 1.7 inches). Sonde went deeper than usual.
- 11/26/2023 13:00 – 16:00 Significant weather event, strong winds (20-27 mph) and heavy precipitation (1.0 – 1.3 inches).
- 11/30/2023 13:30 Missing data caused by the recovery and deployment of the sonde.
- 12/02/2023 13:00 – 16:00 Significant rain event in the area 1.7" – >2.0".
- 12/03/2023 07:00 – 10:00 Significant rain event in the area 0.6" – 0.8".
- 12/04/2023 13:30 Missing data. Unknown cause.
- 12/10/2023 14:00 – 17:00 Significant rain event in the area 1.2" – 1.4" with strong winds of 11-15 mph.
- 12/17/2023 02:00 – 08:00 Significant rain event in the area 0.6" – 1.0" with strong winds of 19-24 mph.
- 01/06/2024 03:00 – 07:00 Significant rain event in the area 1.2" – 2.0" with strong winds of 24-26 mph.
- 01/09/2024 14:00 – 17:00 Significant rain event in the area 0.7" – 0.9".
- 01/10/2024 13:30 Missing data caused by the recovery and deployment of the sonde.
- 01/24/2024 23:00 – 01/25/2024 01:00 Significant rain event in the area 0.9" – 1.0".
- 03/05/2024 14:00 – 23:00 Significant rain event in the area 0.7" – 1.0".

- 03/09/2024 17:00 – 20:00 Significant rain event in the area >1.0".
- 03/20/2024 14:00 Missing data caused by the recovery and deployment of the sonde.
- 03/27/2024 05:00 – 08:00 Significant rain event in the area 1.6" – >2.0".
- 04/08/2024 08:00 – 11:00 Significant rain event in the area 0.6" – 0.8" with strong winds of 16-21 mph.
- 04/11/2024 08:00 – 11:00 Significant rain event in the area 1.1" – 1.7".
- 05/10/2024 07:00 – 10:00. 14:00– 17:00. 20:00 – 23:00 Significant weather event. A strong storm generated tornadoes causing winds (20-28 mph) and precipitation (0.4-0.7 inches).
- 05/13/2024 15:00 – 20:00. Significant rain event in the area 0.5" – 1.9" with strong winds of 15-32 mph.
- 05/14/2024 5:00 – 06:00. Significant rain event in the area 0.4" – 0.7" with strong winds of 17-21 mph.
- 06/16/2024 21:00 – 22:00. Significant rain event in the area 0.8" – 1.4".
- 06/30/2024 14:00 – 17:00. Significant rain event in the area 0.4" – 0.6".

Oyster Bay

- 5/18/2023 – 7/11/2023 This deployment was over 45 days (56 days). These extra days can impact the data.
- 5/19/2023 15:15-17:00 Very low conductivity and salinity. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 5/20/2023 15:45-18:00 Very low conductivity and salinity. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 5/21/2023 16:45-18:00 Very low conductivity and salinity. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 6/02/2023 14:30-15:45 Negative depth values with no possibility of the sonde being out of the water. Conductivity and salinity readings are within range.
- 6/03/2023 14:15-17:15 Negative depth values with no possibility of the sonde being out of the water. Conductivity and salinity readings are within range.
- 6/04/2023 15:15-15:45 Negative depth values with no possibility of the sonde being out of the water. Conductivity and salinity readings are within range.
- 6/04/2023 16:00-17:15 Very low conductivity and salinity. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 6/04/2023 17:30-18:00 Negative depth values with no possibility of the sonde being out of the water. Conductivity and salinity readings are within range.
- 6/05/2023 16:45-18:30 Very low conductivity and salinity. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 6/06/2023 18:15 Very low conductivity and salinity. Negative depth values and high turbidity values. Cause unknown.
- 6/06/2023 18:30-19:15 Negative depth values with no possibility of the sonde being out of the water. Conductivity and salinity readings are within range.
- 6/07/2023 18:45-19:15 Negative depth values with no possibility of the sonde being out of the water. Conductivity and salinity readings are within range.
- 6/16/2023 14:30-15:15 Negative depth values with no possibility of the sonde being out of the water. Conductivity and salinity readings are within range.
- 6/17/2023 14:45-16:45 Negative depth values with no possibility of the sonde being out of the water. Conductivity and salinity readings are within range.
- 6/18/2023 15:00-15:45 Negative depth values with no possibility of the sonde being out of the water. Conductivity and salinity readings are within range.
- 6/18/2023 16:15-16:45 Very low conductivity and salinity. Values close to 0. All data was rejected, and the sonde was likely out of water.
- 6/18/2023 17:00-17:15 Negative depth values with no possibility of the sonde being out of the water. Conductivity and salinity readings are within the range.

- 6/20/2023 11:00 – 12:45 Missing data for this period, cause unknown. No data in telemetry either.
- 6/21/2023 19:00 – 22:00 Significant rain event in the area 0.8" – >2.0".
- 6/22/2023 19:00 – 22:00 Significant rain event in the area 0.8" – >2.0" with strong winds of 15-17 mph.
- 6/23/2023 16:00 – 19:00 Significant rain event in the area 0.8" – >2.0" with strong winds of 15-17 mph.
- 7/02/2023 16:30-17:00 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 7/03/2023 17:00-18:15 Very low conductivity and salinity. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 7/04/2023 17:30-19:15 Very low conductivity and salinity. Values close to 0. All data was rejected, and it is likely the sonde was out of water. The readings of conductivity, salinity, and turbidity at 22:30 are different from the other timeframe in which it is assumed that the sonde was out of water. However, these readings may be due to the sonde going to the surface.
- 7/05/2023 19:15-19:30 Very low conductivity and salinity. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 7/09/2023 16:00 – 19:00 Significant rain event in the area 0.8" – >2.0".
- 7/11/2023 06:00 – 10:00 Missing data for this period, cause unknown. No data in telemetry either.
- 7/13/2023 19:00 – 22:00 Significant rain event in the area 0.8" – >2.0".
- 7/15/2023 16:00 – 19:00 Significant rain event in the area 0.8" – >2.0".
- 7/22/2023 16:00 – 19:00 Significant rain event in the area 0.8" – >2.0".
- 7/29/2023 16:00 – 19:00 Significant rain event in the area 0.8" – >2.0".
- 7/30/2023 19:00-20:30 Very low conductivity and salinity with shallow readings depth due to very low tide (-0.59 ft). Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 7/31/2023 20:00-21:30 Very low conductivity and salinity along with shallow readings depth due to very low tide (-0.78 ft). Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 8/1/2023 21:00-22:15 Very low conductivity and salinity along with shallow readings depth due to very low tide (-0.81 ft). Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 8/16/2023 19:00 – 22:00 Significant rain event in the area 0.8" – >2.0".
- 8/26/2023 01:00 – 04:00 Significant rain event in the area 0.8" – >2.0".
- 8/30/2023 04:00 – 8/30/2023 18:45 Significant weather event. Hurricane Idalia, which was a tropical storm when it impacted this area, caused increased winds (20-30 mph) and heavy precipitation (~ 1.3 inches) from 4:00 to 10:00 am, which led to a decrease in temperature, salinity, and pH values, and an increase in turbidity and dissolved oxygen values.
- 8/30/2023 7:45 – 9:15 Negative depth values with no possibility of the sonde being out of the water. Conductivity and salinity readings are within range.
- 9/01/2023 07:00 – 13:00 Significant rain event in the area 0.8" – >2.0".
- 9/26/2023 10:00 – 13:00 Significant rain event in the area 0.8" – >2.0".
- 9/27/2023 10:00 – 9/29/2023 1:15 Missing data for this period due to instrument malfunction. Water got into the battery and circuit compartments. Data were able to be recovered from telemetry.
- 9/29/2023 1:30 – 10/10/2023 13:00 Missing data for this period due to instrument malfunction. Water got into the battery and circuit compartments. Deployment stopped early on 10/10/2023 at 10:00.
- 10/16/2023 09:15-10:15 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 11/01/2023 09:30-12:45 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 11/26/2023 13:00 – 16:00 Significant weather event, strong winds (20-27 mph) and heavy precipitation (1.0 – 1.3 inches).
- 11/27/2023 08:00-10:15 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 11/28/2023 08:15-11:15 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.

- 11/29/2023 09:00-11:15 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 12/02/2023 10:00 – 16:00 Significant rain event in the area 1.7" – >2.0".
- 12/10/2023 14:00 – 17:00 Significant rain event in the area 1.2" – 1.4".
- 12/11/2023 06:30-10:00 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 12/12/2023 07:15-09:30 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 12/13/2023 07:45-10:45 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 12/14/2023 08:30-12:15 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 12/15/2023 10:15-12:30 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 12/17/2023 02:00 – 08:00 Significant rain event in the area 0.6" – 1.0" with strong winds of 14-16 mph.
- 12/29/2023 09:30-11:45 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 12/30/2023 10:45-11:45 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 01/06/2024 03:00 – 07:00 Significant rain event in the area 1.2" – 2.0" with strong winds of 17-24 mph.
- 01/08/2024 05:45-06:30 Very low conductivity and salinity with shallow readings depth due to very low tide. All data was rejected, but the reason for these readings is uncertain.
- 01/09/2024 14:00 – 17:00 Significant rain event in the area 0.7" – 0.9".
- 01/10/2024 07:15-10:30 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 01/11/2024 08:45-10:00 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 01/13/2024 09:30-13:00 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 01/14/2024 11:15-12:00 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 01/20/2024 02:45-07:15 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 01/21/2024 03:15-09:00 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 01/28/2024 10:30-12:00 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 01/29/2024 09:15-12:45 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 02/04/2024 02:00 –14:00 Significant weather events caused increased winds (15-38 mph).
- 02/06/2024 05:45–07:00 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 02/07/2024 05:45–09:00 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 02/09/2024 08:45–09:15 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 02/21/2024 07:00–08:45 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 02/27/2024 14:30 – 03/20/24 10:15 Very low readings of specific conductivity and salinity without finding the cause. Calibration and post-calibration information was revised and nothing unusual was found. Reading of specific conductivity and salinity were rejected along with depth and DO mg/L.

- 03/05/2024 14:00 – 03/06/2024 02:00 Significant rain event in the area 0.7" – 2.0".
- 03/07/2024 07:00–07:15 Very low conductivity and salinity but the cause was unknown. All data was rejected.
- 03/10/2024 08:30–11:00 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water
- 03/10/2024 21:30 Very low conductivity and salinity but the cause was unknown. All data was rejected.
- 03/11/2024 08:45–11:00 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water
- 03/11/2024 21:30–22:45 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water
- 03/19/2024 02:45–08:15 Very low conductivity and salinity with shallow readings depth due to very low tide. Values close to 0. All data was rejected, and it is likely the sonde was out of water.
- 03/20/2024 10:30 Missing data caused by the recovery and deployment of the sonde.
- 03/27/2024 05:00 – 08:00 Significant rain event in the area 1.6" – >2.0".
- 04/08/2024 08:00 – 11:00 Significant rain event in the area 0.9" with strong winds of 16-21 mph.
- 04/11/2024 08:00 – 11:00 Significant rain event in the area 1.3" – 1.4".
- 05/10/2024 07:00 – 10:00. 14:00– 17:00 Significant weather event. A strong storm generated tornadoes causing winds (20-28 mph) and precipitation (0.4-0.7 inches).
- 05/13/2024 15:00 – 17:00. Significant rain event in the area 0.5" – 1.9" with strong winds of 15-32 mph.
- 05/14/2024 5:00 – 06:00. Significant rain event in the area 0.4" – 0.7" with strong winds of 17-21 mph.
- 05/18/2024 14:00 – 17:00. Significant rain event in the area 0.4" – 0.7" with strong winds of 14-21 mph.

