

Waquoit Bay (WQB) National Estuarine Research Reserve Water Quality
Metadata
March 2001-December 2001
Latest Update: July 1, 2021

I. Data Set & Research Descriptors

1) Principal investigator & contact persons:

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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 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 is 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. 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
2001,
the Research Assistant, Kelly Chapman, performed all instrument
calibration and
maintenance and data management.

3) Research objectives:

For the NERR System-Wide Monitoring Program, the YSI data loggers are
programmed
to record water quality parameters every 30 minutes. Two monitoring sites
were
located in the Waquoit Bay estuarine system during 2001. One is located
roughly
in the middle of Waquoit Bay's main basin and the other is located
adjacent to
Eel Pond Inlet on Vineyard Sound - one of the two tidal inlets into the
Waquoit Bay estuary.
The main purpose of the SWMP water quality monitoring program is to aid
Waquoit
Bay NERR in one of its priority missions: to be used as a living
laboratory and

platform for coastal and estuarine research. The long term, continuous detailed monitoring of the estuary's basic physical 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 have contributed to alterations of habitats in the bay. For example, thick mats of seaweeds (macroalgae) now cover the bottom where eelgrass meadows thrived in the 1970's. Unfortunately, there are few definitive records of bay conditions during that period, which makes it difficult to evaluate the rates of change. To facilitate future evaluation, long-term records from the SWMP can be used to track water column conditions. Of particular interest are measurements of dissolved oxygen (DO), turbidity, and chlorophyll (Chl). Such records will facilitate evaluation of changes which may come about from a continuation of watershed alteration that result from "traditional" development (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, but as of 2001 and still in the early years of our SWMP program at Waquoit Bay, we have established only two permanent stations in the Waquoit Bay estuaries. We expect to double this number to four in 2002. That said, our current SWMP stations, referred to as Metoxit Point and Menauhant 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 for the region and so it is possible to make this correction to the depth data).

Also, at our Metoxit Point site during 2001 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 for this year's SWMP data set for 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. 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 chlorophyll grabs were taken at deployment/retrieval times. Air and water temperature were measured with a simple thermometer. DO was determined by the Winkler titration procedure, using a LaMotte DO field kit. Salinity was measured using a hydrometer and chlorophyll samples were analyzed using a Hach 4000 spectrophotometer for chlorophyll-a determination. No SWMP data were collected in 2001 prior to March due to ice-over conditions that extended from late December 2000 into late February 2001, which prevented boat operation in much of the bay (in fact, our research boat used to service the SWMP stations was hauled out until mid-March). The Metoxit Point station was

reoccupied first, following by the initial occupation of the Menauhant station (a new SWMP site) a couple days later. Different types of mooring silos were used to hold the sondes at each of the stations. The Metoxit Point station is located near the middle of the main basin and distant from shore structures. The sonde mooring for this station (first installed in July 2000) consists 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 exposed to allow the YSI sonde's sensors direct exposure to the flow of ambient waters. The Metoxit Point silo is set so that the sensor package is 0.75 m off the bottom. This ensures that the sensors are above the dense macro algal mats that cover the bottom of much of the bay. The mooring tower was completely cleaned of fouling growth (including barnacles and mussels) in mid-summer and the sonde silo's inside was scrubbed of any algal growth before each deployment. The Menauhant station is a shore-side location and its mooring is a more typical type of silo - a single PVC section (4" ID) mounted vertically on a pier that extends into a tidal inlet. The base of the silo is ventilated with large holes (1.5" diameter) and its sensor package (bottom of the sonde) is mounted within a 0.4 m distance off the bottom. This mooring was also cleaned of fouling growth several times during the year to ensure rapid flushing with ambient waters.

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 fold 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 groundwater contaminants.

WBNERR's estuaries are representative of shallow coastal lagoons that occur from Cape Cod to Sandy Hook, New Jersey. WBNERR is within the Virginian biogeographic province, on the transitional border (Cape Cod) between the Virginian and the Acadian biogeographic province to the north.

Like many embayments located on glacial outwash plains, Waquoit Bay is shallow, 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, and has migrated westward since. Though open throughout 2001, this small tidal inlet finally closed up in February 2002.

Bottom sediments in the bay are organic rich silts and medium sands. 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 tikvahiae*, 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, 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, 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 salt 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 the reserve's Childs River are more appropriately described as "rivulets" 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 small 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 070° 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 overlain by thick algal mats. Because of this site's fairly open exposure to south (greatest fetch over the bay), we have observed that when sustained winds are greater than about 20 knots out of the south, the Metoxit Point site experiences increased turbidity. Salinity values for this site range from approximately 26 ppt to 32 ppt.

The Menauhant station (MH) (41° 33.156' N 070° 32.912' W, 1.2 m deep), initiated this year in late 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 generally 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. After a year of operation, 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 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. Salinity values for this site range from approximately 29 ppt to 33 ppt.

6) Data collection period:

Data loggers were first deployed on March 26, 2001 at the Metoxit Point Site (MP)

and on March 28, 2001 at the Menauhant Yacht Club Site (MH) when the ice conditions

subsided. Both Stations were in operation from these dates through the end of December.

