

Padilla Bay (PDB) NERR Water Quality Metadata
January - December 2002
Latest Update: July 1, 2021

I. Data Set & Research Descriptors

1) Principal investigator & contact persons:

Address: Padilla Bay NERR
10441 Bayview-Edison Road
Mount Vernon, WA 98273-9668

Contact Persons:

Dr. Douglas Bulthuis, Research Coordinator
phone: (360) 428-1558; email: bulthuis@padillabay.gov
Robin Cottrell, Lab Manager
phone: (360) 428-1558; email: cottrell@padillabay.gov

2) Entry verification:

The data are downloaded from the YSI 6600s to a Windows based PC. Graphs of all data are printed using EcoWatch software and are examined for suspect, anomalous, or outlying data. The files are then exported as .csv files and the CDMO macros are used for final formatting and a second check for outliers and missing data. The CDMO cdmomac3.xls macro allows 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 (outliers). The CDMO import.xls macro allows PC users with 30-minute data to automatically create a monthly Excel file from a two-week deployment and insert periods for missing data. It also has a graphing capability that allows users to produce single parameter and missing data point graphs on a monthly basis. After formatting the data, some files are more closely checked for anomalies in DeltaGraph Pro(r). Edited and raw files are archived on a PC hard drive and on a Macintosh hard drive at Padilla Bay NERR. This process of entry verification was completed by Robin Cottrell for the 2002

data. Final verification and this metadata documentation were completed by Robin Cottrell and Douglas Bulthuis.

3) Research objectives:

The Bay View Channel site has been set out to detect and monitor short-term variability and long-term changes in the south end of Padilla Bay. The Ploeg Channel site has been set out to detect and monitor short-term variability and long-term change in the north end of Padilla Bay to contrast and compare to the south end. The Joe Leary Slough site has been set at the mouth of the slough to measure the effects of tidal "closure" of the tide gates on water in the slough and to detect long-term changes in water quality in the slough associated with an implementation of a non point source pollution watershed action plan. Measurements are taken every 30 minutes at all sites unless otherwise noted in data anomalies.

4) Research methods:

YSI 6600 dataloggers were deployed in Joe Leary Slough in a vertical position, 1.7 m from the bottom of the slough in a 4 in. diameter PVC pipe with a metal bar secured at the bottom as a stop. That portion of pipe around the sensors is cut out so that only two one-inch wide strips of deployment pipe remain around the sensor guard to allow water circulation around the probes. The PVC pipe is attached to a steel pipe that was driven into the sediment. (This slough was dredged in the fall of 2000 so the area of deployment is much deeper than it had been the previous 5 years. To keep the data comparable the YSI is deployed at the same height relative to Mean Sea Level.)

YSI 6600 dataloggers were deployed in Padilla Bay in a tributary of Bayview Channel. They were deployed using the same design as that in Joe Leary Slough, except that the PVC pipe was attached to two steel pipes. To keep marine fauna from interfering with operation of the sensors "Gutter Guard" (a sheet of

plastic 1/4 inch mesh) is formed into a cylinder to fit inside the sensor guard.

The depth of the YSI was -1.1 m (depth below MLLW) and about 0.75 m above the bottom along the sloping edge of a small channel draining the surrounding intertidal flats.

YSI 6600 dataloggers were deployed in Ploeg Channel using the same design as that in Bayview Channel including the use of mesh to protect the sensors. The depth of the YSI was 0.5 m above the bottom along the sloping edge of a channel draining the surrounding intertidal flats.

In all cases, measurements of temperature, specific conductivity, salinity, percent saturation of dissolved oxygen, depth, pH and turbidity are recorded every half hour. At the end of each deployment, the YSI 6600 is brought back into the laboratory for downloading, cleaning, and recalibration. Before final cleaning and recalibration a post-deployment check is done that consists of recording sensor readings in the standard solutions. The results of these checks are used to help evaluate the validity of the logged data.

All calibrations are conducted according to the protocols in the YSI Environmental Operations Manual for the 6-Series Environmental Monitoring Systems. For the conductivity calibration, a conductivity standard of 50 mS/cm was used. The pH calibration is a 2-point calibration using standard buffer solutions with a pH of 7 and 10. The KCl solution and Teflon membrane on the dissolved oxygen probe are changed prior to each YSI 6600 deployment and the new oxygen membrane is allowed to stabilize overnight in water saturated air before calibration. A 2-point calibration is used for the turbidity probe and the wiper pad is changed prior to each deployment. The standards used are distilled/deionized water for zero and 4000 NTU Formazin solution diluted to 100 NTU.

5) Site location and character:

General: Padilla Bay (48° 30' N; 122° 30' W) is a shallow embayment in northern Puget Sound. The tide flats are dominated by the eelgrass *Zostera marina*, which

covers approximately 3,000 ha. *Zostera japonica*, a recent invader to the region, now covers about 350 ha of the bay. Tides in Padilla Bay are mixed semi-diurnal with a mean range of 1.55 m. Salinity in the bay varies from about 15 to 30 PSU.

Padilla Bay is an "orphaned" estuary in that the Skagit River no longer empties directly into it. Most of the land in the 9300 ha Padilla Bay watershed is agricultural, and is drained by four sloughs which empty into the bay. The salinity in Padilla Bay reflects both the sloughs that flow into the bay and the greater Puget Sound-Georgia Basin estuary in which Padilla Bay is located. Major freshwater flows into this area of the Puget Sound-Georgia Basin estuary come from the Fraser and Nooksack Rivers to the north and from the Skagit River to the south.

