Old Woman Creek (OWC) NERR Site Water Quality Metadata
March through December, 2011
Latest Update: September 11, 2015

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2. Entry verification:

The data were directly downloaded from either a YSI PC6600 EDS (site DR) or a YSI PC6600 V2 (sites BR, OL, WM) data logger into the YSI Ecowatch for Windows program in the PC. The data were graphed and visually checked for any obvious outliers. Notes were made of any unusual data or faulty probes. Pre- and post- deployment data was removed and then the data were then exported as a comma-delimited format file (.csv or .cdf) to the CDMO where they underwent an automated primary QAQC and became part of the CDMO's online provisional database. During primary QAQC, data were flagged if they were missing, out of sensor range, or outside 2 or 3 standard deviations from the historical seasonal mean. The edited file was then returned to the Reserve where it was opened in Microsoft Excel and processed using the CDMO's NERR QAQC Excel macro. The macro inserted station codes, created metadata worksheets for flagged data and graphed the data for review. QAQC flags and codes were applied to the data, and the files were appended. These resulting data files were then exported to the CDMO for tertiary QAQC and assimilation into the CDMO's authoritative online database. When deployment overlap occurs between files, the data produced by the most recently calibrated sonde is generally accepted as being the most accurate. Further information on the QAQC flags and codes are presented in sections 11 and 12 of this metadata. The files are archived at OWC. Dr. David Klarer was responsible for both data logger deployment and data management at Old Woman Creek NERR during the 2011 deployment.

3. Research Objectives:

Measurements are taken every 15 minutes over two or three-week periods at four sites within the Old Woman Creek- three in the estuary proper- one in the upper reaches at Darrow Road (DR), one near the mouth, just south of State Route 6 (WM), and the third site upstream from the WM site (OL). The final site (BR) is just upstream of the first riffle zone above the estuary in Old Woman Creek proper. The purpose of this monitoring program is to document the role of this Great Lakes estuary in the Lake Erie ecosystem, particularly the estuary's role in mitigating storm flow that passes through it. The role of the OL site is to document the degree of intrusion by lake water during northerly winds and subsequent seiche events.

4. Research methods:

The YSI monitoring program began on at sites BR, DR, OL, and WM on March 22. The sampling at all sites ended for the year on December 9. Prior to deployment of the data loggers, a 4-inch diameter PVC pipe was bolted to an 8-foot long metal post that had been driven into the sediment. The logger trap at site DR was not bolted to an 8-foot metal post, but rather was suspended from the north side of the road bridge by metal chain. Each pipe had 4 vertical slits ¾" wide drilled into it spanning the area of the probe guard on the data logger to insure that the probes would have direct contact with the surrounding waters. Additional field readings for dissolved oxygen, pH, temperature, turbidity, and specific conductance are taken when the instrument is changed at each site (see the Other Remarks Section). The data loggers are replaced in the field after a two or three-week deployment, depending on temperature and degree of fouling of the data loggers. All data loggers were the extended deployment loggers. The data was retrieved from each data logger and each data logger was recalibrated (according to the directions in the YSI Operations Manual) before being returned to the field. Conductivity, turbidity (2 point calibration using distilled water for zero turbidity and a YSI standard for the other turbidity point),and pH (2 point calibration) are calibrated using commercial standards. These standards were prepared prior to each deployment. The data loggers at site WM has a vented water level sensors while the loggers at sites BR, DR, and OL have non-vented depth sensors. At all four sites the ROX optical dissolved oxygen probe was used. The calibration logs provide sensor information.
A Sutron Sat-Link2 transmitter was installed at Site OL during October 2006. This system transmits data to the NOAA Goes satellite, NESDIS ID# 3B02849A. The transmissions are scheduled hourly and contain four (4) data sets reflecting fifteen minute data sampling intervals. Upon receipt by the CDMO, 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 and assimilation in the CDMO's authoritative online database. Provisional and authoritative data are available at http://cdmo.baruch.sc.edu. After 21 June, the data to the Goes satellite was garbled due to problems with the cable from the logger to the transmitter.