All monitoring is considered long-term. Deployment dates and times for 2001

are indicated below:

BEGAN

Metoxit Point Site

*03/26/01,12:00:00

*04/10/01,10:00:00

04/25/01,08:00:00

05/08/01,08:00:00

05/22/01,07:30:00

06/05/01,07:30:00

06/19/01,07:30:00

07/03/01,08:00:00

07/17/01,16:00:00

08/01/01,10:30:00

08/17/01,07:30:00

08/28/01,17:00:00

09/18/01,07:30:00

10/02/01,07:30:00

10/16/01,07:30:00

10/30/01,08:30:00

11/15/01,08:00:00

11/27/01,08:30:00

12/12/01,14:00:00

12/27/01,12:00:00

ENDED

04/10/01,09:30:00

04/25/01,07:30:00

05/08/01,07:30:00

05/22/01,07:00:00

06/05/01,07:00:00

06/19/01,07:00:00

07/03/01,07:30:00

07/17/01,07:30:00

08/01/01,10:00:00

08/17/01,07:00:00

08/28/01,14:00:00

09/18/01,07:00:00

10/02/01,07:00:00

10/16/01,07:00:00

10/30/01,08:00:00

11/15/01,07:30:00

11/27/01,08:00:00

12/12/01,13:30:00

12/27/01,11:30:00

01/16/02,04:00:00

Menauhant YC Site

03/28/01,16:30:00

04/10/01,10:00:00

04/25/01,08:30:00

05/08/01,08:30:00

05/22/01,09:00:00

06/05/01,08:00:00

06/19/01,08:00:00

07/03/01,07:30:00

07/17/01,07:30:00

07/31/01,08:00:00

08/17/01,08:00:00

08/29/01,

09/18/01,08:00:00

10/02/01,09:00:00

10/16/01,08:00:00

10/30/01,09:00:00

04/10/01,09:30:00

04/25/01,08:00:00

05/08/01,08:00:00

05/22/01,08:30:00

06/05/01,07:30:00

06/19/01,07:30:00

07/03/01,07:00:00

07/17/01,07:00:00

07/31/01,07:30:00

08/17/01,07:30:00

08/29/01,07:00:00

no data collected

10/02/01,08:00:00

10/16/01,07:30:00

10/30/01,08:30:00

11/15/01,08:00:00

11/15/01,08:30:00	11/27/01,08:30:00
11/27/01,09:00:00	12/12/01,13:00:00
12/12/01,13:30:00	12/27/01,12:00:00
12/27/01,12:30:00	01/16/02,09:00:00

* indicates deployments for which time data required correction to Eastern Standard Time (from Daylight Savings Time) in the edited .csv file.

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 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:
(None)

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/month/year or SS/MM/YY

Example: MP0501 (designates monthly data from May 2001 at Metoxit Point Site)

11) Data anomalies:

March 2001

Metoxit Point:

a) The datalogger was not deployed until March 26, 2001 (station data for 2001 begins on 3/26/2001, 11:00:00). There was no anomalous data found in the monthly file of March.

Menauhant:

a) The data logger was not deployed until March 28, 2001 (station data for 2001 begins on 3/28/2001, 16:30:00).

b) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

03/30/2001 15:30:00 1064 NTU

April 2001

Metoxit Point:

a) The following data points were lost while re-deploying the sonde.
04/10/2001 09:00:00

b) The following were all small negative and/or zero turbidity values (translated to 0000's), likely due to a small calibration error. These data were not deleted.

04/10/2001 22:30:00 0000 NTU

04/11/2001 12:30:00 0000

04/11/2001	19:00:00	0000
04/12/2001	00:00:00	0000
04/17/2001	08:30:00	0000
04/17/2001	11:30:00	0000
04/17/2001	12:00:00	0000
04/17/2001	14:00:00	0000
04/17/2001	17:30:00	0000

Menauhant:

a) SUSPENSION EVENT-Southeasterly Winds: The following records include turbidity readings that were either outside the normal range, or spikes way above background. We believe these are real enough numbers (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.) during suspension events from southeasterly winds (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 southeasterly winds. These readings were deleted.

04/08/2001	08:00:00	0323 NTU
04/08/2001	09:00:00	0531 NTU
04/08/2001	09:30:00	1469 NTU
04/08/2001	11:00:00	0466 NTU
04/08/2001	12:30:00	0133 NTU

b) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

04/28/2001	05:30:00	0080 NTU
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May 2001
Metoxit Point:

a) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

05/10/2001 22:00:00	0227 NTU
05/13/2001 20:00:00	0135 NTU
05/14/2001 18:30:00	0059 NTU

Menauhant:

a) SUSPENSION EVENT-Channel Dredging/Easterly Winds: The following records include turbidity readings that were either outside the normal range, or spikes way above background. We believe these are real enough numbers (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.) during suspension events from dredging in the adjacent inlet channel that was occurring at this time. However, some of these data also occurred during a period of easterly wind and so there may be some contribution to the anomalies from wind as well. Our criteria for flagging these data are values over 100NTU that are more than 5 times the magnitude of surrounding values. These readings were deleted.

05/17/2001 10:30:00	0967 NTU
05/22/2001 19:00:00	0732 NTU
05/22/2001 08:30:00	0636 NTU
05/23/2001 10:30:00	1851 NTU

b) SUSPENSION EVENT-Southeasterly Winds: The following records include turbidity readings that were either outside the normal range, or spikes way above background. We believe these are real enough numbers (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.) during suspension events from southeasterly winds (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 southeasterly winds. These readings were deleted.

05/27/2001 01:30:00 0510 NTU

c) Dissolved Oxygen data for 05/24/2001 19:30:00 were considered suspect. A drop in DO from 94.6% to 29.7% in one half hour then went back up to 94.8% again, for unknown reasons. Data were deleted.

June 2001

Metoxit Point:

a) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

06/03/2001 15:00:00	0121 NTU
06/03/2001 17:00:00	0141 NTU
06/09/2001 21:00:00	1078 NTU
06/15/2001 04:00:00	1330 NTU
06/15/2001 04:30:00	1330 NTU
06/15/2001 07:00:00	0573 NTU
06/18/2001 06:30:00	0092 NTU
06/22/2001 07:00:00	0053 NTU
06/24/2001 03:30:00	0074 NTU

Menauhant:

a) SILO FOULING TURBIDITY ANOMALIES: The following records include turbidity readings that followed an unusual pattern of trending way above normal for 2-3 days (to values over 100NTU) and then returning to "more normal" levels and

repeating the cycle several days later. We believe these data cannot be explained by any real or ambient turbidity event (i.e., meteorological conditions were not conducive for significant suspension events) and subsequent deployment with a different sonde and sensor shows no similar pattern (and a large offset between the retrieved and replacement sensor turbidity values). Our current interpretation (3/2002) is that these signals were caused by some as yet unexplained temporary malfunctioning or fouling of the turbidity sensor. This situation may be due to a build-up of seaweeds in the sonde silo or probe casing. After the onset of the first such event during this deployment the data are considered suspect and so have been deleted.

