WELLS (WEL) National Estuarine Research Reserve
April-December 1995 Water Quality Metadata Report
Latest Update: August 24, 1998

I. Data Set & Research Descriptors

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2. Entry verification:

The data are directly downloaded in the YSI-PC6000 format (as a .dat file) and the Comma
& ³ ³
Delimited format (as a .csv file) from the dataloggers to an IBM compatible lap-top (Epson
Equity LT-
286e). The data are reviewed using the PC6000 software. Graphs and basic statistics are
then generated
with the PC6000 program and the information is printed out for each data file. These graphs
are used to
determine any obvious data outliers and sonde and/or probe malfunction. All downloaded data
files from
the dataloggers (both raw unedited .dat and .csv files) are then transferred via disk to a Power
Mac 7100,
where all files are reviewed and formatted for CDMO and stored. Here the raw unedited .csv
data files
are imported into Microsoft Excel 5.0. After a complete month of data has been recorded,
each file is
ready to review which requires several steps. The NERR CDMO QA/QC Excel macros are
used for all
data. A data file is created (from the merged raw unedited .csv data files) in Excel format
with a full

month of data. The first step is to make sure that the parameter columns are in the correct order, specified by the NERR CDMO. If any parameters are not collected due to probe failure or other causes, the cells with this missing data are filled in with periods (.) and documented and explained in the appropriate section of the metadata. Secondly, missing dates and times are inserted in the data file where data were not collected due to maintenance, sonde failure, etc., and the cells with this missing data are filled in with periods (.) and documented and explained in the appropriate section of the metadata. The first NERR CDMO QA/QC Excel 5.0 macro is then run to determine if there are any missing dates and times; and if so these missing dates and times are inserted. Next, the second NERR CDMO QA/QC Excel 5.0 macro is used to find and filter all data readings outside the sonde specification measuring range for each parameter. Here the ³outlier² data generated by the second macro are examined and determined as either explained or unexplained anomalies, as specified by NERR CDMO Operations Manual. All anomalous data (explained and unexplained) are documented and explained in the appropriate sections of the metadata. The explained anomalous data are then removed from the data file and replaced by periods. The unexplained anomalous data are investigated for validity based on weather data, field observations, instrument diagnostics, and PC6000 printouts. If these data are rejected from the file then these are removed and replaced by periods. Lastly, the third and final NERR CDMO QA/QC Excel 5.0 macro is used to reformat all the columns in the data file to the correct number of significant digits. After this last step, once the file has been completely formatted and edited as specified by NERR CDMO, the

file is saved as a Tab delimited (.txt) text file and sent by FTP to the CDMO. The metadata form is also submitted with the data file to the CDMO. Scott Orringer is responsible for this task of entry verification with the analyses of suspect and anomalous data. Michele Dionne supervises, proofs and answers questions with the evaluation of suspect and anomalous data.

3. Research objectives:

The Webhannet River estuary is located in proximity to heavily used beaches in Wells, Maine. It has a shoreline that is highly developed with residential and commercial structures. The estuary receives water from a 14 sq. mi. watershed that is well forested. We are measuring variations in hydrologic variables in the Webhannet River estuary at the head of tide and at the inlet. Data from head of tide will integrate surface and ground water inputs (from both point and non-point sources) from the freshwater watershed into the estuary. Data from the inlet will integrate surface and ground water inputs from the freshwater watershed and the estuarine watershed. Differences in data between the head of tide and the inlet will indicate inputs from the estuarine portion of the watershed (on the ebb tide), and inputs from the Gulf of Maine on the flood tide. The instruments will track runoff events via salinity, and will measure pollutant-carrying sediment particles via turbidity. Our working hypothesis is that the freshwater watershed is the primary source of sediment and therefore potential NPS pollutants in the estuary. These two variables will indicate the potential for non-point source pollutants to enter the estuary, and whether they are of upland, estuarine or Gulf of Maine origin. Other variables measured by the data loggers (DO, temperature, pH, specific conductivity, and water level) will provide

important baseline data to track changes in the estuary's physico-chemical parameters over the long term. These variables can be affected by changes in human water use, and by natural or human induced changes in inlet and river channel morphology, climate, and organic loadings. The inlet site is heavily impacted at the Wells Harbor dock and is our long-term monitoring site. The head of tide site is relatively unimpacted, located just east of the Route One bridge, and is our ³roving² site.

