



Metadata: Tivoli Bay South Hydrologic Station

Location: Tivoli Bay, NY([42.027038](#), [-73.925957](#))

Data collection period: July 1996* – present

Parameters: temperature, conductivity, pH, dissolved oxygen, turbidity, chlorophyll, depth, and water elevation.

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Tivoli Bay South Water Quality Station is located within the NYS DEC Tivoli Bays Wildlife Management Area and within the boundary of the Hudson River National Estuarine Research Reserve (NERR). Permission for research work can be obtained through Nathan Ermer, Manager of Tivoli Bays Wildlife Management Area (nmermer [at] gw.dec.state.ny.us, 845-256-3047)

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The National Estuarine Research Reserve, which operates this station, also requires compliance with the NOAA Ocean and Coastal Resource Management Data Ownership and Dissemination Policy for the NERRS System-wide National Monitoring Program (cdmo.baruch.sc.edu/data/policy.cfm).

*Data Collection Period:

Transmission to the HRECOS network began 4/10/2008 (data prior to this date is available at [NERRS CDMO](#)). YSI 6-series datalogger sampling at Tivoli South Bay (TS) began in May 1995. Sampling is continuous from April through December but is not conducted from approximately mid-December through the end of March due to winter storms and ice on the Hudson River and the tributaries.

A YSI 6600 Extended Deployment System (EDS) sonde was deployed at Tivoli South Bay starting on 04/08/2003. The EDS differs from the other 6600 instruments in that a large wiper is positioned centrally to the probes and wipes them prior to every sample. This wiper requires that the pH probe not have a guard over the glass bulb, and a new flat pH probe was deployed on the EDS starting 09/25/2003. Otherwise, the EDS sonde is identical to the other 6600 dataloggers.

New YSI EXO2 sondes replaced all YSI 6600 sondes in April 2014.

Data Quality Assurance:

Data collection and verification have been performed since 2008 according to the HRECOS Quality Assurance Project Plan, which is available at www.hrecos.org ("About HRECOS" -> "Supporting Documents"). See relevant section following pages for QAQC flag and comment code definitions.

Location and equipment:

Tivoli South Bay (42° 01' 37.336" N, 73° 55' 33.445" W) is a tidal freshwater wetland with intertidal mudflats exposed at low tide. During the growing season (June – September), the subtidal area of Tivoli South Bay is dominated by the invasive floating macrophyte *Trapa natans*. Tivoli South Bay has a tidal range of 1.19 meters and a soft, silt/clay bottom type. The depth at the sampling location ranges from 0.5 to 2.5 meters. Hydrological sensors are deployed at Tivoli South Bay approximately 0.5 meters off the bottom in a perforated four-inch PVC tube that is vertically mounted to an existing concrete structure. The datalogger contains sensors for temperature, conductivity, pH, dissolved oxygen, turbidity, and depth**. The depth sensor at Tivoli South Bay is vented to the atmosphere for more precise depth readings. GOES telemetry equipment includes a larger solar panel and battery, a larger enclosure to house the battery, a Sutron Satlink 2 transmitter, associated GPS for time synchronization and a Yagi antenna.

****Depth Qualifier**

HRECOS stations utilize YSI data sondes that can be equipped with either vented or non-vented depth/level sensors. Readings for both vented and non-vented sensors are automatically compensated for water density change due to variations in temperature and salinity; but for all non-vented depth measurements, changes in atmospheric pressure between calibrations appear as changes in water depth. The error is equal to approximately 1.03 cm for every 1 millibar change in atmospheric pressure, and is eliminated for vented sensors because they are vented to the atmosphere throughout the deployment time interval.

Since the start of HRECOS, standard calibration protocol calls for all non-vented depth sensors to read 0 meters at a (local) barometric pressure of 1013.25 mb (760 mm/hg). To achieve this, each site calibrates their depth sensor with a depth offset number, which is calculated using the actual atmospheric pressure at the time of calibration and the equation provided in the calibration sheet.

In 2010, the Tivoli North site began correcting depth/level data for changes in barometric pressure as measured by the associated meteorological station. Unfortunately, it is not possible to apply these adjustments in real-time; instead, corrections are made retroactively once per quarter.