06/26/2001 00:00:00 through 06/30/2001 23:30:00

July 2001

Metoxit Point:

a) Deployment 7/3/2001 to 7/17/2001 had a large negative dissolved oxygen peak on 7/8/2001, caused by a catastrophic failure of the DO membrane (hole in membrane noted on post-check). All DO data from this deployment beginning with this membrane failure were deleted from the record from 07/08/01 09:30 through 07/17/01 07:30.

b) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

07/12/2001 08:00:00 0233 NTU

07/12/2001 12:30:00 0461 NTU

07/12/2001	14:30:00	0146 NTU
07/13/2001	22:30:00	1358 NTU
07/16/2001	02:00:00	1055 NTU
07/18/2001	07:30:00	1308 NTU
07/18/2001	08:30:00	0861 NTU
07/23/2001	19:30:00	0213 NTU

c) No Data were collected for 7/17/2001 08:00:00. This time fell during deployment/retrieval and no sonde was deployed for this reading.

d) The YSI was accidentally dropped to the bottom of the bay during deployment on 7/17/2001 on or about 08:00:00 where it sat in the muck for part of the day, until it was redeployed properly later on the same day (16:00:00). All data during this several hour period from 07/17 08:30 - 15:30 of improper deployment were deleted.

e) Due to biological growth of algae and barnacles, we carried out a complete cleaning of the sonde silo and mooring in late afternoon on 7/17/2001. At this time (7/17/01) the mooring was moved within the range of 10 feet or so from its previous location. Depth values for this station may be slightly offset from previous readings due to this move.

Menauhant:

a) SILO FOULING TURBIDITY ANOMALIES: The following records include turbidity readings that followed an unusual pattern of trending way above normal for 2-3 days (to values over 100NTU) and then returning to "more normal" levels and repeating the cycle several days later. We believe these data cannot be explained by any real or ambient turbidity event (i.e., meteorological conditions were not conducive for significant suspension events) and subsequent deployment with a different sonde and sensor shows no similar pattern. Also, we noted a large offset between the retrieved and replacement turbidity values with the replacement turbidity values being near low background levels. Our current interpretation (3/2002) is that these signals were caused by some as yet unexplained temporary malfunctioning or fouling of the turbidity sensor. This situation may be caused by a build-up of seaweeds in the sonde silo. After the

onset of the first such event in each deployment for this month the subsequent turbidity data are considered suspect and so have been deleted.

07/01 00:00 - 07/03 07:00
07/21 00:00 - 07/31 07:30

b) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

07/08/2001 06:30:00	0105
07/15/2001 22:00:00	1041
07/15/2001 22:30:00	0541
07/16/2001 00:00:00	0799
07/16/2001 00:30:00	0724

c) The following records include turbidity readings that were slightly negative and/or zero and were likely caused by a slight calibration offset. These data were not deleted.

07/17/2001 08:30:00	0000
07/17/2001 09:00:00	0000
07/17/2001 09:30:00	0000
07/17/2001 10:00:00	0000
07/17/2001 10:30:00	0000
07/17/2001 11:00:00	0000
07/17/2001 11:30:00	0000
07/17/2001 12:00:00	0000
07/17/2001 12:30:00	0000
07/17/2001 17:00:00	0000
07/17/2001 18:30:00	0000
07/17/2001 19:00:00	0000
07/18/2001 07:00:00	0000
07/18/2001 07:30:00	0000
07/18/2001 08:30:00	0000
07/19/2001 11:00:00	0000
07/19/2001 23:00:00	0000
07/20/2001 12:00:00	0000

August 2001

Metoxit Point:

a) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

08/02/2001	06:00:00	0398
08/02/2001	06:30:00	1440
08/02/2001	21:00:00	0064
08/02/2001	21:30:00	0121
08/03/2001	03:30:00	1437
08/03/2001	09:30:00	0284
08/06/2001	12:30:00	1441
08/09/2001	05:00:00	0296
08/11/2001	12:30:00	0086
08/12/2001	19:00:00	0978

b) DEPLOYMENT FAILURE: On 8/19/01 in the mid afternoon the data shows that there was an unusual event at the site - perhaps a boat collision or other interference with the sonde and mooring. On the date of retrieval (8/28/2001), the sonde silo and mooring were found tipped over and lying on its side on the bottom. For this reason, all data following this event have been deleted (from 8/19/01 13:30 to 8/28/01 14:00).

c) On 8/28/2001 during retrieval/deployment, the Metoxit Point station was re-established, and the mooring and sonde silo were completely cleaned of fouling. No data were collected for 2 hours from 8/28/2001, 14:30 to 8/28/2001, 16:30 while this maintenance was carried out.

Menauhant:

a) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

08/03/2001 00:00:00	0532 NTU
08/03/2001 00:30:00	0535 NTU
08/04/2001 00:00:00	0353 NTU
08/11/2001 11:00:00	0068 NTU
08/11/2001 22:30:00	0142 NTU

b) SILO FOULING TURBIDITY ANOMALIES: The following records include turbidity readings that followed an unusual pattern of trending way above normal for 2-3 days (to values over 100NTU) and then returning to "more normal" levels and repeating the cycle several days later. We believe these data cannot be explained by any real or ambient turbidity event (i.e., meteorological conditions were not conducive for significant suspension events). Also, we noted a large offset between the retrieved and replacement turbidity values with the replacement turbidity values being near low background levels. Our current interpretation (3/2002) is that these signals were caused by some as yet unexplained temporary malfunctioning or fouling of the turbidity sensor. This situation may be caused by a build-up of seaweeds in the sonde silo. After the onset of the first such event in each deployment period the subsequent turbidity data are considered suspect and so have been deleted for the following dates and times:
08/12 00:30 - 08/29 07:00

c) No data were collected from 8/29/01, 7:30:00 through 8/31/01, 23:30:00 due to battery failure an hour after the sonde was checked before deployment.

