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| **C:\HRECOS\HRECOS_logo.small.TIFMetadata: Marist College Pump Station**  **Location:** Marist College, Poughkeepsie, NY ([41.7206, -73.9388](https://maps.google.com/maps?q=41.7206+N,73.9388+W&hl=en&sll=41.721001,-73.938573&sspn=0.003239,0.004823&t=m&z=17) )  **Data collection period:** Water elevation: 07/19/2012- present  All other parameters: 10/25/2012 – 11/2/2021  **Parameters:** pH, specific conductance, turbidity, water temperature, and water elevation (NAVD88). | |
| **Disclaimer:**HRECOS is a research project. No warranty—either express or implied—is made for any information presented by this program.  Researchers interested in accessing the pump station to co-locate monitoring equipment or to use the pump facility to collect samples must contact the HRECOS Coordinator (see contact info below). | |
| **Contacts**:  Brittney Flaten, HRECOS Coordinator  NY State Dept. of Environmental Conservation  256 Norrie Point Way, Staatsburg, NY 12580  Phone: 845-889-4745 x117  Email: brittney.flaten [at] dec.ny.gov  Gary Wall, Marist Pump Station Manager  USGS  425 Jordon Road, Troy, NY 12180  Phone: 518-256-3016  Email: grwall [at] usgs.gov | Stuart Findlay, Marist Pump Station Manager  Cary Institute of Ecosystem Studies  2801 Sharon Turnpike, Millbrook NY 12545-0129  Phone: (845) 677-7600 Ext. 138  Email: findlays [at] caryinstitute.org |
| **Distribution terms:**  HRECOS requests that attribution be given whenever HRECOS material is reproduced and re-disseminated and the HRECOS Coordinator be notified prior to publications including any part of the data. Example citation: “Hudson River Environmental Conditions Observing System. 2012. Marist Pump Station data. Accessed April 13th, 2036. <http://www.hrecos.org/>.” | |
| **Data Quality Assurance:**  Data collection and verification have been performed since the establishment of this station (July 2012) according to the HRECOS Quality Assurance Project Plan, which is available at [www.hrecos.org](http://www.hrecos.org) (“About HRECOS” -> “Supporting Documents”). See relevant section on following pages for QAQC flag and comment code definitions. | |
| **Station details:**  This metadata will only address the water quality monitoring equipment at the Marist Pump Station.  The intake for the pump station is located 91 meters from the main channel and is raised by a tripod approximately 3 meters from the river bottom (41.720993 N, 73.942569 W). Water depth is 18 meters at this location. Water is pumped from this location into the pump house where water quality sensors on a YSI 6600 sonde record the following parameters every 15 minutes\*: specific conductance, turbidity, and water temperature. Dissolved oxygen and pH are also recorded at this station, but the pumping mechanism effects dissolved gases in the water, cause very low readings. These data are not published, but are available by request for those interested.  A separate sensor at the southern edge of the Marist Boat dock (41.720585 N, 73.938794 W) records water elevation, which is converted from NGVD29 to NAVD88 in the HRECOS database. All data are recorded by a CR1000 datalogger and transmitted to the HRECOS database via cellular modem.  \*The sampling rate for this station (including the Marist surface sonde; see metadata) was 6 minutes until it was changed to 15 minutes on 2014-03-28 07:15:00. The lower rate was determined to be sufficient for this station.  Station was upgraded to an EXO2 system on 12/6/2019. | |
| **Special remarks and notes:**   * While dissolved oxygen was measured by this station, it was noted that the pumping system may have affected the concentration. Therefore, dissolved oxygen values may not reflect conditions at the river bottom. See Appendix A for more details. * 2014-03-28 07:15:00: Sampling rate changed from 6 to 15 minutes. * June 2017: Divers assessed intake assembly and replaced intake screens. Flow capacity of the primary line improved, but for only short period of time. Station ran on backup intake line. * 12/6/2019: YSI 6600-series replaced with YSI EXO2 sonde. * November 2021: pump system failed, and water quality station was decommissioned. | |
| **QAQC Comment Code definitions:**  General Errors  [GIM] instrument malfunction  [GIT] instrument recording error, recovered telemetry data  [GMC] no instrument deployed due to maintenance/calibration  [GPF] power failure/low battery  [GQR] rejected due to QAQC checks  [GSM] see metadata  [GIC] no instrument deployed due to ice  [GNF] deployment tube clogged/no flow  [GOW] out of water event  Sensor Errors  [SBO] blocked optic  [STF] catastrophic temperature sensor failure  [SCF] conductivity sensor failure  [SDF] depth port frozen  [SDP] DO membrane puncture  [SDO] DO suspect  [SIC] incorrect calibration/contaminated standard  [SNV] negative value  [SPC] post calibration out of range  [SSD] sensor drift  [SSM] sensor malfunction  [SOW] sensor out of water  [SSR] sensor removed (not deployed)  [STS] turbidity spike  [SWM] wiper malfunction/loss  Comments  (CAB) algal bloom  (CAF) acceptable calibration/accuracy error of sensor  (CAP) depth sensor in water, affected by atmospheric pressure  (CBF) biofouling  (CCU) cause unknown  (CDA) DO hypoxia < 28 percent saturation  (CDB) disturbed bottom  (CDF) data appear to fit conditions  (CFK) fish kill  (CIP) surface ice present at 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 wrong depth  (CWE) significant weather event | |