Post-deployment checks:

Sondes deployed at this station are run in a discrete mode post-deployment and are checked against calibration standards *before* any cleaning or biofouling removal is performed (contrary to non-HRNERR HRECOS stations, which generally report these values *after* having cleaned the sonde). These values are reported in the table below. The sonde is left in its condition as was deployed to determine what, if any, impacts the bio-fouling or sediment deposits had on individual parameters. This procedure also helps isolate errors with the equipment or sensors.

Date deployed	Date retrieved	DO %	Specific Conductivity	pH	Turbidity	Sonde Model	Sonde Nickname
<i>(expected values) →</i>		<i>(100%)</i>	<i>(1.0 mS/cm)</i>	<i>(7)</i>	<i>(0 NTU)</i>		
4/10/2008 11:30	4/28/2008 13:30	102.3	1.0	6.98	1.9	6600	C
4/28/2008 13:45	5/22/2008 10:00	104.5	0.977	6.42	0.5	6600	5
5/22/2008 10:15	6/9/2008 12:15	100.7	0.998	6.87	0.1	6600	C
6/9/2008 12:30	6/26/2008 13:15	101	1.081	7.97	-1.4	6600	5
6/26/2008 13:30	7/25/2008 13:30	96.7	0.973	7.0	-2.9	6600	C
7/25/2008 13:45	8/20/2008 11:00	107.3	0.997	7.04	1.2	6600	B
8/20/2008 11:45	9/8/2008 14:30	101.9	1.0	7.05	2.0	6600	6
9/8/2008 14:15	10/2/2008 11:00	100.5	0.991	6.98	-1.0	6600	C

10/2/2008 11:15	10/20/2008 11:30	98.2	1.001	7.21	1.1	6600	5
10/20/2008 11:45	11/5/2008 12:30	101.4	1.035	7.09	0.2	6600	B
11/5/2008 12:45	11/17/2008 12:45	105.1	1.001	6.96	1.2	6600	C
11/17/2008 13:00	12/3/2008 10:30	101.5	1.001	6.98	1.6	6600	5
4/8/2009 10:00	4/29/2009 10:30	108.8	0.977	7.07	0.1	6600	5
4/29/2009 10:45	5/13/2009 10:15	104.7	1.0	7.09	0.2	6600	7
5/13/2009 10:30	5/27/2009 11:45	102.2	1.0	7.17	-0.1	6600	B
5/27/2009 12:15	6/10/2009 10:00	102.9	0.989	7.08	0.2	6600	5
6/10/2009 10:30	6/23/2009 9:15	94.9	0.972	7.03	-0.1	6600	7
6/23/2009 9:30	7/9/2009 10:30	100.2	0.961	7.06	1.1	6600	5
7/9/2009 10:45	7/22/2009 9:30	97.8	0.989	7.08	2.2	6600	7
7/22/2009 9:45	8/5/2009 9:45	100.8	0.992	7.05	-0.6	6600	5
8/5/2009 10:00	8/20/2009 9:45	100.8	0.98	7.0	-0.1	6600	7
8/20/2009 10:00	8/27/2009 15:15	N/A	N/A	N/A	N/A	6600	5
8/27/2009 15:30	9/8/2009 12:00	101.3	0.95	7.0	0.1	6600	B
9/8/2009 12:15	9/24/2009 12:45	102.4	0.94	7.01	1.8	6600	7
9/24/2009 13:00	10/7/2009 10:00	100.4	0.974	6.98	-0.3	6600	B
10/7/2009 10:15	10/22/2009 11:15	100	0.983	6.96	3.3	6600	7
10/22/2009 11:30	11/11/2009 14:30	103.9	1.33	6.85	4.3	6600	B
11/11/2009 14:45	11/24/2009 13:30	108.5	0.937	7.03	-0.9	6600	5
11/24/2009 14:00	12/8/2009 13:15	97.6	0.989	6.97	-5.1	6600	B
4/1/2010 9:30	4/19/2010 8:57	104.7	0.983	7.08	-0.7	6600	B
4/19/2010 8:57	5/11/2010 8:55	102.2	1.006	N/A ¹	-1.0	6600	A
5/11/2010 8:55	6/22/2010 8:27	96.6	1.08	6.64	-0.1	6600	C
6/22/2010 8:27	7/19/2010 12:40	99.6	1.07	7.1	1.4	6600	B
7/19/2010 12:40	8/10/2010 9:43	100.8	0.98	7.08	-1.3	6600	C
8/10/2010 9:43	9/8/2010 10:00	102.8	1.028	7.08	-0.3	6600	A
9/8/2010 10:00	9/28/2010 9:50	101.5	0.945	7.1	-0.6	6600	C
9/29/2010 9:54	10/12/2010 11:20	101.2	0.973	7.17	1.1	6600	B
10/12/2010 11:20	11/9/2010 10:20	98.6	0.984	7.08	1.0	6600	A
11/9/2010 10:20	11/10/2010 12:35	102	0.944	7.03	0.9	6600	C
11/10/2010 12:35	11/30/2010 12:14	98.9	0.991	7.04	0.3	6600	A
11/30/2010 12:14	12/10/2010 11:30	98	1.034	6.94	-0.2	6600	C
4/4/2011 11:25	4/25/2011 14:00	101.5	0.986	7.06	1.7	6600	C
4/25/2011 14:00	5/11/2011 13:00	101.2	1.049	6.99	2.3	6600	B
5/11/2011 13:00	6/1/2011 9:09	99.5	1.092	7.15	-3.3	6600	A
6/1/2011 9:09	6/24/2011 13:30	92.8	0.991	7.13	4.3	6600	N/A ²
6/24/2011 13:30	7/15/2011 9:15	94.7	0.993	7.06	-0.1	6600	B
7/15/2011 9:15	8/5/2011 11:15	101.6	0.974	7.09	22.6	6600	A
8/5/2011 11:15	9/12/2011 10:00	102.5	1.002	N/A ³	0.5	6600	B
9/12/2011 10:00	10/3/2011 13:45	100.8	1.001	7.06	-1.6	6600	C
10/3/2011 13:45	11/3/2011 11:30	100.4	0.989	7.09	1.5	6600	A
11/3/2011 11:30	11/30/2011 12:46	98.9	0.88	7.04	2.8	6600	B
11/30/2011 12:46	12/20/2011 13:45	100.4	1.006	6.99	-0.5	6600	C
3/16/2012 14:45	4/6/2012 10:40	102.4	1.011	7.05	1.9	6600	B
4/6/2012 11:00	5/3/2012 16:00	98.3	0.993	6.98	-0.4	6600	A
5/3/2012 16:00	6/5/2012 9:30	99.3	0.972	7.08	-3.2	6600	C
6/5/2012 9:30	7/12/2012 11:15	100.8	0.971	6.59	-0.5	6600	B
7/12/2012 11:15	8/3/2012 9:30	99.6	1.006	7.16	-0.2	6600	A