Joe Leary Slough Site: (48° 31' 05.3" N; 122° 28' 22.8" W) Joe Leary Slough drains land that is predominantly annual crop agriculture and pasture land with some low-density housing. The slough is characterized by high fecal and nutrient inputs, high turbidity, and low dissolved oxygen concentrations. During the summer, there is low flow and the depth ranges from 0.5-1.5 m. During winter flooding, the slough can reach a depth of 4 m. There is a dam at the mouth of the slough with twelve 4 ft. diameter outfall pipes that have one-way hinged tide gates. Upstream water flows out of Joe Leary Slough when water height in Padilla Bay is lower than water height in Joe Leary Slough (i.e. ebbing tide and low water). Some saline water from Padilla Bay seeps through the tide gates during high water, salinity at this site can vary from 0 to 30 PSU. The bottom of the slough is composed of very soft sediment, which is periodically dredged, most recently October 2000. The deployment site is on the freshwater side of the tide gates. The latitude/longitude were measured with a Trimble GeoExplorer II and differentially corrected with post processing providing a manufacturer's stated accuracy of ± 5 m.

Bayview Channel Site: (48° 29' 46.6" N; 122° 30' 01.8" W) Bayview Channel, a major Padilla Bay tributary/distributary, floods and drains intertidal flats including eelgrass beds, mats of macroalgae, and flats without macro-vegetation. The YSI 6000 or 6600 is located in a tributary channel to Bayview Channel. The tributary drains predominately eelgrass (*Zostera marina* and *Z. Japonica*) covered intertidal flats. Bottom sediments beneath the deployment site are fine silt and clay overlying sand, depth at this site ranges from about 0.75 to 5 m. Pollutants entering the bay include general non-point source, agricultural non-point source, and fecal coliform bacteria from agriculture, failing septic tanks and wildlife. The latitude/longitude were measured with a Trimble GeoExplorer II and differentially corrected with post processing providing a manufacturer's stated accuracy of ± 5 m.

Ploeg Channel Site: (48° 33' 23.5" N; 122° 31' 46.7" W) Ploeg Channel floods and drains intertidal flats at the north end of Padilla Bay that are comprised of mud flats and eelgrass beds (*Zostera marina* and *Z. Japonica*) in approximately equal amounts. Bottom sediments beneath the deployment site are sandy without macro vegetation, depth at this site ranges from about 0.75 to 5m. Pollutants entering the bay include general non-point source, agricultural non-point source, and fecal coliform bacteria from agriculture, failing septic tanks and wildlife. The latitude/longitude were measured with a Trimble GeoExplorer II and differentially corrected with post processing providing a manufacturer's stated accuracy of ± 5 m.

6) Data collection period: Data collection was continuous from January 1 to December 31 at all the sites sampled this year.

Deployment and retrieval times are listed below. The times indicate the first and last measurements made with each deployment. (Deployments using the new 6600EDS sonde are noted with EDS.)

BEGAN

ENDED

Bayview Channel Site

12/19/01, 15:00:00	01/15/02, 11:30:00
01/15/02, 12:30:00	01/31/02, 10:30:00
01/31/02, 11:00:00	02/12/02, 14:00:00
02/12/02, 14:30:00	02/26/02, 08:30:00
02/26/02, 09:30:00	03/22/02, 09:30:00
03/22/02, 10:00:00	04/04/02, 09:00:00
04/04/02, 09:30:00	04/18/02, 09:00:00
04/18/02, 09:30:00	05/10/02, 14:30:00
05/10/02, 15:00:00	05/22/02, 12:00:00
05/22/02, 12:30:00	06/05/02, 12:30:00
06/05/02, 13:00:00	06/20/02, 14:00:00
06/20/02, 14:30:00	07/17/02, 11:00:00
07/17/02, 11:30:00	08/15/02, 11:00:00
08/15/02, 11:30:00	08/28/02, 09:00:00
08/28/02, 09:30:00	09/12/02, 10:00:00
09/12/02, 10:30:00	09/26/02, 08:30:00
09/26/02, 09:00:00	10/10/02, 12:30:00
10/10/02, 13:00:00	10/24/02, 14:00:00
10/24/02, 14:30:00	11/19/02, 14:00:00
11/19/02, 14:30:00	12/16/02, 13:00:00
12/16/02, 13:30:00	12/31/02, 10:00:00
12/31/02, 10:30:00	01/21/03, 11:00:00