September 2001

Metoxit Point:

a) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

09/13/2001	23:00:00	0359
09/15/2001	23:00:00	0506
09/15/2001	23:30:00	0224
09/16/2001	00:30:00	0790
09/16/2001	01:00:00	0122
09/20/2001	18:30:00	0098
09/25/2001	02:30:00	0574
09/27/2001	06:00:00	0334

Menauhant:

a) No data were collected from 9/01/01, 00:00:00 through 9/18/01, 07:30:00 due to battery failure an hour after the sonde was checked prior to deployment on 8/28/01.

b) The following turbidity data were slightly negative and /or zero likely due to a slight calibration offset. These readings were not deleted.

09/18/2001	09:30:00	0000
09/18/2001	10:00:00	0000
09/18/2001	10:30:00	0000
09/18/2001	11:00:00	-0001
09/18/2001	12:30:00	0000
09/18/2001	13:00:00	0000
09/18/2001	13:30:00	0000
09/18/2001	14:00:00	0000
09/18/2001	17:30:00	0000
09/18/2001	23:00:00	0000
09/19/2001	01:00:00	0000
09/19/2001	02:00:00	0000

09/19/2001	05:30:00	0000
09/19/2001	06:00:00	0000
09/19/2001	06:30:00	0000
09/19/2001	13:30:00	0000
09/19/2001	16:00:00	0000
09/22/2001	04:00:00	0000
09/22/2001	04:30:00	0000
09/22/2001	13:30:00	0000
09/22/2001	14:00:00	0000
09/22/2001	14:30:00	0000
09/22/2001	16:00:00	0000
09/22/2001	16:30:00	-0001
09/22/2001	17:00:00	-0001
09/22/2001	17:30:00	0000
09/22/2001	18:00:00	0000
09/23/2001	05:00:00	0000
09/23/2001	06:00:00	0000
09/23/2001	06:30:00	0000
09/23/2001	07:00:00	0000
09/23/2001	08:00:00	0000
09/23/2001	08:30:00	0000
09/23/2001	09:00:00	0000
09/23/2001	14:30:00	0000
09/23/2001	15:00:00	0000
09/23/2001	15:30:00	0000
09/23/2001	17:00:00	0000
09/23/2001	18:00:00	0000
09/23/2001	18:30:00	0000
09/23/2001	19:00:00	-0001
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09/24/2001	02:00:00	0000
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09/24/2001	03:00:00	-0001
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09/24/2001	08:00:00	00000
09/24/2001	08:30:00	0000
09/24/2001	09:00:00	0000
09/24/2001	09:30:00	0000
09/24/2001	10:00:00	0000
09/24/2001	10:30:00	0000
09/24/2001	11:00:00	0000
09/24/2001	13:30:00	0000
09/24/2001	14:00:00	0000
09/24/2001	15:30:00	0000
09/24/2001	18:30:00	-0001
09/26/2001	08:30:00	0000
09/26/2001	09:00:00	-0001
09/26/2001	09:30:00	-0001
09/26/2001	10:00:00	0000
09/26/2001	10:30:00	0000

09/26/2001	11:30:00	0000
09/26/2001	12:00:00	0000
09/26/2001	13:00:00	0000
09/26/2001	21:30:00	0000
09/26/2001	23:30:00	0000
09/27/2001	09:00:00	0000
09/27/2001	09:30:00	0000
09/27/2001	10:00:00	0000
09/27/2001	11:00:00	0000
09/27/2001	12:30:00	0000
09/27/2001	13:00:00	-0001
09/27/2001	13:30:00	-0001
09/27/2001	14:00:00	0000
09/27/2001	14:30:00	0000
09/27/2001	18:30:00	-0001
09/27/2001	19:30:00	0000
09/27/2001	21:00:00	0000
09/27/2001	21:30:00	-0001
09/27/2001	22:00:00	-0001
09/27/2001	22:30:00	0000
09/27/2001	23:00:00	-0001
09/27/2001	23:30:00	0000
09/28/2001	00:00:00	0000
09/28/2001	02:30:00	0000
09/28/2001	06:30:00	0000
09/28/2001	08:00:00	0000
09/28/2001	09:30:00	0000
09/28/2001	10:00:00	0000
09/28/2001	10:30:00	0000
09/28/2001	11:00:00	0000
09/28/2001	11:30:00	0000
09/28/2001	12:00:00	-0001
09/28/2001	12:30:00	-0001
09/28/2001	13:00:00	-0001
09/28/2001	13:30:00	0000
09/28/2001	14:00:00	0000
09/28/2001	14:30:00	-0001
09/28/2001	17:30:00	0000
09/28/2001	18:00:00	0000
09/28/2001	18:30:00	0000
09/28/2001	19:00:00	-0001
09/28/2001	19:30:00	0000
09/28/2001	20:00:00	-0001
09/28/2001	20:30:00	0000
09/28/2001	21:00:00	0000
09/28/2001	21:30:00	0000
09/28/2001	22:00:00	-0001
09/28/2001	22:30:00	0000
09/28/2001	23:00:00	0000
09/28/2001	23:30:00	-0001
09/29/2001	00:00:00	0000
09/29/2001	07:00:00	0000
09/29/2001	07:30:00	0000
09/29/2001	10:00:00	0000

October 2001

Metoxit Point:

a) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

10/08/2001	20:00:00	0092
10/13/2001	04:30:00	0342
10/25/2001	18:30:00	0086
10/29/2001	03:00:00	0050
10/30/2001	05:00:00	0078

b) SUSPENSION EVENT-Southerly Winds: The following records include turbidity readings that were either outside the normal range, or spikes way above background. We believe these are real enough numbers (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.) during suspension events from southerly winds. Our criteria for flagging these data are values over 100NTU that are more than 5 times the magnitude of surrounding values, and linked to southerly winds. These readings were deleted.