8/3/2012 9:30	8/27/2012 14:00	100.9	0.995	6.98	0.8	6600	C
8/27/2012 14:00	9/14/2012 9:45	103.1	1.001	7.03	0.1	6600	A
9/14/2012 9:45	10/3/2012 10:15	103.5	0.993	7.01	0.0	6600	B
10/3/2012 12:00	11/2/2012 9:45	101.5	1.038	7.1	-0.2	6600	A
11/6/2012 13:15	12/7/2012 14:00	97.5	1.0	7.11	0.5	6600	C
12/7/2012 14:15	12/26/2012 9:15	99.2	0.978	7.22	0.6	6600	A
3/29/2013 11:02	5/2/2013 14:12	103.4	0.985	7.15	-2.4 ⁴	6600	B
5/2/2013 14:12	5/30/2013 13:51	96.1	0.998	7.04	1.7	6600	C
5/30/2013 13:51	6/28/2013 12:22	96.2	1.053	7.24	7.4	6600	B
6/28/2013 12:22	7/22/2013 9:14	100.4	0.997	7.22	5.0	6600	C
7/22/2013 9:14	8/20/2013 9:00	100.3	0.950	7.13	17.9	6600	B
8/20/2013 9:00	9/11/2013 11:50	95.1	0.991	6.76	-3.7	6600	A
9/10/2013 11:50	10/23/2013 10:39	99.4	0.983	7.11	0.3	6600	B
10/23/2013 10:39	11/8/2013 10:55	100.1	1.011	6.99	1.1	6600	C
11/08/2013 10:55	12/06/2013 10:29	100.4	1.126	7.08	7.6	6600	7
12/06/2013 10:29	12/12/2013 14:18	100.6	0.993	7.02	0.0	6600	C

As of the 2014 Sampling Season YSI 6600 series sensors were retired and replaced with YSI EXO 2 Sensors. Sensor Specifications can be found in the chart at the end of this document.