5. Site Location and Character:

Old Woman Creek National Estuarine Research Reserve is located on the southern shore of Lake Erie, east of the city of Huron, Ohio (Latitude 41° 23'N; Longitude 82° 33'W). Land use in the Old Woman Creek (OWC) watershed is primarily row crop agriculture. Other than the non-point source pollutants coming into the estuary from these agricultural practices and from the town of Berlin Heights, there are no other major pollution sources in the estuary. Salinity in Old Woman Creek is normally 1 ppt. or less, although it will rise, on occasion, to nearly 2 ppt. The tidal range in Lake Erie (and therefore in the estuary) is on the order of 4 cm or less. Water levels in the estuary and in the creek are extremely variable, with changes occurring daily, seasonally and annually due to changing lake levels, seiches on the lake, storm runoff, and the mouth closing and opening through the year.

The data logger at the State Route 6 (WM) site (Latitude 41° 22' 57" N, Longitude 82° 30'54" W) is very close to the mouth of Old Woman Creek. In this portion of the Reserve, the creek is very shallow but extends over a large surface area. This site frequently experiences influx of Lake Erie waters. The bottom sediments at this site are silty clay. At the beginning of the deployment for 2011, there was no rooted aquatic vegetation directly adjacent to the site, although there was both emergent and submerged vegetation within 3 meters of the site. The data logger is about .18 meters above the bottom sediments.

The data logger at site OL (Latitude 41^0 22' 55" N, Longitude 82^0 30'51" W) is in the

lower reaches of the estuary. This site is not in direct sight of the mouth, so northerly winds and resulting seiche activities should be less noticeable at this site. The bottom sediments are silty clay. This site is located about 5 meters north of a *Nelumbo lutea* bed, but, there were no plants immediately adjacent to the data logger. In March 2009, a new logger site was established 5 meters north of the original site due to damage of the original site by a winter storm. In 2010, this temporary site became the OL site. At this site, the base of logger is 26 cm above the sediment. There are some *N. lutea* leaves adjacent to this site. This is the site that is telemetered to the GOES satellite.

The data logger at site BR (Latitude 41^0 20'54" N, Longitude 82^0 30'30"W) is located in the lower portion of the creek proper. Just upstream from the data logger, Berlin Road crosses Old Woman Creek. Site BR is just upstream of the first riffle above the estuary. Unlike the other three sites, Lake Erie water levels have no impact on this site. The bottom of the creek at this site is a combination of rocks interspersed with some clay-silt that has been washed in from upstream. There are no aquatic macrophytes at or near this site. The logger is 18 cm above the bottom at this site. Short guards were used on all loggers at this site through the year. Wire mesh fencing around trap was installed to diminish debris build-up around the logger. The logger trap was destroyed by storm runoff during the last part of May and was reinstalled on 3 June, 2011 at about 10:15 am. The logger is now 22 cm above the bottom. The stream bottom under the logger was excavated on 17 July, 2011 at about 07:40 and the logger and trap were lowered about 18 cm. The bottom of the logger is now about 10 cm above the bottom of the creek. When the loggers were exchanged on 7 August, 2011 (about 07:55), the logger was lowered another 5 cm. For the remainder of the year, the logger was 5 cm above the stream bottom.

The data logger at site DR (Latitude 41^0 21'54"N, Longitude 82^0 30' 17"W) is at the southern boundary of the reserve. The logger trap is suspended from western most of the two center guard rail supports on the north side of the Darrow Road bridge near the deepest part of the creek channel.. At this site the creek is relatively narrow. Although water direction and flow is influenced at this site by changes in Lake Erie water levels, this site doesn't have direct contact with Lake Erie waters. The bottom sediments at this site are silty clay. There is no rooted aquatic vegetation near or upstream from this site. The data logger is about .20 meters above the bottom at this site. Prior to deployment on 04/14/2011 (08:15) the trap was raised about 5 cm. Beginning with the deployment on 06/ 26/2011 (08:00) the longer guard was used on the logger thus effectively raising the logger 5 cm in the water column. The trap was raised 6 cm on October 3, 2011 between 10:15 and 10:30. With the November 6 deployment (09:00) the short guard was used thus effectively lowering the logger by 5 cm.

