Waquoit Bay (WQB) National Estuarine Research Reserve Water Quality Metadata
January 2003-December 2003
Latest Update: July 1, 2021

I. Data Set & Research Descriptors

1) Principal investigator & contact persons:

Address: Waquoit Bay NERR
PO Box 3092
149 Waquoit Highway
Waquoit, MA 02536
Phone: (508) 457-0495
fax: (617) 727-5537
Email: waquoit.bay@state.ma.us

Contact persons:
Dr. Christopher Weidman, Research Coordinator
Email: cweidman23@yahoo.com; (508) 457-0495 ext.105
Kelly Chapman, Research Assistant
Email: kelly.chapman@state.ma.us; (508) 457-0495 ext.109

2) Entry verification:

The data are uploaded in three file formats (each to separate files identified with the same file name but with unique extensions) from the YSI 6000 and 6600 data loggers to a PC with the YSI 6000 and 6600 EcoWatch software. Two of these (PC6000 and ASCII text formats) are kept on file in the WBNERR archive. The comma delimited format data file (.csv) is imported to the EXCEL spreadsheet program (version 5.0) where it is processed according to standard NERRS CDMO protocol using the CDMO Excel 5.0 macros. File size of one complete month of data each has been achieved by concatenating (and truncating if necessary) shorter files of interrupted data segments. File contents initially are examined for anomalies (e.g., sensor malfunction, battery failure, spurious values, etc.) by visualization of data with the Ecowatch Software provided by YSI. The data are also graphed using the Excel program for each two-week deployment of raw data. Data requiring editing are noted and copies of the graphs of raw data are saved at WBNERR. Data editing to CDMO protocol is conducted in Excel. Missing data (data logger malfunction or maintenance periods) are represented by periods (".") . Outliers (data values not within the

design range of the respective sensors except for turbidity and depth) are changed to periods. Data values recorded during deployment or retrieval (i.e., when the instrument was out of the water or in the laboratory) are deleted or replaced with periods. Upon data review by the CDMO, all periods were later removed for data dissemination purposes and left blank. A record of changes is documented in the Data Anomalies section of the metadata file. The monthly files are sent electronically by FTP to CDMO.

The CDMO cdmomac3.xls will allow the user to automatically format column widths to the correct number of decimal places based on YSI sensor specifications. It also allows the user to QA/QC each data logger generated file for missing data points, fill all cells that do not contain data with periods, and find all data points that fall outside the range of what the data logger is designed to measure (i.e. outliers). The CDMO import.xls macro will allow PC users with 30-minute data to automatically create a monthly Excel file from a two-week deployment and insert periods for missing data. In addition, in November 1999 a graphing capability was added to this macro allowing users to produce single parameter and missing data point graphs on a monthly basis. Copies of all files are retained at the Reserve. During Deployment Year 2003, the Research Assistant, Kelly Chapman, performed all instrument calibration and maintenance and data management.

3) Research objectives:

For the NERR System-Wide Monitoring Program (SWMP), the YSI data loggers are programmed to record water quality parameters every 30 minutes. A total of four SWMP sites were located in the Waquoit Bay estuarine system during 2003. These four are: 1) Metoxit Point (MP), which is the oldest actively monitored site (since 1998), is located in the middle of Waquoit Bay's main basin; 2) Menauhant (MH), in operation since March 2001, is located adjacent to Eel Pond Inlet on Vineyard Sound – one of the two tidal inlets into the Waquoit Bay estuary; 3) Child's River (CR), in operation since May 2002, located near

the head of the tidal section of Child's River— one of the two main surface fresh water sources to Waquoit Bay; and 4) Sage Lot (SL), in operation since May 2002, located in Sage Lot Pond—a relatively pristine tidal pond surrounded by salt marsh and barrier beach, possessing one of the bay's few remaining eelgrass stands.

The main purpose of water quality monitoring program is to aid Waquoit Bay NERR in one of its priority missions - to perform as a natural laboratory and platform for coastal and estuarine research. The long term, continuous detailed monitoring of the estuary's basic hydrophysical parameters is an essential tool and context for any research activities located here. Besides this overarching mission, there are also several specific research interests. One primary issue for the Waquoit Bay ecosystem is the influence of anthropogenic induced alterations by nitrogen enrichment. Waquoit Bay receives nitrogen from several sources, such as septic systems (their leachate percolates into groundwater which then enters the bay), run off from roads, run off containing domestic and agricultural fertilizer and animal waste, and atmospheric sources. This elevated nitrogen loading to the bay has resulted in enhanced eutrophication that has contributed to the alteration of the bay's habitats. For example, thick mats of seaweeds (macroaglae) now cover the bottom where eelgrass meadows thrived in the 1970's. Unfortunately, there are few definitive records of the bay's water quality conditions during that period, which makes it difficult to evaluate the rates of change. To facilitate future evaluation, long-term records from SWMP can be used to track water column conditions. Of particular interest, in this regard are measurements of dissolved oxygen (DO), turbidity, dissolved nitrogen and chlorophyll concentration. Such records will facilitate evaluation of changes which may come about from a continuation of watershed alteration that result from current development patterns (i.e., non-sewered residential areas served by private septic systems typically consisting of septic tanks and leach fields) as well as non-industrial commercial development, such as golf courses, cranberry

bogs, and retail shopping outlets. The records will be useful for evaluating the efficacy of remediation efforts intended to reduce the nitrogen loading from these sources to Waquoit Bay.

Another focus of long-term research interest is the detection of climate change and the determination of its effects on the estuarine environment. Characterizing the variability of the various water column parameters, such as their scale, magnitude and frequency, is likely to be an important aspect of the estuarine ecosystem that may be sensitive to climate change. Related to this focus is an interest in the impact of storms (hurricanes and northeasters) and other extreme meteorological events on the estuary. For example, what temperature and wind field thresholds exist that might bring about or trigger certain conditions within the bay? The observations recorded by the SWMP will allow for these types of studies.

4) Research methods:

YSI 6000 and 6600 series sondes are deployed at each permanent water quality monitoring station at the Waquoit Bay Reserve. Since in-situ instrumentation can only record conditions at a specific location, permanent monitoring stations for SWMP are chosen to be in some way representative of the overall estuary. This is difficult in practice since estuaries by their very definition are coastal regions where large physical, chemical and biological variations tend to occur in space and time, so that often no particular location within the system is "typical" of the overall system. Establishing a number of stations can overcome this problem somewhat, and as of 2002 four permanent stations were established in the Waquoit Bay estuaries. Our current SWMP stations are situated so as to be as representative as much as possible of the estuary and its inputs/outputs. Additional details concerning the station characteristics are discussed in the next section.

The YSI sondes measure and record ambient water temperature, specific conductivity (and calculate salinity), dissolved oxygen (mg/L and % saturated), turbidity (NTU), water level (m), and pH at 30 minute intervals

during deployment periods extending for approximately two weeks. Note that the pressure sensors we currently use are unvented and so variations in atmospheric pressure are recorded as changes in water depth (atmospheric data) are available from our SWMP meteorological station (as of 1/2002) and other nearby meteorological observatories, so it is possible to make this correction to the depth data, for increased accuracy. Also, at our Metoxit Point site (from 12/2000 to 12/2002) and our Child's River site (from 3/2003 through 12/2003), we have been using a YSI chlorophyll 6025 sensor and these data are available by contacting us directly at the reserve (and included in the raw files sent to CDMO).

Sondes are deployed and retrieved approximately every two weeks. The "old" sonde is retrieved and a "new" replacement sonde is deployed immediately so that ideally no record gap occurs. The two week deployment duration is constrained by a combination of battery life (shorter life in colder waters) and fouling of the DO sensor (and other sensors to a lesser degree) during the warm summer months. Prior to deployment (within 24 hrs), each instrument is checked and its sensors re-calibrated using standard YSI (Operating Manual) protocols. Similarly, after a deployment, each sonde is brought back to the laboratory for a post-deployment check, data downloading, instrument and sensor cleaning. Salinity sensors are calibrated with reference seawater that had been previously analyzed with a Guildline salinometer at the Woods Hole Oceanographic Institution (David Wellwood is the technician for this instrument). pH sensors are calibrated with 7.0 and 10.0 pH standard solutions (2-point calibrations). The turbidity standard used was Hach 100 NTU, and distilled water (DI) for 0 NTU. Temperature sensors were not calibrated. Oxygen sensor membranes were inspected before and after each deployment. Oxygen sensor membranes were replaced 24 hours prior to each deployment when the sensor seemed to need reconditioning. Final DO calibration was not done until the membrane had been in place for at least 8 hours. As another check on instrument performance, in-situ measurements of air and water temperature, DO, salinity, water temperature, and pH are made using a hand-held YSI 650 at

deployment/retrieval times.

In 2003, SWMP water quality data were collected more or less continuously at our dockside sites, Child's River and Menauhant, from January through December, while no data were collected at Sage Lot from January until mid- to late April owing to heavy iceover conditions on the bay. Data collection at Metoxit Point initially began on January 1, 2003 until the site began to ice over. The datalogger was then pulled for the ice season until April 21, 2003. Winter 2002 / 2003 was one of the heaviest iceovers for the bay since 1994, with significant ice (up to 9" in thickness at maximum) in the open waters of the bay from early December 2002 through late March 2003. The empty sonde moorings / silos at the two open water sites remained in place over winter, but both silo assemblies received ice damage. The Sage Lot silo was completely destroyed and the Metoxit Point silo was dragged by ice over 1 mile and required extensive refurbishing. Heavy cold and ice conditions returned in early December 2003, affecting operation at the Sage Lot site and so no data were collected for this site from early December through the remainder of the year.

