Metadata: Mohawk R. Lock 8 Water Quality Station

Location: Lock 8, Mohawk River (42.8281 N, 73.9904 W)

Data collection period: January 4th, 2012 – present

Parameters: acidity, dissolved oxygen, specific conductance, turbidity, water elevation*, and water temperature.

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Data Quality Assurance:

Data collection and verification have been performed since the establishment of this station (January 2012) according to the HRECOS Quality Assurance Project Plan, which is available at www.hrecos.org (“About HRECOS” -> “Supporting Documents”). See relevant section on following pages for QAQC flag and comment code definitions.

*The level gage is maintained by the U.S. Geological Survey. Data QAQC for this parameter occurs on a different schedule than the sonde parameters (~annually, as opposed to quarterly). Verified data may have been corrected based on field measurements, sensor calibrations, sensor cleanings, and other observations using standard USGS methodology. Unverified data is provisional and subject to revision.

Location and equipment:

The hydrologic station for Mohawk Lock 8 is at the downstream end of the sheet piling below Lock 8 on the Mohawk River/Erie Canal. Sensors are approximately 5 ft. above the riverbed.

Water quality parameters are measured using a YSI 6600V2 sonde. The sonde reports the following parameters every 15 minutes: acidity, dissolved oxygen (% saturation and mg/L), specific conductance, turbidity, and water temperature (see the section titled “Sensor Specifications” for more information). Data is logged to a Campbell Scientific CR1000 datalogger, and is transmitted hourly to the HRECOS database via FTP.

*Water elevation is measured by USGS using a co-located OTT Compact Bubbler System. Water level is converted from NGVD29 to NAVD88 relative to sea level (USGS gage height + 200 ft. – 0.538 ft.). Only 15-minute data is retained for HRECOS, but the gage records at 5-minute intervals. Original USGS data can be accessed at the following URL: http://waterdata.usgs.gov/usa/nwis/uv?01354330.
Post-deployment calibration values:

The sonde is calibrated before and after each deployment and is never deployed longer than three months, with the exception of winters during which persistent surface ice exists. The following table lists the post calibration values for each deployment:

<table>
<thead>
<tr>
<th>Sonde</th>
<th>Date deployed</th>
<th>Date Retrieved</th>
<th>DO % saturation (100%)</th>
<th>Specific Cond. (1.0 mS/cm)</th>
<th>pH (7, 10)</th>
<th>Turbidity (0, 126 NTU)</th>
<th>Deployment notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRNERRG</td>
<td>4/17/13</td>
<td>5/22/13</td>
<td>100.0</td>
<td>1.000</td>
<td>7.03, N/A</td>
<td>0.2, N/A</td>
<td></td>
</tr>
<tr>
<td>NYSDEC5</td>
<td>5/22/13</td>
<td>5/23/13</td>
<td>98.7</td>
<td>1.001</td>
<td>6.88, N/A</td>
<td>0.0, N/A</td>
<td></td>
</tr>
<tr>
<td>HRNERRG</td>
<td>5/23/13</td>
<td>7/26/13</td>
<td>100.4</td>
<td>1.006</td>
<td>7.13, N/A</td>
<td>0.3, N/A</td>
<td></td>
</tr>
<tr>
<td>NYSDEC2</td>
<td>7/26/13</td>
<td>9/27/13</td>
<td>102.2</td>
<td>0.999</td>
<td>7.10, N/A</td>
<td>0.4, N/A</td>
<td></td>
</tr>
<tr>
<td>NYSDEC5</td>
<td>9/27/13</td>
<td>12/4/13</td>
<td>100.4</td>
<td>0.999</td>
<td>7.11, N/A</td>
<td>0.1, N/A</td>
<td></td>
</tr>
<tr>
<td>HRNERRG</td>
<td>12/4/13</td>
<td>4/24/14</td>
<td>100.4</td>
<td>0.999</td>
<td>7.24, 10.25</td>
<td>0.0, N/A</td>
<td>See special notes below regarding temp. offset, pH drift, and depth measurements</td>
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<tr>
<td>NYSDEC5</td>
<td>4/24/14</td>
<td>6/30/14</td>
<td>103.5</td>
<td>1.003</td>
<td>7.14, 10.06</td>
<td>0.0, 125.9</td>
<td></td>
</tr>
<tr>
<td>HRNERRG</td>
<td>6/30/14</td>
<td>8/27/14</td>
<td>100.5</td>
<td>1.010</td>
<td>7.02, 10.00</td>
<td>0.2, 125.0</td>
<td></td>
</tr>
<tr>
<td>NYSDEC5</td>
<td>8/27/14</td>
<td>10/31/14</td>
<td>103.0</td>
<td>0.988</td>
<td>7.11, 10.13</td>
<td>0.1, 126.5</td>
<td></td>
</tr>
<tr>
<td>HRNERRG</td>
<td>10/31/14</td>
<td>12/10/14</td>
<td>102.2</td>
<td>1.015</td>
<td>6.97, 10.01</td>
<td>0.2, 125.7</td>
<td></td>
</tr>
<tr>
<td>NYSDEC2</td>
<td>12/10/14</td>
<td>4/10/15</td>
<td>99.8</td>
<td>1.005</td>
<td>7.14, 10.09</td>
<td>0.6, 126.8</td>
<td>See special notes below regarding temp. offset</td>
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<tr>
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<td>5/11/15</td>
<td>0.0</td>
<td>0.995</td>
<td>6.94, 10.02</td>
<td>0.4, 124.9</td>
<td>DO flatlined 5/2</td>
</tr>
<tr>
<td>NYSDEC2</td>
<td>5/11/15</td>
<td>6/5/15</td>
<td>N/A</td>
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<td>N/A</td>
<td>N/A</td>
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<tr>
<td>NYSDEC5</td>
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<td>8/4/15</td>
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<td>1.003</td>
<td>7.00, 9.93</td>
<td>0.3, 126.7</td>
<td>Some suspicious pH, DO data</td>
</tr>
<tr>
<td>HRNERRG</td>
<td>8/4/15</td>
<td>10/19/15</td>
<td>102.7</td>
<td>0.998</td>
<td>7.09, 10.06</td>
<td>-0.2, 116.0</td>
<td></td>
</tr>
<tr>
<td>NYSDEC2</td>
<td>10/19/15</td>
<td>12/11/15</td>
<td>101.5</td>
<td>1.000</td>
<td>7.05, 9.99</td>
<td>0.1, 126.6</td>
<td>Partial turbidity wiper pad failure</td>
</tr>
<tr>
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<td>12/11/15</td>
<td>4/19/16</td>
<td>102.3</td>
<td>1.006</td>
<td>6.99, 10.00</td>
<td>0.8, 125.9</td>
<td></td>
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<td>Sensor</td>
<td>Start Date</td>
<td>End Date</td>
<td>Temp</td>
<td>Precip</td>
<td>DO</td>
<td>pH</td>
<td></td>
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<tr>
<td>NYSDEC2</td>
<td>4/19/16</td>
<td>6/22/16</td>
<td>99.7</td>
<td>0.995</td>
<td>7.06, 10.13</td>
<td>-0.3, 124.7</td>
<td></td>
</tr>
<tr>
<td>HRNERRF</td>
<td>6/22/16</td>
<td>6/28/16</td>
<td>99.5</td>
<td>1.010</td>
<td>7.06, 9.99</td>
<td>-0.5, 127.7</td>
<td>Turb. probe failure; negative and low readings</td>
</tr>
<tr>
<td>NYSDEC2</td>
<td>6/28/16</td>
<td>8/30/16</td>
<td>100.0</td>
<td>1.000</td>
<td>7.06, 10.03</td>
<td>0.6, 126.9</td>
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<tr>
<td>NYSDEC1</td>
<td>8/30/16</td>
<td>11/8/16</td>
<td>103.1</td>
<td>1.000</td>
<td>6.97, 9.94</td>
<td>0.2, 125.1</td>
<td>Attempted swap on 12/19/16. Unable to remove due to surface ice.</td>
</tr>
<tr>
<td>HRNERRF</td>
<td>11/8/16</td>
<td>3/3/17</td>
<td>103.0</td>
<td>1.000</td>
<td>6.98, 9.97</td>
<td>-0.4, 126.0</td>
<td></td>
</tr>
<tr>
<td>NYSDEC2</td>
<td>3/3/17</td>
<td>5/15/17</td>
<td>99.8</td>
<td>1.000</td>
<td>7.03, 10.03</td>
<td>0.5, 127.2</td>
<td></td>
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<tr>
<td>NYSDEC1</td>
<td>5/15/17</td>
<td>8/3/17</td>
<td>106.0</td>
<td>1.011</td>
<td>7.20, 10.16</td>
<td>0.3, 124.9</td>
<td></td>
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<tr>
<td>HRNERRF</td>
<td>8/3/17</td>
<td>10/25/17</td>
<td>105.6</td>
<td>1.005</td>
<td>7.13, 10.13</td>
<td>0.0, 125.3</td>
<td></td>
</tr>
<tr>
<td>NYSDEC2</td>
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<td>11/30/17</td>
<td>101.9</td>
<td>0.990</td>
<td>7.01, 10.01</td>
<td>-0.2, 125.3</td>
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</tr>
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<td>NYSDEC1</td>
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<td>4/13/18</td>
<td>101.7</td>
<td>0.996</td>
<td>7.27, 10.13</td>
<td>0.2, 126.4</td>
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<tr>
<td>NYSDEC2</td>
<td>4/13/18</td>
<td>6/22/18</td>
<td>100.2</td>
<td>1.003</td>
<td>7.12, 10.14</td>
<td>-0.1, 125.6</td>
<td></td>
</tr>
<tr>
<td>NYSDEC1</td>
<td>6/22/18</td>
<td>8/3/18</td>
<td>87.3</td>
<td>1.005</td>
<td>7.24, 10.15</td>
<td>0.1, 126.0</td>
<td>DO sensor failure</td>
</tr>
<tr>
<td>HRNERRF</td>
<td>8/3/18</td>
<td>[currently deployed]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Special notes:**