6. Data collection periods:

Sampling at WM began on March 22 at 09:30. The logger was pulled for the year at 09:15 on 9 December. Sampling at OL began on March 22 at 09:30, and ceased on 9 December at 09:15. Sampling at BR began on March 22 at 08:00 and ceased on 9 December at 10:45. Sampling at DR began on March 22 at 08:30. The logger was pulled for the year on 9 December at 10:30. Specific deployment dates are listed below.

Site	Deployed	Pulled
WM	3/22/2011 (09:30)	4/14/2011 (10:00)
	4/14/2011 (10:15)	05/08/2011 (09:00)
	05/08/2011 (09:15)	06/05/2011 (09:30)
	06/05/2011 (09:45)	06/26/2011 (09:30)
	06/26/2011 (09:45)*	07/17/2011 (09:00)

	07/17/2011 (09:15)	08/07/2011 (08:45)
	08/07/2011 (09:00)	08/21/2011 (09:00)
	08/21/2011 (09:15)	09/11/2011 (08:45)
	09/11/2011 (09:00)	10/03/2011 (10:15)
	10/03/2011 (10:30)	11.06.2011 (10:00)
	11/06/2011 (10:30)	12/09/2011 (09:15)
OL	3/22/2011 (09:30)	4/14/2011 (09:45)
	4/14/2011 (10:00)	5/8/2011 (08:45)
	5/8/2011 (09:00)	6/5/2011 (09:30)
	6/5/2011 (09:45)	6/26/2011 (09:15)
	6/26/2011 (09:30)	7/17/2011 (08:45)
	7/17/2011 (09:15)	08/07/2011 (08:45)
	08/07/2011 (09:00)	08/21/2011 (08:45)
	08/21/2011 (09:00)	09/11/2011 (08:30)
	09/11/2011 (08:45)	10/03/2011 (10:15)
	10/03/2011 (10:30)	11/06/2011 (09:45)
	11/06/2011 (10:15)	12/09/2011 (09:15)
BR	3/22/2011 (08:00)	4/14/2011 (08:15)
	4/14/2011 (08:45)	5/8/2011 (07:45)
	5/8/2011 (08:00)*	6/5/2011 (07:30)
	6/5/2011 (07:45)	6/26/2011 (08:00)
	6/26/2011 (08:15)	7/17/2011 (07:30)
	7/17/2011 (07:45)	8/7/2011 (07:45)
	8/7/2011 (08:00)	8/21/2011 (07:45)
	8/21/2011(08:00)	09/11/2011(07:30)
	09/11/2011 (07:45)	10/03/2011 (08:30)
	10/03/2011 (08:45)	11/06/2011 (08:45)
	11/06/2011 (09:15)	12/09/2011 (10:45)
DR	3/22/2011 (08:30)	4/14/2011 (08:00)
	4/14/2011 (08:15)	5/8/2011 (07:15)
	5/8/2011 (07:45)	6/5/2011 (07:15)
	6/5/2011 (07:30)	6/26/2011 (07:45)
	6/26/2011 (08:00)	7/17/2011 (07:15)
	7/17/2011 (07:30)	8/7/2011 (07:30)
	8/7/2011 (07:45)	8/21/2011 (07:30)
	8/21/2011 (07:45)	9/11/2011 (07:00)
	09/11/2011 (07:15)	10/03/2011 (08:15)
	10/03/2011 (08:30)	11/06/2011 (08:30)
	11/062011 (09:00)	12/09/2011 (10:30)

*Sonde deployed but did not log due to internal error

7. Distribution

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and processed the data. The NERRS retains the right to be fully credited for having collected and process the data. Following academic courtesy standards, the NERR site where the data were collected should be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

Requested citation format:
National Estuarine Research Reserve System (NERRS). 2012. System-wide Monitoring Program. Data accessed from the NOAA NERRS Centralized Data Management Office website: http://cdmo.baruch.sc.edu/; *accessed* 12 October 2012.

NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see Principal Investigators and Contact Persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page http://cdmo.baruch.sc.edu/. Data are available in comma delimited format.

8. Associated projects:

Replicate samples for chemical analysis of the water are collected at each site every time the data loggers are changed. Samples for phytoplankton determination are collected at the same time at sites near two of the data logger deployment sites (DR and WM). Additionally, a 26 hour sampling regime (samples are collected at 2 hour intervals over the 26 hours) is conducted at the WM site once during each month.

II. Physical Structure and Descriptors:

9. Sensor specifications:

YSI 6600EDS and YSI 6600 V2 dataloggers

Parameter: Temperature
Units: Celsius (C)
Sensor Type: Thermistor
Model #: 6560
Range: -5 to 45 °C
Accuracy: +/-0.15 °C

Resolution: 0.01 °C

Parameter: Conductivity
Units: milli-Siemens per cm (mS/cm)
Sensor Type: 4-electrode cell with autoranging
Model #: 6560
Range: 0 to 100 mS/cm
Accuracy: +/-0.5% of reading + 0.001 mS/cm
Resolution: 0.001 mS/cm to 0.1 mS/cm (range dependent)

Parameter: Salinity
Units: parts per thousand (ppt)
Sensor Type: Calculated from conductivity and temperature
Range: 0 to 70 ppt
Accuracy: +/- 1.0% of reading or 0.1 ppt, whichever is greater
Resolution: 0.01 ppt

Parameter: Dissolved Oxygen % saturation
Units: percent air saturation (%)
Sensor Type: Rapid Pulse – Clark type, polarographic (YSI 6600 EDS loggers only)
Model #: 6562
Range: 0 to 500 % air saturation
Accuracy: 0-200 % air saturation, +/- 2 % of the reading or 2 % air saturation, whichever is greater; 200-500 % air saturation, +/- 6 % of the reading
Resolution: 0.1 % air saturation

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature and salinity)
Units: milligrams per Liter (mg/L)
Sensor Type: Rapid Pulse – Clark type, polarographic (YSI 6600 EDS loggers only)
Model #: 6562
Range: 0 to 50 mg/L
Accuracy: 0 to 20 mg/L, +/- 2 % of the reading or 0.2 mg/L, whichever is greater; 20 to 50 mg/L, +/- 6 % of the reading
Resolution: 0.01 mg/L

Parameter: Dissolved Oxygen % saturation
Units: percent air saturation (%)
Sensor Type: Optical probe with mechanical cleaning
Model #: 6150 ROX (YSI 6600 V2 loggers only)
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- +/- 15% of the reading
Resolution: 0.1% air saturation

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature and salinity)
Units: milligrams per Liter (mg/L)
Sensor Type: Optical probe with mechanical cleaning
Model #: 6150 ROX (YSI 6600 V2 loggers only)

Range: 0-50 mg/L
Accuracy: 0-20 mg/L- +/- 2% of the reading or 0.2 mg/L, whichever is greater
20-50 mg/L- +/- 6% of the reading
Resolution: 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 30 ft (9.1 m)
Accuracy: +/- 0.06 ft (0.018 m)
Resolution: 0.001 ft (0.001 m)

Parameter: Vented Level – Shallow (Depth)
Units: feet or meters (ft or m)
Sensor Type: Stainless steel strain gauge
Range: 0 to 30 ft (9.1 m)
Accuracy 0-10 ft: +/- 0.01 ft (0.003 m)
Accuracy 10-30 ft: +/- 0.06 ft (0.018 m)
Resolution: 0.001 ft (0.001 m)

Parameter: pH (EDS probe)
Units: units
Sensor Type: Glass combination electrode
Model #: 6561
Range: 0 to 14 units
Accuracy: +/- 0.2 units
Resolution: 0.01 units