Two types of mooring silos are used to hold the sondes. The Metoxit Point and Sage Lot stations are located offshore and away from shore structures. The sonde moorings for these stations consist of a vertical PVC pipe tower (2" ID), about 1.5 meters in height) extending from a 120 lb cast concrete base resting on the bottom. Attached to this tower is a 0.7 m PVC pipe section (4" ID), referred to as the silo, that holds the sonde and is adjustable for setting the depth of the sensor package. The sondes are lowered and inserted into the 4" PVC silo from the surface at low water, when the top of the tower is only about 0.3 m below the surface. The lower part of the silo section is perforated with numerous 1.5 " holes to allow the YSI sonde's sensors direct exposure to the flow of ambient waters. The Metoxit Point and Sage Lot silos are set so that the sensor package is 0.7 m and 0.5 off the bottom, respectively. This ensures that

the sensors are above the macro algal mats in the case of Metoxit Point, and sufficiently into the water column because of the thick eelgrass meadow in Sage Lot. The Menauhant and Child's River stations are dock-side locations and their moorings are a more typical type of silo – a single PVC section (4" ID) mounted vertically on a pier piling. The Menauhant site, located at a yacht club dock, is adjacent to a tidal inlet, and the Child's River site, located at commercial marina and boat yard, is adjacent to the upper reaches of a tidal river. The base of the these silos are also ventilated with large holes (1.5" diameter) and their sensor packages (bottom of the sonde) are both mounted about 0.4 m off the bottom. All mooring silos are painted with antifouling paint at the beginning of the spring season, and periodically checked and scrubbed during the summer season.

5) Site location and character:

General description of Waquoit Bay estuarine system:

The Waquoit Bay National Estuarine Research Reserve (WBNERR) is located in the northeastern United States on the southern coast of Cape Cod, Massachusetts. About 8,000 people maintain permanent residency in Waquoit Bay's drainage area, which covers parts of the towns of Falmouth, Mashpee, and Sandwich. During summer months, the population swells 2-3 times with the greatest housing concentrations immediate to the coastline (water views and frontage). In addition, the upper portions of the watershed include a military base, Otis Air Force Base and the Massachusetts Military Reservation, portions of which have been designated by the EPA as Superfund sites due to past practices of dumping jet fuel and other volatile groundwater contaminants.

WBNERR's estuaries are representative of shallow tidal lagoons that occur from Cape Cod to Sandy Hook, New Jersey. WBNERR is within the northern edge of the Virginian biogeographic province, on the transitional border (Cape Cod) with the Acadian biogeographic province to the north and east. Like many embayments located on glacial outwash plains, Waquoit Bay is shallow

(< 5 m), fronted by prominent barrier beaches (i.e., those of South Cape Beach State Park and Washburn Island), and is backed by salt marshes and upland coastal forests of scrub pine and oak. Two narrow, navigable inlets, reinforced with granite jetties, pass through two barrier beaches to connect Waquoit Bay with Vineyard Sound to the south. A third shallow and generally un-navigable inlet opened through the Washburn Island barrier beach during Hurricane Bob in August 1991, finally closed up in February 2002.

Bottom sediments in the bay are organic rich silts and medium sands. Sediment cores taken in summer of 2002 indicate that the depth of these estuarine sediments is up to 9 m thick in places. Thick (up to 0.3 m) macroalgae (seaweed) mats overlie much of the bottom of the bay, and largely consist of species Cladophora vagabunda, Gracilaria tikvahiayae, and Enteromorpha. The dominant marsh vegetation in Waquoit Bay is Spartina alterniflora and Spartina patens. Dominant upland vegetation includes mixed forests of red oak, white oak, and pitch pine, and other shrubs and plants common to coastal New England. Land-use in the bay's watershed is about 60% natural vegetation, but the remaining land is largely residential housing, with some commercial (retail malls), and minor amounts of agriculture (~3%) (cranberry bogs).

Dense housing developments cover the two peninsulas that form the western shore of the Waquoit Bay estuarine system. Although the developments themselves are outside of the Reserve boundaries, dissolved nitrogen in discharges from their septic systems (via groundwater) and in fertilizer run-off from their lawns has significant effects on the functioning of the Waquoit Bay ecosystem. These impacts have been a primary subject of study at the Reserve since its designation (1988). One outcome of this research has been the delineation of sub-watersheds within the overall drainage area for Waquoit Bay, of which WBNERR is a small part. This knowledge allows for the design of experiments based on the spatial variation of nutrient loading and other land-use related impacts.

At the northern end of the bay, an area comprising a separate sub-watershed, coastal bluffs of glacial till rise 30 feet above sea level. The

northern basin of the bay, just below these bluffs, is its deepest area (approximately 3 m MLW), while much of the remainder of the bay is about 1.5 m. Bourne, Bog, and Caleb Ponds are freshwater kettle hole ponds on the northern-most shore of the bay. As components of the same sub-watershed, they have a common albeit minor freshwater outflow into the bay's northern basin via a narrow channel through a brackish marsh. To the east and south, other sub-watersheds surround several tidal and freshwater ponds, including Hamblin and Jehu Ponds, brackish salt ponds that are connected to the main bay by the tidal waters of Little and Great Rivers, respectively. The shorelines of the ponds are developed with residences that are occupied both seasonally and year round. Hamblin Pond and Little River are components of one sub-watershed, and Jehu Pond and Great River are elements of a separate sub-watershed. Further south lies Sage Lot Pond. It is in the least developed sub-watershed and also contains a barrier beach and salt marsh ecosystem of the reserve's South Cape Beach State Park. To the east of Sage Lot Pond and within the same sub-watershed, lies the highly brackish Flat Pond. It receives minimal tidal flows of salt water from Sage Lot Pond through a narrow, excavated and culverted channel. The preponderance of the input to Flat Pond is groundwater and run off, both of which are likely affected (e.g., nutrients, pesticides, bacteria) by an adjacent golf course and near-by upper-scale residential development.

The largest source of surface freshwater to Waquoit Bay is the Quashnet / Moonakis River. Although named "river", this and Child's River are more appropriately described as "streams" because of their small channels and discharge ~1.0 CFS. A component of yet another sub-watershed, it originates in Johns Pond situated north of the bay and traverses forests, cranberry bogs, residential areas, and the Quashnet Valley Golf Course before entering the bay near the southern "boundary" of the northern basin. ("Quashnet" applies to that portion of the river within the town of Mashpee, and "Moonakis" refers to the brackish estuary at the river's mouth, lying in the town of Falmouth. Quashnet will be used hereafter to refer to the entire river.) The Quashnet

River's tidal portion has sufficient numbers of coliform bacteria to cause it to be closed to shell fishing most of the time. The source(s) of this bacteria (human or avian) is unknown at this time.

The Childs River is the second largest input of surface freshwater to the bay. A component of another sub-watershed, it runs through densely developed residential areas. The Childs River sub-watershed receives the highest nitrogen loading and is the largest nitrogen contributor to the Waquoit Bay system of all the sub-watersheds. In the upper tidal portions of the river we have consistently recorded the highest chlorophyll levels and the lowest dissolved oxygen readings of any region in the bay and so this location represents an end-member for looking at anthropogenic inputs and impacts on the system. Another, albeit smaller, source of freshwater is the discharge of Red Brook through brackish marshlands into Hamblin Pond. Additional freshwater enters the bay elsewhere through groundwater seepage (perhaps up to 50% of all freshwater input into the bay), precipitation and the flows of smaller brooks. There is relatively little surface water runoff entering directly into the bay due to the high percolation rates of Cape Cod's coarse, sandy soils.

Knowledge of the homo/heterogeneity of the water masses in Waquoit Bay was originally derived from measurements made by reserve staff and from data obtained by the reserve's volunteer water quality monitoring group, the Waquoit BayWatchers who have collected depth profiles of Waquoit Bay water quality since 1993. Subsequent research by reserve staff (including some numerical modeling by T. Isaji) has revealed that lateral mixing has considerable influence because tidal currents follow a general course through the bay. This results in an overall structure to horizontal patterns of water quality characteristics. The pattern it produces is a gyre in the central portion of the main bay whereby currents follow a generally counter-clockwise flow around a central area that exhibits reduced exchange with the remainder of the bay. The flushing rate within the gyre is diminished when compared with other more peripheral areas of the bay. The location of the gyre meanders slightly, apparently under the influence of tides and wind). Because of the

shallow conditions, restricted tidal inlets, and low amplitude tidal forcing of Vineyard Sound here (tides are semi-diurnal with a range about 0.5 m) water levels in the bay are also strongly influenced by wind forcing. Southerly winds increase tidal heights and advance the phase of the flood and retard the phase of ebb (Northerly winds have the opposite effect).