10/28/2001	01:00:00	0234
10/28/2001	01:30:00	0136
10/28/2001	02:00:00	0124
10/28/2001	02:30:00	0599
10/28/2001	04:00:00	0586

Menauhant:

a) When sonde was retrieved on 10/16/01 after its two week deployment, a small fish was found stuck within the probe casing. The turbidity data from

10/13/01 02:00 until retrieval on 10/16/01 07:30 were way out of range.
When
checked the turbidity wiper was found to be stuck over the aperture. All
following turbidity data for the remainder of deployment period were
deleted.

b) The DO probe membrane suffered a catastrophic failure on 10/3/01.
All DO
data for the remainder of this deployment period are deleted.
10/03/01 21:00:00 to 10/16/01 07:30:00.

c) The following turbidity data were slightly negative and/or zero
likely
due to a slight offset during calibration. These readings were not
deleted.

10/01/2001	16:30:00	0000
10/01/2001	21:30:00	0000
10/02/2001	00:00:00	0000
10/02/2001	00:30:00	-0001
10/02/2001	03:30:00	0000
10/02/2001	04:00:00	0000
10/02/2001	04:30:00	0000
10/02/2001	05:00:00	0000
10/02/2001	08:00:00	0000
10/02/2001	22:00:00	0000
10/03/2001	10:00:00	0000
10/03/2001	13:30:00	0000
10/07/2001	19:30:00	0000
10/07/2001	21:00:00	0000
10/08/2001	16:30:00	0000
10/09/2001	02:00:00	0000
10/09/2001	06:00:00	0000
10/09/2001	07:00:00	0000
10/10/2001	06:30:00	0000
10/12/2001	19:00:00	0000
10/12/2001	20:00:00	0000
10/12/2001	20:30:00	0000
10/16/2001	08:00:00	0000
10/16/2001	08:30:00	0000
10/16/2001	09:00:00	0000
10/16/2001	09:30:00	0000
10/16/2001	11:30:00	0000
10/16/2001	14:00:00	0000
10/19/2001	02:00:00	0000
10/19/2001	10:30:00	0000
10/19/2001	11:00:00	0000
10/19/2001	12:00:00	0000
10/19/2001	18:00:00	0000
10/20/2001	03:00:00	-0001
10/20/2001	04:00:00	0000
10/20/2001	05:30:00	0000
10/20/2001	07:30:00	-0001

10/20/2001	13:30:00	0000
10/20/2001	14:30:00	-0001
10/20/2001	15:00:00	-0001
10/20/2001	15:30:00	0000
10/20/2001	16:00:00	0000
10/20/2001	17:30:00	0000
10/20/2001	20:00:00	0000
10/20/2001	23:00:00	0000
10/20/2001	23:30:00	0000
10/21/2001	00:00:00	0000
10/21/2001	00:30:00	0000
10/21/2001	01:30:00	0000
10/21/2001	02:00:00	0000
10/21/2001	02:30:00	0000
10/21/2001	03:00:00	0000
10/21/2001	03:30:00	0000
10/21/2001	04:00:00	-0001
10/21/2001	04:30:00	0000
10/21/2001	05:00:00	0000
10/21/2001	05:30:00	0000
10/21/2001	06:00:00	0000
10/21/2001	06:30:00	0000
10/21/2001	12:00:00	0000
10/21/2001	12:30:00	0000
10/21/2001	13:00:00	0000
10/21/2001	13:30:00	0000
10/21/2001	14:00:00	0000
10/21/2001	14:30:00	0000
10/21/2001	15:00:00	0000
10/21/2001	15:30:00	0000
10/21/2001	16:00:00	0000
10/21/2001	16:30:00	0000
10/21/2001	17:00:00	0000
10/22/2001	05:00:00	0000
10/22/2001	05:30:00	0000
10/22/2001	08:00:00	-0001
10/22/2001	09:30:00	0000
10/22/2001	13:00:00	0000
10/22/2001	16:00:00	0000
10/22/2001	16:30:00	0000
10/22/2001	17:00:00	-0001
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10/22/2001	23:30:00	0000
10/23/2001	00:30:00	0000
10/23/2001	01:00:00	0000
10/23/2001	01:30:00	-0001
10/23/2001	02:00:00	0000
10/23/2001	02:30:00	0000
10/23/2001	03:00:00	-0001
10/23/2001	03:30:00	0000
10/23/2001	04:00:00	0000

10/23/2001	04:30:00	0000
10/23/2001	05:00:00	-0001
10/23/2001	05:30:00	0000
10/23/2001	06:00:00	-0001
10/23/2001	06:30:00	-0001
10/23/2001	07:00:00	-0001
10/23/2001	07:30:00	-0001
10/24/2001	07:00:00	0000
10/24/2001	07:30:00	0000
10/24/2001	08:00:00	0000
10/24/2001	11:30:00	0000
10/24/2001	13:30:00	0000
10/24/2001	14:00:00	0000
10/24/2001	14:30:00	0000
10/24/2001	15:00:00	0000
10/24/2001	15:30:00	0000
10/24/2001	16:00:00	0000
10/24/2001	16:30:00	0000
10/24/2001	17:30:00	0000
10/24/2001	18:00:00	0000
10/24/2001	18:30:00	0000
10/24/2001	19:00:00	0000
10/24/2001	21:00:00	0000
10/24/2001	21:30:00	0000
10/24/2001	22:30:00	0000
10/24/2001	23:00:00	0000
10/24/2001	23:30:00	0000
10/25/2001	04:00:00	0000
10/25/2001	04:30:00	0000
10/25/2001	05:00:00	0000
10/25/2001	05:30:00	0000
10/25/2001	06:00:00	0000
10/25/2001	06:30:00	0000
10/25/2001	07:00:00	0000
10/25/2001	07:30:00	0000
10/25/2001	08:00:00	0000
10/25/2001	08:30:00	0000
10/25/2001	09:30:00	0000
10/25/2001	10:00:00	0000
10/25/2001	11:00:00	0000
10/25/2001	11:30:00	0000
10/25/2001	12:00:00	0000
10/25/2001	13:00:00	0000
10/26/2001	01:00:00	0000
10/26/2001	01:30:00	0000
10/26/2001	08:30:00	0000
10/26/2001	09:00:00	-0001
10/26/2001	09:30:00	0000
10/26/2001	10:00:00	0000
10/26/2001	10:30:00	0000
10/26/2001	11:00:00	0000
10/26/2001	11:30:00	0000
10/26/2001	12:00:00	0000
10/26/2001	13:00:00	0000