Parameter: Turbidity
Units: nephelometric turbidity units (NTU)
Sensor Type: Optical, 90 ° scatter, with mechanical cleaning
Model #: 6136
Range: 0 to 1000 NTU
Accuracy: +/- 5 % reading or 2 NTU (whichever is greater)
Resolution: 0.1 NTU

Dissolved Oxygen Qualifier (Rapid Pulse / Clark type sensor):
The reliability of dissolved oxygen (DO) data collected with the rapid pulse / Clark type sensor after 96 hours post-deployment for non-EDS (Extended Deployment System) data sondes may be problematic due to fouling which forms on the DO probe membrane during some deployments (Wenner et al. 2001). Some Reserves utilize the YSI 6600 EDS data sondes, which increase DO accuracy and longevity by reducing the environmental effects of fouling. Optical DO probes have further improved data reliability. The user is therefore advised to consult the metadata for sensor type information and to exercise caution when utilizing rapid pulse / Clark type sensor DO data beyond the initial 96-hour time period. Potential drift is not always problematic for some uses of the data, i.e. periodicity analysis. It should also be noted that the

amount of fouling is very site specific and that not all data are affected. If there are concerns about fouling impacts on DO data beyond any information documented in the metadata and/or QAQC flags/codes, please contact the Research Coordinator at the specific NERR site regarding site and seasonal variation in fouling of the DO sensor.

Depth Qualifier:

The NERR System-Wide Monitoring Program utilizes 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.

Beginning in 2006, NERR SWMP 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 SWMP calibration sheet or digital calibration log. This offset procedure standardizes each depth calibration for the entire NERR System. If accurate atmospheric pressure data are available, non-vented sensor depth measurements at any NERR can be corrected. At OWC NERR in 2009, site WM employed water level sensors, and sites BR, OL, and DR employed non-vented depth sensors.

In 2010, the CDMO began automatically correcting depth/level data for changes in barometric pressure as measured by the Reserve's associated meteorological station during data ingestion. These corrected depth/level data are reported as cDepth and cLevel, and are assigned QAQC flags and codes based on QAQC protocols. Please see sections 11 and 12 for QAQC flag and code definitions.

Salinity Units Qualifier:

In 2013, EXO sondes were approved for SWMP use and began to be utilized by Reserves. While the 6600 series sondes report salinity in parts per thousand (ppt) units, the EXO sondes report practical salinity units (psu). These units are essentially the

same and for SWMP purposes are understood to be equivalent, however psu is considered the more appropriate designation. Moving forward the NERR System will assign psu salinity units for all data regardless of sonde type.

Turbidity Qualifier:

In 2013, EXO sondes were approved for SWMP use and began to be utilized by Reserves. While the 6600 series sondes report turbidity in nephelometric turbidity units (NTU), the EXO sondes use formazin nephelometric units (FNU). These units are essentially the same but indicate a difference in sensor methodology, for SWMP purposes they will be considered equivalent. Moving forward, the NERR System will use FNU/NTU as the designated units for all turbidity data regardless of sonde type. If turbidity units and sensor methodology are of concern, please see the Sensor Specifications portion of the metadata

10. Coded variable definitions:

Sampling Station	Sampling site code	Station code
State Route 6	WM	owcwmwq
Lower Estuary	OL	owcolwq
Berlin Road	BR	owcbrwq
Darrow Road	DR	owcdrwq

11. QAQC flag

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), -5, -4, and -2 flags are applied automatically to indicate data that is missing and above or below 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 SWMP 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 datasonde, 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

Corrected Depth/Level Data Codes

GCC	Calculated with data that were corrected during QA/QC
GCM	Calculated value could not be determined due to missing data
GCR	Calculated value could not be determined due to rejected data
GCS	Calculated value suspect due to questionable data
GCU	Calculated value could not be determined due to unavailable data

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 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*	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

