



GROWING AREA EA

**Location - Bagaduce River
Castine, Penobscot and Brooksville**

ANNUAL REVIEW for 2009

Report Date: 3-8-2011

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APPROVAL

Division Director:

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Figure 1. Growing Area EA, with Active Water Stations





Executive Summary

This is an annual report for growing area EA written in compliance with the requirements of the 2007 Model Ordinance and the National Shellfish Sanitation Program. The next triennial is due in 2010 and the next Sanitary Survey is due in 2019.

There were no new stations that were added during the 2009 season. One station, EA 33 was deactivated in April because it is embedded in a current prohibited area 36C. Four stations, EA 25, 26, 27 and 28 were reclassified from conditionally approved to approved on January 13, 2009. There were two changes in classification during the 2009 review period. Pollution Area No. 36A was reduced to open the northwest portion of Northern Bay due to water quality meeting the standard for approved harvest. The second change occurred in Pollution Area No. 36 where the size for the waste water treatment plant (WWTP) conditionally approved area was reduced based on year end data analysis from 2008 and completed upgrades to the Castine WWTP. As a result of a request from the town shellfish committee, increased sampling frequency will occur at EA 14.9 and EA15 in 2009 and 2010. This increased sampling will be used to try and gather enough data by the fall of 2010 to determine if these stations support an expansion in the size of the current approved area in Area No. 36A.

Growing Area Description

Growing area EA includes the near sub-tidal waters, inter-tidal flats and a zone of shore property that extends inland to a definite up-land boundary. This region extends from the southern tip of Dice Head in Castine to the "Head of the Cape", Cape Rosier, in Brooksville (Figure 1). This area includes the entire estuary known as the Bagaduce River, and includes shoreline in the towns of Castine, Penobscot, Sedgwick, and Brooksville. This growing area falls into the Western portion of Hancock County.

There is one municipal sewage treatment plant in Area EA for the town of Castine. There are 5 private licensed overboard discharges in this area around which there are prohibited zones.

There are 10 aquaculture lease sites in this growing area. Of these 10 sites 4 are commercial and consist of one suspended and bottom culture for European and American oysters, hen clams and soft shell clams; one upwelling or Flupsy culture for European and American oysters, hen clams and soft shell clams and 2 over-wintering locations. The other 6 are limited purpose sites for the over-wintering of American and European oysters.

Current Classification(s)

Shellfish growing area EA currently has areas classified as:

Approved: 21 sample sites

(EA 1,5,7,9,11,15.5,16,17,18,19,19.1,19.2,19.4,20,21,25,26,27,28,35,36)



Conditionally Approved: Area No. 36 Castine Harbor; WWTP; 5 sample sites (EA 23, 24, 29, 30, 31)

Area No. 36D Seal Ledge Marina; Seasonal Marina; 1 sample site (EA 6)

Restricted: Area No. 36A Northern Bay; 5 sample sites (EA 11, 12, 13, 14.9, 15)

Prohibited: Area No. 36A Northern Bay, OBD's; 2 sample sites (EA 13, 14)

Area No. 36C Harborside, OBD's and heavy metal from mine site; no sample sites in closure (EA 35 located on margin)

Area No. 36B Upper Bagaduce River, animal farm; no sample sites because of access issues

Please visit the DMR website to view legal notices:

http://www.maine.gov/dmr/rm/public_health/closures/closedarea.htm#

Activity during Review Period

- **Classification Changes:** Pollution Area No. 36A was reduced to open the northwest portion of Northern Bay due to water quality meeting the standard for approved harvest on July 21, 2009. In Pollution Area No. 36, the size for the WWTP conditionally approved area was reduced based on year end data analysis from 2008 and completed upgrades to the Castine WWTP.
- **Conditional Area Closures:** The WWTP conditionally approved area had no closures during this review period.
- **OBD's Removed:** None
- **Aquaculture:** In 2009, 5 new over-wintering sites in Brooksville for oysters and 1 new upwelling culture site for European and American oysters, hen clams and soft shell clams in the Bagaduce Salt Pond were issued.
- **Pollution Source Sampling:** 26 stream samples taken in 2009
- **WWTP Review:** On January 6, 2009, an annual review of WWTP in Castine was conducted.

Current Management Plan(s) for Conditional Area(s)

Area No. 36 (A) based on Castine WWTP; stations EA 23, 24, 29, 30, and 31

Area No. 36 (B) based on seasonal marina; station EA 6; open from November 1- April 30th



The management plan for the WWTP conditional area was last updated in January of 2009. Based on this review, upgrades to the plant and year end data analysis the size of the conditional area was reduced.

Current Annual Review of Management Plan(s)

Both the WWTP and the seasonal marina conditionally approved area met the requirements set forth in the management plan for each area. The P90 for all involved water quality stations met the standard for approved classification during the open phase and each station was sampled the requisite amount of times based on its management plan. A complete review of the management plans can be viewed in Appendices A and B.

Current Management plans for all EA conditional areas can be found in DMR's central files.

Water Quality Review and Discussion

Table 1 lists all active approved restricted and prohibited stations in Growing Area EA, with their respective Geomean and P90 calculations for 2009. Please refer to Appendix C for a key to interpreting the headers on the columns of Table 1. The approved and restricted standards for each station are also displayed in Table 1. These standards will fluctuate yearly as a result of the DMR transition from a most probable number (MPN) fecal coliform test method to a membrane filtration (MF) method and are dependent on the number of sample analyzed by MPN verses MF. The total number of data points used in the calculations is displayed in the Count column and includes both MPN and MF values. The number of data points analyzed by MF is displayed in the MFCNT column. This fluctuating standard will cease when all 30 data points have been analyzed by the MF method. All approved and restricted stations met their NSSP classification standard in 2009.

Table 1. Area EA Geometric Mean and P90 Report

Station	Class	Count	MFCOUNT	GM	SDV	MAX	P90	Appd_Std	Restr_Std
EA001.00	A	30	19	2.5	0.16	9.1	4.2	36	203
EA003.50	P	23	23	3.1	0.5	160	14.1	31	163
EA004.00	P	30	23	3.4	0.48	300	14.2	34	187
EA005.00	A	30	19	2.8	0.25	23	6	36	203
EA007.00	A	30	19	3.4	0.58	1700	19.4	36	203
EA009.00	A	30	19	3.2	0.36	75	9.4	36	203
EA011.00	A	30	25	4.9	0.46	43	19.2	33	180
EA012.00	R	30	25	4	0.36	16	11.6	33	180
EA013.00	R	30	23	6.8	0.66	460	48.4	34	187
EA014.00	P	30	21	5.6	0.51	150	25.8	35	195
EA014.90	new	18	18	7.6	0.57	126	42.6	31	163
EA015.00	R	30	21	9.6	0.5	92	43.2	35	195
EA015.50	new	17	17	3.9	0.55	122	20.4	31	163
EA016.00	A	30	25	2.6	0.28	23	6.1	33	180



Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std
EA017.00	A	30	19	2.8	0.28	22	6.4	36	203
EA018.00	A	30	19	4.3	0.48	93	17.9	36	203
EA019.00	A	30	20	4.1	0.47	72	16.7	36	199
EA019.10	A	30	21	4.3	0.45	62	16.7	35	195
EA019.20	A	30	20	5.5	0.54	280	27.5	36	199
EA019.40	A	30	20	6.2	0.53	80	30.1	36	199
EA020.00	A	30	19	4	0.46	93	16	36	203
EA021.00	A	30	19	3.1	0.42	122	10.9	36	203
EA025.00	A	30	30	2	0.08	4	2.5	31	163
EA026.00	A	30	30	3.6	0.59	360	21.3	31	163
EA027.00	A	30	26	2.6	0.32	36	6.8	32	176
EA028.00	A	30	30	2	0.08	4	2.5	31	163
EA035.00	A	30	20	2.6	0.31	93	6.6	36	199
EA036.00	A	30	19	2.7	0.25	23	5.9	36	203

Table 2 lists all conditionally approved stations in area EA with their respective geometric mean and P90 calculations for 2009. Data for conditionally approved stations reflects only the open status. All stations met the approved standard during open status.

Table 2. Conditionally Approved Stations, Geometric Mean and P90 Report, Open Status Data

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std
EA006.00	CA	30	22	3.4	0.41	116	11.7	35	191
EA023.00	CA	30	30	2.5	0.3	50	6.2	31	163
EA024.00	CA	30	30	2.3	0.2	13	4.2	31	163
EA029.00	CA	30	30	2.6	0.41	120	8.9	31	163
EA030.00	CA	30	24	2.6	0.25	20	5.5	33	184
EA031.00	CA	30	30	3.4	0.61	980	21.1	31	163

All approved and prohibited stations that were active at the beginning of 2009 were sampled at least 6 times following the systematic random sampling (SRS) schedule (Table 3 and Appendix D). At some stations, additional samples were collected under adverse conditions like flood and extra samples were taken to help build the data set. Seal Ledge Marina conditionally approved station EA 6 was sampled 8 times in the open status. Conditionally approved stations in the WWTP area were sampled 12 times during the open status. EA 30, highlighted in yellow below, was only sampled 6 times as we can only get this by boat so it is only collected during the 6 randomly scheduled boat runs.