- **1/22/14 07:00 – 2/27/14 07:45:** OTT bubbler orifice was frozen. YSI depth sensor (with atmospheric pressure correction applied) was activated and OTT data stream was replaced for this time period.
- **12/4/13 16:00 to 4/24/14 11:15:** Sonde deployed on 12/4/13 appears to have a consistent temperature offset of ~-0.75 deg C for the entirety of the deployment. A correction of +0.75 deg C was applied to water temperature. As a result of temperature dependence by DO and pH measurements, this offset introduces a small amount of error to concurrent records of these parameters.
- **(Same period as above):** Significant, but gradual pH drift occurred. All pH records in the period are marked as suspicious.
- **12/10/14 – Sonde deployed had negative temperature offset similarly to last year (albeit different sonde was deployed).** Data was corrected with a +0.67 deg C offset and probe replaced after deployment.
QAQC flag definitions:

Provisional Data Flags

0  Acceptable data
5  Data that demonstrate a dramatic increase or decrease from the previous value
6  Flat lined data
30 Data outside three standard deviations of the seasonal mean
40 Data outside four standard deviations of the seasonal mean
100 Data outside the range of the instrument

Final Data Flags

0  Data determined to be acceptable after a final review by the site manager
10000 Suspicious data according to a final review by the site manager
20000 Corrected data
500000 Rejected data according to a final review by the site manager

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
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBF</td>
<td>biofouling</td>
</tr>
<tr>
<td>CCU</td>
<td>cause unknown</td>
</tr>
<tr>
<td>CDA</td>
<td>DO hypoxia &lt; 28 percent saturation</td>
</tr>
<tr>
<td>CDB</td>
<td>disturbed bottom</td>
</tr>
<tr>
<td>CDF</td>
<td>data appear to fit conditions</td>
</tr>
<tr>
<td>CFK</td>
<td>fish kill</td>
</tr>
<tr>
<td>CIP</td>
<td>surface ice present at sample station</td>
</tr>
<tr>
<td>CLT</td>
<td>low tide</td>
</tr>
<tr>
<td>CMC</td>
<td>in field maintenance/cleaning</td>
</tr>
<tr>
<td>CMD</td>
<td>mud in probe guard</td>
</tr>
<tr>
<td>CND</td>
<td>new deployment begins</td>
</tr>
<tr>
<td>CRE</td>
<td>significant rain event</td>
</tr>
<tr>
<td>CSM</td>
<td>see metadata</td>
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<tr>
<td>CTS</td>
<td>turbidity spike</td>
</tr>
<tr>
<td>CVT</td>
<td>possible vandalism/tampering</td>
</tr>
<tr>
<td>CWD</td>
<td>data collected at wrong depth</td>
</tr>
<tr>
<td>CWE</td>
<td>significant weather event</td>
</tr>
</tbody>
</table>
### Sensor Specifications