Deployment Date	Retrieval Date	DO% Sat	Sp. Cond	pH	Turb.	Depth Meters	Sonde Nickname
(Expected Value) →		100 %	1 (mS/cm)	7.0	0 NTU	(offset)	
4/16/14 10:45	4/23/14 13:30	100.3	0.9225	7.29	0.39	-0.033 (-0.095)	Aquaman
4/23/14 13:45	5/29/14 09:30	100.4	0.8889	7.17	2.73	0.00 (0.007)	Elektra
5/29/14 09:45	6/19/14 13:15	100.8	0.9709	7.23	2.73	0.007 (0.007)	Aqua Man
6/19/14 11:15	7/15/14 11:15	96	1.0103	7.11	1.01	-0.077 (-0.085)	Hawkeye
7/15/14 11:15	8/05/14 12:45	100.5	0.9426	7.23	1.27	0.024 (-0.020)	Cpt America
8/05/14 13:00	8/28/14 09:30	97	0.9420	7.14	1.02	-0.041 (-0.014)	Hawkeye
8/28/14 09:45	9/11/14 10:45	99.2	0.9294	7.08	-1.88	-0.178 (-0.045)	Iron Man
9/11/14 11:00	9/25/14 10:00	101	0.9958	7.17	3.12	0.187 (0.160)	Hawkeye
9/25/14 10:15	10/10/14 12:45	99	0.9717	7.09	1.12	0.295 (-0.068)	Iron Man
10/16/14 12:45	11/05/14 14:00	99	1.0265	7.15	1.12	-0.100 (-0.068)	Flash
11/05/14 15:15	11/25/14 10:45	100.6	0.9564	7.08	2.85	-0.036 (-0.055)	Batman
4/07/15 12:15	5/05/15 09:50	96.7	0.8990	7.11	6.49	-0.007 (0.000)	Hawkeye
5/05/15 10:00	6/04/15 10:45	99.9	0.9080	7.37	4.69	0.035 (0.037)	Daredevil
6/04/15 11:00	6/18/15 10:30	100	0.9761	7.12	2.1	-0.034 (-0.068)	Cpt. America
6/18/15 10:15	7/02/15 09:30	95	0.93	7.14	4.91	-0.116 (-0.116)	Hawkeye
7/02/15 09:45	7/21/15 11:00	95.6	0.9674	7.14	28.1	-0.147 (-0.150)	Batman
7/21/15 11:15	8/06/15 13:00	99.7	1.0017	6.94	0.14	-0.069 (-0.068)	Daredevil
8/06/15 13:15	9/15/15 10:15	101.5	0.9225	7.16	2.5	0.071 (0.037)	Aqua Man
9/15/15 10:30	10/02/15 10:30	99.9	0.8889	7	1.36	0.059 (0.037)	Daredevil
10/02/15 10:30	10/14/15 10:00		0.9709	7.06	1.96	-0.099 (-0.075)	Juggernaut
10/14/15 10:15	11/06/15 13:45	95.7	1.0103	6.92	0.7	-0.084 (-0.085)	Iron Man
11/06/15 14:00	12/04/15 13:15	100.1	0.9426	7.08	6.09	0.085 (0.095)	Flash
12/04/15 13:30	12/31/15 11:30	99.9	0.942	7.22	1.22	-0.044 (-0.068)	Elektra
12/31/15 11:45	1/11/16 11:00	101.6	0.9294	6.94	-0.09	-0.056 (-0.055)	Juggernaut
3/11/16 11:00	3/30/16 10:15	98.5	0.9958	7.13	3.73	-0.183 (-0.177)	Gambit
3/30/16 10:30	4/20/16 09:15	96.8	0.9717	7.23	0.25	-0.092 (-0.068)	Elektra