13. Post deployment information:

End of Deployment Post-calibration Readings in Standard Solutions: Dissolved oxygen standard is in parentheses following the DO reading. Depth is always 0.0 meters for the vented loggers. For the unvented loggers, the depth reading in parentheses after the first depth reading is the expected depth reading when correcting for changes in barometric pressure. The specific conductivity standard is 1.413 mS/cm. If the conductivity ports were inhabited by Chironomid larvae, the sp cond reading after clearing the ports is in parentheses after the initial Sp. Cond reading. The pH standards are 7.00 and 10.00 (both are corrected for temperature). The primary turbidity standard is zero, and the second standard is in parentheses. An asterisk after the higher turbidity reading signifies problems with the wiper. The turbidity reading after cleaning is in parentheses. Complete post deployment data are in the calibration sheets

Site	Date	Sp. Cond.	DO(%)	pH	Turb	Depth
WM	4/14/2011	1.416	97.9 (98.6)	7.02/10.09	0.6/109.2 (109)	-.025
	5/8/2011	1.405	97.8 (98.2)	7.10/10.19	0.8/109.8 (109)	.000
	6/5/2011	1.380	89.3 (98.3)	7.18/10.16	0.7/115.3 (115)	.000
	6/26/2011	1.392	96.1 (98.2)	7.09/10.07	0.7/109.3 (109)	-.004
	7/17/2011	1.380	97.1 (98.4)	7.06/10.03	0.3/108 (109)	.001
	8/7/2011	1.408	94.7 (97.2)	6.99/9.97	0.5/52.8 (109.2)* (109)	-.014
	8/21/2011	1.285*(1.406)	97.1 (97.7)	7.03/10.01	0.4/109.2 (109)	.003
	9/11/2011	1.402	97.0 (98.1)	7.02/10.01	0.8/110.6 (109)	-.011
	10/03/2011	1.432	98.8 (98.7)	7.01/10.02	0.4/109.8 (109)	-.003
	11/06/2011	1.427	93.0 (98.9)	7.10/10.00	0.5/110.5 (109)	-.022
	12/09/2011	1.408	100.7 (99.4)	7.07/10.06	0.8/113.0 (109)	-.007

Site	Date	Sp. Cond.	DO(%)	pH	Turb	Depth
OL	4/14/2011	1.431	95.5 (98.8)	6.95/ 9.97	0.1/110.1 (109)	-.132(-.129)
	5/8/2011	1.410	98.0 (98.2)	7.05/10.09	-0.1/110.0 (109)	-.185(-.182)
	6/5/2011	1.401	87.9 (98.4)	7.08/10.09	0.8/113.6 (109)	-.174(-.160)
	6/26/2011	1.401	92.9 (98.4)	7.11/10.08	0.5/108.8 (109)	-.184(-.189)
	7/17/2011	1.306	96.6 (98.5)	7.10/10.11	0.6/106.3 (109)	-.155 (-.156)
	8/7/2011	1.386	95.5 (97.1)	7.04/10.01	0.9/109.5 (109)	-.287 (-.290)
	8/21/2011	1.368*(1.409)	96.8 (97.7)	7.04/10.05	1.9/109.3 (109)	-.231 (-.232)
	9/11/2011	1.406	97.2 (98.1)	7.06/10.06	1.1/109.5 (109)	-.197 (-.197)
	10/03/2011	1.400	98.6 (98.7)	6.95/10.00	0.6/110.1 (109)	-.160 (-.137)
	11/06/2011	1.433	98.3 (98.8)	7.07/10.04	0.5/109.6 (109)	-.129 (-.121)
	12/09/2011	1.402	100.7 (99.4)	7.06/10.13	2.7/93.9 (109)	-.075 (-.057)

Site	Date	Sp. Cond.	DO(%)	pH	Turb	Depth
BR	4/14/2011	1.412	97.9 (98.8)	7.00/10.05	0/109.6 (109)	-.140 (-.126)
	5/8/2011	1.413	98.5(98.1)	7.05/10.06	0.2/108.8 (109)	-.197 (-.194)