The Metoxit Point station (MP) (41° 34.131' N 70° 31.294' W, 2.2 m deep) initiated in 1998, is located in the main basin of Waquoit Bay and was selected to be within or near the outer regions of the gyre (described above) and more or less represents "typical" water mass conditions and residence times for the bay. The location is at least a half mile from shore, well flushed by tides, and is in an area that is minimally disturbed by routine activities on the bay (e.g. boat traffic, shell fishing, etc.). Bottom sediments at the site are organic rich muds often overlain by thick agal mats. Because of this site's fairly open exposure to south (greatest fetch over the bay), we have observed that when sustained southerly winds are greater than about 20 kts, the Metoxit Point site experiences increased turbidity (sediment suspension events).
This year for the first time, the absolute elevation of the station to relative to NGVD (National Geodetic Vertical Datum, sometimes referred to as 1929 Sea Level) was calibrated. Precision is uncertain at this time (but estimated to be within 0.1 m). Depth to base of the sonde (base of the sensor guard) at the Metoxit Point site is -1.02 m NGVD. The calibrated mean depth sensor height above the guard base for our YSI 6600 instruments is 0.26 m (SD<0.01m).
Therefore depth readings (uncorrected for air pressure) at this station for this year should be interpreted as water surface heights above -0.76 m NGVD. A mean tidal range of 0.46m (SD = 0.17) is calculated based on one month of data (May 2003), with a minimum of 0.13 m and a maximum of 0.91 m. Mean monthly salinity range for 2002 is 4.2 ppt from a mean monthly minimum of 27.8 ppt to 32.0 ppt.

The Menauhant station (MH) (41° 33.156' N 70° 32.912' W, 1.2 m

deep), initiated in March 2001, is located within the Eel Pond Inlet at the Menauhant Yacht Club dock. Eel Pond Inlet is the westernmost of the two main tidal inlets into the Waquoit Bay system. The site was chosen because it occupies one of the strategic locations for gauging the system's water mass characteristics. Entering waters represent the marine end-member while outflows represent the final product of estuarine water mass modification and export to shelf waters. The site also has easy walk-in access to a secure private pier that extends into the throat of the inlet. Also, because of the turbulent tidal flow within the inlet, conditions are vertically well mixed, and the site can be maintained year round even through ice-over conditions in the rest of the bay.

Bottom sediments at this site are clean sands and gravels with almost no attached bottom vegetation. Since inception, we have noted that strong south to southeast (onshore) winds tend to produce turbidity events at this site from the wave induced suspension of fine sediments and organic material in the upstream near-shore zone. While we have found that these type of turbidity events are localized to windward near-shore areas in the bay, the transport of these sediments at inlet mouths during such times is perhaps a dominant sedimentation process within the estuarine system. In other words while the choice of our location may be producing a localized signal in one of our measured parameters that signal may reflect key processes in the system at large. This year for the first time, the absolute elevation of the station to relative to NGVD (National Geodetic Vertical Datum, sometimes referred to as 1929 Sea Level) was calibrated. Precision is uncertain at this time (but estimated to be within 0.1 m). Depth to base of the sonde (base of the sensor guard) at the Menauhant site is -0.68 m NGVD. The calibrated mean depth sensor height above the guard base for our YSI 6600 instruments is 0.26 m (SD<0.01m). Therefore depth readings (uncorrected for air pressure) at this station for this year should be interpreted as water surface heights above -0.42 m NGVD. A mean tidal range of 0.48m (SD = 0.19) is calculated based on one month of data (May 2003), with a minimum of

0.11 m and a maximum of 0.99 m. Mean monthly salinity range for 2002 is 3.9 ppt
from a mean monthly minimum of 28.5 ppt to 32.4 ppt.

The Child's River station (CR) (41° 34.793' N 70° 31.854' W,
1.2 m deep), initiated in May 2002, is located on a dock piling at Edwards Boat
Yard, a commercial marina near the upper tidal reaches of of Child's River— one
of the two main surface fresh water sources to Waquoit Bay (see general
description of Waquoit Bay watershed above). This location is very strongly
stratified, characterized by a salt wedge with fresher river water overlying
saline ocean water. Vertical salinity ranges can run from 0-10 ppm at the
surface to more than 30 ppm just 1 m below. The sonde sensors are usually well
within the salt wedge portion of the water column, nonetheless this location is
also our freshest SWMP site, and is at the opposite end of Child's River from
the seaward Menauhant station. Bottom sediments are fine organic rich muds.
This location represents the most terrigenously and anthropogenically-impacted
SWMP site. Monthly water quality, collected near this location for the past
decade, shows very high chlorophyll concentrations during the warmer months and
more recent dissolved nutrient records show very high nutrient-loads. Boat
traffic at the marina likely leads to increased turbidity during the boating
season as well. As this site is dockside at a private marina, general
security is high along with easy access. The station is also serviceable year-
round and usually not subject to seasonal shutdown due to ice over. This year
for the first time, the absolute elevation of the station to relative to NGVD
(National Geodetic Vertical Datum, sometimes referred to as 1929 Sea Level) was
calibrated. Precision is uncertain at this time (but estimated to be within 0.1
m). Depth to base of the sonde (base of the sensor guard) at the Child's River
site is -0.86 m NGVD. The calibrated mean depth sensor height above the guard
base for our YSI 6600 instruments is 0.26 m (SD<0.01m). Therefore depth readings
(uncorrected for air pressure) at this station for this year should be
interpreted as water surface heights above -0.58 m NGVD. A mean tidal range

of 0.46 m (SD = 0.17) is calculated based on one month of data (May 2003), with a minimum of
0.11 m and a maximum of 0.95 m. Mean monthly salinity range for 2002 is 14.7
ppt from a mean monthly minimum of 15.8 ppt to 30.5 ppt.

The Sage Lot station (SL) (41° 33.254' N 70° 30.612' W, 1.2 m
deep), initiated in May 2002, is located in a deeper portion of Sage Lot Pond –
a small sub-estuary of Waquoit Bay (20 ha) surrounded by salt marsh and barrier
beach. Its small watershed is the least developed of all of Waquoit Bay's sub-
watersheds and Sage Lot Pond is considered to be its least impacted and
most pristine sub-estuary. Bottom sediments are organic rich muds. Sage Lot
Pond possesses one of the few remaining eelgrass beds in the Waquoit Bay system.
Indeed the Child's River and Sage Lot Pond sites are considered to represent
opposite end-members of nutrient-loading and human-induced influence.
Researchers often locate their experiments in these two locations
to take advantage of this difference. However, Sage Lot Pond is hydrologically
connected to an upstream brackish source -- Flat Pond – via a series of tidal
creeks, drainage ditches and culverts. Flat Pond borders a country club and golf
course and some concern exists for its impact on the water quality of Sage Lot
Pond. Cuurently, Sage Lot Pond is closed to shellfishing because of high fecal
colliform concentrations, though these are thought to be of avian source. This
year for the first time, the absolute elevation of the station to relative to
NGVD (National Geodetic Vertical Datum, sometimes referred to as 1929 Sea Level)
was calibrated. Precision is uncertain at this time (but estimated to be within
0.2 m). Depth to base of the sonde (base of the sensor guard) at the Sage Lot
site is about -0.6 m NGVD. The calibrated mean depth sensor height above the
guard base for our YSI 6600 instruments is 0.26 m (SD<0.01m). Therefore depth
readings (uncorrected for air pressure) at this station for this year should be
interpreted as water surface heights above -0.3 m NGVD. A mean tidal range
of 0.40m (SD = 0.14) is calculated based on one month of data (May 2003), with a minimum of

0.11 m and a maximum of 0.67 m. Mean monthly salinity range for 2002 is 4.9
ppt from a mean monthly minimum of 27.2 ppt to 32.1 ppt.

6) Data collection period:

Data loggers were deployed at Metoxit Point (MP) on April 21, 2003, and Menauhant Yacht Club (MH) on January 1, 2003. Data loggers at Child's River
(CR) were first deployed on January 1, 2003 and at Sage Lot (SL) on April 21,
2003. All stations, with the exception of Sage Lot, were in operation from these
dates through the end of December. All monitoring is considered long-term.
Deployment dates and times for 2003 are indicated below:

BEGAN	ENDED
Metoxit Point Site	
04/21/2003, 14:30:00	05/09/2003, 08:30:00
05/09/2003, 09:00:00	05/21/2003, 09:30:00
05/21/2003, 10:00:00	06/03/2003, 08:30:00
06/03/2003, 09:00:00	06/20/2003, 09:30:00
06/20/2003, 10:00:00	07/01/2003, 08:30:00
07/01/2003, 09:00:00	07/16/2003, 09:30:00
07/16/2003, 10:30:00	07/30/2003, 08:30:00
07/30/2003, 09:00:00	08/13/2003, 10:30:00
08/13/2003, 11:00:00	08/27/2003, 09:00:00
08/27/2003, 09:30:00	09/10/2003, 08:30:00
09/10/2003, 09:00:00	09/24/2003, 10:00:00
09/24/2003, 10:30:00	10/08/2003, 11:00:00
10/23/2003, 10:30:00	11/18/2003, 09:00:00
11/18/2003, 09:30:00	12/03/2003, 13:30:00
12/03/2003, 14:00:00	12/19/2003, 09:00:00
12/19/2003, 09:30:00	12/31/2003, 08:00:00
12/31/2003, 09:00:00	01/09/2004, 09:00:00
Menauhant Site	
12/04/2002, 09:30:00	01/01/2003, 22:30:00
01/13/2003, 13:00:00	02/06/2003, 13:00:00
02/06/2003, 13:00:00	02/26/2003, 10:30:00
02/26/2003, 11:00:00	03/18/2003, 09:30:00
03/18/2003, 10:00:00	04/04/2003, 08:00:00
04/04/2003, 08:30:00	04/23/2003, 10:00:00
04/23/2002, 10:30:00	05/09/2003, 10:30:00
05/09/2003, 11:00:00	05/21/2003, 10:30:00
05/21/2003, 11:00:00	06/03/2003, 07:00:00
06/03/2003, 07:30:00	06/20/2003, 06:30:00
06/20/2003, 07:00:00	07/01/2003, 08:00:00
07/01/2003, 08:30:00	07/16/2003, 06:30:00
07/16/2003, 07:00:00	07/30/2003, 07:30:00
07/30/2003, 08:00:00	08/13/2003, 07:30:00