15) Statistics:

FSUCML Seawater Intake (SI) ---> 06/28/2023 – 07/01/2024

Stats with QC flag >= 0 n = 35,255								
	Depth_m	Temp_C	SpCond_mS/cm	Sal_psu	DO_pct	DO_mgl	pH	Turb_NTU
Min	0.95	6.2	26.30	16.3	6.3	0.4	7.1	-1
Max	3.13	34.2	53.12	35.1	159.3	10.0	8.3	478
Average	1.97	23.3	47.38	31.0	79.6	5.7	7.9	4
Std Dev	0.29	6.65	2.83	2.1	16.2	1.5	0.1	16
Stats with QC flag >= 0 excluding 1 flags n = 35,080								
	Depth_m	Temp_C	SpCond_mS/cm	Sal_psu	DO_pct	DO_mgl	pH	Turb_NTU
Min	0.95	6.2	26.30	16.3	6.3	0.4	7.3	0
Max	3.13	34.2	53.12	35.1	159.3	10.0	8.3	478
Average	1.97	23.3	47.38	31.0	79.5	5.7	7.9	4
Std Dev	0.29	6.5	2.83	2.1	16.2	1.5	0.1	12

Alligator Harbor (AH) ---> 06/29/2023 – 07/01/2024

Stats with QC flag >= 0 n = 35,171								
	Depth_m	Temp_C	SpCond_mS/cm	Sal_psu	DO_pct	DO_mgl	pH	Turb_NTU
Min	0.25	5.2	28.56	17.6	14.3	0.9	7.5	-1
Max	2.41	34.4	52.98	34.7	137.1	9.7	8.1	356
Average	1.16	23.3	47.65	31.1	85.0	6.1	7.9	5
Std Dev	0.30	6.6	2.02	1.5	16.6	1.6	0.1	8
Stats with QC flag >= 0 excluding 1 flags n = 35,125								

	Depth_m	Temp_C	SpCond_mS/cm	Sal_psu	DO_pct	DO_mgl	pH	Turb_NTU
Min	0.25	5.2	28.56	17.6	14.3	0.9	7.5	0
Max	2.41	34.4	52.98	34.7	137.1	9.7	8.1	294
Average	1.16	23.3	47.66	31.1	85.0	6.1	7.9	5
Std Dev	0.30	6.6	2.02	1.5	16.6	1.6	0.1	6

Oyster Bay (OB) ---> 05/18/2023 – 05/22/2024

Stats with QC flag >= 0 n = 31,893								
	Depth_m	Temp_C	SpCond_mS/cm	Sal_psu	DO_pct	DO_mgl	pH	Turb_NTU
Min	-0.16	7.0	18.40	10.9	21.4	1.5	7.3	-1
Max	2.22	34.2	49.04	31.9	132.0	11.3	8.3	387
Average	0.81	22.8	37.80	24.1	92.1	7.0	7.9	3
Std Dev	0.35	6.4	6.24	4.4	9.7	1.2	0.1	5
Stats with QC flag >= 0 excluding 1 flags n = 31,456								
	Depth_m	Temp_C	SpCond_mS/cm	Sal_psu	DO_pct	DO_mgl	pH	Turb_NTU
Min	0.00	7.0	18.40	10.9	21.4	1.5	7.3	0
Max	2.22	34.2	49.04	31.9	132.0	11.3	8.3	106
Average	0.81	22.8	37.80	24.4	92.1	7.0	7.9	3
Std Dev	0.35	6.4	6.24	4.4	9.7	1.2	0.1	3

16) References:

Cable, J. E., Burnett, W. C., & Chanton, J. P. (1997). Magnitude and variations of groundwater seepage along a Florida marine shoreline. Biogeochemistry, 38, 189-205.

Lambert, M. J., & Burnett, W. C. (2003). Submarine groundwater discharge estimates at a Florida coastal site based on continuous radon measurements. Biogeochemistry, 66, 55-73.

NOAA National Estuarine Research Reserve System (NERRS). System-wide Monitoring Program. Data processed using tools provided by the NOAA NERRS Centralized Data Management Office. Website: http://www.nerrsdata.org.

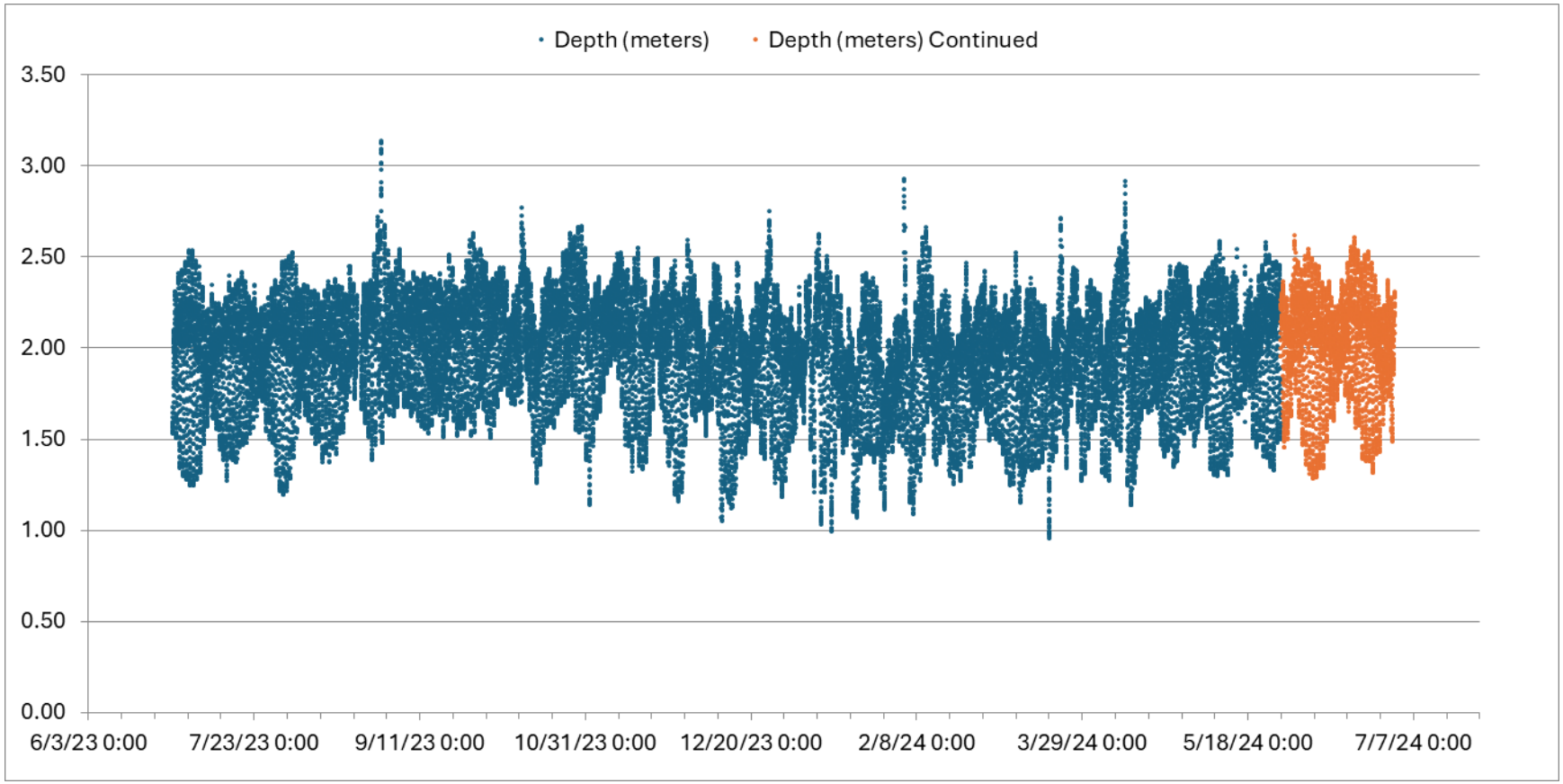
Santos, I. R., Dimova, N., Peterson, R. N., Mwashote, B., Chanton, J., & Burnett, W. C. (2009). Extended time series measurements of submarine groundwater discharge tracers (222Rn and CH4) at a coastal site in Florida. Marine Chemistry, 113(1-2), 137-147.

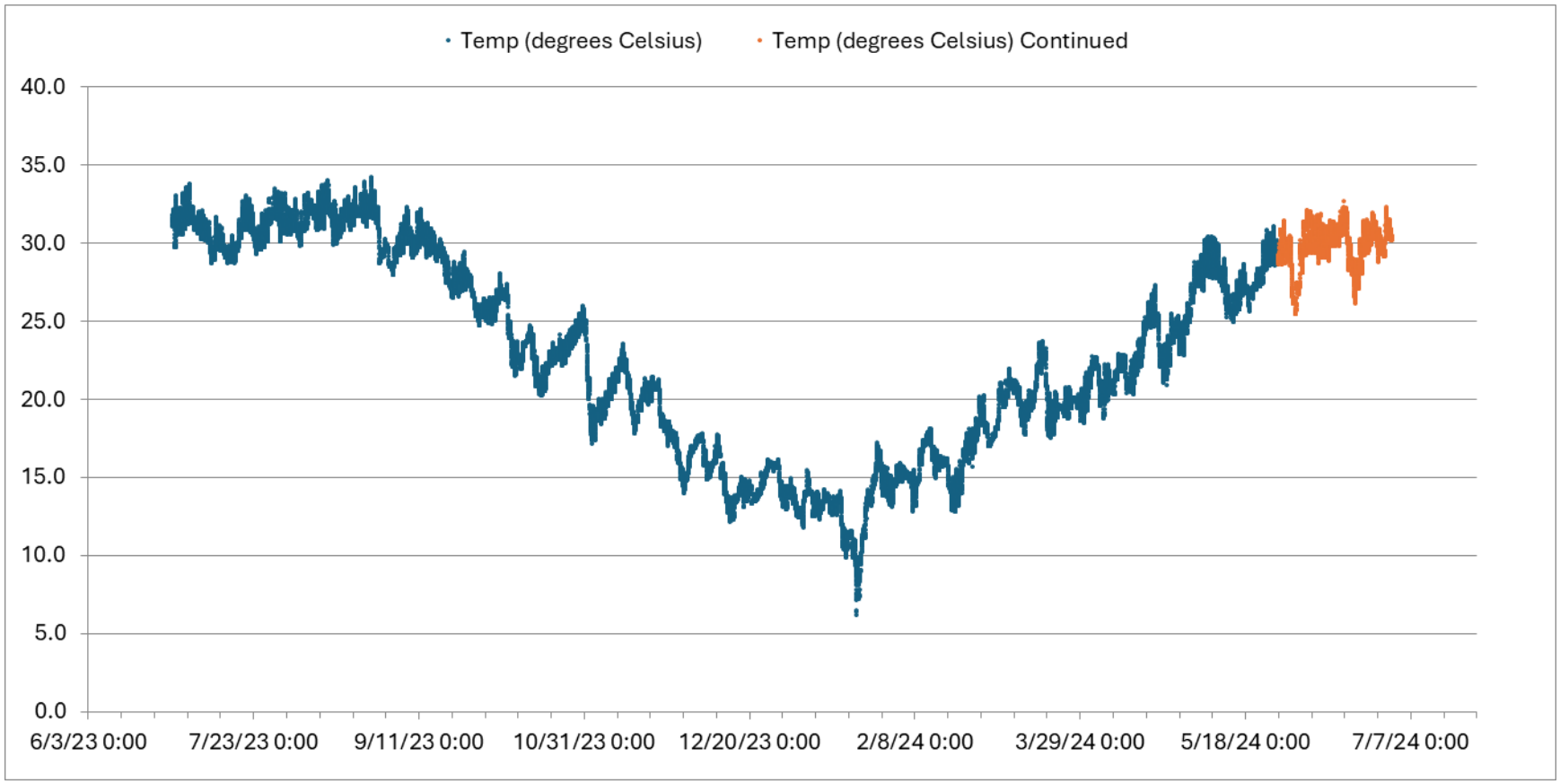
https://tidesandcurrents.noaa.gov/

https://www.ventusky.com/

Annual figures for each parameter in each station.