Ploeg Channel Site

12/19/01, 14:30:00	01/15/02, 11:00:00
01/15/02, 11:30:00	01/31/02, 10:30:00
01/31/02, 11:00:00	02/12/02, 14:30:00
02/12/02, 15:00:00	02/27/02, 09:30:00
02/27/02, 10:00:00	03/22/02, 10:00:00
03/22/02, 10:30:00	04/04/02, 10:00:00
04/04/02, 10:30:00	04/18/02, 09:30:00
04/18/02, 10:00:00	05/10/02, 14:30:00
05/10/02, 15:00:00	05/22/02, 12:30:00
05/22/02, 13:00:00	06/05/02, 13:00:00
06/05/02, 13:30:00	06/20/02, 12:30:00
06/20/02, 13:30:00	07/17/02, 10:00:00
07/17/02, 10:30:00	08/15/02, 11:30:00
08/15/02, 12:00:00	08/28/02, 09:30:00
08/28/02, 10:00:00	09/12/02, 09:00:00
09/12/02, 09:30:00	09/26/02, 09:30:00
09/26/02, 10:00:00	10/10/02, 12:00:00
10/10/02, 12:30:00	10/24/02, 14:30:00
10/24/02, 00:30:00	11/19/02, 14:30:00
11/19/02, 15:00:00	12/31/02, 09:30:00
12/31/02, 10:00:00	01/21/03, 11:30:00

Joe Leary Site

01/03/02, 15:30:00	01/14/02, 14:30:00
01/14/02, 15:00:00	02/01/02, 12:30:00
02/01/02, 13:00:00	02/15/02, 10:00:00
02/15/02, 10:30:00	02/22/02, 12:30:00

02/22/02, 13:30:00	03/01/02, 14:30:00
03/01/02, 15:00:00	03/08/02, 10:30:00
03/08/02, 11:00:00	03/14/02, 16:00:00
03/14/02, 16:30:00	03/26/02, 14:30:00
03/26/02, 15:00:00	04/05/02, 10:00:00
04/05/02, 10:30:00	04/15/02, 13:30:00
04/15/02, 14:30:00	04/29/02, 12:30:00
04/29/02, 13:00:00	05/09/02, 12:00:00
05/09/02, 12:30:00	05/17/02, 10:00:00
05/17/02, 10:30:00	05/30/02, 13:00:00
05/30/02, 13:30:00	06/10/02, 12:00:00
06/10/02, 12:30:00	06/21/02, 14:00:00
06/21/02, 14:30:00	07/02/02, 13:30:00
07/02/02, 14:00:00	07/12/00, 09:30:00
07/12/00, 10:00:00	07/19/02, 09:00:00
07/19/02, 09:30:00	07/26/02, 12:00:00
07/26/02, 12:30:00	08/08/02, 10:00:00
08/16/02, 13:00:00	08/28/02, 13:00:00
08/28/02, 13:30:00 (EDS)	09/16/02, 13:00:00
09/16/02, 13:30:00	09/27/02, 11:00:00
09/27/02, 11:30:00 (EDS)	10/18/02, 11:30:00
10/18/02, 12:00:00	10/28/02, 11:30:00
10/28/02, 12:00:00 (EDS)	11/08/02, 12:00:00
11/08/02, 12:30:00	11/19/02, 13:00:00
11/19/02, 13:30:00 (EDS)	12/10/02, 11:30:00
12/10/02, 12:00:00	12/23/02, 11:30:00
12/23/02, 12:00:00	01/13/03, 14:30:00

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 refereed scientific

journals, will acknowledge that the research was conducted under an award from

the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. The data set enclosed within this package/transmission is only

as good as the quality assurance and quality control procedures outlined by the

enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

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 of 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:

File definitions: YSI deployment site/file definition/month/year (e.g. bywq0902= Bayview Channel water quality data from September 2002)
by=Bayview Channel, bp=Ploeg Channel, jl=Joe Leary.

11) Data anomalies:

January 1-31, 2002

Bayview Channel

During the following periods the DO membrane was damaged so dissolved oxygen data were deleted:

01/04/2002 13:30:00 - 01/15/2002 11:30:00

There is no data at 12:00:00 on 01/15/2002 because the data logger was being

switched out at that time.

The DO reading at the post-calibration check for the deployment from 01/15 to

01/31 was unusually low, 84.4%. This is uncommon for this site; there is no

evidence of problems with this probe in subsequent deployments so it may be an

operator error during calibration. An error of this type was discovered in other

calibration checks done by a new tech that was being trained during this time.

Therefore, DO may be suspect for this deployment.

A small negative turbidity reading of -0.1 NTU during the following period is

within the accuracy specified for this sensor and was formatted to zero by

Excel.

01/09/2002 14:00:00

Ploeg Channel

The post-calibration conductivity value for the deployment period of 01/15 at

11:30:00 to 01/31 at 10:30:00 was low, 48.84 mS/cm in a solution of 50.0 mS/cm.

This could be due to fouling in the probe orifice or compromised calibration solution.

Joe Leary

During the following period there is no data because the datalogger batteries

died during this deployment:

01/01/2002 00:00:00 to 01/03/2002 15:00:00

During the following period turbidity data were deleted because the turbidity

probe malfunctioned:

01/14/2002 15:00:00 to 01/31/2002 23:30:00

February 1 - 28, 2002

Bayview Channel

There is no data on 02/26 at 09:00:00 because the data logger was being switched out at that time.

Ploeg Channel

None

Joe Leary

During the following period turbidity data were deleted because the turbidity

probe malfunctioned:

02/01/2002 00:00:00 to 02/01/2002 12:30:00

During the following period turbidity data was high and erratic so it was deleted, this occurred during a period of high turbidity due to a major rain

event on February 21 and 22 so may have been due to debris interference:

02/21/2002 18:00:00

There is no data on 02/22 at 13:00:00 because the data logger was being switched

out at that time.