08/13/2003, 08:00:00
08/27/2003, 08:30:00
09/08/2003, 09:00:00
09/25/2003, NO DATA RECORDED
10/08/2003, 12:30:00
10/28/2003, 09:30:00
11/18/2003, 11:30:00
12/03/2003, 09:00:00
12/17/2003, 11:30:00
12/30/2003, 09:00:00

08/27/2003, 08:00:00
09/08/2003, 08:30:00
09/25/2003, 08:30:00
10/28/2003, 09:00:00
11/18/2003, 11:00:00
12/03/2003, 08:30:00
12/17/2003, 11:00:00
12/30/2003, 08:30:00
01/13/2004, 09:30:00

Child's River Site

12/04/2002, 09:30:00
01/13/2003, 13:00:00
02/06/2003, 13:30:00
02/26/2003, 11:30:00
03/18/2003, 10:30:00
04/04/2003, 09:00:00
04/23/2003, 10:30:00
05/09/2003, 11:00:00
05/21/2003, 11:30:00
06/03/2003, 07:30:00
06/20/2003, 07:00:00
07/01/2003, 08:30:00
07/16/2003, 07:30:00
07/30/2003, 08:30:00
08/13/2003, 08:00:00
08/27/2003, 09:00:00
09/08/2003, 09:30:00
09/25/2003, 09:30:00
10/10/2003, 08:30:00
10/28/2003, 09:30:00
11/18/2003, 11:30:00
12/03/2003, 09:00:00
12/17/2003, 12:00:00
12/30/2003, 09:00:00

01/08/2003, 12:00:00
02/06/2003, 13:00:00
02/26/2003, 11:00:00
03/18/2003, 10:00:00
04/04/2003, 08:00:00
04/23/2003, 10:00:00
05/09/2003, 10:30:00
05/21/2003, 11:00:00
06/03/2003, 07:00:00
06/20/2003, 07:00:00
07/01/2003, 08:00:00
07/16/2003, 07:00:00
07/30/2003, 08:00:00
08/13/2003, 08:00:00
08/27/2003, 08:30:00
09/08/2003, 09:00:00
09/25/2003, 09:00:00
10/10/2003, 08:00:00
10/28/2003, 09:00:00
11/18/2003, 11:30:00
12/03/2003, 08:30:00
12/17/2003, 11:30:00
12/30/2003, 08:30:00
01/13/2004, 10:00:00

Sage Lot Site

04/21/2003, 15:00:00
05/09/2003, 10:00:00
05/21/2003, 09:00:00
06/03/2003, 08:30:00
06/20/2003, 09:00:00
07/01/2003, 08:00:00
07/16/2003, 09:00:00
07/30/2003, 07:30:00
08/14/2003, 08:00:00
08/27/2003, 08:00:00
09/08/2003, 08:30:00
09/24/2003, 10:00:00
10/08/2003, 10:30:00
10/28/2003, 10:30:00
11/18/2003, 11:00:00

05/09/2003, 09:30:00
05/21/2003, 08:30:00
06/03/2003, 07:30:00
06/20/2003, 09:00:00
07/01/2003, 07:30:00
07/16/2003, 08:30:00
07/30/2003, 07:00:00
08/14/2003, 07:30:00
08/27/2003, 07:30:00
09/08/2003, 08:00:00
09/24/2003, 09:30:00
10/08/2003, 10:00:00
10/28/2003, 10:00:00
11/18/2003, 10:30:00
12/04/2003, 09:00:00

LAST DEPLOYMENT FOR SEASON

7) Distribution:

According to the Ocean and Coastal Resource Management Data Dissemination Policy for the NERRS System-wide Monitoring Program, NOAA/ERD 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. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from the NOAA/OCRM supported research that are produced for publication in open literature, including referred scientific journals will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. 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 of 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.

NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see section 1.Principal investigators and contact persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under general information link on CDMO homepage) and online at the CDMO homepage http://cdmo.baruch.sc.edu. Data are available in text tab-delimited format, Microsoft Excel spreadsheet format and comma-delimited format.

8) Associated researchers and projects:
Our data are publicly available through our web site and we do not track its use.

II. Physical Structure Descriptors

9) Variable sequence, range measurements, units, resolution, and accuracy:

YSI 6000/6600 datalogger

Variable	Range of Measurements	Resolution	Accuracy
Date	1-12, 1-31, 00-99 (Mo,Day,Yr)	1 mo, 1 day, 1 yr	NA
Time	0-24, 0-60, 0-60 (Hr,Min,Sec)	1 hr, 1 min, 1 s	NA
Temp	-5 to 45 (c)	0.01 C	+/- 0.15C
Sp COND	0-100(mS/cm)	0.01mS/cm	+/-0.5% Of reading + 0.001mS/Cm
Salinity	0-70 Parts per thousand (ppt)	0.01 ppt	+/- 1% of Reading or 0.1 ppt, (whichever is greater)
DO	0-200 (% air saturation)	0.1% @air sat	+/-2% @air Saturation
DO	200-500 (% air saturation	0.1% @ air sat	+/- 6% @ Saturation
DO	0-20 (mg/l)	0.01 mg/l	+/- 0.2mg/l
DO	20-50 (mg/l)	0.01 mg/l	+/- 0.6mg/l
Depth (shallow)	0-9.1 (m)	0.001m	+/- 0.018m
PH	2-14 units	0.01 units	+/- 0.2units
Turb	0-1000 NTU	0.1 NTU	+/- 5% of Reading or 2 NTU (whichever is greater)

Data columns are separated by tabs. Each file contains a two line column header at the top of the page which identifies measurements and units for each column.

10) Coded variable indicator and variable code definitions:

All NERRS sites are required to use the following file naming convention.

File definitions: YSI deployment site/file definition/month/year
Our sites names are designated:
a) Metoxit Point= MP
b) Menauhant Site= MH
c) Child's River = CR
d) Sage Lot= SL

Example: MPWQ0502 (designates water quality monthly data from May 2002 at
Metoxit Point Site)

11) Data anomalies:

SMALL NEGATIVE TURBIDITY ANOMALIES: Slight negative turbidity values sometimes occur as a result of small calibration offsets. Often these turbidity minimum values are between 0 and -2 NTU. In May 2002 we installed new model turbidity probes (YSI 6136) on our 6600 YSI data loggers. Due to the larger sampling depth of these new probes, larger calibration offsets occurred resulting in somewhat lower negative turbidity values (e.g., -2 to -14 NTU). Improvement in our calibration methods corrected this larger offset problem. All of these small negative and/or zero turbidity values (the minimum for a given deployment) should be considered to be within 2 NTU of the true datum for correction purposes. Consequently, we have not deleted any of these small negative turbidity data.

BIOLOGICAL-RELATED TURBIDITY ANOMALIES: This type anomaly includes turbidity readings that are either outside of the normal range or spikes way above background and unrelated to increased sediment suspension or decreased water column clarity. We believe these records are real (and not sensor malfunction), though not reflective of actual water column turbidity. These extreme values are likely due to biological factors (such as small fish, crabs, or other marine organisms). Our criteria for flagging these data are single spikes (above rather constant background) over 50NTU that are more than 10 times surrounding values.
These readings were deleted.

SUSPENSION EVENT RELATED TURBIDITY ANOMALIES: This type of anomaly includes turbidity readings that were either outside the normal range, or spikes way above background that are related to elevated turbidity levels indicative of wind wave related suspension events. We believe these are real (and not sensor malfunction), though not reflective of actual water column turbidity. These

extreme values are likely due to large floating particles (i.e., seaweeds, detritus, etc.) suspended in the water column during storm events usually from strong southerly winds in the Waquoit Bay area. (see end of section 5 for more detail on these events at this site). Our criteria for flagging these data are values over 100NTU that are more than 5 times the magnitude of surrounding values, and linked to high winds. These readings were deleted.

January 2003
Metoxit Point:
Data only collected from 01/01/2003 00:00:00 to 01/01/2003 23:00:00. Battery failure ended record after 4 week deployment. Sonde was retrieved 01/02/03 at 10:00:00 and severe ice conditions prevent further deployment during January.

Menauhant:
a) No data were collected from 01/01/2003 23:00:00 to 01/13/2003 12:30 due to battery failure.

b) Extreme low tides caused sensors to be exposed on the morning and evening of 1/22/2003.All data were deleted for the period of exposure (negative depth readings).
01/22/2003 06:30:00 to 01/22/2003 08:00:00
01/22/2003 18:30:00 to 01/22/2003 22:00:00

c) The following anomalous turbidity data are likely related to a biological event and were deleted. See note at the beginning of this section for further explanation.
01/24/2003 12:30:00

Child's River:
a) No sonde deployed from 01/08/2003 12:30:00 to 1/13/2003 12:30:00. No heat in Laboratory-sub-freezing and too cold for calibration.

b) The following depth readings were found negative owing to extreme low tides. But suspect slight calibration offset due to barometric pressure drift,

as parameters appear to be consistent with submerged state of sensors. The data
were not deleted for this period.
01/22/2003 20:30:00 – 21:30:00

Sage Lot:
No data were collected this month due to ice.