FSUCML Seawater Intake (SI) ---> 06/28/2023 – 07/01/2024




Temp (degrees Celsius)
Temp (degrees Celsius) Continued
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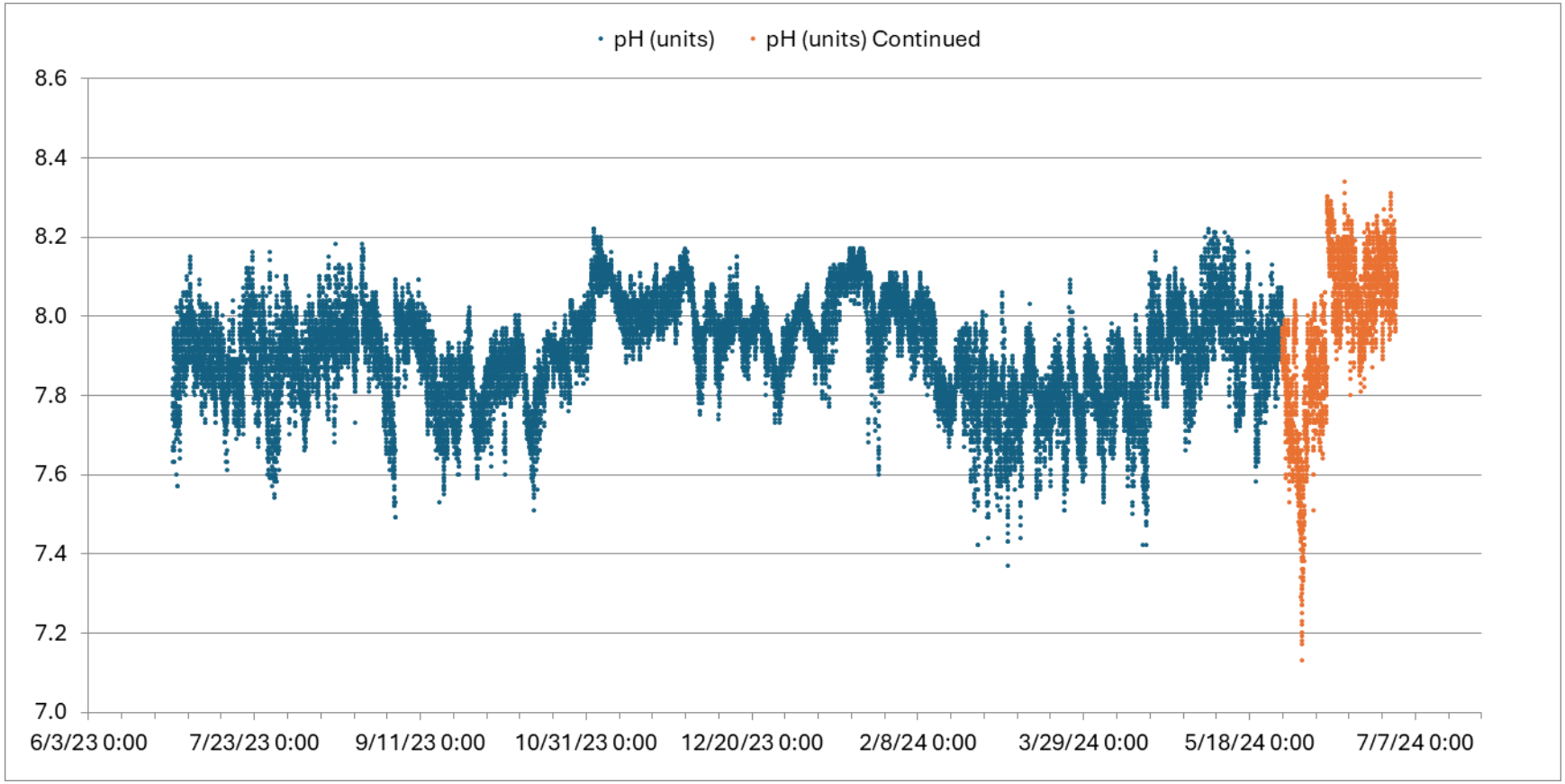
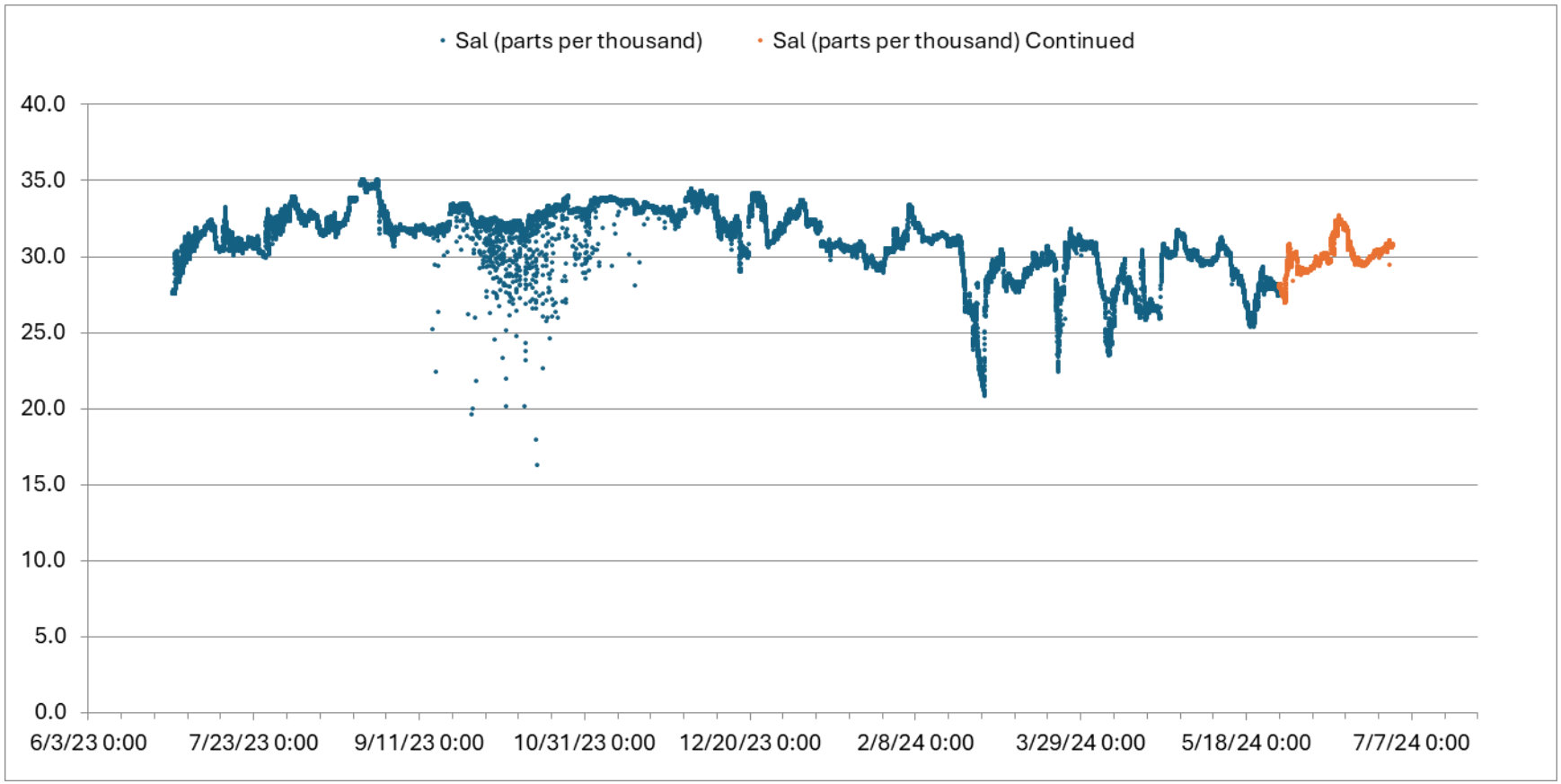
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
6/3/23 0:00
7/23/23 0:00
9/11/23 0:00
10/31/23 0:00
12/20/23 0:00
2/8/24 0:00
3/29/24 0:00
5/18/24 0:00
7/7/24 0:00


pH (units)
pH (units) Continued
8.6
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
6/3/23 0:00
7/23/23 0:00
9/11/23 0:00
10/31/23 0:00
12/20/23 0:00
2/8/24 0:00
3/29/24 0:00
5/18/24 0:00
7/7/24 0:00