March 1 - 31, 2002

Bayview Channel

During the following periods turbidity data were high and erratic so they were

deleted, cause unknown:

03/06/2002 21:30:00

03/09/2002 10:30:00

Small negative turbidity readings of -1.0 NTU occurring intermittently from

03/23 through 03/31 are within the accuracy specified for this sensor and should

be interpreted as zero.

Ploeg Channel

None

Joe Leary

During the following period pH data was deleted because it was the first reading

taken after a new datalogger was deployed and was the highest reading of that deployment indicating the probe may not have had time to equilibrate before the reading, other data looks good:

03/08/2002 11:00:00

For the deployment period of 03/14 at 16:30:00 to 03/26 at 14:30:00 the post-calibration turbidity value was high, 112 NTU in 100 NTU solution, this is outside the specified accuracy for this probe, cause unknown. Turbidity values during the deployment of this probe may be higher than actual values.

April 1 - 30, 2002

Bayview Channel

During the following period turbidity data was deleted because it was high and erratic, cause unknown:

04/15/2002 10:00:00

Small negative turbidity readings of -1.0 and -2.0 NTU occurring intermittently from 04/18 through 04/30 are within the accuracy specified for this sensor and should be interpreted as zero.

Ploeg Channel

During the following period turbidity data was deleted because it was high and

erratic, cause unknown:

04/13/2002 18:30:00

Small negative turbidity readings of -2.0 NTU occurring intermittently from 04/18 through 04/30 are within the accuracy specified for this sensor and should be interpreted as zero.

Joe Leary

There is no data on 04/15 at 14:00:00 because the data logger was being switched out at that time.

During the following period turbidity data was deleted because it was high and

erratic, cause unknown:

04/26/2002 16:30:00

High values for salinity, dissolved oxygen and pH on April 5th indicate one or more of the tide gates was open and leaking marine water into the fresh water side of the dike.

May 1 - 31, 2002

Bayview Channel

During the following period turbidity data was deleted because it was high and erratic, cause unknown:
05/28/2002 14:30:00
During the following periods pH data were deleted because the slope of the sensor as indicated by the millivolt readings during calibration were out of the acceptable range:
05/22/2002 12:30:00 to 05/31/2002 23:30:00
The post-calibration turbidity value was low, 86.3 NTU in 100 NTU solution, which is outside the specified accuracy for this probe. This was a new model (#6136) turbidity probe and YSI eventually recalled them to replace the motor and lubricant. Turbidity values during the deployment of this probe, 05/22 at 12:30:00 to 05/30 at 23:30:00, may be lower than actual values. Small negative turbidity readings of -1.0 NTU occurring intermittently from 05/22 through 05/24 are within the accuracy specified for this probe and should be interpreted as zero.

Ploeg Channel

During the following period turbidity data was deleted because it was high and erratic, cause unknown:
05/13/2002 15:00:00
Small negative turbidity readings of -2 NTU occurring intermittently from 05/01 through 05/22 at 12:30:00 are within the accuracy specified for this probe and should be interpreted as zero. Small negative turbidity readings of -2 NTU occur intermittently from 05/22 at 13:00:00 through 05/31 at 23:30:00. The accuracy specified for this probe is ± 2 NTU and some of the low readings fall outside of this range but all negative readings should be interpreted as zero. This was a new model (#6136) turbidity probe and YSI eventually recalled them to replace the motor and lubricant. The post-calibration DO% value for the deployment period of 05/10 at 15:00:00 to 05/22 at 12:30:00 was low, 83.4%. The last reading pre-deployment was also 83.4% so it appears the calibration may have been wrong. Dissolved oxygen data from this deployment period should be considered lower than the actual values.

Joe Leary

During the following periods turbidity data were high and erratic so they were

deleted, cause unknown:

05/01/2002 10:00:00

05/02/2002 02:00:00

High values for salinity, dissolved oxygen and pH on the night of May 25th

indicate one or more of the tide gates was open and leaking marine water into

the fresh water side of the dike.

The post-calibration salinity value for the deployment period of 05/17 at 10:30:00 to 05/30 at 13:00:00 was low, 49.07 mS/cm in a solution of 50.0 mS/cm.

This could be due to fouling in the probe orifice or compromised calibration solution.

June 1 - 30, 2002

Bayview Channel

During the following periods turbidity data were high and erratic so they were

deleted, cause unknown:

06/01/2002 20:00:00

06/04/2002 07:30:00

06/21/2002 03:30:00

06/28/2002 09:30:00

06/30/2002 05:00:00

During the following periods pH data were deleted because the slope of the

sensor as indicated by the millivolt readings during calibration were out of the

acceptable range:

06/01/2002 00:00:00 to 06/05/2002 12:30:00

06/20/2002 14:30:00 to 06/30/2002 23:30:00

The post-calibration turbidity value for the deployment period of 06/01 at

00:00:00 to 06/05 at 12:30:00 was low, 86.3 NTU in 100 NTU solution, which is

outside the specified accuracy for this probe. This was a new model (#6136)

turbidity probe and YSI eventually recalled them to replace the motor and lubricant. Turbidity values during the deployment of this probe may be lower

than actual values.

Small negative turbidity readings of -1.0 NTU occurring intermittently from

06/01 through 06/30 are within the accuracy specified for this probe and should

be interpreted as zero.