10/27/2001	02:00:00	0000
10/27/2001	09:00:00	0000
10/27/2001	10:00:00	0000
10/27/2001	10:30:00	0000
10/27/2001	11:30:00	0000
10/27/2001	13:30:00	-0001
10/27/2001	14:00:00	-0001
10/27/2001	14:30:00	0000
10/27/2001	21:30:00	0000
10/27/2001	22:00:00	-0001
10/27/2001	22:30:00	0000
10/27/2001	23:00:00	0000
10/27/2001	23:30:00	0000
10/28/2001	01:00:00	0000
10/28/2001	01:30:00	0000
10/28/2001	04:30:00	0000
10/28/2001	05:30:00	0000
10/28/2001	06:00:00	0000
10/28/2001	06:30:00	-0001
10/28/2001	07:00:00	0000
10/28/2001	07:30:00	-0001
10/28/2001	08:00:00	0000
10/28/2001	08:30:00	-0001
10/28/2001	09:30:00	0000
10/28/2001	10:00:00	-0001
10/28/2001	10:30:00	-0001
10/28/2001	11:00:00	-0001
10/28/2001	12:00:00	0000
10/28/2001	13:30:00	0000
10/28/2001	14:00:00	0000
10/28/2001	14:30:00	0000
10/28/2001	16:00:00	0000
10/28/2001	17:00:00	0000
10/28/2001	19:00:00	-0001
10/28/2001	19:30:00	-0001
10/28/2001	20:00:00	-0001
10/28/2001	20:30:00	-0001
10/28/2001	21:00:00	0000
10/28/2001	21:30:00	-0001
10/28/2001	22:00:00	0000
10/28/2001	22:30:00	-0001
10/28/2001	23:00:00	0000
10/28/2001	23:30:00	0000
10/29/2001	00:00:00	-0001
10/29/2001	00:30:00	-0001
10/29/2001	01:00:00	0000
10/29/2001	01:30:00	-0001
10/29/2001	02:00:00	-0001
10/29/2001	02:30:00	-0001
10/29/2001	03:00:00	-0001
10/29/2001	03:30:00	0000
10/29/2001	04:00:00	0000
10/29/2001	04:30:00	0000
10/29/2001	05:00:00	0000

10/29/2001	05:30:00	-0001
10/29/2001	06:00:00	-0001
10/29/2001	06:30:00	-0001
10/29/2001	07:00:00	-0001
10/29/2001	07:30:00	-0001
10/29/2001	08:00:00	0000
10/29/2001	08:30:00	-0001
10/29/2001	09:00:00	-0001
10/29/2001	10:00:00	-0001
10/29/2001	10:30:00	-0001
10/29/2001	11:00:00	-0001
10/29/2001	11:30:00	-0001
10/29/2001	12:00:00	-0001
10/29/2001	12:30:00	-0001
10/29/2001	13:00:00	-0001
10/29/2001	13:30:00	0000
10/29/2001	14:00:00	-0001
10/29/2001	14:30:00	-0001
10/29/2001	15:00:00	-0001
10/29/2001	15:30:00	-0001
10/29/2001	16:00:00	0000
10/29/2001	17:30:00	0000
10/29/2001	18:00:00	0000
10/29/2001	19:00:00	0000
10/29/2001	19:30:00	-0001
10/29/2001	20:00:00	-0001
10/29/2001	20:30:00	-0001
10/29/2001	21:00:00	-0001
10/29/2001	21:30:00	0000
10/29/2001	22:00:00	-0001
10/29/2001	22:30:00	-0001
10/29/2001	23:00:00	-0001
10/29/2001	23:30:00	-0001
10/30/2001	00:00:00	-0001
10/30/2001	00:30:00	-0001
10/30/2001	01:30:00	0000
10/30/2001	02:00:00	0000
10/30/2001	02:30:00	-0001
10/30/2001	03:00:00	-0001
10/30/2001	03:30:00	-0001
10/30/2001	04:00:00	0000
10/30/2001	04:30:00	0000
10/30/2001	05:00:00	0000
10/30/2001	05:30:00	-0001
10/30/2001	06:00:00	-0001
10/30/2001	07:30:00	-0001
10/30/2001	08:00:00	-0001
10/30/2001	08:30:00	-0001
10/30/2001	09:30:00	0000
10/30/2001	10:00:00	0000
10/30/2001	10:30:00	0000
10/30/2001	11:00:00	-0001
10/30/2001	11:30:00	-0001
10/30/2001	12:00:00	0000