6/5/2011	1.422	95.5 (98.4)	7.07/10.04	0.8/114 (115)	-.180 (-.154)
6/26/2011	1.414	95.5 (98.2)	7.05/10.00	0.1/108.8 (109)	-.180 (-.186)
7/17/2011	1.409	96.8 (98.6)	7.10/10.00	1.0/101.8 (109)	-.152 (-.150)
8/7/2011	1.387	95.2 (97.3)	7.06/10.01	0.5/108.0 (109)	-.278 (-.280)
8/21/2011	1.410	97.1 (97.8)	7.02/9.99	.3/108.8 (109)	-.213(-.220)
9/11/2011	1.420	95.3 (98.1)	7.08/9.95	0/108.6 (109)	-.191 (-.192)
10/03/2011	1.422	96.6 (98.5)	7.03/10.01	4.4/108.2 (109)	-.165 (-.154)
11/06/2011	1.394	97.7 (98.7)	7.05/10.02	0.1/108.2 (109)	-.136 (-.126)
12/09/2011	1.394	99.7 (99.3)	7.10/10.13	0.6/109.2 (109)	-.876[1](-.068)

Site	Date	Sp. Cond.	DO(%)	pH	Turb	Depth
DR	4/14/2011	1.416	93.5 (98.5)	7.06/10.16	0.5/109.6 (109)	-.130 (-.131)
	5/8/2011	1.351(1.416)*	98.7 (98.1)	7.12/10.12	0.4/110.5 (109)	-.2.02 (-.188)
	6/5/2011	1.410	89.7 (98.6)	7.12/10.06	0.8/102 (115)	-.180 (-.156)
	6/26/2011	1.409	113.6 (98.1)	7.08/10.01	0.3/108.4 (109)	-.192 (-.190)
	7/17/2011	1.408	95.8 (98.6)	7.10/10.08	0.6/100 (109)	-.152 (-.152)
	8/7/2011	1.285(1.406)*	92.5 (97.1)	6.98/ 9.94	0.4/ 109.3 (109)	-.324 (-.279)
	8/21/2011	1.410	96.3 (97.8)	7.06/10.04	0.5/110.3 (109)	-.219 (-.227)
	9/11/2011	1.414	101.5 (98.4)	7.06/10.03	2.6/108.6 (109)	-.231 (-.196)
	10/03/2011	1.421	98.8 (98.7)	7.03/10.10	0.6/109.0 (109)	-,150 (-.143)
	11/06/2011	1.407	98.4 (98.9)	6.94/10.01	0.2/109.3 (109)	-.170 (-.129)
	12/09/2011	1.403	101.1 (99.4)	7.06/10.06	0.8/108.2 (109)	.152 (-.058)

* after cleaning depth BR 12/09/2011 was -.066 after correcting calibration error
depth DR 12/09/2011 was -.072 after clearing oriface

14. Other Remarks:

Field data collected at time of data logger swap is reported below. Specific conductivity was taken in the laboratory immediately after returning from the field. Temperature is reported in Degrees C, specific conductivity in millimhos, and oxygen in milligrams/liter.

Site	Date	Temp	Sp. Cond.	DO(mg/l)	pH
WM	03/22/2011	8.1	.540	10.2	7.56
	4/14/2011	10.8	.564	10.1	7.75
	5/8/2011	14.4	.488	8.88	7.60
	6/5/2011	23.4	.388	8.36	7.99
	6/26/2011	21.8	.330	9.68	8.32
	7/17/2011	28.6	.392	7.63	7.60
	8/7/2011	27.4	.486	5.32	7.53
	8/21/2011	24.2	.473	4.90	7.54
	9/11/2011	20.9	.426	4.38	7.46
	10/03/2011	12.4	.366	9.88	7.54
	11/06/2011	7.1	.565	9.23	7.66
	12/09/2011	2.8	.424	11.08	7.65