February 2003
Metoxit Point:
No data were collected this month due to ice.

Menauhant:
a) Anomalous low salinity readings from 02/17/2003 07:30:00 to 02/18/2003
09:30:00 are thought to be related to very icy conditions and perhaps some sort
of localized melting. No data were deleted for this period.

b) The following depth readings were found negative. But suspect slight
calibration offset due to barometric pressure drift, as parameters appear to be
consistent with submerged state of sensors. The data were not deleted.
02/12/2003 13:00:00 – 15:30:00
02/14/2003 01:00:00 – 03:00:00
02/23/2003 22:30:00 – 23:30:00
02/24/2003 00:00:00, 11:00:00 – 12:00:00
02/25/2003 12:00:00 – 12:30:00

c) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
02/01/2003 07:30:00
02/28/2003 01:30:00
02/28/2003 05:30:00

d) A combination of a low DO% calibration on 2/6 (85.7%), high DO% calibration
on 2/26 (107.5%) and probe drift resulted in a large DO offset with the 2/26 1100
deployment. Data were retained.

Child's River:
a) The following depth readings were found negative owing to extreme low
tides. But suspect slight calibration offset due to barometric pressure drift,
as parameters appear to be consistent with submerged state of sensors. The data
were not deleted for this period.

02/12/2003 15:00:00 – 16:00:00

b) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
02/05/2003 05:00:00

Sage Lot:
No data were collected this month due to ice.

March 2003
Metoxit Point:
No data were collected this month due to ice.

Menauhant:
a) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
03/17/2003 09:00:00, 11:30:00

b) All turbidity probes were recalled by YSI for repair during this month. No
turbidity data were collected 03/18/2003 10:00:00 to 03/31/2003 23:30:00

c) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
03/08/2003 11:30:00
03/10/2003 18:00:00

Child's River:
a) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
03/03/2003 00:00:00
03/08/2003 14:00:00
03/18/2003 09:00:00

b) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
03/10/2003 17:30:00

c) All turbidity probes were recalled by YSI for repair during this month.
No turbidity data were collected from
03/18/2003 10:30:00 to 03/31/2003 23:30:00

d) Low salinity anomalies may be related to meltwater events and were not
deleted.
03/12/2003 12:00:00 to 18:00:00
03/26/2003 12:00:00 to 15:30:00
03/29/2003 15:00:00 to 18:00:00

Sage Lot:
a) No data were collected this month due to ice.

April 2003
Metoxit Point:
a) Sonde Mooring was damaged by winter ice and required repair, so sonde
redeployed was delayed until late April. First deployment began 4/21/03 at
14:30:00.

b) All turbidity probes were recalled by YSI for faulty motor repairs. Sondes were deployed without them. No turbidity data were collected from 04/21/2003 00:00 to 04/30/2003 23:30:00.

Menauhant:
a) The sonde silo was replaced on 04/21/2003 with a new silo. Maintenance took
about an hour. The data on 04/21/2003 10:00:00 were deleted.

b) All turbidity probes recalled to YSI for repair. No turbidity data were
collected for the entire month.

Child's River:
a) All turbidity probes recalled to YSI for repair. No turbidity data were
collected for the entire month.

b) Missing data due to deployment / retrieval overlap.
04/04/2003 08:30:00

c) Low salinity anomalies noted on 04/15/2003 and 04/16/2003. Appear valid
and were not deleted.

d) DO data look anomalously high from 04/25/2003 to 04/30/2003. Membrane
failure not confirmed. DO data were not deleted but are suspect.

Sage Lot:
a) Sage Lot was reoccupied for first time in 2003 on 04/21/2003 at 15:00:00.

b) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
04/21/2003 15:00:00 – 20:30:00, 21:30:00, 23:00:00
04/22/2003 00:00:00 – 01:00:00, 02:30:00 – 03:00:00, 04:00:00 – 08:30:00,
09:30:00 – 11:30:00, 16:30:00, 17:30:00 – 23:30:00
04/23/2003 00:00:00 – 10:00:00, 11:00:00 – 23:30:00
04/24/2003 00:00:00 – 04/26/2003 12:00:00
04/26/2003 14:00:00 – 15:30:00, 17:00:00, 19:00:00 – 23:30:00
04/27/2003 00:00:00 – 07:00:00, 08:00:00 – 23:30:00
04/28/2003 00:00:00 – 12:30:00, 13:30:00 – 14:00:00, 17:00:00, 18:00:00 –
19:00:00, 20:00:00 – 23:30:00
04/29/2003 00:00:00 – 10:00:00, 11:00:00 – 13:00:00, 15:00:00 – 23:30:00
04/30/2003 00:00:00 – 04:30:00, 05:30:00 – 13:00:00, 14:30:00 – 23:30:00

May 2003
Metoxit Point:
a) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
05/19/2003 19:00:00 - 20:00:00
05/20/2003 03:30:00, 06:00:00 - 06:30:00, 09:30:00 - 11:00:00, 12:00:00 –
15:30:00, 16:30:00 - 19:30:00
05/21/2003 00:00:00-01:00:00, 03:00:00 – 09:30:00

b) Turbidity probes unavailable due to YSI recall. No turbidity data collected from 05/01/2003 00:00:00 to 05/09/2003 08:30:00.

Menauhant:
a) Turbidity probes unavailable due to YSI recall. No turbidity data collected from 05/01/2003 00:00:00 to 05/09/2003 10:30:00.

b) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
05/26/2003 19:30:00
05/29/2003 21:00:00

Child's River:
a) DO data look anomalously high for first period deployment 05/01/2003
00:00:00 to 05/09/2003 10:30:00. Membrane failure not confirmed. DO data were
not deleted.

b) DO data look anomalously high from 05/28/2003 to 05/31/2003. Membrane
failure not confirmed. pH seems to confirm anomaly as real event. DO data were
not deleted.

c) Turbidity probes unavailable due to YSI recall. No turbidity data collected from 05/01/2003 00:00:00 to 05/09/2003 10:30:00.

Sage Lot:
a) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
05/01/2003 00:00:00 – 05/03/2003 15:00:00
05/03/2003 16:00:00 – 05/05/2003 11:00:00
05/05/2003 12:00:00 – 05/09/2003 09:30:00
05/17/2003 18:30:00 – 19:00:00

June 2003
Metoxit Point:
a) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
06/22/2003 10:00:00
06/23/2003 00:00:00, 01:00:00, 02:30:00 – 04:30:00, 06:00:00, 07:00:00 – 07:30:00, 09:30:00 – 10:00:00, 11:00:00 – 11:30:00, 12:30:00 – 13:00:00, 15:00:00-16:00:00, 17:00:00
06/25/2003 06:30:00, 08:00:00

b) Sonde mooring was tipped over (by boat collision?) and replaced in position a
day later. All data for this period were deleted.
06/28/2003 12:30:00 to 06/29/2003 11:30:00

c) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
06/27/2003 07:30:00

Menauhant:
a) Small negative and/or zero turbidity values related to calibration offsets were recorded this month. See note at the beginning of this section for
further explanation.
06/03/2003 17:30:00-18:00:00
06/07/2003 14:00:00, 18:00:00
06/08/2003 00:30:00 – 03:00:00, 04:00:00 – 08:00:00, 14:30:00 – 17:30:00
06/09/2003 15:30:00 – 16:00:00, 17:00:00 – 18:30:00
06/11/2003 05:00:00 – 09:30:00
06/12/2003 07:00:00, 08:30:00 – 10:00:00, 11:00:00, 16:30:00 – 19:30:00
06/15/2003 21:00:00, 22:00:00
06/17/2003 11:00:00, 15:30:00
06/18/2003 11:00:00 – 11:30:00, 12:30:00 – 15:30:00
06/19/2003 04:00:00 – 04:30:00, 12:00:00 – 13:00:00, 14:00:00 –
14:30:00,
17:00:00 – 18:30:00, 23:30:00
06/20/2003 00:00:00 – 01:00:00, 02:00:00, 04:00:00 – 04:30:00, 05:30:00,
18:30:00
06/21/2003 04:00:00 – 06:30:00, 15:30:00 – 16:00:00, 17:30:00 – 19:30:00
06/22/2003 06:30:00 – 07:30:00, 13:30:00 – 14:30:00, 15:30:00 – 20:00:00
06/23/2003 02:00:00 – 05:00:00, 06:00:00 – 07:30:00, 08:30:00 –
11:30:00,
14:30:00 – 16:30:00, 17:30:00 – 19:30:00
06/24/2003 03:00:00, 04:00:00 – 13:30:00, 15:00:00 – 23:30:00
06/25/2003 04:00:00 – 12:30:00, 16:00:00 – 17:00:00, 18:00:00 – 19:30:00
06/26/2003 00:00:00, 04:30:00 – 07:30:00, 08:30:00 – 09:00:00, 10:00:00
–
13:30:00, 17:00:00 – 17:30:00, 18:30:00 – 19:30:00
06/27/2003 06:00:00 – 07:00:00, 08:00:00 – 10:30:00, 11:30:00 –
14:30:00,
15:30:00, 17:00:00 – 17:30:00, 18:30:00 – 19:30:00
06/28/2003 00:00:00 – 00:30:00, 06:30:00 – 09:30:00, 11:00:00 –
13:00:00,
14:00:00 – 14:30:00, 18:00:00 – 19:30:00
06/29/2003 07:30:00 – 08:30:00, 09:30:00, 11:00:00, 12:30:00 – 14:00:00,
19:00:00, 23:00:00 – 23:30:00
06/30/2003 00:00:00 – 01:30:00, 08:00:00 – 09:00:00, 10:00:00 –
11:30:00,
13:30:00 – 15:30:00, 17:00:00