Ploeg Channel

There is no data on 06/20/2002 at 13:00:00 because the data logger was being

switched out at that time.

During the following periods dissolved oxygen data was deleted because the data indicated the DO membrane had been damaged.
06/07/2002 09:30:00 - 06/30/2002 23:30:00
Small negative turbidity readings of -3 NTU occur intermittently from 06/01 at 00:00:00 through 06/05 at 13:00:00. The accuracy specified for this probe is $\pm$ 2 NTU and some of the low readings fall outside of this range but they should all be interpreted as zero. This was a new model (#6136) turbidity probe and YSI eventually recalled them to replace the motor and lubricant. The post-calibration turbidity value was low, 90.6 NTU in 100 NTU solution, which is outside the specified accuracy for this probe, cause unknown. Turbidity values during the deployment of this probe, 06/05 at 13:30:00 to 06/20 at 12:30:00, may be lower than actual values.

Joe Leary

Twice this month the post-calibration turbidity value was low. During the deployment from 06/01 at 00:00:00 to 06/10 at 12:00:00 the value was 91.1 NTU in 100 NTU solution and for the deployment from 06/21 at 14:30:00 to 06/30 at 23:30:00 the value was 94.1. Both values are outside the specified accuracy for this probe. These were new model (#6136) turbidity probes and YSI eventually recalled them to replace the motor and lubricant. Turbidity values during the deployment of these probes may be lower than actual values. The post-calibration DO% value for the deployment period of 06/01 at 00:00:00 to 06/10 at 12:00:00 was low, 91.6%. This may be due to biofouling, which is not uncommon at this site; DO readings (especially toward the end of this deployment) may be lower than actual values.

July 1 - 31, 2002

Bayview Channel

During the following periods turbidity data were high and erratic so they were

deleted, cause unknown:

07/06/2002 01:30:00, 21:00:00
07/07/2002 13:00:00
07/10/2002 13:30:00
07/12/2002 20:00:00
07/13/2002 02:00:00
07/15/2002 02:00:00, 05:00:00
07/16/2002 03:30:00, 07:00:00
07/17/2002 06:00:00

During the following periods pH data were deleted because the slope of the sensor as indicated by the millivolt readings during calibration were out of the acceptable range:

07/01/2002 00:00:00 to 07/17/2002 11:00:00

A small negative dissolved oxygen reading of -0.1% during the following period is within the accuracy specified for this sensor.

07/27/2002 02:00:00

Small negative turbidity readings of -1.0 NTU occurring intermittently from

07/01 through 07/09 are within the accuracy specified for this probe and should be interpreted as zero.

Ploeg Channel

All dissolved oxygen data for this month was deleted; data indicated the DO

membrane had been damaged.

Small negative turbidity readings of -2 NTU occur intermittently from 07/01

at 00:00:00 through 07/31 at 23:30:00. The accuracy specified for this probe is

± 2 NTU and some of the low readings fall outside of this range but they should

all be interpreted as zero. This was a new model (#6136) turbidity probe and YSI

eventually recalled them to replace the motor and lubricant. The post-calibration turbidity value for the deployment from 07/01 at 00:00:00 through

07/17 at 10:00:00 was low, 86.6 NTU in 100 NTU solution, which is outside the

specified accuracy for this probe so turbidity values during this period may

be lower than actual values.

Joe Leary

During the following periods pH data were deleted because the slope of the

sensor as indicated by the millivolt readings during calibration were out of the

acceptable range:

07/02/2002 14:00:00 to 07/12/2002 09:30:00

During the following periods pH data were deleted because the post calibration

value, 7.25 in a 7.0 pH solution, was outside the specified accuracy for this

probe: 07/26/2002 12:30:00 to 07/31/2002 23:30:00

The post-calibration turbidity value was low for the deployment period of 07/01

at 00:00:00 to 07/02 at 13:30:00, 94.1 NTU in 100 NTU solution, which is outside

the specified accuracy for this probe. This was a new model (#6136) turbidity probe and YSI eventually recalled them to replace the motor and lubricant.

Turbidity values during the deployment of this probe may be lower than actual values.

The post-calibration turbidity value was low for the deployment period of 07/26

at 12:30:00 to 07/30 at 23:30:00, 89.9 NTU in 100 NTU solution, which is outside

the specified accuracy for this probe. Turbidity values during the deployment of

this probe may be lower than actual values, cause unknown.

The post-calibration DO% value for the deployment period of 07/02 at 14:00:00 to

07/12 at 09:30:00 was low, 89.5%. This may be due to biofouling, which is not

uncommon at this site; DO readings (especially toward the end of this deployment) may be lower than actual values.

High values for salinity and dissolved oxygen on the evening of July 8th and the

morning of July 9th indicate that one or more of the tide gates was open and

leaking marine water into the fresh-water side of the dike.

August 1 - 31, 2002

Bayview Channel

During the following periods turbidity data were high and erratic so they were

deleted, cause unknown:

08/13/2002 08:30:00

08/19/2002 12:30:00

Small negative dissolved oxygen readings of -1.6 % during the following periods

are within the accuracy specified for this sensor and should be interpreted as

zero.