Sal (parts per thousand)
Sal (parts per thousand) Continued
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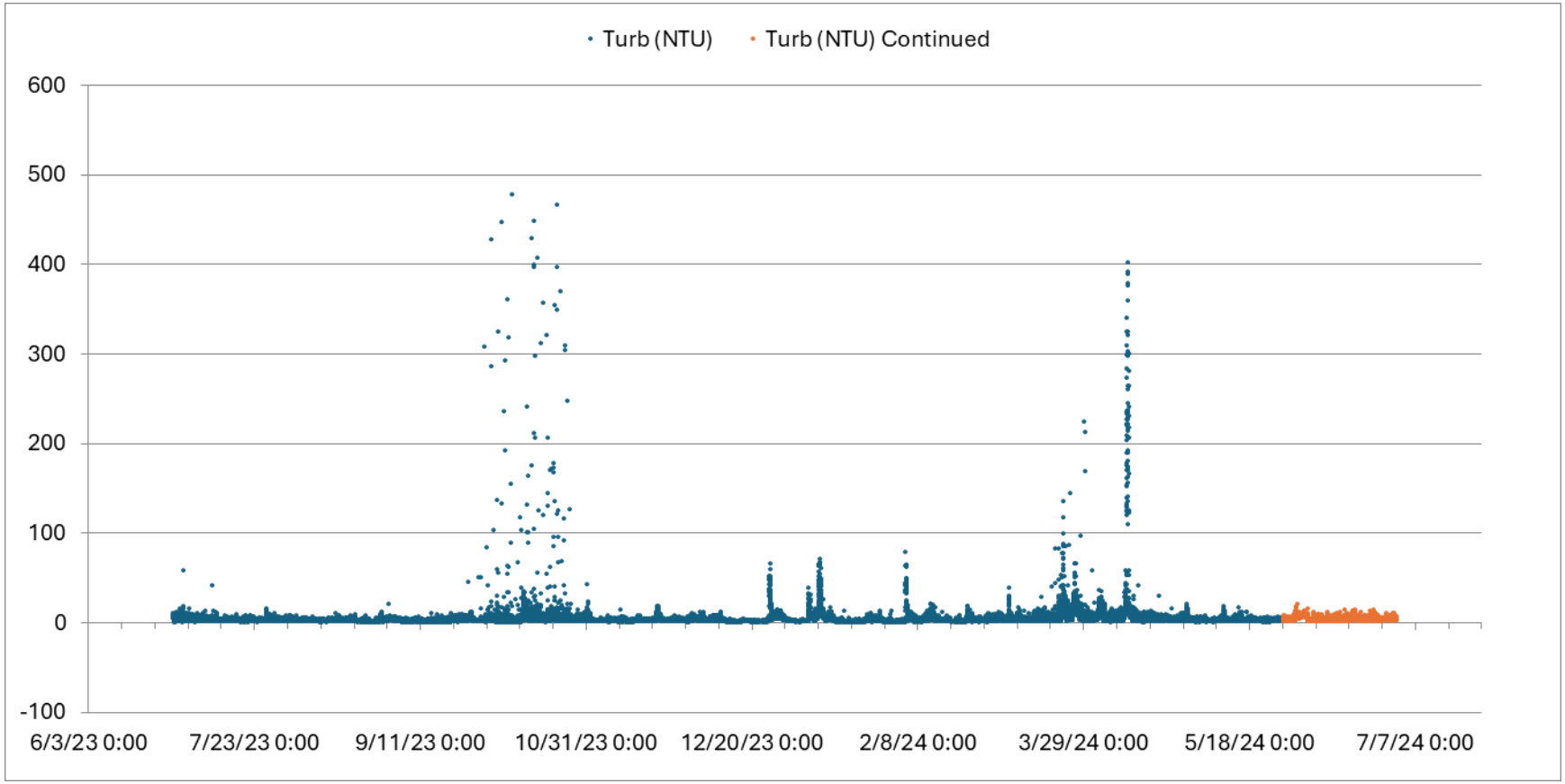
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
6/3/23 0:00
7/23/23 0:00
9/11/23 0:00
10/31/23 0:00
12/20/23 0:00
2/8/24 0:00
3/29/24 0:00
5/18/24 0:00
7/7/24 0:00


Turb (NTU)
Turb (NTU) Continued
600
500
400
300
200
100
0
-100
6/3/23 0:00
7/23/23 0:00
9/11/23 0:00
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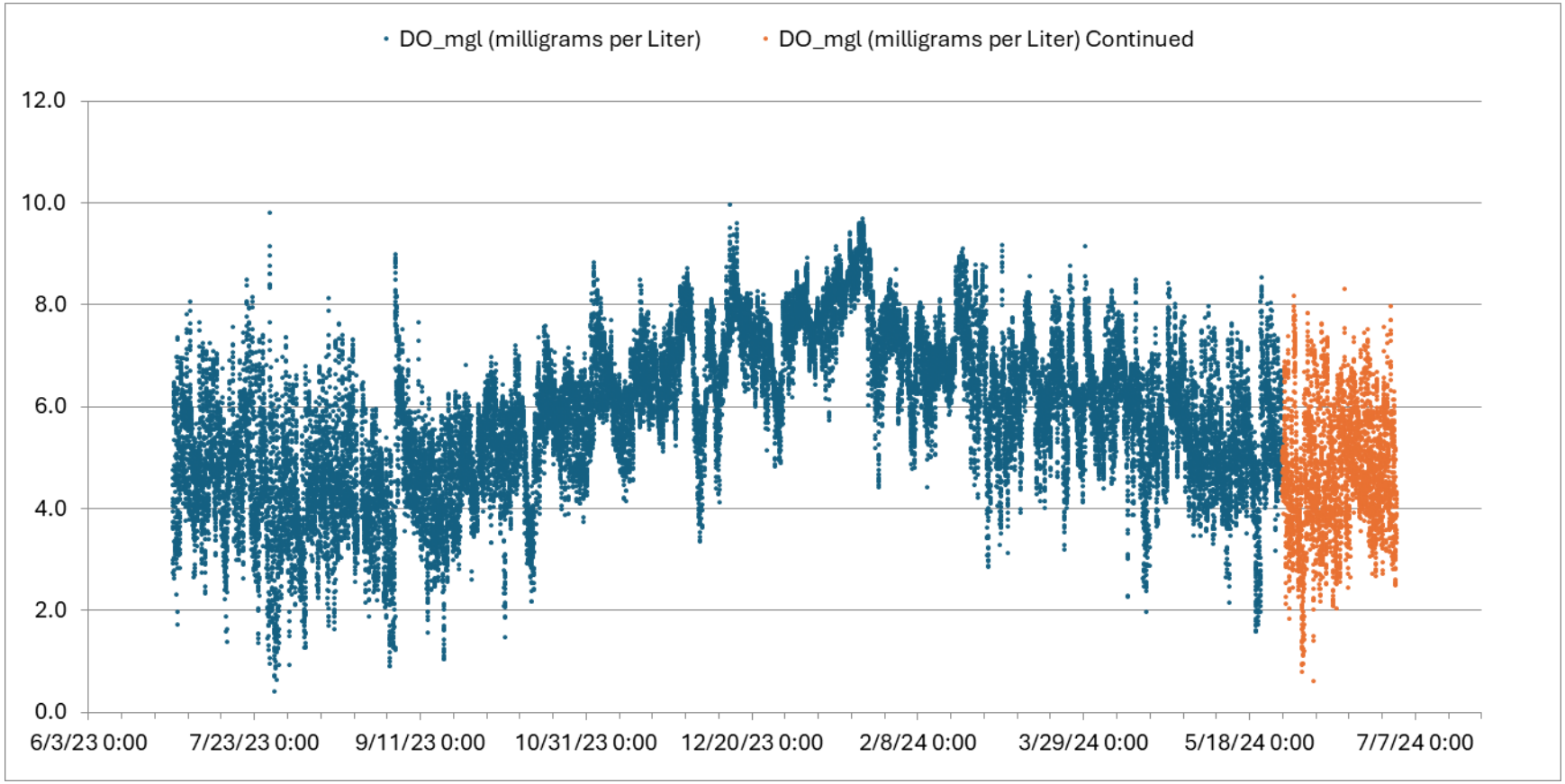
3/29/24 0:00
5/18/24 0:00
7/7/24 0:00


DO_mgl (milligrams per Liter)
DO_mgl (milligrams per Liter) Continued
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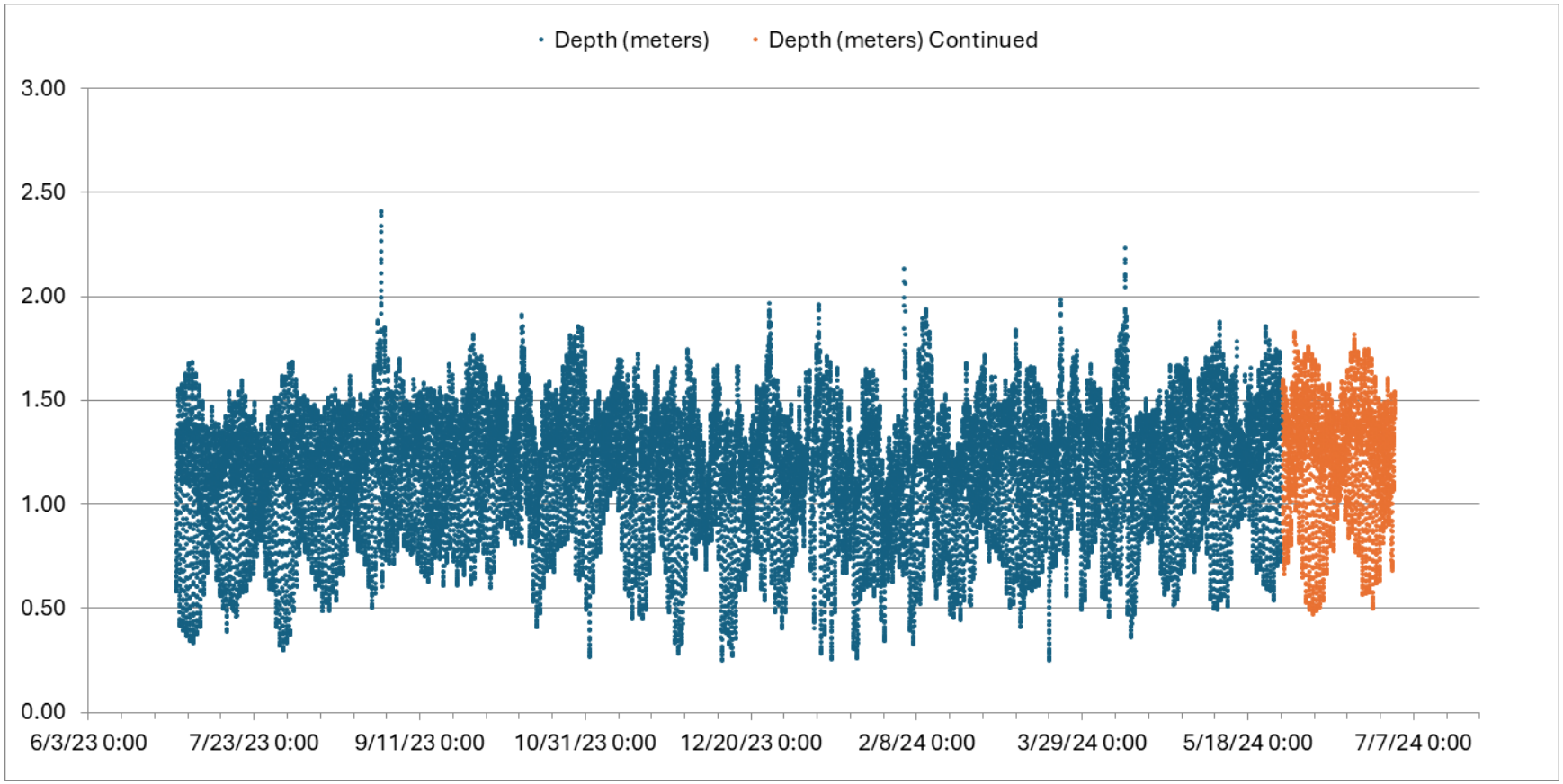
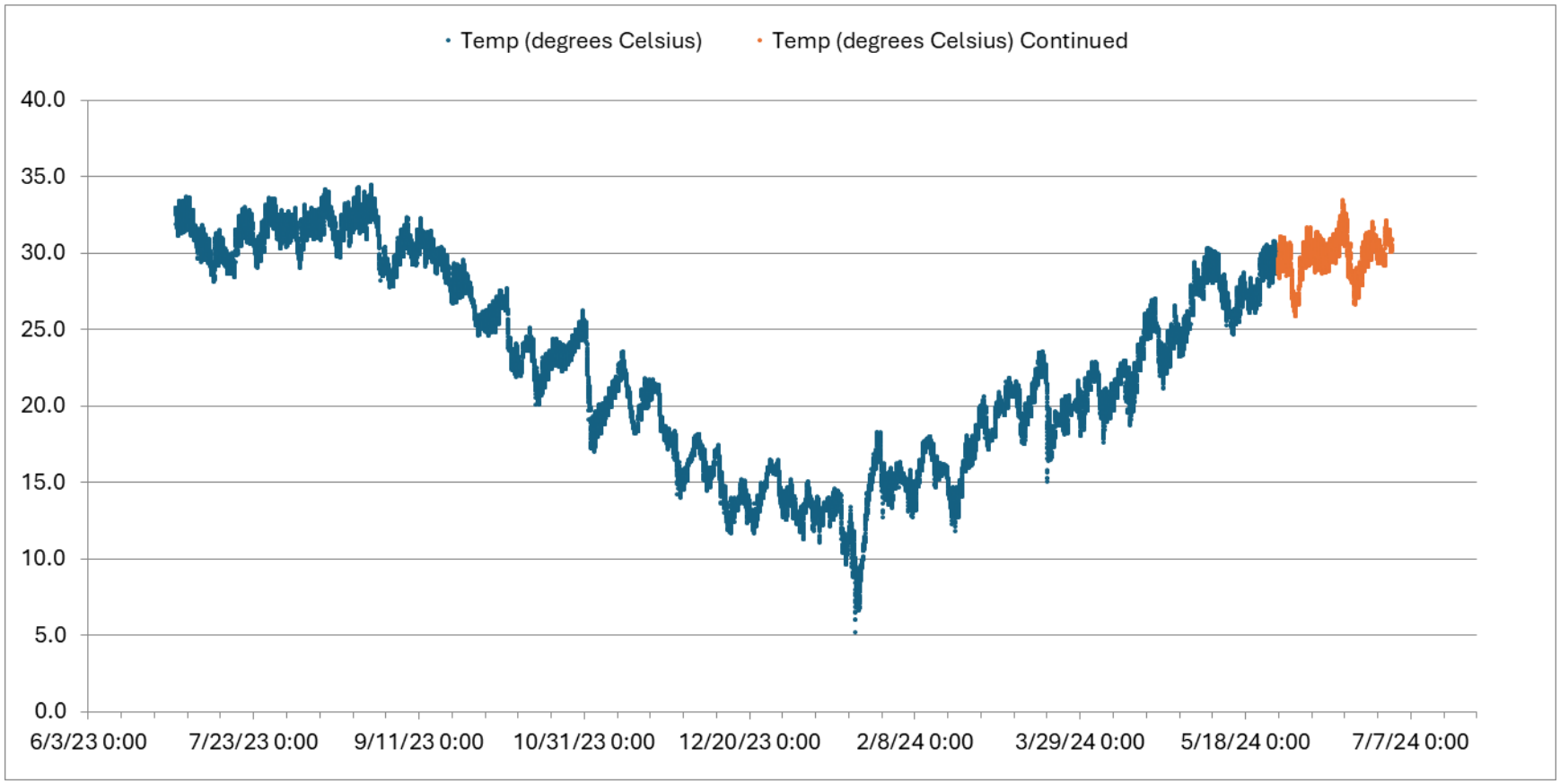
10.0
8.0
6.0
4.0
2.0
0.0
6/3/23 0:00
7/23/23 0:00
9/11/23 0:00
10/31/23 0:00
12/20/23 0:00
2/8/24 0:00
3/29/24 0:00
5/18/24 0:00
7/7/24 0:00