#### Conductivity
- **Parameter**: Conductivity
- **Units**: Microsiemens per cm (µS/cm)
- **Sensor type**: Nickel electrode
- **Model**: YSI 6560
- **Range**: 0 – 100 µS/cm
- **Accuracy**: ±0.5% + 0.001 µS/cm
- **Resolution**: 0.001 – 0.1 µS/cm (range dependent)
- **Other**: NA

#### Dissolved oxygen
- **Parameter**: Dissolved oxygen
- **Units**: Air saturation (%), mg/L
- **Sensor type**: Optical
- **Model**: YSI 6150 ROX
- **Range**: 0 – 500% or 0 – 50 mg/L
- **Accuracy**: 0 – 200%: ±1%
  200 – 500%: ±15%
- **Resolution**: 0.1%
- **Other**: NA

#### Water temperature
- **Parameter**: Water temperature
- **Units**: Celsius (°C)
- **Sensor type**: Thermistor
- **Model**: YSI 6560
- **Range**: -5 – 45 °C
- **Accuracy**: ±0.15 °C
- **Resolution**: 0.01 °C
- **Other**: NA

#### Acidity
- **Parameter**: Acidity
- **Units**: Hydrogen ion concentration (pH)
- **Sensor type**: Glass combination electrode
- **Model**: YSI 6589 Fast-response pH Sensor
- **Range**: 0 – 14 units
- **Accuracy**: ±0.2 units
- **Resolution**: 0.01 units
- **Other**: NA

#### Turbidity
- **Parameter**: Turbidity
- **Units**: Nephelometric Turbidity Units (NTU)
- **Sensor type**: Optical
- **Model**: YSI 6136
- **Range**: 0 – 1000 NTU
- **Accuracy**: ±2% or 0.3 NTU (whichever is greater)
- **Resolution**: 0.1 NTU
- **Other**: NA

#### Water level
- **Parameter**: Water level
- **Units**: Meters/Feet
- **Sensor type**: Nitrogen bubbler
- **Model**: OTT Bubbler Sensor
- **Range**: 0 – 50 ft (15.24 m)
- **Accuracy**: 0 – 15 ft: ±0.01 ft (0.003 m);
  15 – 35 ft: ±0.065 ft;
  35 – 50 ft (0.006 m)
- **Resolution**: Max. traceable rate of change: 3 ft/minute
- **Other**: Vented to atmosphere

#### Water level (sonde; backup)
- **Parameter**: Water level (sonde; backup)
- **Units**: Meters (m)
- **Sensor type**: Strain gauge pressure transducer
- **Model**: YSI 6600V2
- **Range**: 0 to 30 ft (9.1 m)
- **Accuracy**: 0-10 ft: +/- 0.01 ft (0.003 m);
  10-30 ft: +/- 0.06 ft (0.018 m)
- **Resolution**: 0.001 ft (0.001 m)
- **Other**: Corrected for atm. pressure
In June of 2012 and April 2014 we characterized the variability of water quality variables adjacent to the Mohawk Lock 8 HRECOS installation. The two dates were sampled to capture conditions below the lock at a time the water control logs were in place (June) versus removed (April). We followed the established procedures to determine the representativeness of near shore sites in the HRECOS network, towing a sonde across the channel adjacent to the fixed sonde location. At three sites (See Fig. 1) we sampled near surface (~ 1 m) and at depth (2-3 m) to examine any vertical variability.

Fig. 1: Map of Lock 8 transect and sampling locations.
None of the solutes or dissolved oxygen showed significant variability across the channel or with depth. This is evident in a box-plot showing dissolved oxygen for the two dates broken out by shallow/deep samples (Fig. 2). There is clearly a seasonal difference, with April concentrations much higher due to cooler temperatures. Turbidity is typically the variable with the greatest variability both horizontally and vertically in prior HRECOS cross-channel sampling. At this Mohawk site there is very small variability on a given date although (as expected) there are much higher levels in April than June (Fig. 3)

Fig. 2: Box plot comparing dissolved oxygen for two dates at two depths (shallow (s) and deep (d)). Error bars are 1 Std Error.
Fig. 3: Box plot of vertical variation in turbidity (NTU) for two dates at the Mohawk Lock 8 site.

Overall, this site on the Mohawk is well-mixed undoubtedly because it is immediately below the spill way and the shore-mounted sonde will adequately characterize the channel at this point.