Table 3. EA Samples Collected in 2009

Station	Class	Adverse	Extra		Random		Total	Comments
		Closed	Closed	Open	Closed	Open		
EA001.00	A					6	6	
EA003.50	P		1		11		12	
EA004.00	P				6		6	
EA005.00	A					6	6	
EA006.00	CA				4	8	12	Marina CA area



Station	Class	Adverse	Extra		Random		Total	Comments
		Closed	Closed	Open	Closed	Open		
EA007.00	A					6	6	
EA009.00	A					6	6	
EA011.00	A					3	3	Reclassified from R to A on 7/21/09
	R			2		4	6	
EA012.00	R			2		7	9	
EA013.00	P				4		4	Reclassified from P to R on 7/21/09
	R					3	3	
EA014.00	P				6		6	
EA014.90	R			4		7	11	
EA015.00	R					6	6	
EA015.50	A					7	7	
EA016.00	A					7	7	
EA017.00	A					6	6	
EA018.00	A					6	6	
EA019.00	A	16				6	22	
EA019.10	A			1		6	7	
EA019.20	A					6	6	
EA019.40	A					6	6	
EA020.00	A					6	6	
EA021.00	A					6	6	
EA023.00	CA					12	12	WWTP CA area
EA024.00	CA					12	12	WWTP CA area
EA025.00	A	3				6	9	Reclassified from CA to A 1-13-09
	CA					1	1	
EA026.00	A					6	6	
EA027.00	A					6	6	
EA028.00	A					6	6	Reclassified from CA to A 1-13-09
	CA					1	1	
EA029.00	CA					12	12	WWTP CA area
EA030.00	CA					6	6	WWTP CA area
EA031.00	CA					12	12	WWTP CA area
EA033.00	P				1		1	
EA035.00	A					6	6	
EA036.00	A					6	6	

Figure 2 shows the P90 scores of approved stations over the past three review years; scores are expressed as a percent of the approved standard. All approved stations in this growing area meet the NSSP standard for their classification. Station EA 7 showed an increase for 2009 and it can be attributed to one score of >1,600 FC/100 ML that was taken on October 5, 2009; this sample occurred after a rainfall event of 12.8" in the previous 24 hour period.



There are no stations classified approved that have P90 scores that are greater than 90 percent of the standard. Stations 19.2 and 19.4 are 76 and 84 percent, respectively. These two stations are also trending upward over the last two years. A drive through survey of this area on August 21, 2009 found no obvious point source issues. These two stations will be evaluated quarterly over the 2010 sampling season to keep a close watch to see if this upward trend continues.

Figure 2. Area EA Approved Station P90 Trends

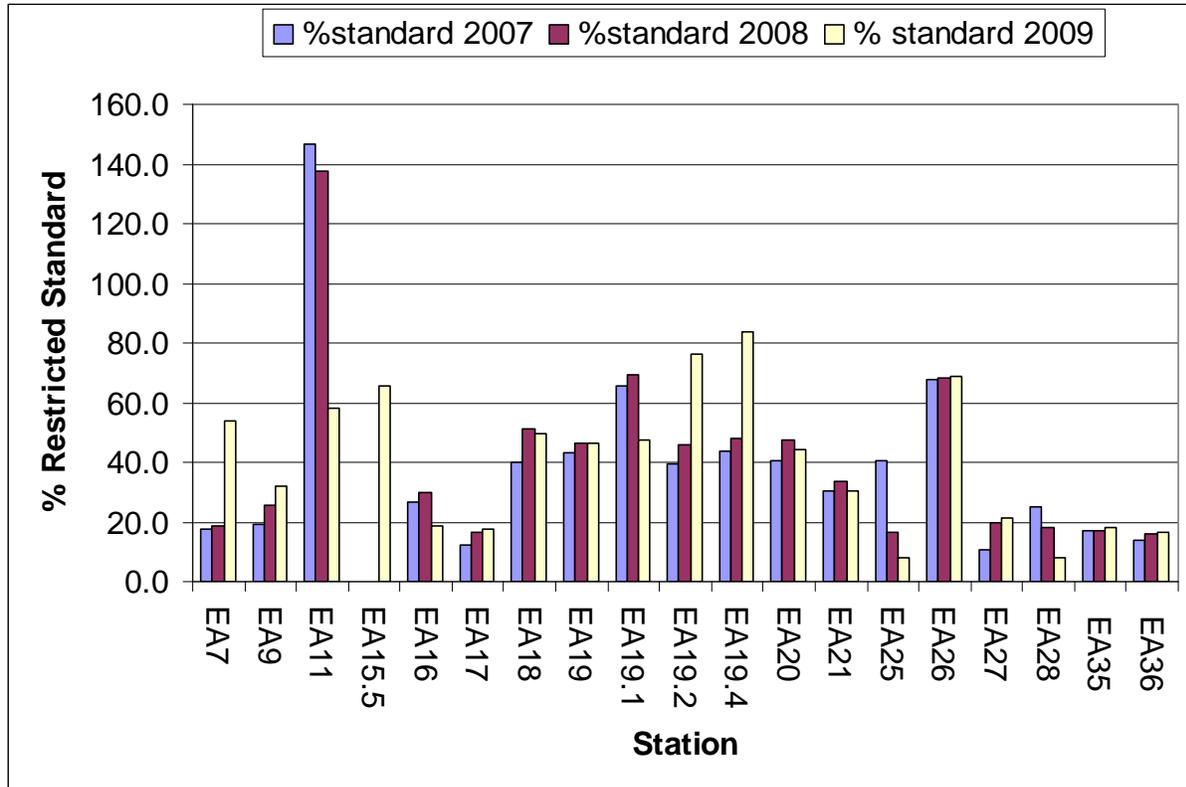


Figure 3 shows the P90 scores of restricted stations over the past three review years; scores are expressed as a percent of the restricted standard. Restricted stations in this growing area have shown steady or improving water quality. Station EA 12 now meets the standard for approved harvest. An upward classification of this area will be discussed in a later section of this report



Figure 3. Area EA Restricted stations

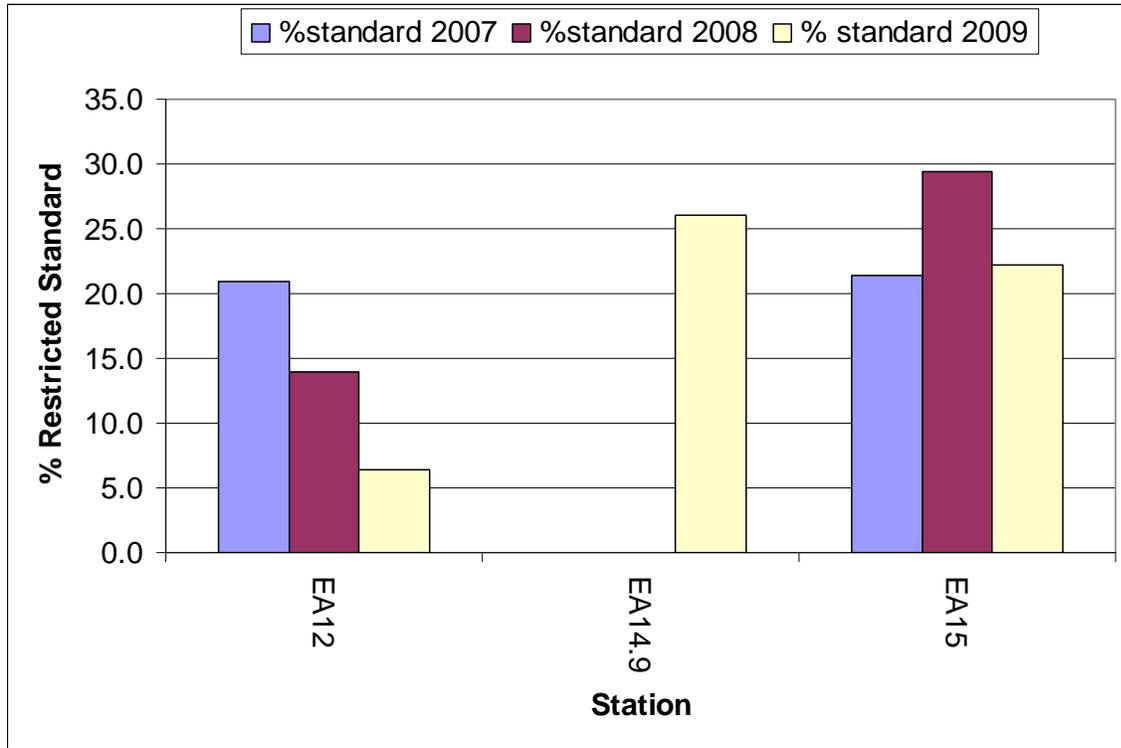


Figure 4 shows the P90 scores of conditionally approved stations over the past three review years; scores are expressed as a percent of the approved standard. These scores reflect only data collected in the open status. Station EA 31 has shown a marked increase in percent standard during 2009. A review of the tabulated data for 2009 showed a score of 980 FC/100 ml recorded on November 2, 2009 (Table 4). This is a sample site with no human habitation within 1000' of the station location. Even with this high score it is still well within the standard for approved harvest during its open status. This station will continue to be monitored to see if this upward trend continues.