08/05/2002 20:30:00

08/05/2002 21:00:00

08/05/2002 21:30:00

During the following periods there was a dip in the salinity readings from 29.8

to 27.8 ppt, cause is unknown but may be due to temporary blockage of the sensor

orifice:

08/21/2002 22:00:00

08/21/2002 22:30:00

Ploeg Channel

Small negative turbidity readings of < -1.0 NTU occurring intermittently from

8/1 through 8/11 are within the accuracy specified for this probe and should be

interpreted as zero.

During the following periods dissolved oxygen data was deleted because the DO

membrane had been damaged:

08/01/2002 00:00:00 - 08/15/2002 11:30:00

During the following period all data were deleted because the datalogger was not

fully deployed to the bottom of the pipe, this was evident from the salinity and

depth readings:

08/15/2002 12:00:00 to 08/28/2002 09:30:00

Joe Leary

During the following period there is no data, the file was deleted before it had

been downloaded from the datalogger:

08/08/2002 10:30:00 to 08/16/2002 12:30:00

During the following periods pH data were deleted because the post calibration

value, 7.25 in a 7.0 pH solution, was outside the specified accuracy for this

probe: 08/01/2002 00:00:00 to 08/08/2002 10:00:00

The post-calibration salinity value for the deployment period of 08/16 at 13:00:00 to 08/28 at 13:00:00 was low, 49.04 mS/cm in a solution of 50.0 mS/cm.

This could be due to fouling in the probe orifice or compromised calibration solution.

September 1 - 30, 2002

Bayview Channel

During the following periods pH data were removed because the post calibration

value, 6.73 in a 7.0 pH solution, was outside the specified accuracy for this

probe:

09/26/2002 09:00:00 to 09/30/2002 23:30:00

During the following period there was a dip in the salinity reading from 29.8 to

27.9 ppt, cause is unknown but may be due to temporary blockage of the sensor

orifice:

09/04/2002 20:00:00

Ploeg Channel

On 09/16 at 01:30:00 there was a steep drop in salinity to 12.68 ppt from 30.17

ppt, the low reading was followed by a value of 30.06 ppt, cause for the drop is

unknown.

From 09/26 at 10:00:00 to 09/30 at 23:30:00 small negative turbidity readings of -2 NTU are within the accuracy specified for this probe and should

be interpreted as zero.

The post-calibration turbidity value for the deployment from 09/12 at 09:30:00

through 09/26 at 09:30:00 was low, 81.9 NTU in 100 NTU solution, which is outside the specified accuracy for this probe so turbidity values during this period may be lower than actual values.

Joe Leary

During the following periods pH data were deleted because the post calibration

value, 7.34 in a 7.0 pH solution, was outside the specified accuracy for this

probe:

09/16/2002 13:30:00 to 09/27/2002 11:00:00

High salinities from 09/25 through 09/28 indicate the tide gates were leaking

marine water into the freshwater side of the dike, this can happen when debris

gets caught in one or more of the gates.

October 1 - 31, 2002

Bayview Channel

During the following periods pH data were removed because the post calibration

value, 6.73 in a 7.0 pH solution, was outside the specified accuracy for this

probe:

10/01/2002 00:00:00 to 10/10/2002 12:30:00

The post-calibration turbidity value was low for the deployment period of 10/24

at 14:30:00 to 10/31 at 23:30:00, 77.6 NTU in 100 NTU solution, which is outside

the specified accuracy for this probe. This was a new model (#6136) turbidity

probe and YSI eventually recalled them to replace the motor and lubricant.

Turbidity values during the deployment of this probe may be lower than actual

values; also during this time there were numerous small negative turbidity

readings of -3 NTU; the accuracy for this sensor is ± 2.0 NTU and some of the

low readings fall outside of this range but they should all be interpreted as

zero.

Ploeg Channel

During the following periods turbidity data were high and erratic so they were

deleted, cause unknown:

10/03/2002 18:30:00

10/06/2002 19:00:00

10/08/2002 05:00:00, 07:00:00

10/17/2002 01:00:00

During the following period all data were deleted because the datalogger was not

fully deployed to the bottom of the pipe, this was evident from the salinity and

depth readings:

10/24/2002 15:00:00 to 10/26/2002 00:00:00

From 10/01 at 00:00:00 to 10/10 at 12:00:00 and 10/26 at 13:30:00 to 10/28 at

19:00:00 small negative turbidity readings of -2 NTU are within the accuracy

specified for this sensor and should be interpreted as zero.

Joe Leary

During the following period turbidity data was high and erratic so it was deleted, cause unknown:

10/10/2002 04:30:00

10/10/2002 14:00:00

November 1 - 30, 2002

Bayview Channel

During the following period turbidity data was high and erratic so it was deleted, cause unknown:

11/09/2002 05:30:00

During the following periods pH data were deleted because the slope of the

sensor as indicated by the millivolt readings during calibration were out of the

acceptable range:

11/19/2002 14:30:00 to 11/30/2002 23:30:00

The post-calibration turbidity value was low for the deployment period of 11/01

at 00:00:00 to 11/19 at 14:00:00, 77.6 NTU in 100 NTU solution, which is outside

the specified accuracy for this probe. This was a new model (#6136) turbidity

probe and YSI eventually recalled them to replace the motor and lubricant.

Turbidity values during the deployment of this probe may be lower than actual

values; also during this time there were numerous small negative turbidity

readings of -3.4 NTU; the accuracy for this sensor is ± 2.0 NTU and some of the

low readings fall outside of this range but they should all be interpreted as

zero.