4. Research Methods

The Wells NERR YSI monitoring program began in April 1995 at one site and May 1995 at a second site in the Webhannet River estuary. Both data loggers are installed with bottom moorings, as described below. Each data logger was placed in a 4 inch diameter, 2 1/2 ft. long PVC pipe housing for protection. Several holes were cut out near the bottom of the PVC pipe to allow water flow to the probes. There are three stainless steel bolts drilled into each PVC housing to hold the data logger in place. Two bolts near the top allow the YSI to hang by its bail and one bolt near the bottom is placed just under the sonde guard. Each PVC housing uses an underwater float and a surface buoy attached to the outer top bolt with 3 feet of rope. This allows the top end of the data logger to float freely while the probe-end is fixed to the bottom mooring. Before deployment, duct tape is used to keep bolt nuts secure and clean. Both data loggers have 1/4 inch vector mesh placed on the outside (using rubber bands) and bottom (using cable ties) of the sonde guard to prevent fouling.

The head of tide site (HT) uses a steel sign post (hammered about 1.5 ft) for a bottom mooring, and

two stainless steel clips are used to secure the probe-end of the data logger 0.45 meters (1.5 ft) off the bottom. One of these clips is attached to the sign post with a marine lock for security. A 4-lb. dansforth anchor is also clipped to the probe-end of the data logger with 20 ft of rope for secondary security measures.

The inlet site (IN) uses a 50 lb. mushroom anchor as a bottom mooring, with 15 ft of rope slack clipped and tied to the pier. The inlet site is secured at 2 meters (6.5 ft) off the bottom using a stainless steel link attached to the rope. The probe-end of the data logger was attached to this link with stainless steel clips (the buoys attached to other end of the housing). Beginning on December 14 at 13:30, after retrieval and calibration, the inlet data logger depth was changed and secured to 1.0 meter (3.28 ft) off the bottom, due to possible probe exposure at low tide.

Two to four week variable sampling periods were chosen due to limitations created by the life of the dissolved oxygen membrane and limited battery power. Measurements of temperature, specific conductivity, salinity, percent saturation, dissolved oxygen, pH, and water level are recorded at 15 minute intervals throughout the deployment period. After April 28 at 10:00, the logging interval was changed from 15 to 30 minutes (began logging every 30 minutes on 4/28 at 10:30).

After the deployment period, the data loggers are brought back into the Wells Reserve Laboratory for downloading, cleaning, and calibration. These procedures are carried out to the methods described in the YSI Operating Manual. Calibration standards are needed and used for only specific conductivity (10mS/cm) and pH (buffer solutions of pH 4, 7, and 10). Both standards are purchased from Fisher Scientific. The dissolved oxygen membranes are replaced and sit 6-24 hours before each

deployment.
After approximately 6-24 hours of down time for cleaning, maintenance and recalibration,
the YSI Data
loggers are redeployed for another sampling period.

5. Site location and character

The Wells National Estuarine Research Reserve is located in York County, within the
Town of Wells,
on the coast of southern Maine and faces the Atlantic Ocean. The Wells NERR is
approximately 31 km
(20 miles) south of Portland, Maine and 110 km (70 miles) north of Boston, Massachusetts.
The
Reserve encompasses 1,690 acres along the Gulf of Maine coastline of tidally-flushed
wetlands, riparian
and transitional upland fields and forests within the Little River Estuary and the larger
Webhannet River
Estuary. Both estuaries arise in the sandy glacial outwash plain about eight miles inland.
Both rivers
empty into Wells Bay, a sandy basin stretching for approximately ten miles along the
Atlantic coast.
Bordering each river¹s inlet are double spit barrier beaches attached to the mainland. The
backbarrier
system is approximately 5 sq. km and is composed of large intertidal marshes (predominantly
S. patens
and S. alterniflora), intertidal sand and mud flats, and tidal channels. The watershed for the
Webhannet
River estuary covers an area of 35 sq. km and has a total of 6 streams, brooks or creeks
which enter the
estuary. These tributaries flow across sand and gravel deposits near the headwaters and the
impermeable
sandy muds of the Presumpscot Formation in the lower reaches. The Webhannet River is
connected to
the ocean via Wells Inlet, which has a spring tidal prism of 28,200,000 m3 (Ward 1993).
The force and volume of tidal action affect the salinity level of both rivers. In the Wells
region, the