Figure 4. Area EA CA Stations P90 Trends, Open Status Data

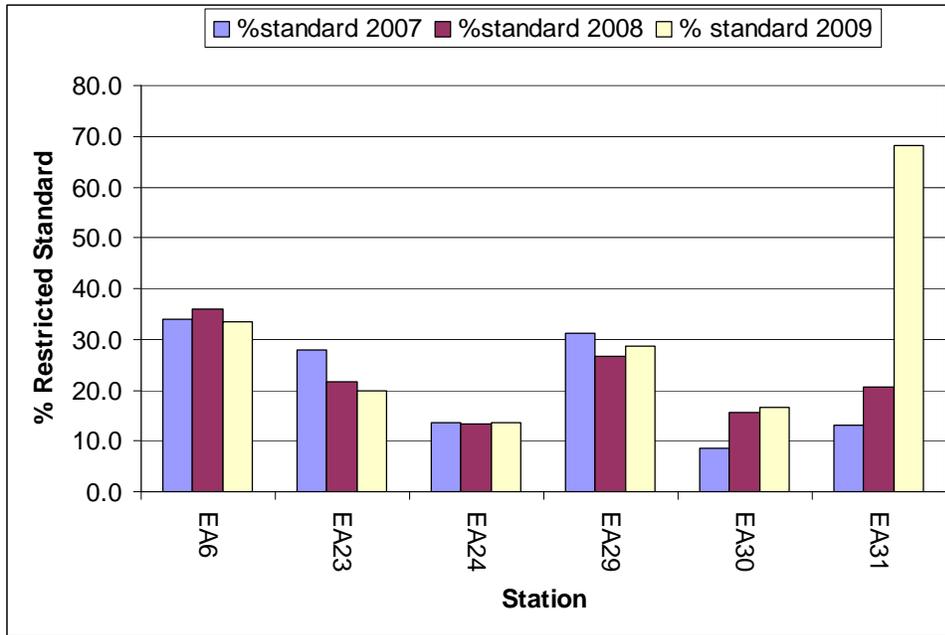


Table 4. Station EA 31 2009 Data

Station	Date	Temp F	Adversity	Current Class	Salinity ppt	MPN
EA031.00	1/5/2009	3		CA	29	<2
EA031.00	2/2/2009	0		CA	30	2
EA031.00	3/9/2009	1		CA	28	2
EA031.00	4/6/2009	5	R	CA	16	<2
EA031.00	5/4/2009	12		CA	18	<2
EA031.00	6/1/2009	12	P	CA	27	2
EA031.00	7/7/2009	14	P	CA	20	38
EA031.00	8/3/2009	20	O	CA	18	<2
EA031.00	9/8/2009	17	O	CA	28	<2
EA031.00	10/5/2009	14	P	CA	29	2
EA031.00	11/2/2009	8	O	CA	27	980
EA031.00	12/1/2009	3	P	CA	25	34



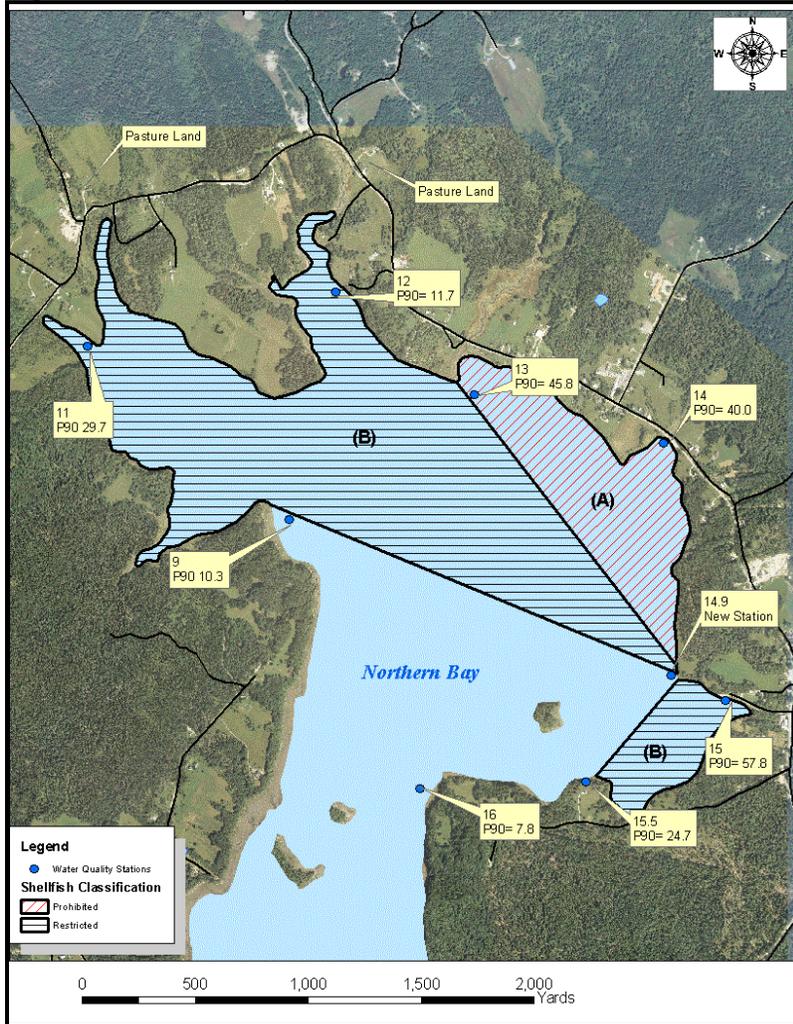
Recommendations for Upward Classification

Northern Bay, Penobscot

Prior to June 27, 2002 the easterly half of Northern Bay from Bridges Point (EA 16 Figure 5) to Hutchins Point (EA13 Figure 5) was classified prohibited due to the presence of three OBDs. In June of 2002 the size of the prohibited area was increased due to malfunctioning of the OBDs. The western boundary extended from Hutchins Point southwest to Wardwell Pt. (EA 9 Figure 5) and the southern boundary line extended west across the Bagaduce River from Bridges Point (EA 16 Figure 5) to Aunt Mollie's Island to the opposite shore. In March 2004, the prohibited areas was expanded to include all of Northern Bay due to water quality no longer meeting approved standards in the vicinity of sample stations EA 11 and 12. In December 2004, the overall size of the closed area in Northern Bay was decreased. The total prohibited area was reclassified into three classifications, prohibited, restricted and approved. The prohibited area was reduced to an area inside of line extending from Freethy Point to Hutchins Point. The restricted area extended south and west of the new prohibited line to a line that extended between Freethy Point (Station EA 14.9, Figure 5) and Wardwell Point (Station EA 9, Figure 5); it included Wardwell Cove, Littlefield Cove, Hutchins Cove and a portion of Northern Bay. The remaining part of the prohibited area that enclosed the area from Freethy and Wardwell Points and north of Bridges Point to Aunt Mollie Island and across to the western shore of the Bagaduce was reclassified approved. In May 2007, a restricted area was added enclosing part of Winslow Cove (EA 14.9 to EA 15.5 Figure 5). The Penobscot Clam committee requested that the DMR work with them on evaluating a portion of Northern Bay to determine what steps may be taken to reclassify some of this area to approved. An analysis of data at stations EA 11 and 12 shows that water quality in the northwest portion of Northern Bay in Littlefield and Hutchins Cove has improved; therefore this area is being proposed for an upward classification change to Approved. A re-evaluation of the OBDs indicates the need to change the location of the prohibited and restricted areas surrounding these outfalls.



Figure 5. Northern Bay Classification, Prior to Classification Change



As part of a request by the town of Penobscot Clam Committee extra sampling was conducted at stations EA 11 and EA 12 during the 2009 sampling season. These two stations have trended downward over the last few years and a survey, conducted in 2007 found no problems on the shoreline of this area. Prior to being classified as restricted in 2004, this portion of Northern Bay was classified as approved. Through conversations with the town shellfish warden, it was discovered that nearby upland pasture land was used for livestock grazing between 2003 and 2005. These pastures are no longer used for livestock grazing and the nearby stations EA 11 and 12 have been trending downward the last two years and currently meet the standard for approved harvest. This time frame corresponded to high scores recorded at stations EA 11 and 12. Table 5 shows all scores recorded at stations EA 11 and 12 since 2003; cumulative rainfall amounts within 4 day of sample collection are also noted in this table. Scores that exceeded the variability standard are highlighted in yellow. This time frame corresponded to high scores recorded at stations EA 11 and 12.



Table 5. Stations EA 11 and 12, SRS and Extra Data 2003 through 2009

Station	Date	Salin	Adv	Col_Method	Fecal Score	Cumulative Rainfall
EA011.00	07-May-03	25	O	A1COL	<3	0.45
	13-May-03	4	P	A1COL	240	0.65
	14-Jul-03	28	P	A1COL	3.6	0.34
	26-Aug-03	30	O	A1COL	<3	0
	23-Sep-03	29	O	A1COL	3.6	0.3
	20-Oct-03	26	N	A1COL	9.1	0
	31-Mar-04	25	R	A1COL	<3	0
	11-May-04	25	P	A1COL	<3	0.12
	06-Jul-04	25	P	A1COL	9.1	0.42
	12-Jul-04	28	O	A1COL	<3	1.98
	30-Aug-04	28	P	A1COL	43	0
	18-Oct-04	28	W	A1COL	43	1.36
	28-Mar-05	4	R	A1COL	240	0.37
	09-May-05	20	P	A1COL	<3	1.54
	11-Jul-05	28	O	A1COL	9.1	1.15
	17-Aug-05	27	O	A1COL	9.1	0.86
	24-Aug-05	27	O	A1COL	240	0.16
	24-Oct-05	22	O	A1COL	23	1
	24-Jan-06	0	O	A1COL	23	0.24
	27-Mar-06	28	O	A1COL	<3	0
	09-May-06	25	O	A1COL	<3	0
	10-Jul-06	24	O	A1COL	43	0
	23-Aug-06	26	O	MFCOL	<2	1.11
	13-Sep-06	20	O	MFCOL	<2	0
	16-Oct-06	28	O	MFCOL	2	0
	03-Jan-07	0	R	MFCOL	20	0.58
	01-May-07	21	R	MFCOL	<2	1.09
	06-Jun-07	1	P	MFCOL	16	2.3
	27-Jun-07	30	O	MFCOL	<2	0
	28-Aug-07	31	O	MFCOL	4	0
	29-Oct-07	28	P	MFCOL	20	1.25
	19-Mar-08	0	X	MFCOL	4	0
	09-Apr-08	12	X	MFCOL	<2	0
	02-Jun-08	28	P	MFCOL	8	1.34
	22-Jul-08	26	P	MFCOL	12	1.87
	16-Sep-08	26	X	MFCOL	3.6	0.63
	28-Oct-08	26	P	MFCOL	20	0.91
	15-Dec-08	19	X	MFCOL	20	1.9
	09-Mar-09	30	X	MFCOL	<2	0.49
	25-Mar-09	26	T	MFCOL	<2	0
06-Apr-09	16	P	MFCOL	<2	1.58	
16-Apr-09	23	X	MFCOL	<2	0	