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| Parameter | Units | Sensor type | Model | Range | Accuracy | Resolution | Other |
| **Acidity** | Hydrogen ion concentration (pH) | Glass combination electrode | YSI 6589 Fast-response pH Sensor | 0 – 14 units | ±0.2 units | 0.01 units | 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 |
| **Specific Conductance** | 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 |
| **Turbidity** | Nephelometric Turbidity Units (NTU) | Optical | YSI 6136 | 0 – 1000 NTU | ±2% or 0.3 NTU (whichever is greater) | 0.1 NTU | NA |
| **Water level** | Meters (m) | Nitrogen bubbler | OTT Bubbler Sensor | 0 – 50 ft (15.24 m) | 0 – 15 ft: ±0.01 ft (0.003 m);  15 – 35 ft: ±0.065%;  35 – 50 ft (0.006 m) | Max. traceable rate of change: 3 ft/minute | Vented to atmosphere |
| **Water temperature** | Celsius (°C) | Thermistor | YSI 6560 | -5 – 45 °C | ±0.15 °C | 0.01 °C | NA |

**Table 1. YSI 6600-series sensor specifications. Equipment was upgraded to EXO2 on 12/6/2019.**

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| Parameter | Units | Sensor type | Model | Range | Accuracy | Resolution | Response |
| **Acidity** | Hydrogen ion concentration (pH) | Glass combination electrode | 599702 | 0 – 14 units | ±0.1 pH units within ±10°C  of calibration temperature;  ±0.2 pH units for entire temp range | 0.01 units | T63<3 sec |
| **Conductivity** | milliSiemens per cm (mS/cm) | 4-electrode nickel | 599870-01 | 0 – 200 mS/cm | 0-100 mS/cm: ±0.5% of  reading or 0.001 mS/cm,  whichever is greater;  100-200 mS/cm: ±1% of  reading | 0.0001 to 0.01 mS/cm  range-dependent | T63<2 sec |
| **Dissolved oxygen** | Air saturation (%)  ¾¾¾¾  mg/L | Optical, luminescence lifetime ¾¾¾¾  Calculated | 599100-01 | 0 – 500%  ¾¾¾¾  0 – 50 mg/L | 0 – 200%: ±1%  200 – 500%: ±5%  ¾¾¾¾  0 – 20 mg/L: ±0.1 mg/L or 1% (whichever is greater);  20 – 50 mg/L: ±-5% | 0.1%  ¾¾¾¾  0.01 mg/L | T63<5 sec |
| **Turbidity** | Formazin Nephelometric Units (FNU) | Optical, 90° scatter | 599101-01 | 0 – 4000 FNU | 0-999 FNU: 0.3 FNU or  ±2% of reading, whichever is greater; 1000-4000 FNU: ±5% of reading | 0-999 FNU: 0.01 FNU  1000-4000 FNU: 0.1 FNU | T63<2 sec |
| **Water temperature** | Celsius (°C) | Thermistor | 599870-01 | -5 to +50°C | -5 to 35°C: ±0.01°C  35 to 50°C: ±0.05°C | 0.001°C | T63<1 sec |
| **Water**  **depth** | Meters (m) | Non-vented (depth auto-corrected) | EXO2, integral | 0 to 100 m | ±0.04% FS (±0.04 m) | 0.001 m  (auto-ranging) | T63<2 sec |

**Table 2. YSI EXO2 model specifications. Equipment was upgraded to EXO2on 12/6/2019.**

**Appendix A.**

**Quarterly Report: Station Maintenance and Characterizing variability at the Marist College HRECOS site.**

**April 1, 2013 through June 30, 2013**

**Prepared by:**

**Stuart Findlay**

**Cary Institute of Ecosystem Studies**

**Millbrook, NY**

**Transmitted to Alene Onion, HRECOS Coordinator on June 18, 2013**

Station Maintenance: Sondes have been exchanged at the Marist pump station on April 26 and June 13 (due to pH probe malfunction). The Schodack sonde was exchanged on April 15. First quarter data from Marist and Schodack were manually checked in May 2013 and posted.

Station Characterization: In late April, 2013, field sampling was conducted offshore from the HRECOS Pump Station adjacent to Marist College. The primary goal was to describe the horizontal and vertical variability near the pump inlet. There was concern that the dissolved oxygen readings reported in the tank in the pump house were not representative of the main channel. A series of vertical profiles were made with a YSI sonde tethered to a heavy weight to capture DO, temperature, conductivity and turbidity in surface and near-bottom waters.

Sampling was conducted between 10AM and 1 PM on a flood tide to capture any effects of the downstream Poughkeepsie wastewater discharge.

RESULTS

Dissolved oxygen showed only slight variation across depths although there is a small downward trend with depth (Fig. 1). All values were within a few percent of expected saturation and the overall range was only about 0.25 mg/L. As reported previously the water column off Marist appears to be well-mixed. Similarly, conductivity showed trivial variation (data not shown).

**Fig. 1: Dissolved oxygen (mg/L) observed during a flood tide at multiple depths off-shore of the Marist pump station at the approximate location of the water intake.**

During this sampling interval the Sonde in the tank reported a mean DO of 7.24 mg/L which is only about 2/3rd saturation confirming the underestimation by the pump station.

During this sampling, turbidity showed a strong and consistent pattern of increasing values nearer the bottom with an overall difference of around 50% (Fig. 2). The sonde in the tank was discovered to have a bad wiper on retrieval making it impossible to compare main channel with tank values.

**Fig. 2: Turbidity observations during a flood tide at multiple depths off-shore of the Marist pump station at the approximate location of the water intake.**