annual mean wave height is almost 20 inches. The estuarine system is dominated by semi-diurnal tides having a range of 8.5 to 9.8 feet. The volume of freshwater influx into both estuaries is moderate to low (on the order of 0.5 cubic meters/second), especially in the summer, because of the rivers¹ relatively small drainage areas and the presence of deep glacial deposits. The relatively low flows from these two rivers taken in with the 20 inch per year average runoff of the area surrounding the estuaries combine to form a fresh water flow which is dwarfed by tidal flushing. Twelve-foot tides dwarf the freshwater flow into the Webhannet estuary, which has a drainage area of 14.1 square miles. The Webhannet estuary, fed by both Blacksmith and Depot Brooks, is adjacent to the harbor and greatly developed land. It offers a valuable opportunity for comparison with the relatively pristine Little River estuary. The land use of the Webhannet estuary include a total of 15% for wetland, fresh water, and tidal marsh; a total of 63.7 % for woodland; and a total of 18.6% for developed land (compared to a total of 5.7% development in the Little River estuary) (WNERR RMA 1996; Holden 1997).

There are two sampling sites in the Webhannet River estuary. These are located at the head of tide and at the inlet. The tidal range at both of these sites is 2.6-2.9 meters.

The head of tide site is located 4 miles south of the Wells Reserve, just downstream of the Webhannet Falls (freshwater) and 10 feet east of Route One (43 deg 17¹ 00² Latitude, 70 deg 35¹ 30² Longitude). Route One is used heavily with traffic all year, especially during the summer tourist months. This site has soft mud, sand, and a rocky substrate, and the low and high tide depth is relatively shallow. The salinity range here is 0-31 ppt, with a mean of 3.6 ppt. These head waters of the Webhannet are

relatively undeveloped. This site is located just 10 feet east of the Route One bridge, and is our ³roving² site.

The inlet site is located 1.5 miles south of the Wells Reserve, at the Wells Harbor pier (43 deg 19¹ 12² Latitude, 70 deg 33¹ 50² Longitude). The mouth of the Webhannet estuary forms an extensive wetland/salt marsh area which is surrounded by development. Wells Harbor, which was most recently dredged in 1971, has moorings for approximately 200 commercial fishing and recreational boats. The mouth of the river flows between two jetties to the Atlantic Ocean. This channel was dredged in 1974. This site has a predominately sand substrate and is characterized by strong current during incoming and outgoing tides. The salinity range here is 7-35 ppt, with a mean of 31 ppt. The inlet site is heavily impacted at the Wells Harbor dock and is our long-term monitoring site.

6. Data collection period:

The Webhannet River head of tide (HT) site data collection began April 4, 1995, 10:30:00, and was pulled December 14, 1995, 10:00:00, for the winter months to prevent ice damage. This site gets a large amount of ice coverage from December through late March.

The Webhannet River inlet (IN) site data collection began May 29, 1995, 13:00:00. The IN datalogger will be ongoing throughout the year and is considered our long-term monitoring site, as this site remains relatively ice-free.

7. Associated researchers and projects

The Research Program¹s volunteer water quality monitoring program (W.E.T.) has been monitoring fecal coliform contamination and other water quality parameters in the estuaries since 1991. W.E.T.

(Watershed Evaluation Team) was established to characterize and monitor the aquatic environment of the Little and Webhannet River estuaries. This program allows students from local schools and volunteers to participate in ³hands-on² scientific research and management activities at the Reserve. Information yielded by this effort is valuable as baseline data for research conducted at the Reserve and may help in guiding current management priorities. Reserve staff with W.E.T. volunteers and students, working with the Town of Wells and the Maine Department of Marine Resources (DMR), have recently opened selected shellfish beds in the Webhannet River after seven years of closure. This was a direct result of monitoring fecal coliform contamination (and other water quality parameters), which is the major source of non-point source pollution in southern Maine. W.E.T. is part of a National Monitoring Program called Estuary-Net. This program allows students to share their data and compare their results with other monitoring groups via the web.