Station	Date	Salin	Adv	Col_Method	Fecal Score	Cumulative Rainfall
	04-May-09	24	X	MFCOL	4	0.16
	01-Jun-09	25	P	MFCOL	2	1.12
	03-Aug-09	25	O	MFCOL	2	0.55
	08-Sep-09	28	W	MFCOL	2	0
	05-Oct-09	28	P	MFCOL	12	1.9
EA012.00	07-May-03	25	O	A1COL	<3	0.45
	13-May-03	22	P	A1COL	43	0.65
	14-Jul-03	28	P	A1COL	<3	0.34
	26-Aug-03	30	O	A1COL	21	0
	23-Sep-03	30	O	A1COL	3.6	0.3
	20-Oct-03	27	O	A1COL	240	0
	31-Mar-04	20	R	A1COL	3.6	0
	11-May-04	25	P	A1COL	<3	0.12
	06-Jul-04	28	P	A1COL	7.3	0.42
	12-Jul-04	28	O	A1COL	1100	1.98
	18-Oct-04	29	W	A1COL	3.6	1.36
	29-Nov-04	24	P	A1COL	43	2.36
	28-Mar-05	0	R	A1COL	3.6	0.37
	09-May-05	8	P	A1COL	3.6	1.54
	11-Jul-05	28	O	A1COL	<3	1.15
	17-Aug-05	27	O	A1COL	23	0.86
	24-Aug-05	28	O	A1COL	<3	0.16
	24-Oct-05	22	O	A1COL	5.7	1
	24-Jan-06	0	O	A1COL	<3	0.24
	27-Mar-06	24	O	A1COL	<3	0
	09-May-06	26	O	A1COL	<3	0
	10-Jul-06	24	O	A1COL	15	0
	23-Aug-06	26	O	MFCOL	4	1.11
	13-Sep-06	7	O	MFCOL	16	0
	16-Oct-06	28	O	MFCOL	<2	0
	03-Jan-07	13	R	MFCOL	2	0.58
	01-May-07	20	R	MFCOL	2	1.09
	06-Jun-07	1	P	MFCOL	16	2.3
	27-Jun-07	29	O	MFCOL	12	0
	28-Aug-07	31	O	MFCOL	4	0
	29-Oct-07	28	P	MFCOL	16	1.25
	19-Mar-08	0	X	MFCOL	4	0
	09-Apr-08	25	X	MFCOL	<2	0
	02-Jun-08	28	P	MFCOL	6	1.34
	22-Jul-08	28	P	MFCOL	4	1.87
	16-Sep-08	26	X	MFCOL	2	0.63
	28-Oct-08	30	P	MFCOL	<2	0.91
	15-Dec-08	19	X	MFCOL	13	1.9



Station	Date	Salin	Adv	Col_Method	Fecal Score	Cumulative Rainfall
	09-Mar-09	26	X	MFCOL	<2	0.49
	25-Mar-09	26	T	MFCOL	<2	0
	06-Apr-09	5	P	MFCOL	2	1.58
	16-Apr-09	24	X	MFCOL	<2	0
	04-May-09	25	X	MFCOL	<2	0.16
	01-Jun-09	23	P	MFCOL	2	1.12
	03-Aug-09	24	O	MFCOL	14	0.55
	08-Sep-09	28	O	MFCOL	<2	0
	05-Oct-09	28	P	MFCOL	10	1.9

A rainfall assessment was completed for stations EA 11 and 12. P90 scores were recalculated using data collected greater than 0.5 inches of cumulative precipitation in a 4 day period (Table 6). Data in table 6 shows the results of the rainfall assessment for the years 2003-2009 which include the time frame when the pastures were used for live stock and Table 7 shows the assessment for the years 2006-2009 after the cattle were no longer present.

Table 6. Geometric Mean and P90 Scores, 2003-2009, cumulative rainfall >0.5 inches

Station	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
EA011.00	21	14	8.6	0.55	240	44.6	36	199	5/13/2003
EA012.00	22	14	7.6	0.65	1100	53.3	36	203	5/13/2003

Table 7. Geometric Mean and P90 Scores, 2006-2009, cumulative rainfall >0.5 inches

Station	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
EA011.00	14	14	6.5	0.45	20	25.7	31	163	8/23/2006
EA012.00	14	14	4.7	0.38	16	15	31	163	8/23/2006

A seasonal analysis was completed for station EA 11 and 12. For this analysis, the data was broken into winter (December, January and February), spring (March, April and May), summer (June, July and August) and fall (September, October and November). The results showed no geometric mean scores exceeding 14 FC /100 ML during any seasonal period (Table 8).

Table 8. Seasonal Geometric Mean Analysis 2005-2009

Station	Geomean winter	Geomean Spring	Geomean Summer	Geomean Fall
EA011.00	NA	4.0	5.9	6.4
EA012.00	3.6	3.3	7.6	6.1

A tidal assessment was also completed for stations EA 11 and 12 (Tables 9 and 10). The geometric mean and P90 was calculated based on tide stage. This analysis showed no geometric mean above 14 FC/100ml for either the ebb or flood criteria. Station 11 did not meet the P90 standard during the Ebb tide stage. It is unknown why this station showed elevated scores during the ebb tide stage. Ebb tide includes all samples taken on the dropping tide to include low tide. Flood tide includes all samples taken on the rising tide to include high tide.



Table 9. Ebb Tide Water Quality Assessment 2005-2010

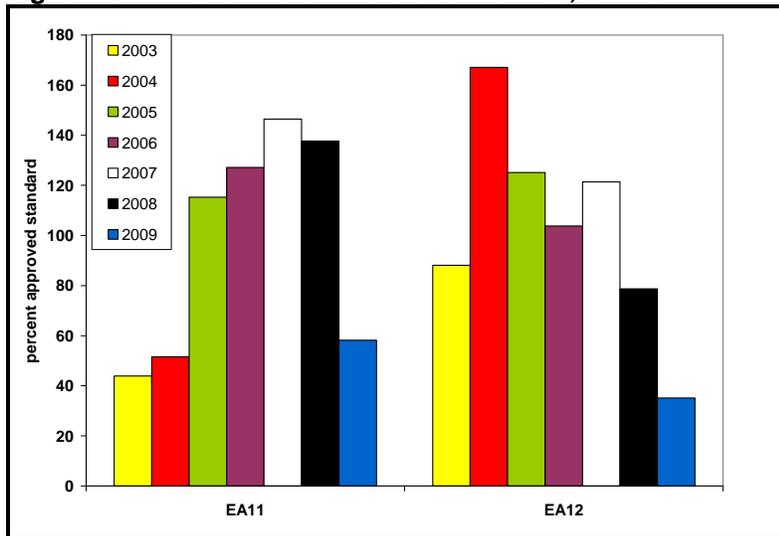
Station	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
EA011.00	9	6	6.3	0.73	240	57.9	36	199	3/28/2005
EA012.00	9	5	2.9	0.34	23	8.5	37	213	3/28/2005

Table 10. Flood Tide Water Quality Assessment 2005-2010

Station	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
EA011.00	26	19	6.2	0.54	240	31.4	35	192	5/9/2005
EA012.00	26	20	4.6	0.35	16	13.3	34	187	5/9/2005

Figure 6 shows the P90 trends for stations EA 11 and 12 for the years 2003 through 2009. At the end of the 2009 review year, both stations were meeting the approved standard; station EA 11 was at 84.8% of the approved standard, and station EA 12 was at 33.4%.

Figure 6. P90 Trends for station EA 1 and 12, 2003-2009



An assessment of the streams draining into the area was also completed. Table 7 shows the data for the streams from 2002-2009. The average flow in gallons per day and the average fecal score were calculated for each stream (Table 11). With this information, a dilution calculation for each stream was completed using the mid tide depth for each area. As the dilution zone for each stream is 1 acre or less these streams have little impact on the receiving waters and should not be considered a threat (Table 12).