Alligator Harbor (AH) ---> 06/29/2023 – 07/01/2024




Temp (degrees Celsius)
Temp (degrees Celsius) Continued
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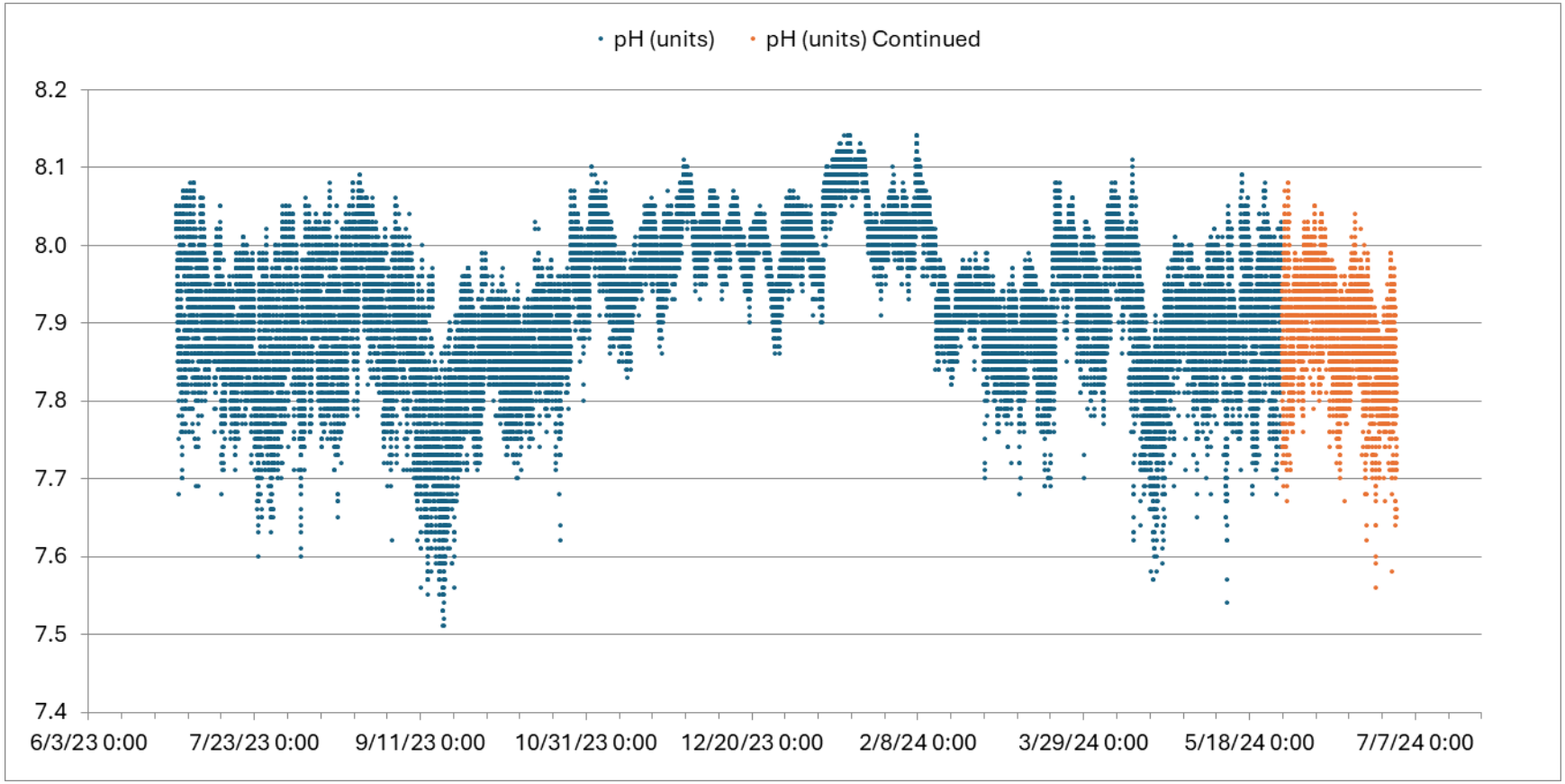
30.0
25.0
20.0
15.0
10.0
5.0
0.0
6/3/23 0:00
7/23/23 0:00
9/11/23 0:00
10/31/23 0:00
12/20/23 0:00
2/8/24 0:00
3/29/24 0:00
5/18/24 0:00
7/7/24 0:00


pH (units)
pH (units) Continued
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8.1
8.0
7.9
7.8
7.7
7.6
7.5
7.4
6/3/23 0:00
7/23/23 0:00
9/11/23 0:00
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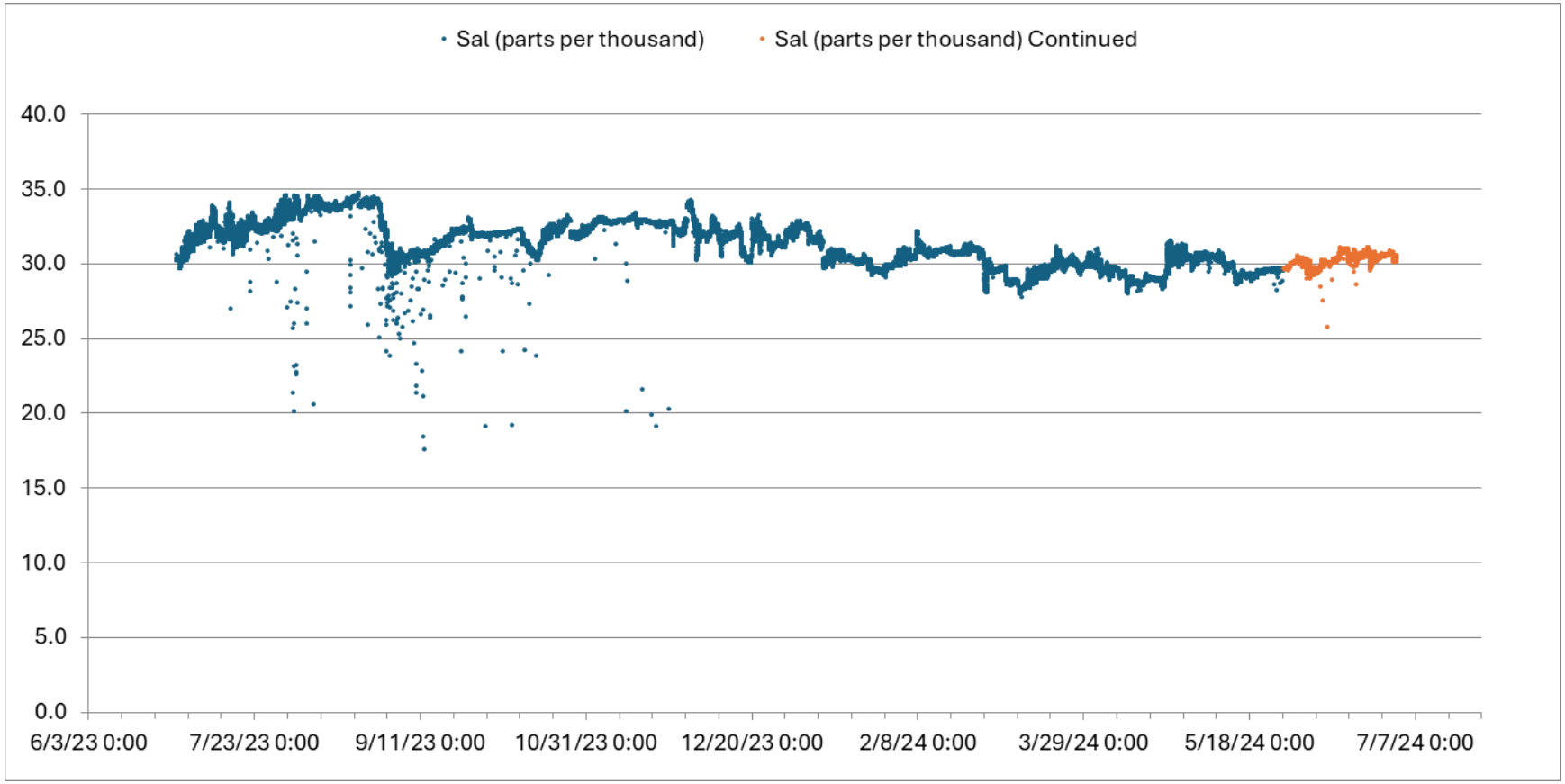
3/29/24 0:00
5/18/24 0:00
7/7/24 0:00