During the following period turbidity data has been deleted because the wiper

pad was missing from the turbidity probe when the datalogger was retrieved at

the end of this deployment period:

11/19/2002 14:30:00 to 11/30/2002 23:30:00

Ploeg Channel

During the following period turbidity data was high and erratic so it was deleted, cause unknown:

11/14/2002 07:00:00

Small negative turbidity readings of -1 NTU occurring intermittently from 11/01 through 11/05 are within the accuracy specified for this probe and should

be interpreted as zero.

During the following periods pH data were deleted because the post calibration

value, 6.57 in a 7.0 pH solution, was outside the specified accuracy for this

probe:

11/19/2002 15:00:00 to 11/30/2002 23:30:00

Joe Leary

During the following periods pH data were deleted because the slope of the

sensor as indicated by the millivolt readings during calibration were out of the

acceptable range:

11/19/2002 13:30:00 to 11/30/2002 23:30:00

High values for salinity and dissolved oxygen on November 21st and 22nd indicate

that one or more of the tide gates was open and leaking marine water into the

fresh-water side of the dike.

December 1 - 31, 2002

Bayview Channel

During the following period dissolved oxygen data were deleted because the DO

membrane was damaged, probably caused by crustaceans found inside the sensor

guard.

12/12/2002 01:30:00 to 12/16/2002 13:00:00

During the following period turbidity data were deleted because the wiper pad

was missing from the turbidity probe when the datalogger was retrieved at the

end of this deployment period:

12/01/2002 00:00:00 to 12/16/2002 13:00:00

During the following periods pH data were deleted because the slope of the

sensor as indicated by the millivolt readings during calibration were out of the

acceptable range:

12/01/2002 00:00:00 to 12/16/2002 13:00:00

12/31/2002 10:30:00 - 23:30:00

The post-calibration conductivity value for the deployment period of 12/31 at

10:30:00 - 23:30:00 was low, 46.0 mS/cm in a solution of 50.0 mS/cm. This could

be due to fouling in the probe orifice or compromised calibration solution.
Salinity values during this period may be lower than actual values.

Ploeg Channel

During the following periods turbidity data were high and erratic so they were deleted, cause unknown:

12/08/2002 19:00:00

12/18/2002 21:30:00

During the following periods pH data were deleted because the post calibration

value, 6.57 in a 7.0 pH solution, was outside the specified accuracy for this

probe:

12/01/2002 00:00:00 to 12/31/2002 09:30:00

Joe Leary

During the following periods pH data were deleted because the slope of the

sensor as indicated by the millivolt readings during calibration were out of the

acceptable range:

12/01/2002 00:00:00 to 12/10/2002 11:30:00

During the following periods turbidity data were high and erratic so they were

deleted, cause unknown:

12/02/02 20:00:00

12/04/02 20:30:00

High values for salinity and dissolved oxygen December 8th through the 10th

indicate that one or more of the tide gates was open and leaking marine water

into the fresh-water side of the dike.

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

the Anomalous Data Section (11.). To find out more details about missing data,

contact the Research Coordinator at the site submitting the data.

13) Post deployment information

End of deployment post-calibration readings in standard solutions (new model

6136 turbidity probes are indicated with a +):

Site	Date	pH	Sp. Conductivity (mS/cm)	Turbidity	DO (Air Sat.)
		(Std. 7)	(Std. 50)	(Std. 100 NTU)	(Std. 100%)
BY	01/15/02	7.12	48.95	97.7	damaged
	01/31/02	6.82	49.52	97.3	84.4
	02/12/02	7.22	50.38	101.4	100.4
	02/26/02	7.09	49.46	98.3	98.4
	03/22/02	6.88	50.53	101.8	99.3
	04/04/02	6.93	48.65	101.9	100.7
	04/18/02	7.05	50.35	98.2	103.7
	05/10/02	7.24	50.22	101.1	98.5
	05/22/02	6.78	49.71	99.5	101.7
	06/05/02	7.27	49.67	86.3(+)	98.3
	06/20/02	6.81	49.05	95.9	106.3
	07/17/02	7.24	49.75	97.2(+)	99.1
	08/15/02	7.01	50.06	100.4	102.8
	08/28/02	6.98	49.66	99.4	96.6
	09/12/02	7.19	50.52	100.4	105.3
	09/26/02	7.22	48.88	100.2	99.6
	10/10/02	6.73	48.35	96.1	102.7
	10/24/02	7.12	50.77	97.1	103.4
	11/19/02	7.07	51.12	77.6(+)	101.4
	12/16/02	6.57	49.45	102.6(+)	damaged
	12/31/02	7.02	50.52	104.4	94.9
	01/21/03	6.84	46.0	95.1	100.9