4/20/16 09:30	5/10/16 10:45	101.6	1.0265	7.19	6.74	0.050 (0.055)	Aqua Man
5/10/16 11:00	6/08/16 10:00	95.1	0.9564	7.22	4.52	-0.109 (-0.150)	Hawkeye
6/08/16 10:15	6/21/16 09:00	98.7	0.899	7.23	2.3	-0.092 (-0.082)	Daredevil
6/21/16 09:15	6/29/16 12:15	97.4	0.908	6.96	1.1	-0.004 (-0.028)	Cpt. America
6/29/16 11:15	7/22/16 11:00	96.5	0.9761	7.06	0.31	-0.068 (-0.096)	Iron Man
7/22/16 11:15	8/08/16 13:00	101.7	0.93	7.07	4.47	-0.002 (0.041)	Daredevil
8/08/16 13:15	9/15/16 09:30	100.7	0.9674	7.24	1.52	0.077 (0.068)	Juggernaut
9/15/16 09:45	10/07/16 11:45	99.7	1.0017	7.26	0.66	0.013 (0.041)	Aqua Man
10/07/16 12:00	10/19/16 11:00	100	0.9514	7.15	4.8	-0.058 (-0.068)	Elektra
10/19/16 11:00	11/08/16 13:15	99.4	0.9416	7.17	2.01	-0.082 (-0.082)	Aqua Man
11/08/16 13:30	12/06/16 12:30	97.6	0.09526	7.09	-1.23	-0.063 (-0.028)	Hawkeye
12/06/16 12:45	1/00/00 00:00	102	0.9032	7.08	-1.16	0.029 (0.014)	Daredevil
4/03/17 14:30	4/25/17 09:45	100.6	0.8695	7.13	3.32	-0.005 (0.000)	Batman
4/25/17 09:45	5/12/17 09:15	99.5	0.8322	7.11	1.13	-0.059 (-0.028)	Juggernaut
5/12/17 09:30	6/01/17 13:00	99.6	0.9665	7.27	3.63	-0.041 (-0.041)	Daredevil
6/01/17 13:15	6/26/17 11:30	101.1	1.0039	7.20	1.68	-0.049 (-0.055)	Iron Man
6/26/17 11:45	8/01/17 13:15	100.7	0.9544	7.00	3.81	-0.008 (0.000)	Flash
8/01/17 13:30	9/20/17 11:00	97.1	0.9430	7.10	1.59	-0.008 (0.000)	Aquaman
9/20/17 11:15	10/10/17 12:45	101.4	0.9627	7.08	-0.03	0.034 (0.027)	Juggernaut
10/10/17 13:00	10/26/17 12:30	98.7	0.9613	7.12	1.38	-0.142 (-0.136)	Flash
10/26/17 12:45	11/29/17 13:30	100.9	0.9590	7.15	0.65	0.096 (0.082)	Hawkeye
11/29/17 13:30	12/14/17 13:45	101.4	0.9211	15.0	0.88	0.020 (0.014)	Cpt. America

¹= The pH probe on the 8/05/11 deployment was broken upon retrieval. Post-cal data for this parameter could not be obtained.

²= Two sonde IDs provided, unclear which reported data.

³= New pH probe was installed after power failure in sonde, no data was collected.

⁴= Turbidity probe failure on ~4/9/13 @ 21:30

⁵=pH Probe dead

Sonde's

6600's

Nickname	Manufactured Year	Serial Number	Version	Vented/Non-Vented
5	1999	99D0810	6600 EDS	Non-Vented
6	2000	00E0470	6600 EDS	Vented
7	2001	01F0145	6600 EDS	Vented
8	2001	01G009 AA	6600	Non-Vented
9	2002	02A0529 AE	6600 EDS	Non-Vented
10	2002	02A0529 AB	6600 EDS	Non-Vented
11	2002	02A0529 AC	6600	Non-Vented
12	2002	02A0529 AA	6600	Non-Vented
A	2004	04M1690AA	6600 V2	Vented
B	2004	04M1690 AB	6600 V2	Vented

C	2005	05M1081 AA	6600 V2	Vented	
D	2009	09H100094	6600 V2	Non-Vented	
E	2009	09G101875	6600 V2	Non Vented	

Exo 2

Nickname	Manufactured Year	Serial Number	Version	Vented/Non-Vented
Aqua Man	2013	13L102147	Exo-2	Non-Vented
Batman	2013	13L101823	Exo-2	Non-Vented
Captain America	2013	13L101822	Exo-2	Non-Vented
Daredevil	2013	13M100249	Exo-2	Non-Vented
Elektra	2013	13M100250	Exo-2	Non-Vented
Flash	2013	13L102149	Exo-2	Non-Vented
Gambit	2013	13L102148	Exo-2	Non-Vented
Hawkeye	2013	13L101821	Exo-2	Non-Vented
Iron Man	2014	14G100980	Exo-2	Non-Vented
Juggernaut	2015	15B104029	Exo-2	Non-Vented
Kingpin	2016	16	Exo-2	Non-Vented
Loki	2017	17	Exo-2	Non-Vented