Child's River:
a) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for
further
explanation.
06/03/2003 08:30:00 – 09:00:00, 10:30:00, 13:00:00, 16:00:00, 17:00:00,
18:00:00 – 20:00:00, 21:30:00 – 22:00:00, 23:00:00 – 23:30:00
06/04/2003 00:30:00 – 02:00:00, 03:30:00, 04:30:00 – 06:30:00, 07:30:00
–
23:30:00
06/05/2003 00:00:00 – 01:00:00, 02:00:00 – 04:00:00, 05:00:00 –
05:30:00,

06:30:00, 07:30:00, 08:30:00 – 10:30:00
06/06/2003 05:00:00 – 06:30:00, 14:00:00, 23:30:00
06/07/2003 00:00:00, 07:00:00, 08:30:00
06/08/2003 02:00:00, 05:00:00 – 06:00:00, 07:00:00 – 08:00:00, 09:00:00
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11:00:00, 12:30:00, 13:30:00
06/09/2003 03:00:00 – 03:30:00, 05:00:00, 06:30:00 – 12:30:00, 13:30:00
06/10/2003 01:30:00, 04:00:00, 05:00:00, 06:00:00, 07:00:00, 08:30:00,
10:00:00
– 10:30:00, 11:30:00, 22:30:00 – 23:00:00
06/11/2003 02:00:00 – 03:00:00, 04:30:00 – 05:30:00, 06:30:00 –
07:00:00,
08:00:00, 09:00:00 – 11:00:00, 15:00:00, 19:30:00 – 20:00:00
06/12/2003 00:30:00, 04:30:00 – 09:30:00, 10:30:00 – 11:00:00, 12:00:00
–
13:30:00, 14:30:00, 16:00:00, 18:00:00 – 18:30:00, 19:30:00, 20:30:00
06/13/2003 09:00:00 – 10:00:00, 11:30:00 – 13:00:00, 17:00:00 – 18:30:00
06/14/2003 00:30:00, 10:00:00, 11:30:00, 12:30:00
06/15/2003 09:00:00, 13:00:00
06/16/2003 12:30:00, 16:30:00, 18:00:00
06/18/2003 05:30:00, 07:30:00 – 09:00:00, 10:00:00 – 11:00:00, 13:00:00
–
13:30:00, 14:30:00, 17:00:00, 1:00:00, 19:00:00 - 23:30:00
06/19/2003 00:00:00, 01:00:00 – 01:30:00, 02:30:00 – 11:30:00, 12:30:00,
13:30:00 – 23:30:00
06/20/2003 00:00:00 – 03:00:00, 04:00:00, 05:00:00 – 06:30:00
06/21/2003 19:00:00
06/24/2003 07:30:00, 15:30:00
06/25/2003 06:00:00, 15:00:00 – 15:30:00, 17:00:00 – 17:30:00, 18:30:00
–
19:30:00, 20:30:00, 22:00:00
06/26/2003 01:00:00, 07:30:00 – 08:00:00, 12:00:00, 16:00:00, 17:30:00,
19:00:00, 20:00:00 – 20:30:00
06/27/2003 02:00:00, 06:00:00 – 06:30:00, 07:30:00, 17:30:00, 19:00:00
06/28/2003 04:30:00, 05:30:00, 07:00:00, 14:30:00, 18:30:00 – 19:00:00,
20:30:00, 22:30:00 – 23:00:00
06/29/2003 04:00:00, 05:00:00, 07:00:00 – 08:30:00, 15:00:00, 16:00:00,
17:00:00 – 18:30:00
06/30/2003 06:30:00 – 07:30:00, 17:00:00 – 18:00:00, 19:30:00

b) The following anomalous turbidity data are likely related to a
biological
event and were deleted. See note at the beginning of this section for
further
explanation.
06/13/2003 16:30:00
06/22/2003 19:30:00

Sage Lot:
a) Missing Data for 06/03/2003 08:00:00 due to deployment / retrieval
overlap.

b) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
06/16/2003 19:30:00 – 20:00:00
06/17/2003 10:00:00, 19:00:00
06/18/2003 11:00:00, 12:00:00, 21:00:00, 22:00:00
06/19/2003 09:00:00, 22:00:00 – 23:00:00
06/20/2003 00:00:00, 10:30:00 – 13:00:00
06/21/2003 12:30:00
06/24/2003 15:00:00, 16:30:00
06/25/2003 10:00:00
06/26/2003 03:30:00, 04:30:00 – 06:30:00, 07:30:00 – 08:00:00, 09:00:00, 10:30:00 – 11:00:00, 13:00:00 – 14:30:00

c) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
06/11/2003 06:00:00
06/14/2003 12:00:00

July 2003
Metoxit Point:
a) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
07/18/2003 02:00:00 – 07/20/2003 12:30:00
07/20/2003 13:30:00 – 07/30/2003 08:30:00

b) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
07/04/2003 03:30:00

c) Turbidity readings look funny for this period, we suspect possible wiper
failure or unknown sensor malfunction. We have deleted all turbidity data for
the period:
07/16/2003 10:30:00 to 07/18/2003 01:30:00

d) Missed reading at deployment / retrieval on 07/16/2003 10:00:00.

Menauhant:

a) Turbidity motor failure from 07/28/2003 00:00:00 to 07/30/2003 7:30:00. These
turbidity data were deleted.

b) Small negative and/or zero turbidity values related to calibration offsets
were recorded
this month. See note at the beginning of this section for further explanation.
07/01/2003 08:00:00

c) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation
07/22/2003 17:30:00

d) Dissolved oxygen readings from 07/09/2003 20:30:00 to 07/16/2003 09:00:00
are suspect, either due to fouling or membrane failure. These data were deleted.

Child's River:

a) Anoxic events were frequent this month. Some DO readings were negative due to slight calibration offset (and some drift perhaps) from 07/05/2003 05:00:00 to 07/25/2003 08:00:00. These data were not deleted.

b) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
07/01/2003 03:30:00 – 04:00:00, 05:00:00 - 05:30:00, 06:30:00 –09:30:00, 11:00:00, 16:30:00, 21:00:00 – 22:00:00, 23:00:00
07/02/2003 03:30:00, 04:30:00 – 05:00:00, 06:00:00 – 08:00:00, 10:00:00, 11:30:00, 13:00:00 – 13:30:00, 15:00:00 – 16:00:00, 17:00:00 – 20:00:00, 21:00:00 – 23:00:00
07/04/2003 04:30:00 – 05:00:00, 07:00:00 – 09:30:00, 19:30:00
07/06/2003 00:00:00 – 00:30:00, 01:30:00 – 02:00:00, 14:00:00, 20:30:00, 21:30:00
07/07/2003 20:30:00

e) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
07/03/2003 19:30:00
07/05/2003 19:30:00
07/05/2003 21:00:00 – 07/06/2003 02:00:00
07/06/2003 14:00:00, 20:30:00, 21:30:00 – 23:00:00
07/07/2003 20:00:00 – 21:30:00
07/08/2003 00:30:00, 20:00:00 – 20:30:00

Sage Lot:
a) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
07/01/2003 07:30:00
07/02/2003 10:00:00, 21:30:00
07/03/2003 09:30:00
07/05/2003 21:00:00, 22:00:00
07/06/2003 09:00:00 – 09:30:00, 11:00:00 – 12:00:00, 23:30:00
07/07/2003 00:30:00 – 01:30:00, 10:30:00 – 12:30:00, 13:30:00 – 14:00:00,
22:00:00
07/08/2003 00:00:00 – 02:00:00, 10:00:00 – 11:30:00, 12:30:00 – 13:30:00,
15:00:00
07/09/2003 02:00:00, 10:30:00, 11:30:00 – 13:00:00, 14:30:00, 15:30:00
07/10/2003 11:30:00, 13:00:00 – 13:30:00, 14:30:00 – 15:30:00
07/12/2003 03:30:00, 06:00:00 – 07:00:00, 14:30:00, 16:00:00 – 18:00:00
07/13/2003 03:30:00, 08:00:00, 14:30:00 – 15:30:00, 18:00:00, 19:00:00 – 20:00:00
07/14/2003 05:00:00, 06:00:00 – 07:30:00, 08:30:00 – 09:30:00, 12:00:00, 16:00:00, 18:00:00, 18:30:00, 20:00:00
07/15/2003 09:30:00, 13:00:00, 17:30:00, 18:30:00 – 20:00:00, 21:00:00
07/16/2003 09:00:00 – 23:30:00
07/17/2003 00:00:00, 01:00:00 – 23:30:00
07/18/2003 00:00:00 – 23:30:00
07/19/2003 00:00:00 – 11:30:00, 14:00:00, 15:00:00 – 23:30:00
07/20/2003 00:00:00 – 23:30:00
07/21/2003 00:00:00, 01:00:00 – 23:30:00
07/22/2003 00:00:00 – 07/23/2003 22:00:00
07/23/2003 23:00:00
07/24/2003 00:00:00 – 22:00:00, 23:00:00 – 23:30:00
07/25/2003 00:00:00 – 14:30:00, 17:00:00 – 18:00:00
07/26/2003 07:30:00, 08:30:00, 09:30:00 – 10:30:00, 11:30:00 – 12:30:00, 13:30:00 – 14:30:00
07/30/2003 07:30:00 – 21:30:00
07/31/2003 01:30:00, 02:30:00 – 03:00:00, 04:00:00 – 22:00:00

b) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
07/29/2003 01:30:00

c) DO sensor failure on 07/30/2003. Large tear in membrane. All data deleted
from 07/30/2003 23:30:00 thru 07/31/2003 23:30:00.