Table 11. Data for Streams Draining into Northern Bay

Stream ID	Date	Col score (FC/100 ML)	GPM
EA00174.10	09-Jan-02	23	9.9
EA00174.10	01-Oct-02	1100	9
EA00174.10	11-Jul-05	2.9	5
EA00174.10	10-Jun-09	16	7



Stream ID	Date	Col score (FC/100 ML)	GPM
EA00174.10	31-Aug-09	570	25
EA00174.10	24-Jul-07	44	9
EA00174.10	06-Aug-03	460	150
EA00185.10	09-Jan-02	2.9	75
EA00185.10	01-Oct-02	240	200
EA00185.10	05-Jul-07	500	110
EA00185.10	10-Jun-09	9.1	590
EA00185.10	31-Aug-09	200	110
EA00185.10	24-Jul-07	25	99
EA00185.10	06-Aug-03	75	100

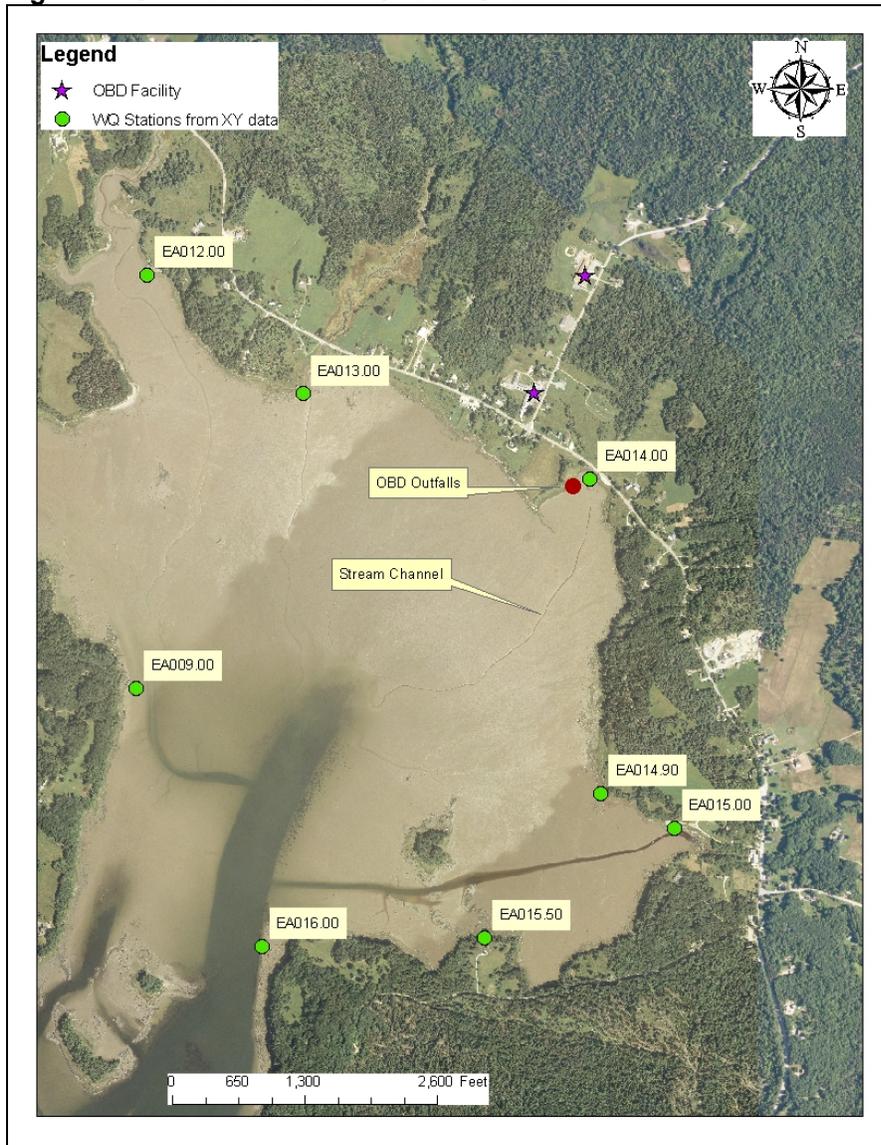
Table 12. Average Flow and Fecal Score

Stream ID	Avg. Flow GPD	Avg. Col Score (FC/ 100 ml)	Dilution zone (acres)	Mid Tide Depth (feet)
EA 174.10	44,208	317	0.8	4
EA 185.10	264,137	150	1.0	7.5

In addition to completing an assessment to reclassify a western portion of Northern Bay from restricted to approved, the restricted and prohibited area surrounding an OBD outfall was re-evaluated. In the past, the shorelines of Northern Bay Penobscot have been classified prohibited because of OBD's from a Nursing home (#2139) and an elementary school (#2465) (Figure 7). Generally, closure zones around OBD outfalls are determined using a complete mix dilution calculation based on the flow, bacterial concentrations for undisinfectated effluent and mid-tide water depths. A review of the design and operation of the OBD #2139 and the topography and hydrography of the outfall area indicate that this outfall is not suitable for this type of calculation and application.



Figure 7. OBD locations and Stream Channel



The OBD #2139 is comprised of a series of tanks that flow to two sand filters. The sand filters drain to a final tank where chlorine tablets are supplied for disinfection before discharge to Carpenter Cove in Northern Bay. This system is licensed for 7,400 gallons per day; the average daily flow is around 5,000 gallons per day. The Nursing home has reported flows up to 12,000 GPD. The high flows are due to infiltration during rain and other wet weather events such as snow melt. The outfall pipe is buried under the flats in a trench supported and surrounded by rocks in Carpenter Cove next to the mouth of an intermittent stream. At low tide there is no water in Carpenter Cove and the outfall pipe is exposed. The effluent discharge is controlled by a tidal timer and normally only allows discharge during the high tide. However, when the flow reaches 7,000 - 7,500 gallons the chlorine chamber, a mercury switch turns on and the pump



operates sending effluent to the bay, regardless of tidal stage. The outfall has a history of discharging during low tide stages due to both problems with the tidal timer not operating properly and high flow events.

The topography of the sea-bed in Northern Bay and Carpenter Cove is a broadly sloping bed that flats out entirely at low tide. As the tide recedes exposing the flat the intermittent stream has cut a channel across the mudflat and joins the seawater approximately 3,000 feet beyond the shore (Figure 7). This channel forms a conduit for the OBD outfall effluent to follow when it discharges during lower tide conditions when there is less water available for dilution. Considering the design and historical operation of the outfall discharge it is necessary to apply the dilution calculation based on low tide depths and consider the flow through the stream channel.

The dilution calculation was applied using the totals of the design flow for the two OBDs, 140,000 FC/100 ml and 1.0 ft depth for both the approved and restricted standard (Table 13). The lower tide depth is necessary because the nursing home OBD is designed to and has a history of discharging at low tide when there is little to no water on the flats. This allows the effluent flow across the flats by way of the stream channel with minimal dilution. The required closure acreages have been applied so that the stream channel is encompassed by a prohibited area that provides dilution to restricted standards and extends out to the low tide line where a larger volume of water is available for dilution. A restricted area has been drawn adjacent to the prohibited area and provides needed dilution to meet approved standards. The prohibited area closure line formed a rectangle with two corner points defined by lat/lon co-ordinates beyond the low tide line. Since there are no points of land or permanent structures (such as a buoy) identifying the prohibited zone this type of closure is not easily identified or enforced by the marine patrol. With a restricted area adjacent, harvesting would require a special permit notifying the marine patrol and specifying day and time of harvest would be scheduled. This would allow a physical line be constructed on the day of harvest so that closure line would be easily identified. This type of closure would not be appropriate or manageable if an approved area was adjacent to either a prohibited or restricted line.

Table 13. Northern Bay Dilution Requirements at low Tide for both OBDs

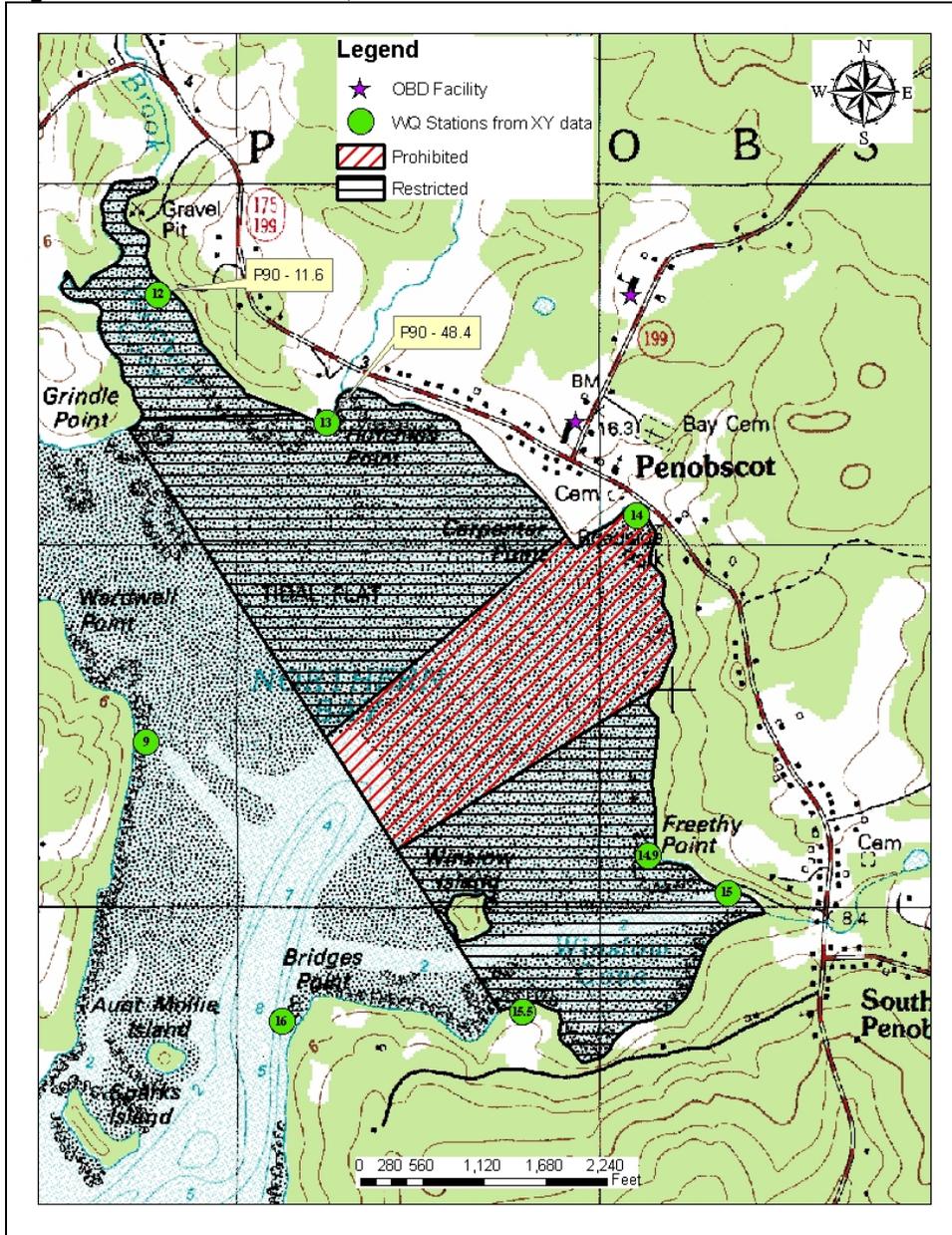
GPD total design flow	Fecal Load FC/100ml	Standard FC/100ml	Depth Water FT	Acre for Viral '1000:1	Acre for Bacterial Dilution
10000	140000	14	1	31	307
10000	140000	88	1	31	50