University of New Hampshire researchers completed a year long monitoring project measuring the volume, nutrient concentrations, and total suspended solids of freshwater discharge into the Webhannet River estuary, relating these inputs to precipitation, and measuring their effects on estuarine water quality; using a hydrolab. Research staff and students have completed a four year study of hydrology and vegetation of a degraded Webhannet River marsh recovering from roadway impoundment after restoration of tidal flow. In June of 1994, Reserve research staff and students completed an 18 month survey of larval fish distribution and abundance in the Wells Reserve¹s estuaries and in the near-shore waters of Wells Bay. University of New Hampshire researchers are working with eelgrass beds

in Wells
Embayment to develop criteria for siting and evaluating eel grass restoration projects. Both
salt marsh
and eelgrass are thought to be important habitats for many Gulf of Maine fishes. University
of Maine
Machias is collaborating with Reserve staff to determine the status of the soft-shell clam
resource in the
Reserve¹s estuaries. Reserve staff are working with the Maine Dept. of Environmental
Protection to
survey the dissolved oxygen status of 25 estuaries throughout Maine, using data sondes to
measure
oxygen depletion as an indicator of non-point source pollution (Coastal Hypoxia Study).

-Other publications/reports including the above sited ones:

Bryan, R., M.Dionne, R. Cook, J. Jones and A. Goodspeed (1997) Maine citizens guide to
evaluating,
restoring, and managing tidal marshes. Maine Audubon Society, Falmouth, ME.

Burdick, D., M.Dionne, R.Boumans and F.Short (1997) Ecological responses to tidal
restoration in
two New England salt marshes. Wetlands Ecology and Management 4:129-144.

Hoffman, C. 1997. Drakes Island Marsh Restoration Project Report. Contracted out by the
Wells
NERR.

Holden, W.F. 1997. Fresh water, suspended sediment and nutrient influx to the Little River
and
Webhannet River Estuaries, Wells, Maine. Ph.D. dissertation, Boston University. pp
1-179

Ward, L. G. 1993. Precipitation, streamflow, and water characteristics (physical and
chemical) of the
Webhannet River Estuary, Wells, Maine. Draft final report by UNH, Jackson Estuarine
Laboratory,
Durham, NH. NOAA Technical Memorandum, pp. 1-13.

WNERR RMA 1996. Wells NERR Management Plan. Prepared by the WNERR

Management
Authority (RMA) and NOAA, SRD Division. pp. 1-120.

II. Physical Structure Descriptors

8. Variable sequence, range of measurements, units, resolution, and accuracy:

YSI 6000 datalogger

Variable Name	Range of Measurements (units)	Resolution	Accuracy
Date	1-12, 1-31, 00-99 (Mo, Day, Yr)	1 month, 1 day, 1 year	NA
Time	0-24, 0-60, 0-60 (Hr, Min, Sec)	1 hr, 1 min, 1 s	NA
Temp	-5 to 45 (deg C)	0.01 C	+/-0.15 C
SpCOND	0-100 (mS/cm)	0.01 mS/cm	+/-0.5% of reading+ 0.001 mS/cm
Salinity	0-70 parts per thousand (ppt)	0.01 ppt	+/- 1.0% of reading or 0.1 ppt, (whichever is greater)
DOsat	0-200 (% air Saturation)	0.1% @air saturation	+/-2% @air sat.
DOsat	200-500 (% air Saturation)	0.1% @air saturation	+/-6% @air sat.
Domg	0-20 (mg/l)	0.01 mg/l	+/-0.2 mg/l
DOmg	20-50 (mg/l)	0.01 mg/l	+/-0.6 mg/l
Depth (shallow)	0-9.1 (m)	0.001 m	+/- 0.018 m
pH	2-14 (units)	0.01 units	+/-0.2 units
Turbidity*	0-1000 NTU	0.1 NTU	+/-5% of

reading or

2 NTU, (whichever is greater)

Data columns are separated by tabs
*Turbidity not measured in 1995

9. Coded variable indicator and variable code definitions:

Site definitions:HT = Head of Tide of Webhannet River
IN = Inlet at Webhannet River Mouth

File definitions: YSI deployment site/month/year (ex.: IN0795 = Webhannet Inlet data from
July 1995).

10. Data anomalies:

April, 1995 Sampling Period
Head of Tide:
No dissolved oxygen data or percent saturation data on 4/20 03:30 to 4/28 10:00 due to a
suspected DO
membrane puncture. All DOmg and DOsat data, after a certain point, decreased
steadily until
reaching values of 0.0. These data were suspect and deleted.
Inlet: Sonde not deployed until May.

May, 1995 Sampling Period
None to report.