Site	Date	pH	Sp. Conductivity (mS/cm)	Turbidity	DO (Air Sat.)
		(Std. 7)	(Std. 50)	(Std. 100 NTU)	(Std. 100%)
BP	01/15/02	7.22	48.91	96.9	104.7
	01/31/02	6.87	48.84	96.3	98.4
	02/12/02	7.08	50.73	99.7	99.9
	02/27/02	6.99	50.35	101.1	100.0
	03/22/02	6.77	50.06	101.0	102.2
	04/04/02	6.95	48.31	101.5	91.1
	04/18/02	7.0	50.28	98.5	118.1
	05/10/02	7.22	50.59	98.3	100.4
	05/22/02	6.88	49.74	100.3(+)	83.4
	06/05/02	7.24	49.65	95.3(+)	105.1
	06/20/02	6.61	48.59	90.6	damaged
	07/17/02	7.24	49.82	86.6(+)	damaged
	08/15/02	7.07	46.40	101.1(+)	damaged
	08/28/02	6.72	48.94	84.7(+)	99.7
	09/12/02	7.24	50.07	100.7	98.7
	09/26/02	7.15	48.77	81.9(+)	94.4
	10/10/02	6.77	49.01	96.1(+)	105.1
	10/24/02	7.21	50.81	96.3	100.9
	11/19/02	6.90	50.16	95.4(+)	102.5
	12/31/02	6.57	49.80	97.8	101.6
	01/21/03	7.01	49.29	97.0	101.3

Site	Date	pH	Sp. Conductivity (mS/cm)	Turbidity	DO (Air Sat.)
		(Std. 7)	(Std. 50)	(Std. 100 NTU)	(Std. 100%)

JL

01/03/02	6.82	49.14	99.1	104.5
01/14/02	7.19	49.02	98.0	93.6
02/01/02	6.95	50.34	malfunction	99.8
02/22/02	7.08	50.15	103.0	97.0
02/15/02	6.92	48.34	91.4	91.6
03/01/02	7.01	48.60	98.1	98.0
03/08/02	6.99	48.57	103.4	103.2
03/14/02	6.91	49.58	101.7	95.4
03/26/02	7.03	50.43	112.0	98.7
04/05/02	7.17	50.04	100.4	97.7
04/15/02	6.90	49.19	100.6	97.4
04/29/02	7.08	50.49	97.7	96.1
05/09/02	6.95	49.27	100.0	103.6
05/17/02	7.01	49.40	99.9	102.2
05/30/02	7.22	49.07	97.2	99.7
06/10/02	6.94	49.67	91.9(+)	91.6
06/21/02	6.88	50.11	96.0	99.8
07/02/02	6.9	50.04	94.1(+)	102.0
07/12/02	7.5	49.51	97.1	94.8
07/19/02	6.98	50.09	97.0	99.4
07/26/02	7.07	49.24	99.7	99.5
08/08/02	7.25	51.59	89.9	91.0
08/28/02	7.15	49.04	102.4(+)	99.9
09/16/02	7.19	49.57	97.2(+)	102.1
09/27/02	7.34	49.67	100.7	100.3
10/18/02	7.09	50.28	100.1(+)	102.8
10/28/02	6.83	48.61	95.7(+)	104.2
11/08/02	7.10	50.92	104.7(+)	100.6
11/19/02	7.17	49.67	96.1	100.2
12/10/02	6.57	49.84	97.2(+)	101.6
12/23/02	6.98	50.53	97.0	104.4
01/13/03	6.81	49.85	98.0	100.3

14) Other Remarks/notes

On 07/01/2021 this dataset was updated to include embedded QAQC flags for anomalous/suspect data. System-wide monitoring data beginning in 2007 were processed to allow for QAQC flags and codes to be embedded in the data files rather than detailed in the metadata alone (as in the anomalous/suspect, deleted, and missing data sections above). Prior to 2006, rejected data were deleted from the dataset so they are unavailable to be used at all, but suspect data were only noted in the metadata document. Suspect data flags <1> were

embedded retroactively in order to allow suspect data to be easily identified and filtered from the dataset if desired for analysis and reporting purposes. No other flags or codes were embedded in the dataset and users should still refer to the detailed explanations above for more information.

Generally high turbidities in Joe Leary Slough correspond to heavy rain events as on February 21 and 22 when a two-day total of 35.6 mm of precipitation was recorded at our weather station. At the two bay sites, Bayview and Ploeg Channel, wind is often the driving force affecting turbidity as on April 22 when both bay sites had elevated turbidities in the afternoon and wind average speed for the day was 5.4 m/s with a maximum gust of 17.3 m/s. As noted in data anomalies section there were problems with a new model of turbidity probe, #6136 (denoted in post deployment section with +). It would calibrate without error but post-calibration readings in a 100 NTU standard were often low. These probes were recalled for an upgrade to replace the lubricant and install a new wiper motor.

Joe Leary:

April: High values for salinity, dissolved oxygen and pH on April 5th indicate one or more of the tide gates was open and leaking marine water into the fresh water side of the dike.

May: High values for salinity, dissolved oxygen and pH on the night of May 25th indicate one or more of the tide gates was open and leaking marine water into the fresh water side of the dike.

July: High values for salinity and dissolved oxygen on the evening of July 8th and the morning of July 9th indicate that one or more of the tide gates was open and leaking marine water into the fresh-water side of the dike.

September: High salinities from 09/25 through 09/28 indicate the tide gates were leaking marine water into the freshwater side of the dike, this can happen when debris gets caught in one or more of the gates.

November: High values for salinity and dissolved oxygen on November 21st and 22nd indicate that one or more of the tide gates was open and leaking marine water into the fresh-water side of the dike.

December: High values for salinity and dissolved oxygen December 8th through the 10th indicate that one or more of the tide gates was open and leaking marine water into the fresh-water side of the dike.