Sal (parts per thousand)
Sal (parts per thousand) Continued
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35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
6/3/23 0:00
7/23/23 0:00
9/11/23 0:00
10/31/23 0:00
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2/8/24 0:00
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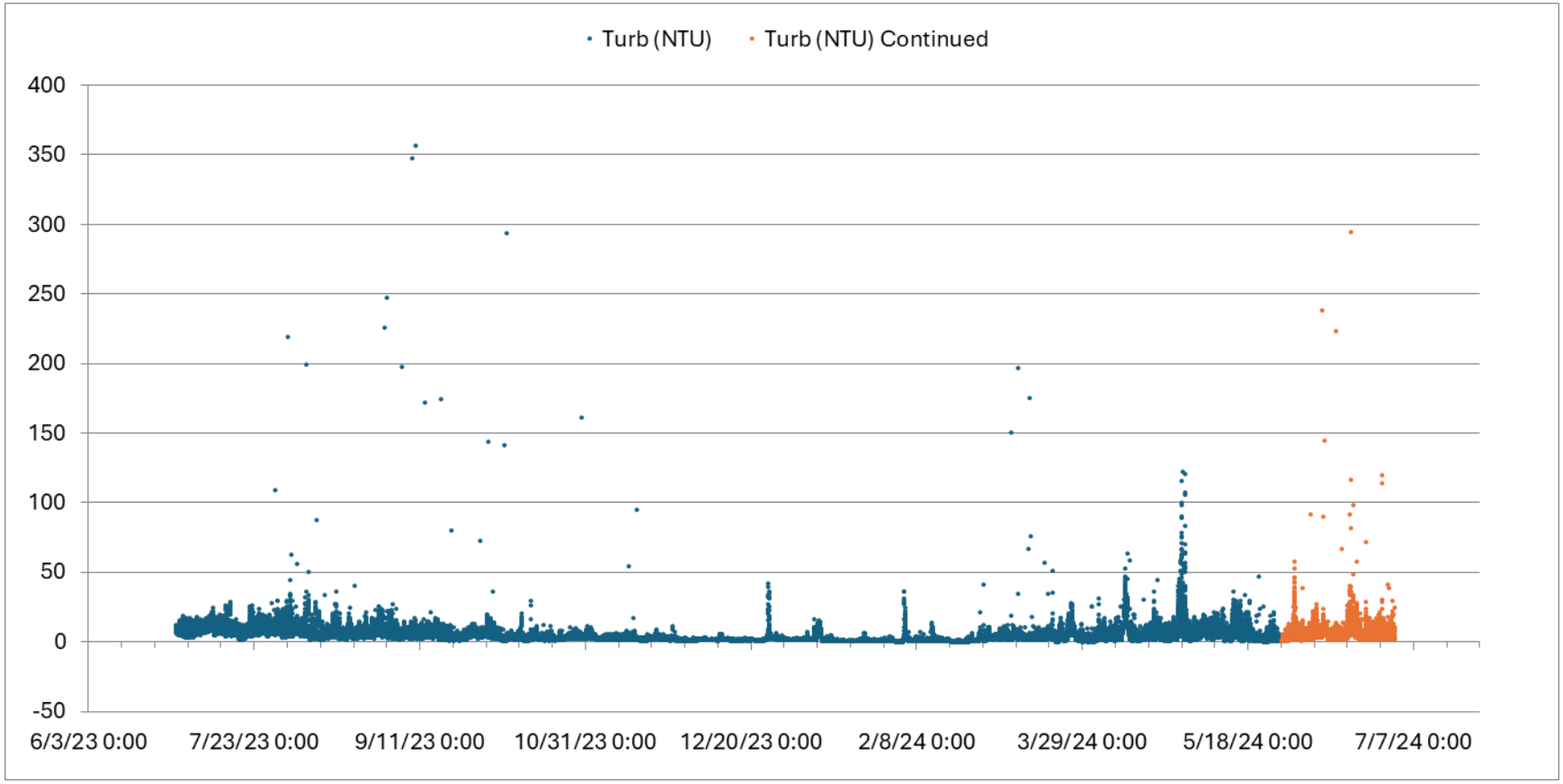
Turb (NTU)
Turb (NTU) Continued
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300
250
200
150
100
50
0
-50
6/3/23 0:00
7/23/23 0:00
9/11/23 0:00
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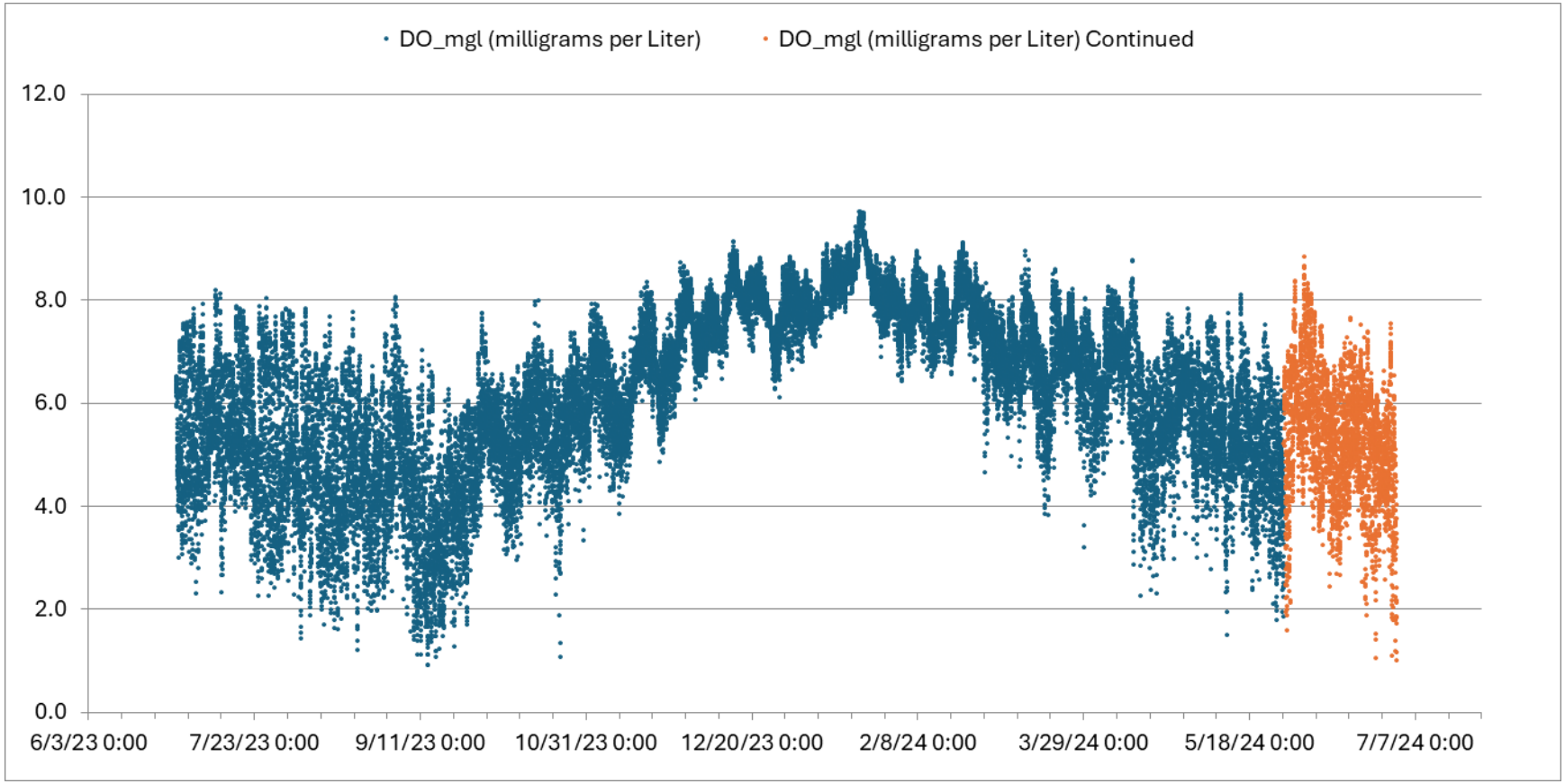
3/29/24 0:00
5/18/24 0:00
7/7/24 0:00