June, 1995 Sampling Period
Head of Tide: None to report.
Inlet:
No data on 6/8 10:30 to 14:00 due to suspect of sonde probes being out of the water. This
was a period
with episodes of negative depth, low conductivity, and low salinity. All data were
suspect and
deleted.

July, 1995 Sampling Period
Head of Tide:
No pH data on 7/10 0:00 to 7/31 23:30 due to a pH probe crash. pH data steadily decreased
to suspect
data, and the probe could not be recalibrated upon return to the lab.

No pH data on 7/12 0:00 to 7/31 23:30 due to pH probe crash. pH data steadily decreased to
suspect
data, and the probe could not be recalibrated upon return to the lab.
Inlet:
No pH data on 7/10 0:00 to 7/31 23:30 due to a pH probe crash.

August, 1995 Sampling Period
Head of Tide:
No pH data on 8/1 0:00 to 8/31 23:30 due to a pH probe crash. We were waiting for probe
replacement.
Inlet:
No pH data on 8/1 0:00 to 8/31 23:30 due to a pH probe crash. We were waiting for probe
replacement.

September, 1995 Sampling Period
Head of Tide:
No pH data on 9/1 0:00 to 9/8 8:00 due to a pH probe crash. We were waiting for probe
replacement.
Inlet:
The following data are missing due to negative depths. The sonde probes are suspected to be
out of the
water at extremely low tides. This was a period with episodes of low conductivity and
low salinity.
All data were suspect and deleted.
9/23 3:00 to 4:30
9/26 17:00 to 19:00
9/27 5:30 to 7:00; 17:30 to 20:00
9/28 6:00 to 8:00
The following data are missing due to shallow depths. The sonde probes are suspected to be
out of the water at
extremely low tides. This was a period with episodes of low conductivity and low
salinity. All data were
suspect and deleted.
9/20 1:00 to 1:30
9/22 3:30
9/23 15:00 to 17:00
9/24 3:30 to 5:00; 15:30 to 17:30
9/25 4:00 to 6:00; 16:00 to 18:30
9/26 4:30 to 6:30
9/28 18:00 to 21:00
9/29 7:00 to 8:30; 19:00 to 22:00
9/30 8:00 to 9:30; 20:00 to 23:00
The following depth data are negative, but sonde probes suspected to be underwater as other
parameters check
out normal. These data were not deleted.

9/22 15:00 to 15:30
9/26 19:30
9/27 5:00; 7:30

October, 1995 Sampling Period
Head of Tide:
No data from 10/29 12:00 to 10/31 11:30 due to a pulled datalogger and moorings by Wells
Police.
Wells Police removed datalogger and PVC shell from water to identify (mooring, buoys and all), and
brought back to Wells NERR over the weekend. Since the datalogger was taking dry readings on our
lab floor all weekend, we chose to delete the suspect data, although these data looked very interesting!
Inlet:
No data on 10/1 22:00 to 23:30 due to negative depths. The sonde probes are suspected to be out of water at
extremely low tides. This was a period with episodes of low conductivity and low salinity. All data were
suspect and deleted.
The following data are missing due to shallow depths. The sonde probes are suspected to be out of water
at extremely low tides. This was a period with episodes of low conductivity and low salinity. All
data were suspect and deleted.
10/1 9:00 to 10:00; 21:30
The depth data on 10/2 10:30 to 11:00 are negative, but sonde probes suspected to be underwater as other
parameters check out normal. These data were not deleted.

November, 1995 Sampling Period
Head of Tide:
No dissolved oxygen data or percent saturation data on 11/3 0:00 to 11/26 23:00 due to a suspected
DO membrane puncture. All DOmg and DOsat data, after a certain point, decreased steadily until
reaching values of 0.0, and then fluctuated greatly. These data were suspect and deleted.
Inlet:
The following data are missing due to negative depths. The sonde probes are suspected to be out of

water at extremely low tides. This was a period with episodes of low conductivity and
low salinity.
All data were suspect and deleted:
11/8 17:00
11/9 9:00

December, 1995 Sampling Period
None to report.