August 2003

Metoxit Point:
a) Dissolved oxygen membrane had bubbles under it, suspect membrane malfunction from 8/18/2003 through rest of deployment. DO data were deleted from
08/18/2003 11:00:00 to 08/27/2003 09:00:00.

Menauhant:
a) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
08/15/2003 02:00:00, 02:30:00
08/16/2003 01:00:00
08/25/2003 11:30:00

b) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation
08/09/2003 04:00:00, 04:30:00, 13:00:00
08/10/2003 18:00:00

c) Suspect turbidity motor failure for this deployment from 8/27/2003 08:30:00 to 8/31/2003 23:30:00. These turbidity data were deleted.

d) Noted barnacles growing on membrane upon retrieval for deployment period
08/18/2003 11:00:00 to 08/27/2003 08:00:00. Data were not deleted.

Child's River:
a) Anoxic events (zero to near zero DO) were frequent this month. Some DO readings were negative due to slight calibration offset (and some drift perhaps)
from 08/23/2003 05:30:00 to 08/23/2003 08:30:00. These data were not deleted.

b) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation
08/11/2003 15:30:00
08/22/2003 03:00:00
08/29/2003 09:00:00

Sage Lot:
a) DO sensor failure on 07/30/2003. Large tear in membrane. All data deleted
from 08/01/2003 00:00:00 thru 8/14/2003 07:30:00.

b) Small negative and/or zero turbidity values related to calibration offsets

were recorded this month. See note at the beginning of this section for
further
explanation.
08/01/2003 02:30:00 – 05:30:00, 06:30:00 – 23:30:00
08/02/2003 00:00:00, 05:30:00 – 23:30:00
08/03/2003 00:00:00 – 01:30:00, 05:30:00 – 17:00:00, 18:30:00 – 23:30:00
08/04/2003 00:00:00 – 02:00:00, 07:30:00 – 13:30:00, 15:30:00, 16:30:00
–
20:00:00, 21:00:00 – 23:30:00
08/05/2003 00:00:00 – 03:30:00, 04:30:00, 08:00:00 – 15:00:00, 17:00:00
–
18:00:00, 19:00:00 – 23:30:00
08/06/2003 00:00:00 – 06:00:00, 10:30:00 – 16:00:00, 20:30:00, 21:30:00
–
23:30:00
08/07/2003 00:00:00 – 06:00:00, 12:00:00 – 12:30:00, 13:30:00, 14:30:00,
16:00:00
08/08/2003 01:30:00, 02:30:00 – 05:30:00, 11:00:00 – 16:30:00
08/09/2003 01:30:00 – 02:30:00, 03:30:00 – 07:00:00, 14:30:00 –
15:30:00,
16:30:00 – 17:30:00
08/10/2003 04:00:00, 05:00:00 – 08:00:00, 17:00:00, 18:00:00 – 18:30:00
08/18/2003 12:00:00

c) The following anomalous turbidity data are likely related to a
biological
event and were deleted. See note at the beginning of this section for
further
explanation.
08/18/2003 12:00:00
08/21/2003 03:30:00

September 2003
Metoxit Point:
a) The following anomalous turbidity data are likely related to a
biological
event and were deleted. See note at the beginning of this section for
further
explanation.
09/18/2003 08:00:00

Menauhant:
a) Suspect turbidity motor failure for this first deployment period
from
09/01/2003 00:00:00 to 09/08/2003 08:30:00. These turbidity data were
deleted.

b) The following anomalous turbidity data are likely related to a
suspension
event and were deleted. See note at the beginning of this section for
further
explanation
09/19/2003 19:00:00 - 09/19/2003 19:30:00

09/23/2003 00:30:00, 01:30:00
09/24/2003 21:00:00, 22:00:00, 23:30:00

c) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
09/09/2003 02:30:00-03:30:00, 04:30:00, 18:00:00
09/11/2003 18:00:00-18:30:00, 22:00:00
09/20/2003 03:00:00

d) DO% and mg/L data were deleted for deployment 09/08/2003 09:00:00 - 09/25/2003 08:30:00. Post Deployment Calibration check low (49.5%). Calibration
error possible.

e) Instrument failure for this deployment period-loose battery connection. No
data collected from 9/25/2003 09:00:00 to 09/30/2003 23:30:00.

Child's River:
a) The following anomalous turbidity data are likely related to a biological
event and were deleted.
See note at the beginning of this section for further explanation.
09/01/2003 10:00:00
09/03/2003 12:30:00
09/04/2003 07:00:00
09/07/2003 00:30:00, 23:00:00
09/22/2003 10:00:00, 12:30:00
09/27/2003 11:00:00
09/29/2003 02:30:00

Sage Lot:
a) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
09/28/2003 12:30:00
09/29/2003 01:00:00

b) DO% and mg/L were deleted for the following dates and times due to punctured
membrane.
08/28/2003 21:30:00 - 09/08/2003 08:00:00

October 2003
Metoxit Point:
a) Small negative and/or zero turbidity values related to calibration offsets

were recorded this month. See note at the beginning of this section for further
explanation.
10/23/2003 20:30:00
10/31/2003 14:00:00, 15:00:00

b) The sonde silo was found damaged upon retrieval / deployment on 10/08/2003
at 11:30:00 and so no sonde was redeployed until 10/23/2003 at 10:30:00. Delay
in redeployment was further exacerbated by Research boat out for repair for
this period as well. No data were collected during this period.

Menauhant:
a) Instrument failure for first deployment period-loose battery connection.
No data collected from 10/01/2003 00:00:00 to 10/08/2003 12:00:00.

b) The following anomalous turbidity data are likely related to a suspension
event and were deleted. See note at the beginning of this section for further
explanation
10/16/2003 21:00:00
10/17/2003 18:00:00

c) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
10/25/2003 17:00:00

d) Suspect DO membrane failure on / about 10/16/2003. All DO data from 10/16/00
00:00:00 to 10/28/2003 09:00:00 were deleted.

Child's River:
a) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
10/01/2003 08:30:00
10/02/2003 13:00:00
10/03/2003 07:00:00
10/05/2003 20:30:00
10/06/2003 21:00:00

Sage Lot:
a) pH probe damaged sometime prior to or during deployment. All pH data were
deleted. 10/08/2003 10:30:00 to 10/28/2003 10:00:00

b) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
10/17/2003 08:30:00
10/18/2003 08:30:00
10/20/2003 09:30:00
10/22/2003 13:00:00
10/25/2003 07:30:00

c) The following anomalous turbidity data are likely related to a suspension
event and were deleted. See note at the beginning of this section for further
explanation
10/15/2003 16:30:00

d) DO membrane failure suspected. All DO data deleted from
10/16/2003 23:30:00 to 10/28/2003 10:00:00.

November 2003
Metoxit Point:
a) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
11/01/2003 07:00:00 – 07:30:00, 08:30:00 – 17:00:00
11/03/2003 04:00:00, 06:00:00, 07:30:00 – 08:30:00, 10:30:00, 12:00:00 – 17:30:00, 19:30:00
11/04/2003 01:00:00 – 03:00:00, 05:00:00, 06:00:00, 07:00:00 – 11:30:00, 14:00:00, 15:30:00
11/05/2003 03:30:00, 06:00:00 – 06:30:00, 07:30:00, 13:00:00, 17:30:00, 19:00:00 – 19:30:00, 20:30:00, 23:30:00
11/06/2003 02:00:00 – 04:00:00, 05:30:00 – 07:30:00, 09:30:00, 10:30:00, 12:00:00 – 14:00:00, 15:00:00 – 15:30:00
11/07/2003 06:00:00 – 07:00:00, 08:00:00, 09:00:00 – 11:00:00, 12:00:00 –
15:30:00, 16:30:00
11/08/2003 02:00:00, 05:00:00, 06:00:00 – 16:30:00, 18:30:00, 19:30:00 – 21:30:00, 23:00:00
11/09/2003 03:30:00
11/11/2003 21:30:00 – 22:30:00
11/12/2003 10:30:00, 16:00:00, 17:00:00 – 17:30:00, 18:30:00 – 19:30:00, 21:00:00
11/13/2003 00:30:00, 01:30:00 – 04:00:00, 07:00:00