DO_mgl (milligrams per Liter)
DO_mgl (milligrams per Liter) Continued
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8.0
6.0
4.0
2.0
0.0
6/3/23 0:00
7/23/23 0:00
9/11/23 0:00
10/31/23 0:00
12/20/23 0:00
2/8/24 0:00
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5/18/24 0:00
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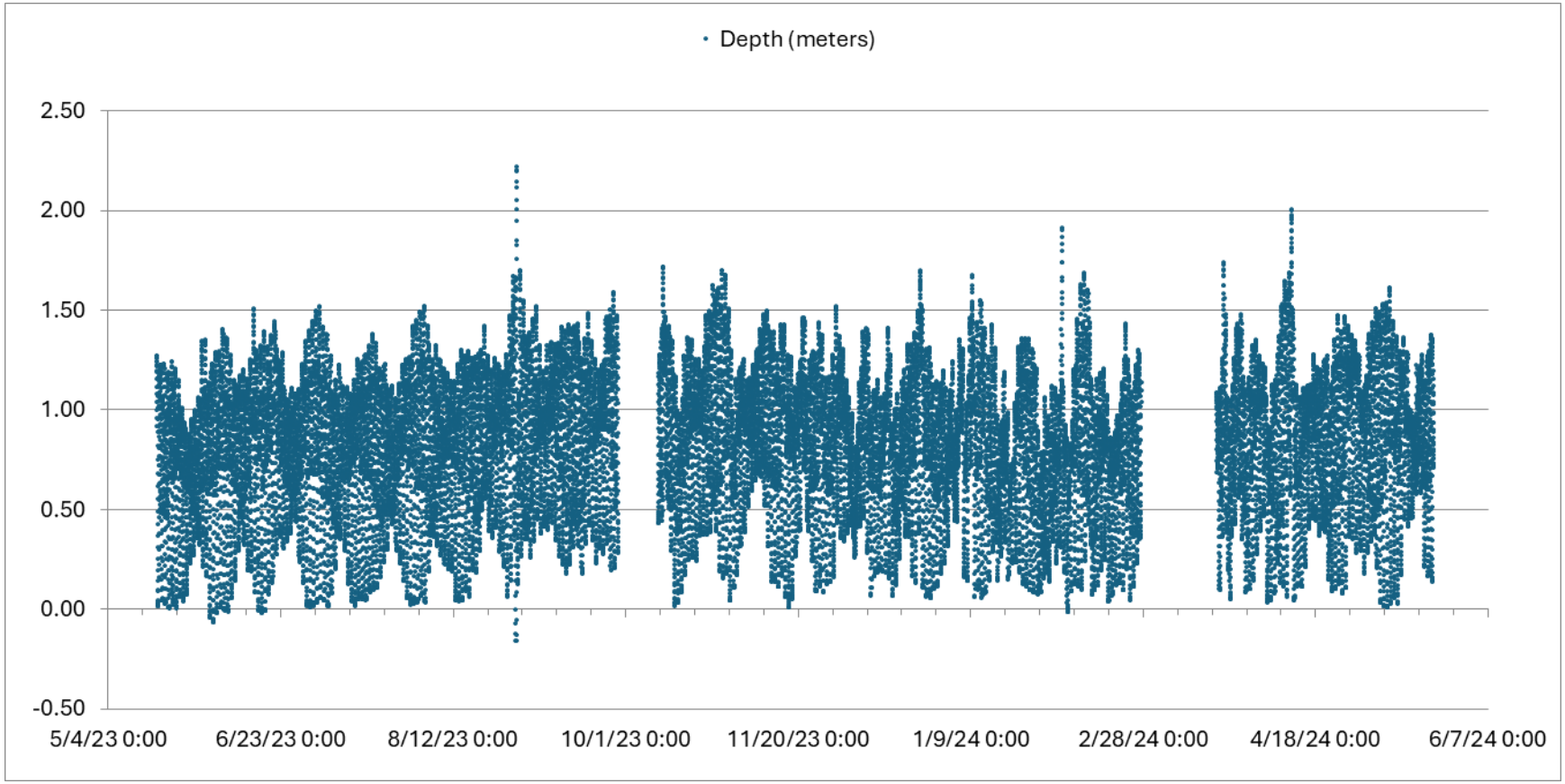
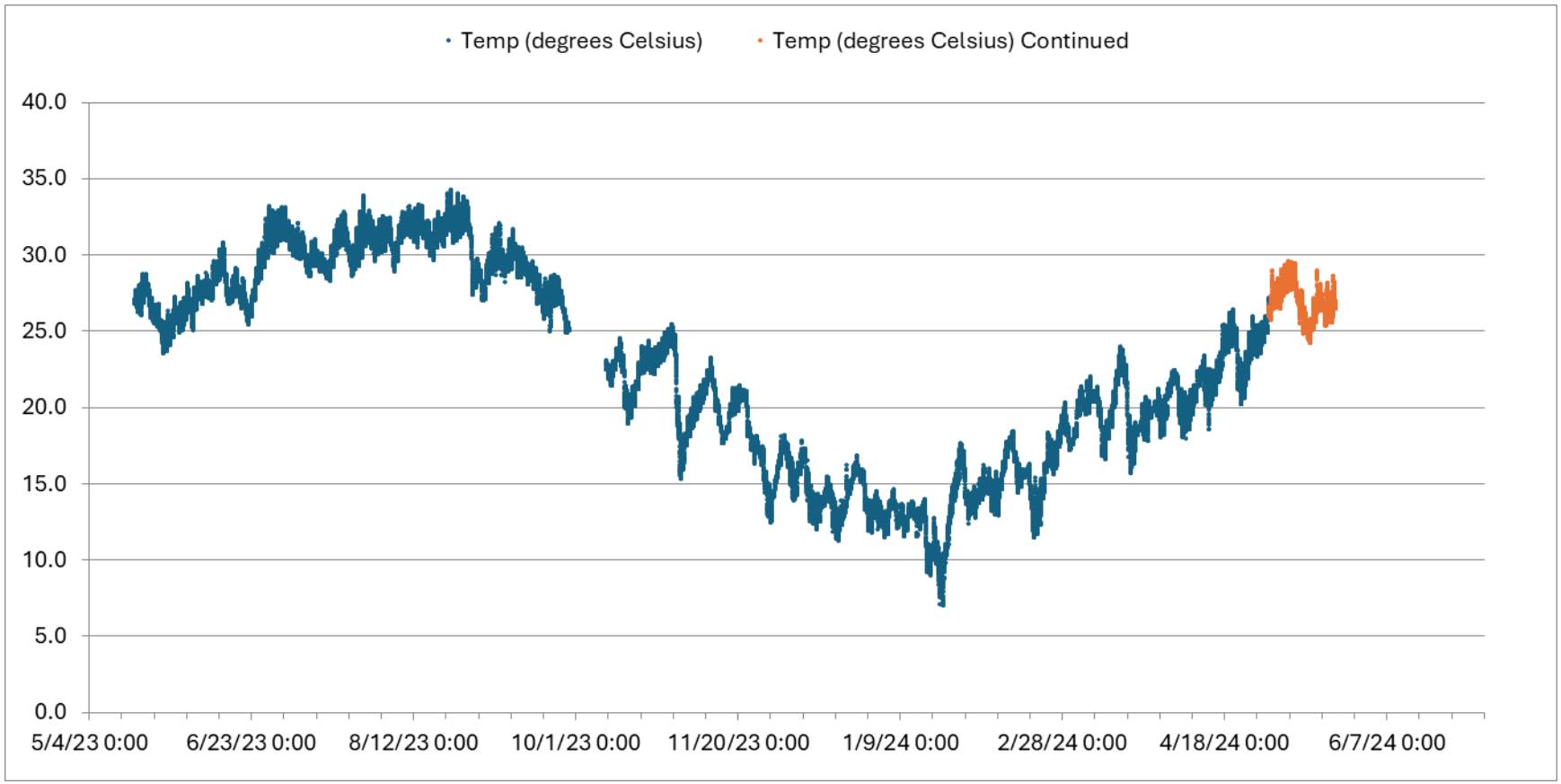
Oyster Bay (OB) ---> 05/18/2023 – 05/22/2024




Temp (degrees Celsius)
Temp (degrees Celsius) Continued
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25.0
20.0
15.0
10.0
5.0
0.0
5/4/23 0:00
6/23/23 0:00
8/12/23 0:00
10/1/23 0:00
11/20/23 0:00
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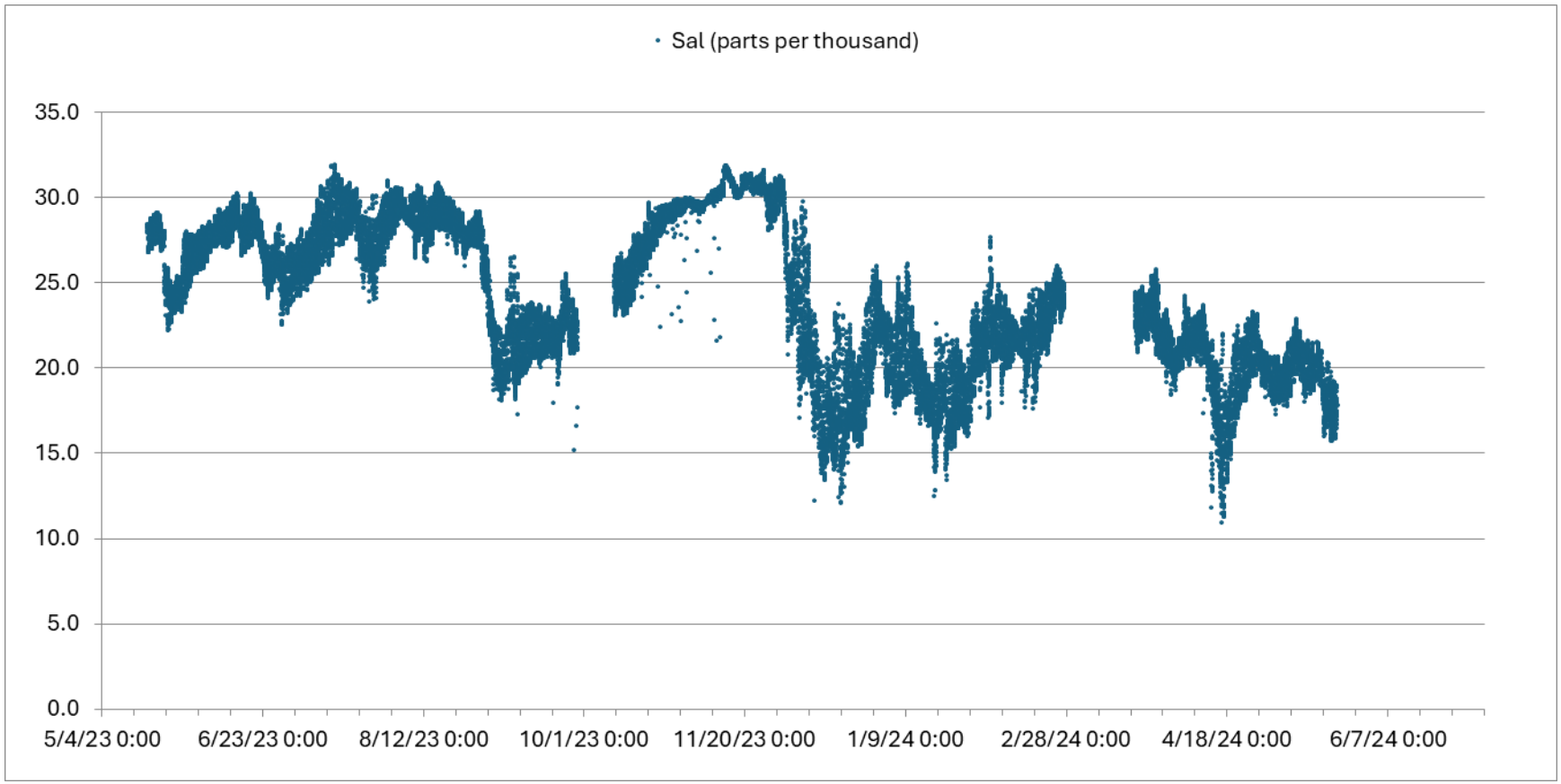
6/7/24 0:00