Although EA 12 in Hutchins Cove is meeting approved classification, the next station, EA13, is not. In order to reopen Hutchins Cove the closure line would have to be drawn to an approved station which would be EA 12. Considering the atypical closure lines proposed for the OBD closure, the marine patrol determined that the additional closure to station EA 12 within Hutchins Cove would be too difficult to enforce. Based on the evaluation of water quality, the OBD outfalls and marine patrol enforcement, a closure was proposed to provide a prohibited area enclosing Carpenter Cove and extending out to just beyond the low tide area with restricted areas adjacent to both long sides of the prohibited rectangle with a line that extends from Grindle Point southeast past Winslow Island to the southeast shore of Northern Bay east of



Bridges Point (Figure 4). This classification change was enacted Aug 13, 2009. This change reopened Littlefield and Wardwell Coves and the western portion of Northern Bay and increased the restricted area north and east of Winslow Island and Winslow Cove.

Figure 8. Pollution Area 36, Classifications at the end of 2009





Shoreline Survey Activity

The entire growing area was surveyed in 2007 for the scheduled Sanitary Survey. A drive through survey was done on August 13, 2009 and August 21, 2009 during random sampling runs. No septic changes in the shoreline were observed, no new housing developments or businesses or drainage alterations were noted. In July, a survey of the Freethy Point and Hutchins Point area was conducted with a member of the Penobscot clam committee and no potential or actual problems were identified. Also during this review period 26 stream samples were collected on June 10, 2009 and August 31, 2009. In September optical brightener pads were placed at stream EA 189.11 and EA 213.99. The pads were placed in response to the high stream scores collected on August 31, 2009 at these locations. The pads were picked up after one week and both showed negative results.

Table 14. Stream Scores from 8/31/09 Sample Collection

Stream ID	Date	Salinity	Flow GPM	FECAL	REMARKS
EA00189.11	8/31/2009	0	1	1600	very low flow, just a trickle
EA00213.99	8/31/2009	0	5	200	STREAMS DRAINS UPLAND BEHIND EA 14.9

Aquaculture/Wet Storage Activity

There are ten aquaculture lease sites in growing area EA:

REY 08: This is a limited purpose lease for the over-wintering of both American and European oysters. The lease is .01 acres and is located in Northern Bay; Penobscot, Me.

NOR2 07: This is a limited purpose lease for the over-wintering of both American and European oysters. The lease is .01 acres and is located in Northern Bay; Penobscot, Me.

NOR 07: This is a limited purpose lease for the over-wintering of both American and European oysters. The lease is .01 acres and is located in Northern Bay; Penobscot, Me.

BAG SB: This is a suspended and bottom culture lease sight of 4.13 acres located in the Bagaduce Salt Pond; Brooksville, Me. The species cultivated are European and American oysters, hen clams and soft shell clams.

LEA 09: This is Upweller or Flupsy of .01 acres located in the Bagaduce Salt Pond; Brooksville, Maine. The species cultivated are European and American oysters, hen clams and soft shell clams.

LEA 2 09: This is an over wintering site of .01 acres located just Southeast of Youngs Island the Bagduce River in the town of Penobscot. The species are European and American oysters, hen clams and soft shell clams.

LEA 3 09: This is an over wintering site of .01 acres located in South Bay of the Bagaduce River town of Brooksville. The species are European and American oysters, hen clams and soft shell clams.



PEA 1 09: This is a soft bag cultivation site just N of Bear Head, Bagaduce Salt Pond, Brooksville Me. The species cultivated is the American oyster.

PEA 2 09: This is a soft bag cultivation site just N of Bear Head, Bagaduce Salt Pond, Brooksville Me. The species cultivated is the American oyster.

PEA 3 09: This is a soft bag cultivation site just N of Bear Head, Bagaduce Salt Pond, Brooksville Me. The species cultivated is the American oyster.

For more information about aquaculture leases located in growing area EA, please visit the aquaculture web site:

[Maine Aquaculture Lease Inventory](#)

Summary

There were no new pollution sources found in this growing area during the 2009 sampling season. In 2009, two upward classification changes were made: one for Pollution Area No. 36A and another for Pollution Area No. 36. One upward classification change to Pollution Area No. 36 A is being recommended, based on the P90 of station EA 12 being well within the standard for approved harvest.

Two new stations EA 3.5 and EA 14.9 that were added in 2008 are still undergoing accelerated sampling. Station EA 3.5 was added to gather data for a possible line change to the WWTP CA and EA 14.9 was added as a margin station for a current restricted line.

Water quality for growing Area EA supports its current classification under the NSSP. Current trends show some stations trending upward and some stations trending downward. Those stations that have shown an upward trend 19.2 and 19.4 will be monitored on a quarterly basis during the 2010 sampling season to see if the upward trend continues. No downward classification changes are needed at this time.

During the 2010 sampling season DEP will conduct a Sanitary Survey around Northern Bay from the Littlefield Cove area to Winslow Stream. This survey will be conducted based on a request from the town of Penobscot to help determine why the area around Winslow Stream and Hutchins Point have a history of poor water quality.

References

Maine DMR Aquaculture. 2010. Aquaculture Lease Inventory.
<http://www.maine.gov/dmr/aquaculture/leaseinventory/index.htm>

NSSP 2007. National Shellfish Sanitation Program Model Ordinance, Guide for the Control of Molluscan Shellfish. 2007.



Maine Office of GIS 2010.

Penobscot Clam Committee (Interview and conversation with Bailey Bowden in August)

Castine WWTP interview with operator George Mytoyka on 1/5/10



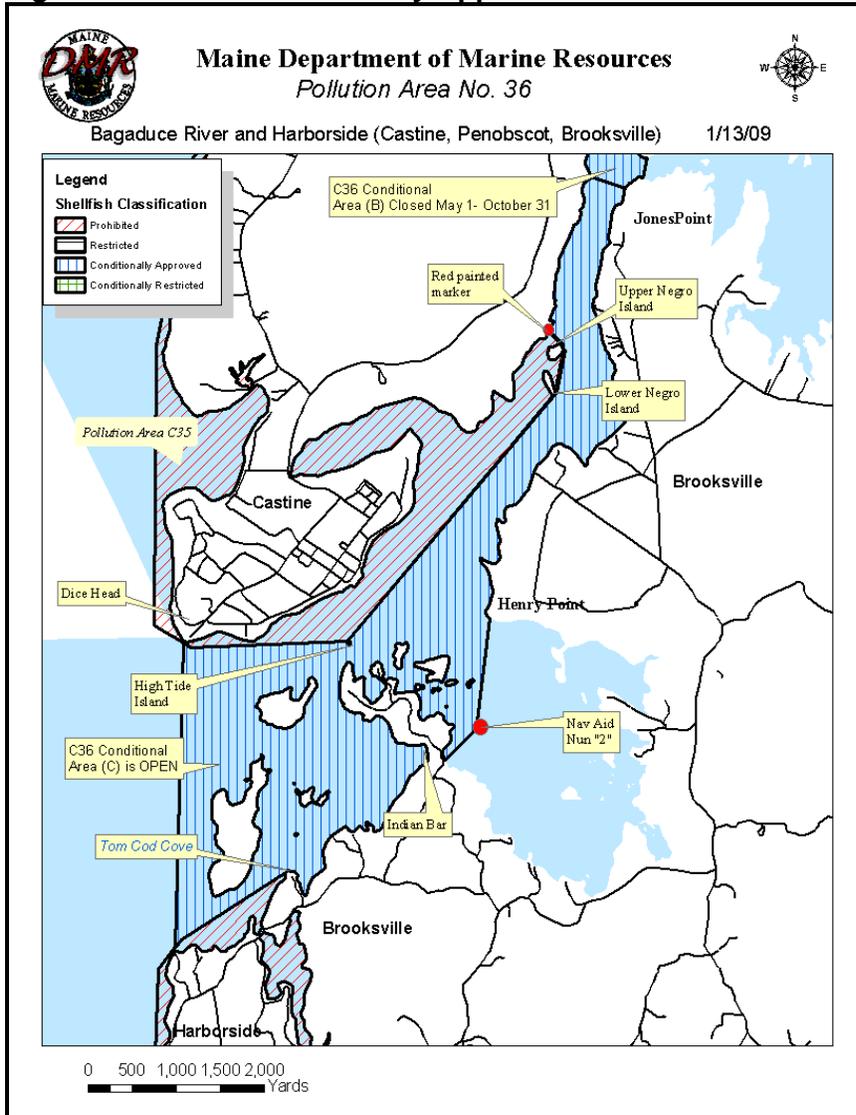
Appendix A. Annual Review of Conditional Area Management Plan- Bagaduce River and Harborside, Castine, Penobscot and Brooksville

Scope

This area is conditionally approved because of the Castine Wastewater Treatment Facility which discharges treated, year-round chlorinated effluent into the Bagaduce River. The conditional area includes a portion of the Bagaduce River east of a line from the southern tip of Dice Head, Castine running south to the northwest point of Harborside, Brooksville; then north of a line extending from the northwest point of Harborside, Brooksville northeast to the western tip of land in Tom Cod Cove, Brooksville; then follows the shoreline northeast to the northwest end of Indian Bar, Brooksville; then running across the bar to the northeast end; then running northeast to the Coast Guard navigational aid Nun "2"; then north to the southern tip of Henry Point, Brooksville; then follows the shoreline north to Jones Point, Brooksville; then south of a line from Jones Point, Brooksville west to the nearest opposite shore in Castine; then follows the shoreline approximately .9 miles to a red painted post on the western shore of the Bagaduce River, Castine; then south and east of a line extending from the red painted post southeast about .2 miles to the eastern point on Upper Negro Island, Castine; then south and east of a line running south to Lower Negro Island, Castine; then south and east of a line running southwest to the northern tip of High Tide Island; then south of a line extending west to the southern tip of Dice Head, Castine (Figure 1). This conditionally approved area has 5 water quality sample sites; EA 23, 24, 29, 30, and 31. In case of a malfunction at the WWTP water is collected at all 5 sites and shellfish samples are collected at stations EA 23, 24 and 29.