Menauhant:
a) The following depth negative due to extreme low tides. However, as other

parameters appear to be consistent with submerged sensor condition (depths
offset due to barometric drift), these data were not deleted.
11/13/2003 19:30:00 – 21:30:00, 22:30:00 – 23:00:00
11/14/2003 01:00:00, 08:00:00 – 08:30:00, 19:00:00 – 22:30:00
11/29/2003 20:30:00 – 23:30:00
11/30/2003 00:00:00-00:30:00

b) The following depth negative due to an extreme low tide. Other parameters appear to be consistent with out-of-water sensor condition, these
data were deleted.
11/29/2003 21:30:00-23:00:00

c) Small negative and/or zero turbidity values related to calibration offsets
were recorded this month. See note at the beginning of this section for further
explanation.
11/02/2003 08:00:00
11/03/2003 04:30:00, 05:30:00, 6:30:00 – 07:00:00, 08:00:00 – 08:30:00, 10:00:00 – 11:00:00, 12:00:00 – 14:00:00, 15:30:00 – 17:00:00, 18:30:00, 19:30:00
11/04/2003 06:00:00 – 09:00:00
11/06/2003 07:00:00 – 08:00:00, 09:00:00, 10:00:00, 11:30:00, 18:30:00
11/07/2003 06:30:00, 07:30:00 – 13:30:00, 14:30:00, 21:00:00
11/08/2003 10:30:00, 11:30:00 – 13:30:00
11/09/2003 08:30:00, 10:00:00, 12:30:00 – 14:30:00
11/10/2003 07:30:00 – 08:00:00, 10:30:00 – 15:30:00
11/11/2003 10:30:00 – 11:00:00
11/12/2003 08:00:00 – 08:30:00, 11:30:00, 14:00:00 – 16:00:00

Child's River:
a) The following depth readings were found negative owing to extreme low tides.
But suspect slight calibration offset due to barometric pressure drift, as
parameters appear to be consistent with submerged state of sensors. The data
were not deleted for this period.
11/14/2003 21:30:00 – 22:00:00

b) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
11/19/2003 05:30:00
11/30/2003 08:00:00

Sage Lot:

a) The following anomalous turbidity data are likely related to a biological
event and were deleted. See note at the beginning of this section for further
explanation.
11/04/2003 12:00:00
11/05/2003 15:00:00
11/24/2003 15:30:00

b) No pH data 11/18/2003 11:00:00 to 12/04/2003 09:00:00 due to no sensor installed on datalogger.

December 2003
Metoxit Point:
a) DO membrane had bubbles under it, suspect membrane malfunction throughout
deployment. DO data were deleted for this period.
12/03/2003 14:00:00 to 12/19/2003 09:00:00

b) Suspect turbidity sensor malfunction or optics problem (pits noted around
the optic after retrieval. Turbididty data were deleted for this period.
12/31/2003 09:00 to 12/31/2003 23:30:00

c) Missing data at retrieval / deployment overlap time.
12/31/2003 08:30:00

Menauhant:
a) The following depth negative due to extreme low tides. However, as other
parameters appear to be consistent with submerged sensor condition (depths
offset due to barometric drift), these data were not deleted.
12/15/2003 20:30:00 – 22:30:00

Child's River:
a) There are no anomalies this month.

Sage Lot:
a) No pH data 11/18/2003 11:00:00 to 12/04/2003 09:00:00 due to no sensor installed on datalogger.
b) Datalogger taken out 12/04/2003 after 09:00:00 due to heavy icing and not re-
deployed due to ice for the remainder of year . No data were collected from
12/04/2003 09:30:00 thru
12/31/2003 23:30:00.

12) Missing data:

Missing data are denoted by a period in the data set. Upon data review by the CDMO,
all periods were later removed for data dissemination purposes and left blank.
Data are missing due to equipment failure where no probes deployed, maintenance/calibration of
equipment, elimination of obvious outliers, or elimination of data due to calibration (both pre and post) problems. For more details on deleted data, see
section 11, Data Anomalies. The Waquoit Bay NERR Research Coordinator can also
be contacted about other issues concerning missing or anomalous data.

13) Post deployment information:

End of Deployment Post-calibration Readings in Standard Solutions:

Site	Date	Salinity (ppt) (std-31.93ppt)	DO% (std-air)	pH (std-7.0)	Turbidity (std-0 NTU)
MP					
	05/09/03	32.14	106.4	6.86	no probe
	05/21/03	32.09	106.2	6.90	0.4
	06/03/03				
	06/20/03	32.15	98.6	6.91	1.0
	07/01/03	32.34	96.1	7.08	0.1
	07/16/03	32.61	100.2	7.07	0.4
	07/30/03	32.16	99.0	7.04	0.8
	08/13/03	31.80	87.4	7.12	-0.6
	08/27/03	31.56	152.3	7.05	-0.1
	09/10/03	31.20	105.6	6.95	0.0
	09/24/03	31.90	104.0	6.91	0.0
	10/08/03	31.91	111.7	7.00	-0.2
	11/18/03	31.70	90.3	6.93	-0.4
	12/03/03	32.02	108.3	7.10	0.0
	12/19/03	31.91	118.9	7.04	0.0
	01/09/04	31.82	100.3	6.94	5.7

Site	Date	Salinity (ppt) (std-31.93ppt)	DO% (std-air)	pH (std-7.0)	Turbidity (std-0 NTU)
MH					
	04/04/03	31.79	98.9	7.08	no probe
	04/23/03	32.05	102.8	6.98	no probe
	05/09/03	32.00	101.5	7.03	no probe
	05/21/03	32.03	102.0	6.96	0.3
	06/03/03				
	06/20/03	31.91	80.4	7.08	-0.8
	07/01/03	32.45	101.2	7.08	-1.2
	07/16/03	32.19	63.4	7.03	0.1
	07/30/03	31.80	91.7	6.98	1100.0
	08/13/03	30.91	76.8	7.00	0.0
	08/27/03	32.02	68.4	7.00	-0.4
	09/08/03	31.84	101.3	6.95	685.2
	09/25/03	31.44	49.5	7.09	2.2

10/08/03	NO DATA			
10/28/03	32.01	107.1	7.00	-0.1
11/18/03	32.06	98.4	6.84	-0.2
12/03/03	31.75	104.7	7.00	-0.3
12/17/03	31.47	107.7	6.93	0.1
01/13/04	31.41	111.9	7.00	0.2

*MH Post Deployment information for January through April has been misplaced.
Please call NERR Reserve for more information.

Site	Date	Salinity (ppt) (std-31.93ppt)	DO% (std-air)	pH (std-7.0)	Turbidity (std-0 NTU)
CR					
	02/06/03	31.85	105.6	7.02	0.0
	02/26/03	32.40	85.7	6.90	0.3
	03/18/03	32.24	91.0	7.10	0.2
	04/04/03	31.51	73.7	6.9	no probe
	04/23/03	32.14	95.3	6.98	no probe
	05/09/03	31.57	84.8	6.54	no probe
	05/21/03	31.26	89.0	7.00	1.6
	06/03/03				
	06/20/03	32.09	92.6	7.13	-0.2
	07/01/03	32.83	97.2	7.20	0.1
	07/16/03	32.94	67.4	7.00	0.4
	07/30/03	30.84	80.4	7.04	0.9
	08/13/03	30.99	59.0	7.15	-0.3
	08/27/03	33.55	15.7	7.67	-0.5
	09/08/03	31.79	31.0	6.96	-0.4
	09/25/03	32.84	98.3	6.80	-0.1
	10/10/03	31.95	105.9	7.44	0.0
	10/28/03	31.86	92.5	7.00	-0.4
	11/18/03	31.90	92.3	7.00	0.0
	12/03/03	31.12	90.5	6.99	0.0
	12/17/03	31.45	102.7	7.07	0.2
	01/13/04	31.27	92.0	7.08	-0.4

Site	Date	Salinity (ppt) (std-31.93ppt)	DO% (std-air)	pH (std-7.0)	Turbidity (std-0 NTU)
SL					
	05/09/03	31.9	103.5	6.95	-1.1
	05/21/03	32.92	102.1	7.12	-0.3
	06/03/03				
	06/20/03	32.17	102.2	6.97	0.6
	07/01/03	32.08	97.9	6.97	0.8
	07/16/03	32.24	106.3	7.00	0.6
	07/30/03	31.85	103.2	7.05	28.7
	08/14/03	26.7	91.8	7.00	0.0

08/27/03	31.75	56.1	7.00	0.0
09/08/03	32.79	31.3	7.00	-0.8
09/24/03	32.11	100.4	6.92	0.2
10/08/03	32.32	99.2	7.02	-0.2
10/28/03	31.93	101.4	NA	0.0
11/18/03	31.88	104.9	7.00	-0.2
12/04/03	31.10	102.6	NA	0.0

LAST DEPLOYMENT FOR SEASON

14) Other remarks/notes:

On 07/01/2021 this dataset was updated to include embedded QAQC flags for anomalous/suspect data. System-wide monitoring data beginning in 2007 were processed to allow for QAQC flags and codes to be embedded in the data files rather than detailed in the metadata alone (as in the anomalous/suspect, deleted, and missing data sections above). Prior to 2006, rejected data were deleted from the dataset so they are unavailable to be used at all, but suspect data were only noted in the metadata document. Suspect data flags <1> were embedded retroactively in order to allow suspect data to be easily identified and filtered from the dataset if desired for analysis and reporting purposes. No other flags or codes were embedded in the dataset and users should still refer to the detailed explanations above for more information.

Any time a reference is made to turbidity data being negative and/or zero, it was recorded as a negative in the raw data file and a zero in the edited data file due to the formatting of Excel. The technician edited none of these data points by hand nor did he/she delete any of them.