11. Missing data:

April, 1995 Sampling Period
Head of Tide:
No data on 4/1 0:00 to 4/4 10:15; this was the first logger deployment (4/4 at 10:30) at this
site.
No turbidity data 4/4 10:30 to 4/30 23:30; as turbidity probe was not deployed.
No data on 4/6 10:45 to 15:15 due to downtime for calibration, maintenance and
downloading.
No data on 4/15 15:45 to 4/17 15:00 due to downtime for calibration, maintenance and
downloading.
No dissolved oxygen data or percent saturation data on 4/20 03:30 to 4/28 10:00 due to a
suspected
DO membrane puncture.
No data on 4/28 10:15 to 12:45 due to downtime for calibration, maintenance and
downloading.
Missing data at each 00:15:00 and 00:45:00 from 4/28 13:15 to 4/30 23:45 (recommended
by CDMO;
see Section 12).

Inlet:
No data in April; sonde not deployed until May.

May, 1995 Sampling Period
Head of Tide:
No turbidity data 5/1 0:00 to 5/31 23:30; as turbidity probe was not deployed.
No data on 5/12 13:00 to 16:00 due to downtime for calibration, maintenance and
downloading.
No data on 5/27 15:00 to 17:00 due to downtime for calibration, maintenance and
downloading.
Inlet:
No data on 5/1 0:00 to 5/29 12:30; this was the first logger deployment (5/29 at 13:00) at

this site.
No turbidity data 5/29 13:00 to 5/31 23:30; as turbidity probe was not deployed.

June, 1995 Sampling Period
Head of Tide:
No turbidity data 6/1 0:00 to 6/30 23:30; as turbidity probe was not deployed.
No data on 6/11 18:00 to 6/12 13:30 due to downtime for calibration, maintenance and
downloading.
No data on 6/29 09:00 to 14:00 due to downtime for calibration, maintenance and
downloading.
Inlet:
No turbidity data 6/1 0:00 to 6/30 23:30; as turbidity probe was not deployed.
No data on 6/8 10:30 to 14:00 due to suspect of sonde probes being out of the water.
No data on 6/12 13:30 to 17:00 due to downtime for calibration, maintenance and
downloading.
No data on 6/29 09:30 to 14:00 due to downtime for calibration, maintenance and
downloading.

July, 1995 Sampling Period
Head of Tide:
No turbidity data 7/1 0:00 to 7/31 23:30; as turbidity probe was not deployed.
No pH data on 7/12 0:00 to 7/31 23:30 due to pH probe crash.
No data on 7/18 10:00 to 12:30 due to downtime for calibration, maintenance and
downloading.
Inlet:
No turbidity data 7/1 0:00 to 7/31 23:30; as turbidity probe was not deployed.
No pH data on 7/10 0:00 to 7/31 23:30 due to a pH probe crash.
No data on 7/12 16:00 to 7/17 17:00 due to a needed DO probe for other state project. The
Maine DEP DO probe failed and we
needed to use ours for this other study. We can compare this missing data to UNH¹s
water quality
monitoring (hydrolab was used) at the Webhannet inlet the previous year (also see #7
above).
(Coastal Hypoxia
Study-see associated researchers and projects (#7 above)).

August, 1995 Sampling Period
Head of Tide:
No turbidity data 8/1 0:00 to 8/31 23:30; as turbidity probe was not deployed.

No pH data on 8/1 0:00 to 8/31 23:30 due to a pH probe crash.
No data on 8/11 10:30 to 17:30 due to downtime for calibration, maintenance and
downloading.
Inlet:
No turbidity data 8/1 0:00 to 8/31 23:30; as turbidity probe was not deployed.
No pH data on 8/1 0:00 to 8/31 23:30 due to a pH probe crash.
No data on 8/11 10:30 to 17:30 due to downtime for calibration, maintenance and
downloading.
No data on 8/12 12:00 8/31 23:30 due to a battery crash. No data were recorded.

September, 1995 Sampling Period
Head of Tide:
No pH data on 9/1 0:00 to 9/8 8:00 due to a pH probe crash.
No data on 9/8 8:30 to 13:00 due to downtime for calibration, maintenance and
downloading.
No turbidity data 9/1 00:00 to 9/30 23:30; as turbidity probe was not deployed.
Inlet:
No data from 9/1 0:00 to 9/8 13:00 due to a battery crash (continued from mid August,
1995).
No turbidity data 9/8 13:30 to 9/30 23:30; as turbidity probe was not deployed.
The following data are missing due to negative depths. The sonde probes are suspected to be
out of
water:

9/23 3:00 to 4:30
9/26 17:00 to 19:00
9/27 5:30 to 7:00; 17:30 to 20:00
9/28 6:00 to 8:00

The following data are missing due to shallow depths. The sonde probes are suspected to be
out of
water:

9/20 1:00 to 1:30
9/22 3:30
9/23 15:00 to 17:00
9/24 3:30 to 5:00; 15:30 to 17:30
9/25 4:00 to 6:00; 16:00 to 18:30
9/26 4:30 to 6:30
9/28 18:00 to 21:00
9/29 7:00 to 8:30; 19:00 to 22:00
9/30 8:00 to 9:30; 20:00 to 23:00

October, 1995 Sampling Period
Head of Tide:
No turbidity data 10/1 0:00 to 10/31 23:30; as turbidity probe was not deployed.