10/30/2001	12:30:00	0000
10/30/2001	13:30:00	0000
10/30/2001	15:30:00	0000
10/30/2001	16:00:00	0000
10/30/2001	18:00:00	0000
10/30/2001	19:00:00	0000
10/30/2001	19:30:00	0000
10/30/2001	20:00:00	-0001
10/30/2001	20:30:00	-0001
10/30/2001	21:00:00	-0001
10/30/2001	21:30:00	-0001
10/30/2001	22:00:00	-0001
10/30/2001	22:30:00	0000
10/30/2001	23:00:00	0000
10/30/2001	23:30:00	-0001
10/31/2001	00:00:00	-0001
10/31/2001	00:30:00	-0001
10/31/2001	01:00:00	-0001
10/31/2001	01:30:00	-0001
10/31/2001	02:00:00	-0001
10/31/2001	02:30:00	-0001
10/31/2001	03:00:00	-0001
10/31/2001	03:30:00	0000
10/31/2001	04:00:00	0000
10/31/2001	05:00:00	0000
10/31/2001	05:30:00	0000
10/31/2001	06:00:00	0000
10/31/2001	06:30:00	0000
10/31/2001	07:00:00	0000
10/31/2001	07:30:00	0000
10/31/2001	08:00:00	0000
10/31/2001	08:30:00	-0001
10/31/2001	09:00:00	-0001
10/31/2001	09:30:00	-0001
10/31/2001	10:00:00	-0001
10/31/2001	10:30:00	-0001
10/31/2001	11:00:00	0000
10/31/2001	11:30:00	0000
10/31/2001	12:00:00	-0001
10/31/2001	12:30:00	0000
10/31/2001	13:00:00	0000
10/31/2001	13:30:00	0000
10/31/2001	14:00:00	0000
10/31/2001	15:30:00	0000
10/31/2001	19:30:00	0000
10/31/2001	22:00:00	0000

d) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

10/16/2001	21:30:00	0387
10/17/2001	02:30:00	0152

e) No data were recorded for 10/2/2001, 08:30:00 owing to retrieval/deployment operation (no sonde in the water at the time).

f) The DO probe membrane suffered a catastrophic failure on 10/16/01. All DO data for the remainder of this deployment period are deleted. This period extends from 10/16/01 23:30:00 to 10/30/01 08:30:00.

November 2001

Metoxit Point:

a) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

11/24/2001	06:00:00	0093
11/28/2001	20:00:00	0483

Menauhant:

a) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

11/18/2001	22:30:00	1796
11/20/2001	11:30:00	0237

b) Instrument #95B46179 did not record data for the following times for the deployment period 11/14/01 to 11/27/01. No data are available for these times.

11/21/01	08:30:00
11/21/01	09:00:00
11/23/01	05:30:00

c) The following turbidity data were slightly negative likely due to a slight offset during calibration. These readings were not deleted.

11/01/2001	05:00:00	-0001
11/01/2001	12:30:00	-0001
11/01/2001	13:00:00	-0001
11/03/2001	23:30:00	-0001
11/04/2001	02:30:00	-0001
11/04/2001	03:00:00	-0001
11/04/2001	03:30:00	-0001
11/04/2001	05:00:00	-0001
11/04/2001	05:30:00	-0001
11/04/2001	06:00:00	-0001
11/04/2001	07:00:00	-0001
11/04/2001	14:00:00	-0001
11/04/2001	14:30:00	-0001
11/04/2001	15:00:00	-0001
11/04/2001	15:30:00	-0001
11/05/2001	03:00:00	-0001
11/05/2001	07:30:00	-0001
11/05/2001	08:00:00	-0001
11/05/2001	08:30:00	-0001
11/05/2001	09:00:00	-0001
11/05/2001	12:30:00	-0001
11/05/2001	13:00:00	-0001
11/05/2001	15:00:00	-0001
11/05/2001	15:30:00	-0001
11/05/2001	16:00:00	-0001
11/05/2001	16:30:00	-0001
11/06/2001	04:00:00	-0001

11/06/2001	04:30:00	-0001
11/06/2001	08:30:00	-0001
11/06/2001	11:30:00	-0001
11/06/2001	14:30:00	-0001
11/06/2001	15:30:00	-0001
11/06/2001	16:00:00	-0001
11/06/2001	17:30:00	-0001
11/06/2001	18:00:00	-0001
11/06/2001	21:30:00	-0001
11/07/2001	02:00:00	-0001
11/07/2001	03:00:00	-0001
11/07/2001	04:00:00	-0001
11/07/2001	05:00:00	-0001
11/07/2001	05:30:00	-0001
11/07/2001	06:00:00	-0001
11/07/2001	07:30:00	-0001
11/07/2001	08:00:00	-0001
11/07/2001	08:30:00	-0001
11/07/2001	09:00:00	-0001
11/07/2001	09:30:00	-0001
11/07/2001	15:30:00	-0001
11/07/2001	17:00:00	-0001
11/07/2001	17:30:00	-0001
11/07/2001	18:00:00	-0001
11/08/2001	06:00:00	-0001
11/08/2001	07:00:00	-0001
11/08/2001	08:30:00	-0001
11/08/2001	09:00:00	-0001
11/08/2001	10:00:00	-0001
11/08/2001	18:00:00	-0001
11/08/2001	18:30:00	-0001
11/08/2001	19:00:00	-0001
11/09/2001	10:00:00	-0001
11/09/2001	11:30:00	-0001
11/09/2001	12:00:00	-0001
11/09/2001	19:00:00	-0001
11/09/2001	19:30:00	-0001
11/09/2001	23:00:00	-0001
11/10/2001	08:00:00	-0001
11/10/2001	08:30:00	-0001
11/10/2001	09:30:00	-0001
11/10/2001	11:00:00	-0001
11/10/2001	11:30:00	-0001
11/10/2001	12:00:00	-0001
11/10/2001	13:00:00	-0001
11/11/2001	08:30:00	-0001
11/11/2001	09:00:00	-0001
11/11/2001	09:30:00	-0001
11/11/2001	10:30:00	-0001
11/11/2001	11:00:00	-0001
11/11/2001	13:00:00	-0001
11/11/2001	13:30:00	-0001
11/11/2001	20:30:00	-0001
11/11/2001	21:00:00	-0001