Special remarks / notes:**2008**

- 04/28/08 13:45: Depth data corrected for period 4/28/08 13:45 to 5/22/08 09:45. Depth was originally recorded in feet – feet were converted to meters using the following formula: depth (feet) x 0.3048
- 05/22/08 10:00: Data missing due to swapping of instruments
- 07/24/08 08:15: Data missing for period 7/24/08 08:15 to 7/25/08 13:30 due to insufficient battery voltage.
- 08/20/08 11:00: Data missing due to swapping of instruments
- 08/20/08 11:15: Depth data suspect for period 8/20/08 11:15 to 9/8/08 14:00 due to non-vented sonde being erroneously deployed at a vented site.
- 12/03/08: Sonde was retrieved for the winter due to rapid freezing of the water. Sonde deployment will resume after the spring thaw in April 2009.

2009

- 05/27/09 12:00: Data missing due to instrument swap
- 06/10/09 10:15: Data missing due to instrument swap.
- 08/20/09 10:00: Data missing for period 8/20/09 10:00 up to and including 8/27/09 15:15. Sonde not functioning in field. Instrument was replaced and sent for repair.
- 11/11/09 14:45: pH data disregarded for deployment period 11/11/09 14:45 up to and including 11/24/09 13:30: Probe very unstable. Probe changed just before deployment therefore possibly port became flooded.

- 11/24/09 13:45: Data missing due to instrument swap.
- 12/8/09: Sondes at Tivoli North & South Bays were retrieved for the winter due to imminent snow /ice storm.

2010

- 4/1/10 10:30: Depth data during the period from 4/1/10 10:30 up to and including 4/5/10 10:30 was flagged suspect due to the dri-rite canister not being attached properly to the vented cable. Data appears to be within range, however, the canister was not installed until 4/5/10 10:30.
- 4/5/10 10:30: Data missing due to instrument maintenance.
- 4/19/10 09:00: Data missing due to instrument swap.
- 5/31/10 17:30: DO % and mg/l data was intermittently reported as a zero (0.0) value during the period between 5/31/10 17:30 up to 5/31/10 22:30. The error was contributed to be caused by a sensor malfunction.
- 6/20/10 07:30: DO % and mg/l data was flagged for rejection during this time period based on a flooding of the probe port. This flooding affected only the DO readings during the period of 6/20/10 07:30 up to and including 06/21/10 22:00. The flooded port caused further readings to also be flagged as rejected (see 06/21/10 22:00, below)
- 06/21/10 22:00: Data during the time period of 6/21/10 22:00 up to and including 6/22/10 08:30 was flagged as rejected based on general instrument malfunction. A flooded probe caused a malfunction and short circuiting error of the instrument. All data during this time period was deemed to be unreliable based on this malfunction.
- 08/10/10 09:30: Data missing due to instrument swap.

2011

- 04/04/11 to 12/20/11: The vented portion of the TS sonde was rendered unusable; however, due to equipment limitations, a vented sonde was deployed as non-vented for the duration of the 2011 sampling year. The sonde was calibrated with a non-vented cable, and deployed with the protective cap on. The data was submitted as non-vented instrument in order to apply the barometric pressure offset. The water depth data will be marked suspect for the entirety of the 2011 sampling season. Based on comparison with past years data at this location, the accuracy of the data appears correct. The data will be flagged as suspect regardless, due to out of the ordinary and unavoidable sampling protocol.
- 4/14/11 – 12/20/11: Depth data during the period from 4/14/11 up to and including 12/20/11 was flagged suspect due to the dri-rite canister not being attached properly to the vented cable. Data appears to be within range.
- 7/15/11 9:30 – 8/05/11 11:15: Wiper pad was not on turbidity sensor during retrieval. The entire deployment is flagged suspect due to the unknown date the wiper came off, post calibration readings were elevated.
- 8/28/11 13:00 – 9/15/11 17:00: Two significant rain events during this period resulted in extremely high turbidity readings. Based on usual observations and proper post calibration of sensor, data is not considered suspect. These turbidity spikes may coincide with observed chlorophyll spikes during this same time frame.
- 9/12/11 18:45 – 20:30: During this period the pH was unusually high, the cause is still unknown.
- 10/20/11 13:45 – 10/21/11 17:30: Turbidity spike due to Tropical Storms Irene and Lee. Loose sediment travelled quickly.
- 9/12/11 9:45-10:15: Sonde out water for maintenance
- 11/03/11 11:45: Sonde out water for maintenance
- 12/14/11 11:00 – 12/20 13:30: Ice present at base of sonde.