Site	Date	Temp	Sp. Cond.	DO(mg/l)	pH
OL	03/22/2011	8.3	.576	10.6	7.55
	4/14/2011	10.7	.596	10.7	7.68
	5/8/2011	13.8	.447	9.10	7.61
	6/5/2011	23.8	.430	9.00	8.06
	6/26/2011	21.9	.325	10.08	8.46
	7/17/2011	28.8	.400	6.89	7.43
	8/7/2011	27.4	.484	6.40	7.52
	8/21/2011	24.2	.473	4.58	7.50
	9/11/2011	21.4	.434	4.60	7.48
	10/03/2011	11.8	.417	8.42	7.40
	11/06/2011	7.4	.608	9.35	7.70
	12/09/2011	3.3	.447	11.24	7.66

Site	Date	Temp	Sp. Cond.	DO(mg/l)	pH
BR	3/22/2011	8.3	.643	10.0	7.50
	4/14/2011	8.6	.602	11.5	7.74
	5/8/2011	12.5	.530	9.90	7.57
	6/5/2011	21.0	.620	6.88	7.56
	6/26/2011	19.2	.547	8.98	7.82
	7/17/2011	22.4	.760	7.66	7.52
	8/7/2011	24.2	.674	7.16	7.59
	8/21/2011	21.2	.696	7.91	7.90
	9/11/2011	19.0	.616	8.58	7.79
	10/03/2011	11.4	.491	10.21	7.73
	11/06/2011	6.7	.664	10.91	7.82
	12/09/2011	4.7	.496	11.66	7.76

Site	Date	Temp	Sp. Cond.	DO(mg/l)	pH
DR	3/22/2011	9.2	.640	9.6	7.51
	4/14/2011	10.0	.590	9.6	7.60
	5/8/2011	13.0	.535	8.96	7.44
	6/5/2011	21.2	.616	7.08	7.44
	6/26/2011	18.7	.528	7.67	7.74
	7/17/2011	24.0	.716	7.44	7.68
	8/7/2011	24.7	.703	5.58	7.43
	8/21/2011	22.6	.704	6.48	7.86
	9/11/2011	19.1	.652	5.38	7.50
	10/03/2011	11.8	.458	9.20	7.52
	11/06/2011	7.1	.648	9.49	7.74
	12/09/2011	5.0	.476	11.50	7.74

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. If additional information on missing data is needed, contact the Research Coordinator at the reserve submitting the data.

In October 2014 the Data Management Committee determined that barometric pressure readings used for producing the depth offset during water quality data sonde calibration should be taken from the same weather station where barometric pressure is used to correct depth/level for the cDepth/cLevel parameters. This is a requirement for NERRS Reserves (like Old Woman Creek) where that weather station is located significantly above sea level. Please be aware that this protocol was not followed in 201, which introduces some additional minor error to that calculated parameter.

Turbidity spikes at sites OL and WM, particularly from April through June, could be due to biological activity, especially activity of *Cyprinus carpio* L.

For BR the depth calibration was messed up for the 11/6 deployment, entered -0.9 instead of -0.09. Corrected logger data during QAQC by adding .810 to each depth reading.

For OL: CSM in the F_Records can indicate a seiche event or the opening or closing of the barrier beach between the estuary and the lake. And, finally, this time series shows a lot of those low turbidity "blips" (too many to list).

5/25 22:30 to 5/30 8:00
7/13 18:45 to 7/14 23:45

For OL: Depth issue during the following deployments where the cause is unknown. But, it could be due to sonde positioning in trap or due to malfunction of depth sensor in sonde #19.

8/21
10/3
11/6

For WM: CSM in the F_Records can indicate a seiche event or the opening or closing of the barrier beach between the estuary and the lake from 4/15 to 4/27.

For WM: During the 11/6 deployment a short guard might have been used on this deployment (and a long guard on the previous deployment) causing a disparity in depth between the two deployments.

For DR: The depth bumped up and down at the stations during the 2011 season. While the depth differences weren't large they are visible in the data. This potentially occurred due to guards of differing length being used between deployments. This caused disparity in depth between them. The station tube was also moved up and down when these different guards were used. This practice is no longer used at the reserve (as of 2014).

4/14
6/26
10/3
11/6