Figure 1. WWTP Conditionally Approved Area No. 36



Compliance with management plan

The wastewater treatment facility met compliance criteria that included peak effluent flow, fecal coliform levels, physical and chemical effluent quality, lack of mechanical failures and effective sewage treatment during conditionally open and approved periods. Reporting of noncompliance events was in accordance with the management plan with closures enacted immediately upon DMR notification. There were no violations requiring the closure of the conditional area during the 2009 review period.



Adequacy of reporting and cooperation of involved persons

Review of WWTP and DMR records show management plan violations have been reported by the municipal treatment plant staff to the Department of Marine Resources public health laboratory staff within acceptable time limits and with adequate detail to initiate action. The effectiveness of this management plan is excellent due to the close working relationship between the treatment plant staff, local law enforcement agencies and the Maine Department of Marine Resources Water Quality Laboratory, Lamoine. The timetable of events, details of noncompliance issues, estimates of repair intervals and update of plant's treatment effectiveness reporting fall within management plan compliance limits. Maine Marine Patrol officers have alerted local shellfish harvesters to any regulation changes. Legal closure of the area is automatically enacted immediately at the time of notification, with written regulation amendments dependent on administrative staffing and violation event timing (regular work hours, nighttime hours, weekends, and holidays). No anecdotal evidence (failing water testing criteria, shoreline survey, and reported illness) suggests that a public health risk exists when the treatment plant is operating correctly.

Compliance with approved growing area criteria

All stations meet the standard for approved classification during its open status a (Table 1).

Table 1. CA P90 scores during open status

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std
EA023.00	CA	30	30	2.5	0.3	50	6.2	31
EA024.00	CA	30	30	2.3	0.2	13	4.2	31
EA029.00	CA	30	30	2.6	0.41	120	8.9	31
EA030.00	CA	30	24	2.6	0.25	20	5.5	33
EA031.00	CA	30	30	3.4	0.61	980	21.1	31

Water sampling compliance history

The management plan requires that samples be taken at least monthly during its open status. Table 2 shows the conditional area samples taken during the 2009 sampling season. Station EA 30 was not sampled monthly because we were denied access to the property and may only collect this sample by boat during our regular random run. Therefore this sample station will only have 6 samples done yearly. This particular property is located at the end of a peninsula with only one road to access this entire area so there is no opportunity to use any adjoining property to add another station. EA 24 had no sample during the month of January because of access issues with the road into the property not being plowed.

Table 2. Tabulated Data Collected in 2009

Station	Date	Collector	Tide	Wind	Temp	Salin	Strat	Adv	Status	Class	Col
EA023.00	1/5/2009	ERS	LE	CL	2	28	R		O	CA	1.9
EA023.00	2/2/2009	ERS	L	CL	1	30	R		O	CA	1.9



Station	Date	Collector	Tide	Wind	Temp	Salin	Strat	Adv	Status	Class	Col
EA023.00	3/9/2009	ERS	HE	N	0	30	R		O	CA	1.9
EA023.00	4/6/2009	CREW	E	S	3	26	R	R	O	CA	1.9
EA023.00	5/4/2009	CREW	E	SW	8	25	R		O	CA	1.9
EA023.00	6/1/2009	CREW	LE	W	10	28	R	P	O	CA	2
EA023.00	7/8/2009	ERS	F	SE	14	26	R	P	O	CA	5.4
EA023.00	8/3/2009	CREW	E	CL	19	25	R	O	O	CA	10
EA023.00	9/8/2009	CREW	H	W	15	30	R	O	O	CA	1.9
EA023.00	10/5/2009	CREW	HF	SW	13	30	R	P	O	CA	1.9
EA023.00	11/2/2009	ERS	HE	NW	8	30	R	O	O	CA	5.5
EA023.00	12/1/2009	JF	E	N	5	31	R	P	O	CA	1.9
EA024.00	2/2/2009	ERS	LF	CL	1	30	R		O	CA	1.9
EA024.00	3/9/2009	ERS	HE	N	0	30	R		O	CA	1.9
EA024.00	3/24/2009	ERS	HF	N	2	30	E		O	CA	1.9
EA024.00	4/6/2009	CREW	E	S	4	28	R	R	O	CA	1.9
EA024.00	5/4/2009	CREW	E	SW	7	26	R		O	CA	2
EA024.00	6/1/2009	CREW	LF	W	11	28	R	P	O	CA	2
EA024.00	7/8/2009	ERS	F	SE	14	26	R	P	O	CA	6
EA024.00	8/3/2009	CREW	E	CL	20	22	R	O	O	CA	1.9
EA024.00	9/8/2009	CREW	HF	CL	16	29	R	O	O	CA	1.9
EA024.00	10/5/2009	CREW	HE	SW	15	30	R	P	O	CA	1.9
EA024.00	11/2/2009	ERS	HE	NW	8	30	R	O	O	CA	3.6
EA024.00	12/1/2009	JF	E	NW	3	26	R	P	O	CA	2
EA029.00	1/5/2009	ERS	LE	CL	3	29	R		O	CA	1.9
EA029.00	2/2/2009	ERS	LF	CL	1	30	R		O	CA	1.9
EA029.00	3/9/2009	ERS	H	N	1	28	R		O	CA	1.9
EA029.00	4/6/2009	CREW	E	SE	5	25	R	R	O	CA	1.9
EA029.00	5/4/2009	CREW	LE	SW	10	22	R		O	CA	1.9
EA029.00	6/1/2009	CREW	LF	W	11	29	R	P	O	CA	1.9
EA029.00	7/8/2009	ERS	F	SE	14	20	R	P	O	CA	40
EA029.00	8/3/2009	CREW	E	SW	20	24	R	O	O	CA	2
EA029.00	9/8/2009	CREW	HF	CL	16	28	R	O	O	CA	2
EA029.00	10/5/2009	CREW	HE	NW	14	30	R	P	O	CA	1.9
EA029.00	11/2/2009	ERS	E	NW	8	28	R	O	O	CA	120
EA029.00	12/1/2009	JF	E	NW	3	30	R	P	O	CA	6
EA030.00	4/6/2009	CREW	E	SE	6	22	R	R	O	CA	1.9
EA030.00	5/4/2009	CREW	LE	SW	11	22	R		O	CA	1.9



Station	Date	Collector	Tide	Wind	Temp	Salin	Strat	Adv	Status	Class	Col
EA030.00	6/1/2009	CREW	F	W	11	28	R	P	O	CA	1.9
EA030.00	8/3/2009	CREW	E	SW	22	22	R	O	O	CA	1.9
EA030.00	9/8/2009	CREW	HF	CL	18	29	R	O	O	CA	1.9
EA030.00	10/5/2009	CREW	HE	CL	15	30	R	P	O	CA	2
EA031.00	1/5/2009	ERS	LE	CL	3	29	R		O	CA	1.9
EA031.00	2/2/2009	ERS	LF	CL	0	30	R		O	CA	2
EA031.00	3/9/2009	ERS	H	N	1	28	R		O	CA	2
EA031.00	4/6/2009	CREW	E	SE	5	16	R	R	O	CA	1.9
EA031.00	5/4/2009	CREW	LE	SW	12	18	R		O	CA	1.9
EA031.00	6/1/2009	CREW	F	W	12	27	R	P	O	CA	2
EA031.00	7/8/2009	ERS	F	SE	14	20	R	P	O	CA	38
EA031.00	8/3/2009	CREW	E	SW	20	18	R	O	O	CA	1.9
EA031.00	9/8/2009	CREW	F	W	17	28	R	O	O	CA	1.9
EA031.00	10/5/2009	CREW	E	SW	14	29	R	P	O	CA	2
EA031.00	11/2/2009	ERS	E	NW	8	27	R	O	O	CA	980
EA031.00	12/1/2009	JF	E	NW	3	25	R	P	O	CA	34

Analysis-Recommendations

No changes to this conditional area management plan are recommended at this time.