2012

- 10/28/12 00:00 – 10/31/12 06:30: A strong Hurricane “Sandy” greatly impacted the entirety of the northeast making landfall on the southern end of New Jersey. Sustained winds of 80 mph were noted throughout some portions of the Hudson River Valley. A significant storm surge was observed impacting the entirety of the estuary rooted by this storm system. A significant drop in barometric pressure was sustained over the period identified. The barometric compensation should be noted in water depth readings. Vented instruments were flooded during this storm event so depth readings in the TS location are marked as suspect until the unit was evaluated and replaced.
- 03/26/12 20:30 – 23:00: A strong north wind combined with a low tidal event, caused the sonde’s depth sensor to be removed from the water. The remainder of the sonde’s probes were seemingly out of water for a short time as well. The data during this time span is to be treated as suspect, but not rejected.
- 12/19/12 17:45 – 12/26/12 08:30: Surface ice was observed in the area of the sampling location. Due to the constant movement/formation of the ice, all data from the observed time forward will be flagged as CIP. Data should not be flagged suspect, however; deviations from normal conditions may be observed during this time period.

2013

- The Vented sondes were compromised during a storm surge during Hurricane Sandy in 2012, the sondes vent tubes were flooded. Upon doing quality assurance tests the sondes appeared to function normally. During the 2013 deployment season, numerous power issues arose in the sondes including multiple power failures on new deployments despite utilizing brand new functioning batteries. The data during the following times was not sampled and recorded due to the power failure. The missing data were excused by the SWMP Oversight Committee (J. Crooks, 1/21/14). The sondes will be replaced for the 2014 sampling season, or as soon as funding allows.

5/17/13 @ 23:00 – 5/30/13 @ 13:45

Battery drainage occurred; data was not logged during this time period.

5/30/13 @ 14:00 – 6/28/13 @ 12:30

Battery failure in sonde due to equipment malfunction. No data collected during entirety of deployment.

09/16/13 @ 20:00 – 10/24/13 @ 12:00

Battery drainage occurred; data was not logged during this time period

- 11/08/13 – 12/06/13
Due to damaged equipment, a 2 Optical port probe was needed to be deployed during this sample cycle. The optical Chlorophyll probe was omitted during this deployment, based on the determination of minimal chlorophyll productivity during the freezing temperatures of late fall. It was resumed briefly on 12/06/13 - 12/12/13 before sondes were pulled.

2014

- Spring 2014 – Discontinued use of YSI 6600 sondes and began using YSI EXO2 sondes at start of sampling season.
- A slight drop in spCond occurred on 6/26/14 @ 05:15. The cause of this event is unknown as no other parameters were impacted, and no known events occurred. Events may have coincided with a rain event over a 5 day period.

2015

- The deployed sonde on 07/02/15 experienced a known manufacturer failure of the CT probe. This caused a failure of all temperature based readings as well as salinity and SpConductance. All data

was flagged until the sonde was removed on 07/21/15 @ 11:00. The probe was returned to the manufacturer for replacement.

- During the deployment on 06/04/15 @ 11:00 Chlorophyll data appeared to abnormally low compared to the surrounding deployments. It is unclear as to the cause of this issue. The data may be lower due to a contaminated standard, however it can not be proven as bad data. It is marked as suspect and should be considered for rejection.