No data on 10/2 14:00 to 18:00 due to downtime for calibration, maintenance and downloading.
No data on 10/24 7:30 to 17:00 due to downtime for calibration, maintenance and downloading.
No data on 10/29 12:00 to 10/31 11:30 due to a pulled datalogger and moorings by Wells Police.
Inlet:
No turbidity data 10/1 0:00 to 10/31 23:30; as turbidity probe was not deployed.
The following data are missing due to shallow depths. The sonde probes are suspected to be out of water:
10/1 9:00 to 10:00; 21:30
No data on 10/1 22:00 to 23:30 due to negative depths. The sonde probes are suspected to be out of water.
No data on 10/2 14:00 to 18:00 due to downtime for calibration, maintenance and downloading.
No data on 10/24 7:30 to 17:00 due to downtime for calibration, maintenance and downloading.

November, 1995 Sampling Period
Head of Tide:
No turbidity data 11/1 0:00 to 11/30 23:30; as turbidity probe was not deployed.
No dissolved oxygen data or percent saturation data on 11/3 0:00 to 11/26 23:00 due to a suspected DO membrane puncture.
No data from 11/26 23:30 to 11/27 11:30 due to downtime for calibration, maintenance and downloading.
Inlet:
No turbidity data 11/1 0:00 to 11/30 23:30; as turbidity probe was not deployed.
The following data are missing due to negative depths. The sonde probes are suspected to be out of water:
11/8 17:00
11/9 9:00
No data on 11/21 11:00 to 14:30 due to downtime for calibration, maintenance and downloading.

December, 1995 Sampling Period
Head of Tide:

No turbidity data 12/1 0:00 to 12/14 9:30; as turbidity probe was not deployed.
No data on 12/14 10:00 to 12/31 23:30. This datalogger was pulled for the year (winter months) to prevent ice damage.
Inlet:
No turbidity data 12/1 0:00 to 12/31 23:30; as turbidity probe was not deployed.
No data on 12/14 10:00 to 13:00 due to downtime for calibration, maintenance and downloading.

12. Other Remarks/Notes:

-After April 28 at 12:45, the logging interval for the head of tide site (inlet site logger not deployed yet) was changed from 15 to 30 minutes (began logging every 30 minutes on 4/28 at 13:00). However, to create a full month data file at 15 minute intervals (recommended by CDMO); there are missing data at each 00:15:00 and 00:45:00 from 4/28 13:15 to 4/30 23:45.

-No inlet data on 7/12 16:00 to 7/17 17:00 due to a needed DO probe for other state project (Coastal Hypoxia Study-see associated researchers and projects (#7 above)). The Maine DEP DO probe failed and we needed to use ours for this other study. We can compare this missing data to UNH¹s water quality monitoring (hydrolab was used) at the Webhannet inlet the previous year (also see #7 above).

-No head of tide data from 10/29 12:00 to 10/31 11:30 due to a pulled datalogger and moorings by Wells Police. Wells Police removed datalogger and PVC shell from water to identify (mooring, buoys and all), and brought back to Wells NERR over the weekend. Since the datalogger was taking dry readings on our lab floor all weekend, we chose to delete the suspect data, although these data looked very interesting!

-Beginning on December 14 at 13:30, after retrieval and calibration, the inlet data logger depth was changed and secured to 1.0 meter (3.28 ft) off the bottom, due to possible probe exposure at low tide.

-The inlet time variable changed during the time frame on 11/8 17:00 to 11/21 10:30. During this period, the time changed from 17:00:00=17:01:31, 17:30:00=17:31:31, etc., to 10:30:00=10:31:31 on 11/21. On 11/21 15:00, after calibration, the time was back to normal. This time differential was deleted during the strange time frame occurrence and changed back to normal for graphing and analysis purposes.

-Turbidity measurements began at both sites in 1996.