Sal (parts per thousand)
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15.0
10.0
5.0
0.0
5/4/23 0:00
6/23/23 0:00
8/12/23 0:00
10/1/23 0:00
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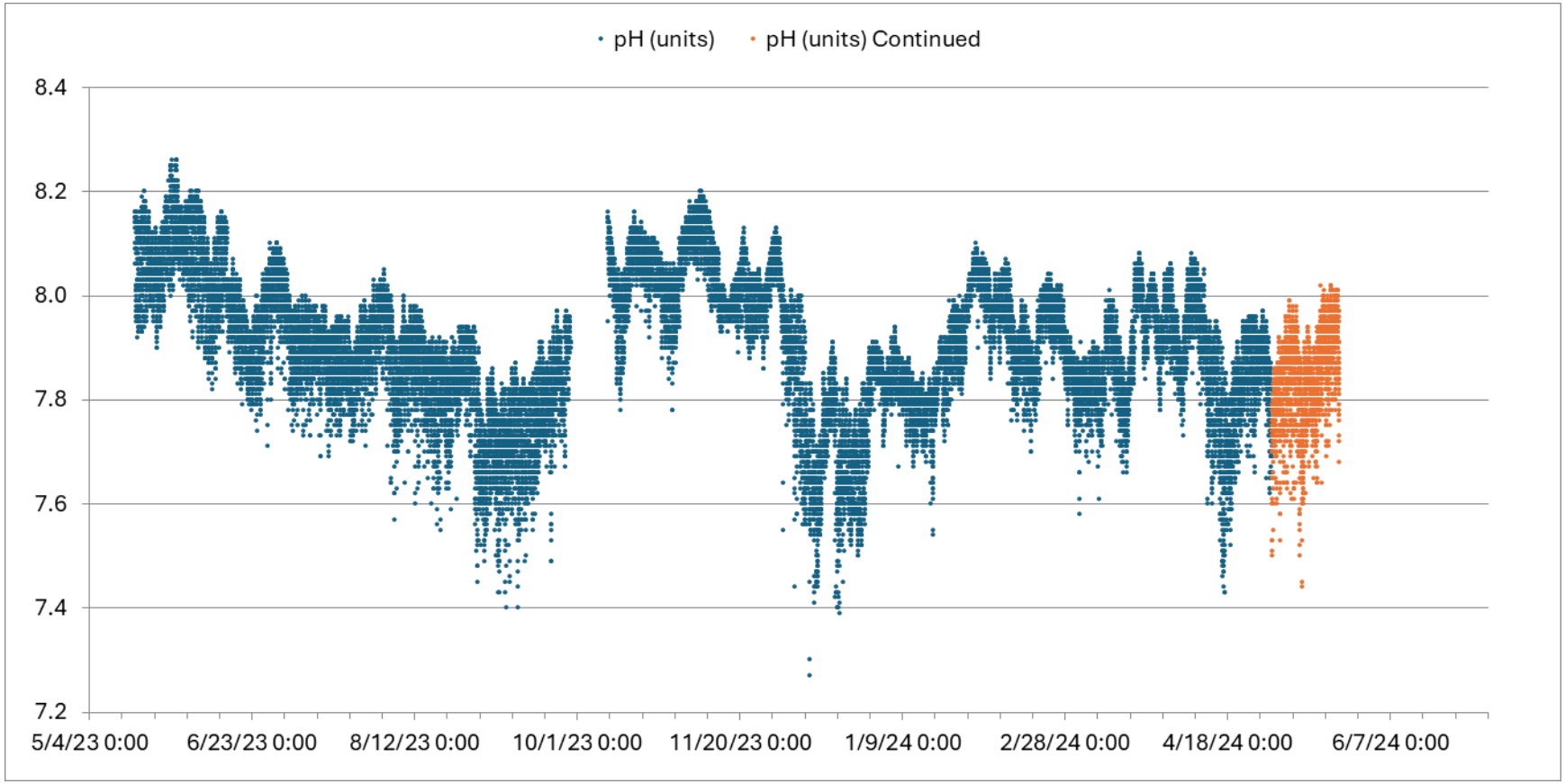
4/18/24 0:00
6/7/24 0:00


pH (units)
pH (units) Continued
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7.4
7.2
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6/23/23 0:00
8/12/23 0:00
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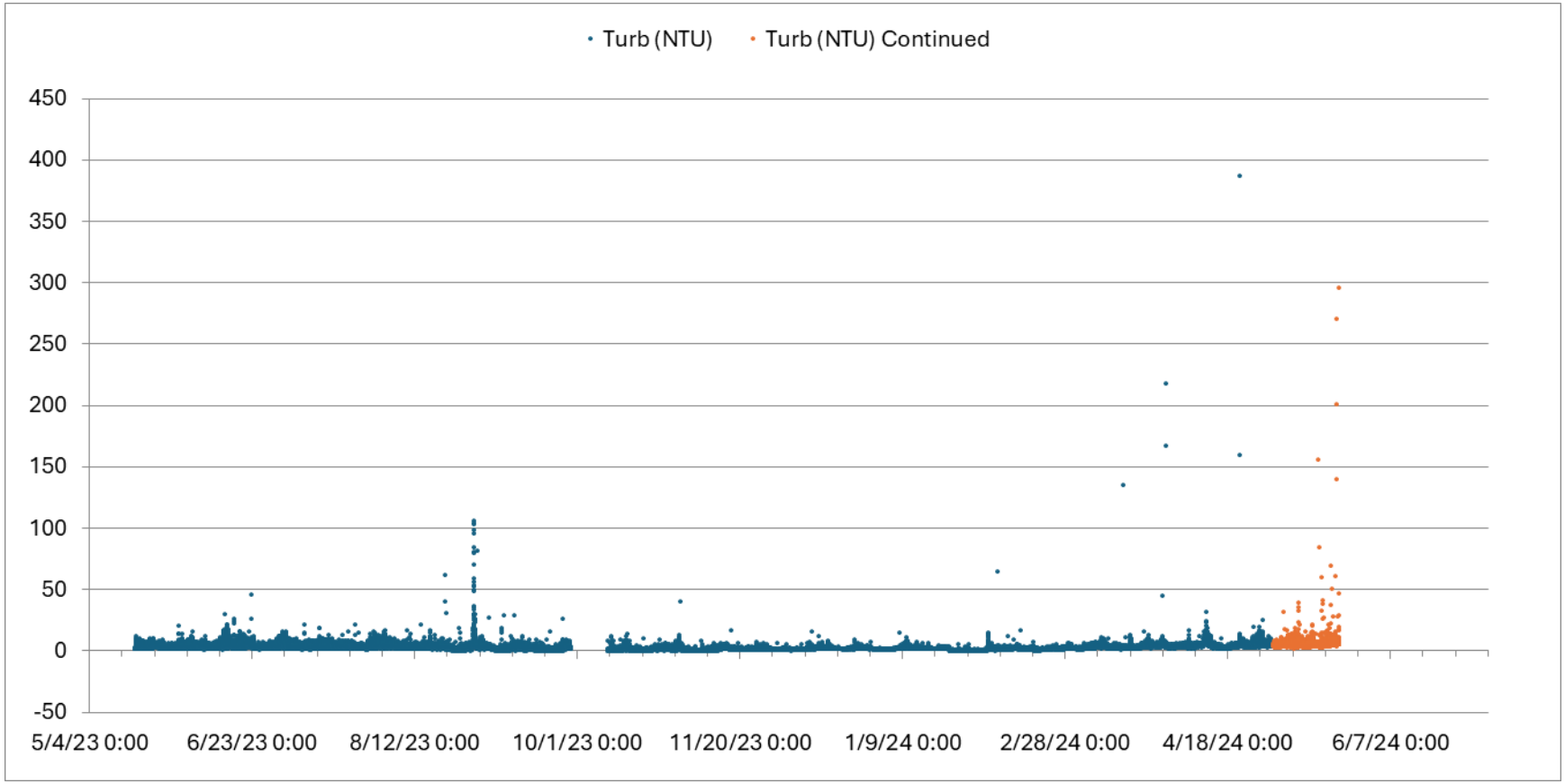
Turb (NTU)
Turb (NTU) Continued
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400
350
300
250
200
150
100
50
0
-50
5/4/23 0:00
6/23/23 0:00
8/12/23 0:00
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2/28/24 0:00
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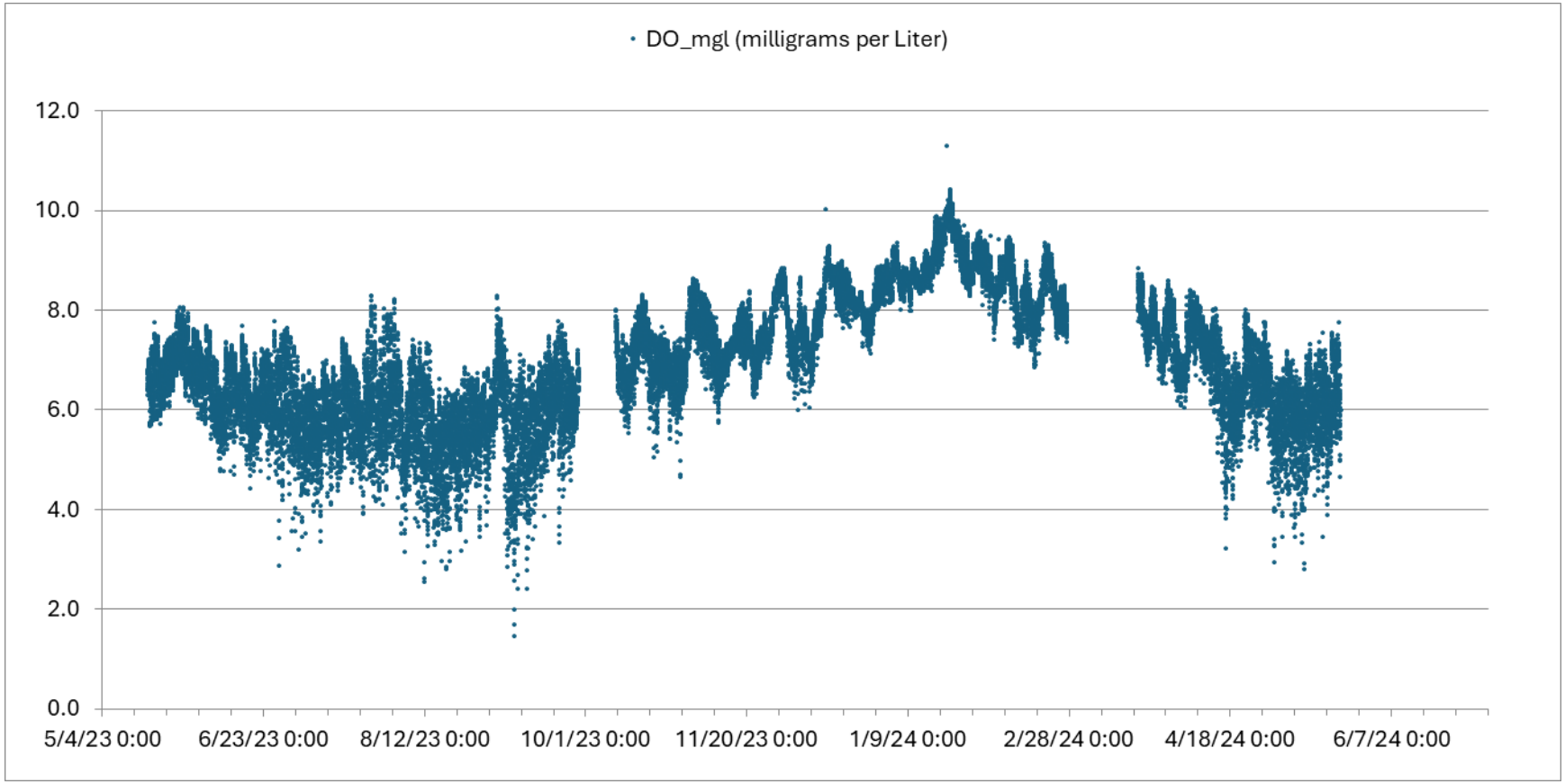
DO_mgl (milligrams per Liter)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
5/4/23 0:00
6/23/23 0:00
8/12/23 0:00
10/1/23 0:00
11/20/23 0:00
1/9/24 0:00
2/28/24 0:00
4/18/24 0:00
6/7/24 0:00