2016

- Various times throughout the year. Due to a very low tide, the oxygen levels tend to go anoxic for short periods of time. Data impacted by this common low tide event are flagged as <0> (CDA) and the associated depths are flagged <0> (CLT)

2017

- Various times throughout the year. Due to a very low tide, the oxygen levels tend to go anoxic for short periods of time. Data impacted by this common low tide event are flagged as <0> (CDA) and the associated depths are flagged <0> (CLT)

Sensor Specifications YSI 6600 (Before April 2014)

<u>Parameter</u>	<u>Units</u>	<u>Sensor type</u>	<u>Model</u>	<u>Range</u>	<u>Accuracy</u>	<u>Resolution</u>	<u>Other</u>
Acidity	Hydrogen ion concentration (pH)	Glass combination electrode	YSI 6561 Flat Glass	0 – 14 units	±0.2 units	0.01 units	NA
Chlorophyll	Micrograms per liter (µg/L)	Optical	YSI 6025	0 – 400 µg/L	NA	0.1 µg/L	Detection limit: 0.1 µg/L
Conductivity	Microsiemens per cm (µS/cm)	Nickel electrode	YSI 6560	0 – 100 µS/cm	±0.5% + 0.001 µS/cm	0.001 – 0.1 µS/cm (range dependent)	NA
Dissolved Oxygen	Air saturation (%) mg/L	Optical Calculated	YSI 6150 ROX	0 – 500% 0 – 50 mg/L	0 – 200%: ±1% 200 – 500%: ±15% 0 – 20 mg/L: ±0.1 mg/L or 1% (whichever is greater); 20 – 50 mg/L: ±15%	0.1% 0.01 mg/L	NA
Salinity	Parts per thousand (ppt)	Calculated	NA	0 to 70 ppt	+/- 1.0% of reading or 0.1 ppt (whichever is greater)	0.01 ppt	NA
Turbidity	Nephelometric Turbidity Units (NTU)	Optical	YSI 6136	0 – 1000 NTU	±2% or 0.3 NTU (whichever is greater)	0.1 NTU	NA
Water Depth	Meters (m)	Stainless steel strain gauge	NA	0 to 30 ft (9.1 m)	0-10 ft: +/- 0.01 ft (0.003 m); 10-30 ft: +/- 0.06 ft (0.018 m)	0.001 ft (0.001 m)	Vented to atmosphere
Water Temperature	Celsius (°C)	Thermistor	YSI 6560	-5 – 45 °C	±0.15 °C	0.01 °C	NA

Sensor Specifications YSI EXO2 (After April 2014)

<u>Parameter</u>	<u>Units</u>	<u>Sensor type</u>	<u>Model</u>	<u>Range</u>	<u>Accuracy</u>	<u>Resolution</u>	<u>Other</u>
Acidity	Hydrogen ion concentration (pH)	Wiped Glass combination electrode	YSI 599702	0 – 14 units	±0.01 units with 10°C of Cal Temp, ±0.02 for remainder of temp range	0.01 units	NA
Chlorophyll	Micrograms per liter (µg/L)	Optical with mechanical cleaning	YSI 599102	0 – 400 µg/L	NA	0.1 µg/L	Detection limit: 0.1 µg/L
Conductivity	mS/cm	4 electrode cell with autoranging	YSI 599870-01	0 – 200 mS/cm	±0.5% of reading or 0.001 mS/cm; 100 to 200:± 1% of reading	0.001 – 0.1 µS/cm (range dependent)	NA
Dissolved Oxygen	Air saturation (%) mg/L	Optical with mechanical cleaning Calculated from % saturation temperature and salinity	YSI 599100-01	0 – 500% 0 – 50 mg/L	0-200% air saturation: ±1% of the reading or 1% air saturation whichever is greater) 200-500% air saturation: ± 5% or reading ±0.1 mg/l or 1% of the reading, whichever is greater 20 to 50 mg/L:±5% of the reading	0.1% 0.01 mg/L	NA
Salinity	Practical Salinity Units (psu)	Calculated from conductivity and temperature	NA	0 to 70 psu	±1.0% of reading or 0.1 ppt (whichever is greater)	0.01 psu	NA
Turbidity	Formazin nephelometric units (FNU)	Wiped Optical, 90° Scatter	YSI 599101-01	0 – 4000 FNU	0 to 999 FNU: 0.3 FNU or ±2% of reading (whichever is greater); 1000 to 4000 FNU ±5% of reading	0 to 999 FNU: 0.01 FNU, 1000 to 4000 FNU: 0.1 FNU	NA
Water Depth	Meters (m)	Non-vented stainless steel strain gauge	NA	0 to 33 ft (10 m)	±0.013 ft (0.04 m)	0.001 ft (0.001 m)	Non-Vented
Water Temperature	Celsius (°C)	Thermistor	YSI 599870-01	-5 – 50°C	-5 to 35: ± 0.01, 35 to 50 ± .005	0.01 °C	NA