11/11/2001	21:30:00	-0001
11/11/2001	22:30:00	-0001
11/11/2001	23:00:00	-0001
11/11/2001	23:30:00	-0001
11/12/2001	02:30:00	-0001
11/12/2001	06:30:00	-0001
11/12/2001	07:00:00	-0001
11/12/2001	07:30:00	-0001
11/12/2001	08:00:00	-0001
11/12/2001	09:00:00	-0001
11/12/2001	09:30:00	-0001
11/12/2001	10:00:00	-0001
11/12/2001	10:30:00	-0001
11/12/2001	11:00:00	-0001
11/12/2001	11:30:00	-0001
11/12/2001	12:00:00	-0001
11/12/2001	12:30:00	-0001
11/12/2001	13:00:00	-0001
11/12/2001	13:30:00	-0001
11/12/2001	19:30:00	-0001
11/12/2001	20:00:00	-0001
11/12/2001	20:30:00	-0001
11/12/2001	22:00:00	-0001
11/12/2001	22:30:00	-0001
11/12/2001	23:00:00	-0001
11/12/2001	23:30:00	-0001
11/13/2001	00:30:00	-0001
11/13/2001	01:30:00	-0001
11/13/2001	02:00:00	-0001
11/13/2001	02:30:00	-0001
11/13/2001	04:00:00	-0001
11/13/2001	05:00:00	-0001
11/13/2001	06:00:00	-0001
11/13/2001	06:30:00	-0001
11/13/2001	07:30:00	-0001
11/13/2001	08:00:00	-0001
11/13/2001	08:30:00	-0001
11/13/2001	09:00:00	-0001
11/13/2001	09:30:00	-0001
11/13/2001	10:00:00	-0001
11/13/2001	10:30:00	-0001
11/13/2001	11:00:00	-0001
11/13/2001	11:30:00	-0001
11/13/2001	12:00:00	-0001
11/13/2001	12:30:00	-0001
11/13/2001	13:00:00	-0001
11/13/2001	13:30:00	-0001
11/13/2001	14:00:00	-0001
11/13/2001	14:30:00	-0001
11/13/2001	15:00:00	-0001
11/13/2001	15:30:00	-0001
11/13/2001	20:30:00	-0001
11/13/2001	21:00:00	-0001
11/13/2001	22:00:00	-0001

11/13/2001	23:00:00	-0001
11/13/2001	23:30:00	-0001
11/14/2001	00:00:00	-0001
11/14/2001	00:30:00	-0001
11/14/2001	01:00:00	-0001
11/14/2001	02:00:00	-0001
11/14/2001	02:30:00	-0001
11/14/2001	03:00:00	-0001
11/14/2001	13:30:00	-0001
11/14/2001	14:30:00	-0001
11/14/2001	15:00:00	-0001
11/15/2001	04:30:00	-0001

December 2001

Metoxit Point:

a) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

12/29/2001	01:30:00	0142
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Menauhant:

a) BIOLOGICAL-RELATED TURBIDITY ANOMALIES: The following records include turbidity readings that were either outside of the normal range or spikes way above background. We believe these are real enough numbers (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), but are not associated with suspension events. 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.

12/15/2001 13:00:00

0057

b) There were several zero turbidity data from 12/05/01 21:00 - 12/31/01 01:00 that were likely due to a slight offset during calibration. These readings were not deleted.

12) Missing data:

Missing data are denoted by a period in the data set. 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-30.75ppt)	DO% (std-air)	pH (std-7.0)	Turbidity (std-0 NTU)
MP	04/10/01	30.72	96.9	7.10	0.6
	04/25/01	30.97	100.4	7.12	-0.4
	05/08/01	30.78	113.3	6.99	-0.2
	05/22/01	30.67	91.4	7.14	3.3
	06/05/01	30.97	105.2	7.03	0.5
	06/19/01	30.44	102.8	7.02	0.4
	07/03/01	30.52	94.9	7.01	0.6
	07/17/01	30.91	102.5	7.18	0.0
	08/01/01	30.33	133.1	7.07	0.5
	08/17/01	30.24	107.7	7.11	0.3
	08/29/01	31.73	62.9	7.03	0.4
	09/19/01	30.30	90.1	6.68	0.0
	10/02/01	30.17	80.5	7.04	-0.9
	10/16/01	30.78	102.5	7.08	0.0
	10/30/01	30.13	96.8	6.95	0.8
	11/15/01	30.57	99.3	7.03	0.6
	11/27/01	30.74	99.8	7.00	0.0
	12/12/01	30.55	101.4	7.01	0.2
	12/27/01	30.14	100.6	7.06	0.0

Site	Date	Salinity (ppt) (std-30.75ppt)	DO% (std-air)	pH (std-7.0)	Turbidity (std-0 NTU)
MH	04/10/01	29.63	93.0	6.86	0.5
	04/25/01	30.97	98.5	7.17	0.2
	05/08/01	30.95	106.1	6.86	0.9
	05/22/01	30.49	93.2	7.05	0.0
	06/05/01	31.26	85.0	6.67	1.8

06/19/01	29.85	72.2	7.10	0.3
07/03/01	30.09	90.4	6.76	0.7
07/17/01	31.20	93.3	7.08	0.7
07/31/01	28.95	103.4	6.98	0.7
08/17/01	29.40	24.2	7.07	-0.4
08/29/01	30.76	93.7	6.92	0.6
09/19/01	30.20	86.2	6.87	5.1
10/02/01	30.51	105.2	6.51	-0.3
10/16/01	30.50	107.8	7.01	1648.5
10/30/01	30.26	91.9	6.73	-0.3
11/15/01	29.89	101.8	6.98	0.0
11/27/01	29.97	103.9	7.07	0.8
12/12/01	30.39	94.6	6.91	0.0
12/27/01	30.25	97.4	7.00	0.2
01/16/02	33.28	104.6	7.15	-1.0

14) Other remarks/notes: None

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.

Our data is publicly available through our web site and we do not track its use.