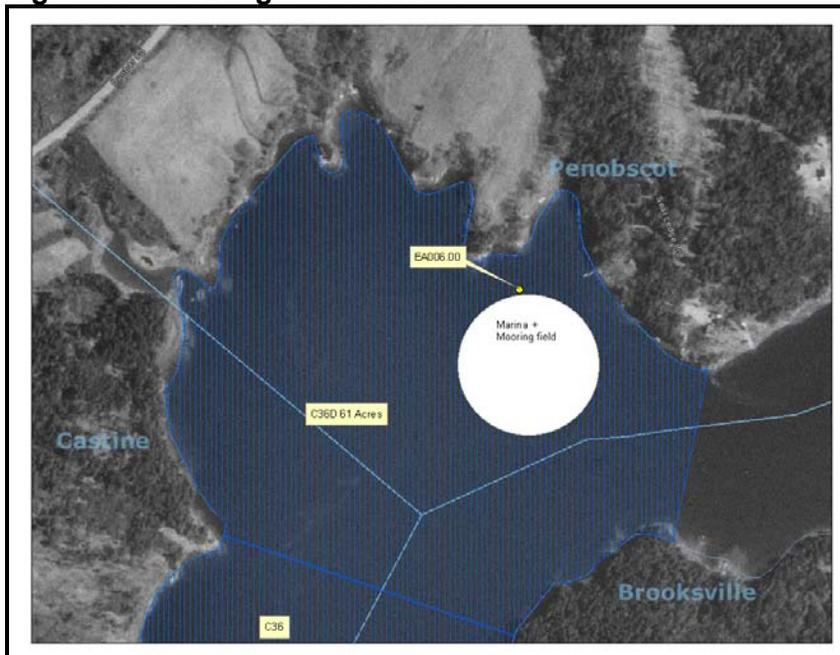


Appendix B. Annual Review of Conditional Area Management Plan- Seal Ledge Marina

Scope

The area surrounding Seal Ledge is classified as conditionally approved based on season and marina operations. This marina deals many with pleasure boats and has 18 slips and approximately 20 moorings. The marina has a pump out facility and a shore side head. The marina operates between the dates of May 1st and October 15th and is located in a seasonal conditional area that is closed between May 1st and October 31st. The water quality sample station associated with this area, EA 6 meets the standard for approved harvest year round, showing this marina has little or no affect on the adjacent waters however, the NSSP requires that marinas be managed conditionally due to the potential for pollution from boats with heads.

Figure 1. Seal Ledge Marian Area



Compliance with management plan

The management plan for this area requires that the closure size surrounding the marina be based on a dilution calculation. The following calculation was used to determine the closure size needed.

Average low water marina depth = 12 feet

75% of boats have marine heads= 28.5 rounded up to 29



Fecal Load Per Day

FC Load = (Number of boats)(2 person/boat)(2.0×10^9 FC/person)

$29 \times 2 = 58$

$58 \times 2E9 = 116E9$

Dilution Required

Dilution Volume (L) = FC Load/($14\text{FC}/100\text{ml} \times 1000\text{ml}/\text{L}$)

Fecal coliform bacteria must be diluted down to $<14 \text{ FC}/100\text{ml}$ of water

There are 283 100ml units in one cubic foot

Therefore, the bacteria must be diluted down to $14\text{FC} \times 283$ units per cubic foot, OR 3,962 colonies per cu.ft.

$$\frac{116E9\text{FC}}{3962\text{colonies} / \text{ft}^3} = 29,278,142 \text{ cu feet of receiving water for minimum dilution}$$

Average depth of receiving waters is 12 feet

CU feet required for dilution/ by average depth = 2,439,845

This equals 226,669 sq meters of surface area or 56 acres.

The above calculation calls for a closure size of 56 acres. The Seal Ledge Marina closure is a seasonal conditionally approved area encompassing 61 acres or 250,908 square meters. This closure allows for shellfish harvesting of this area between November 1 and April 30 (winter). This is based on the marina operation schedule for putting in and removing docks from the water as the current water quality scores in the area currently exhibit exceptional water quality

Adequacy of reporting and cooperation of involved persons

This management plan does not require reporting by non-DMR personnel. An open and closed status inspection is required annually. The 2009 annual inspection of the marina for open status on October 26, 2009 by DMR staff noted only 3 boats: 1 small pleasure boat and two small sailboats present and the docks being pulled. At this time the marina was in the process of pulling out boats and docks. An inspection for closed status was completed on May 4, 2009 by DMR staff. No boats were present and the docks were still being placed.

Compliance with approved growing area criteria

Water quality at station EA 6 meets the approved standards during the open period (Table 1).



Table 1. 2009 P90 Report, Open Status

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std
EA006.00	CA	30	22	3.4	0.41	116	11.7	35

Water sampling compliance history

The management plan requires sampling of station EA 6 at least once a month during the open status of November 1st – April 30th. Table 2 shows that the required samples were collected during the 2009 review period.

Table 2. 2008 and 2009 Samples during Open Status

Station	Date	Strat	Raw Col Score	Collector	Adv	Wind	Tide	Class
EA006.00	11/17/2008	R	3.6	ERS	P	SW	H	CA
EA006.00	12/1/2008	R	8	ERS	P	S	F	CA
EA006.00	1/5/2009	R	<2	ERS		CL	E	CA
EA006.00	2/2/2009	R	<2	ERS		CL	L	CA
EA006.00	3/9/2009	R	<2	ERS		N	E	CA
EA006.00	4/6/2009	E	<2	CREW	R	S	E	CA
EA006.00	5/4/2009	R	<2	CREW		SW	E	CA
EA006.00	11/2/2009	R	9.1	ERS	O	NW	HE	CA
EA006.00	11/23/2009	R	2	JF	O	CL	F	CA
EA006.00	12/1/2009	R	4	JF	P	CL	E	CA

Analysis-Recommendations

No changes to this conditional area management plan are recommended at this time.



Appendix C. Key to Water Quality Table Headers

Station = water quality monitoring station

Class = classification assigned to the station; prohibited (P), restricted (R), conditionally restricted (CR), conditionally approved (CA) and approved (A).

Count = the number of samples evaluated for classification, must be a minimum of 30.

MFCNT = the number of samples evaluated with the MTec method (included in the total Count column)

Geo_Mean = means the antilog (base 10) of the arithmetic mean of the sample result logarithm (base 10).

SDV = standard deviation

Max = maximum score of the 30 data points in the count column

P90 = 90th percentile

APPD_STD = the 90th percentile, at or below which the station would meet approved criteria in the absence of pollution sources or poisonous and deleterious substances.

RESTR_STD = the 90th percentile, at or below which the station would meet restricted criteria.



Appendix D. Growing Area EA 2009 Data

Station	Date	Strategy	Status	Class	Adversity	Temp	Salinity	Tide	Wind	Col Score
EA001.00	06-Apr-09	R	O	A	R	5	25	LE	SE	<2
	04-May-09	R	O	A		9	16	L	SW	4
	01-Jun-09	R	O	A	P	10	26	F	W	<2
	03-Aug-09	R	O	A	O	20	19	E	SW	4
	08-Sep-09	R	O	A	O	15	28	F	W	<2
	05-Oct-09	R	O	A	P	14	30	E	W	<2
EA003.50	05-Jan-09	R	C	P		3	32	E	CL	<2
	09-Mar-09	E	C	P		1	30	E	N	<2
	06-Apr-09	R	C	P	R	4	25	E	SE	<2
	04-May-09	R	C	P		9	20	E	SW	<2
	01-Jun-09	R	C	P	P	8	28	LE	W	<2
	07-Jul-09	R	C	P	P	14	22	F	SE	27
	03-Aug-09	R	C	P	O	18	23	E	CL	<2
	08-Sep-09	R	C	P	O	15	30	HF	CL	2
	05-Oct-09	R	C	P	P	14	30	HF	CL	4
	02-Nov-09	R	C	P	O	8	22	HE	NW	4
	23-Nov-09	R	C	P	O	3	28	F	CL	2
01-Dec-09	R	C	P	P	5	31	E	N	<2	
EA004.00	25-Mar-09	R	C	P	T	0	29	E	NW	<2
	04-May-09	R	C	P		9	25	E	CL	13
	01-Jun-09	R	C	P	P	8	28	H	W	2
	03-Aug-09	R	C	P	O	17	16	H	CL	<2
	08-Sep-09	R	C	P	O	17	30	HF	W	<2
	05-Oct-09	R	C	P	P	13	30	H	CL	2
EA005.00	06-Apr-09	R	O	A	R	4	28	E	S	<2
	04-May-09	R	O	A		8	22	E	SW	<2
	01-Jun-09	R	O	A	P	9	28	LE	W	2
	03-Aug-09	R	O	A	O	18	30	E	SW	4
	08-Sep-09	R	O	A	O	15	29	H	W	<2
	05-Oct-09	R	O	A	P	13	30	HF	SW	2
EA006.00	05-Jan-09	R	O	CA		2	28	E	CL	<2
	02-Feb-09	R	O	CA		1	30	L	CL	<2
	09-Mar-09	R	O	CA		0	28	E	N	<2
	06-Apr-09	R	O	CA	R	4	26	E	S	<2
	04-May-09	R	O	CA		8	25	E	SW	<2
	01-Jun-09	R	C	CA	P	10	28	LE	W	<2
	03-Aug-09	R	C	CA	O	17	25	E	SW	<2
	08-Sep-09	R	C	CA	O	17	30	H	CL	<2
	05-Oct-09	R	C	CA	P	14	30	HF	W	9.1
	02-Nov-09	R	O	CA	O	8	28	HE	NW	9.1
23-Nov-09	R	O	CA	O	4	28	F	CL	2	



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Station	Date	Strategy	Status	Class	Adversity	Temp	Salinity	Tide	Wind	Col Score
EA007.00	01-Dec-09	R	O	CA	P	5	30	E	CL	4
	06-Apr-09	R	O	A	R	5	23	E	S	<2
	04-May-09	R	O	A		9	25	E	SW	<2
	01-Jun-09	R	O	A	P	12	27	LE	W	2
	03-Aug-09	R	O	A	O	21	27	E	SW	<2
	08-Sep-09	R	O	A	O	17	30	H	CL	<2
EA009.00	05-Oct-09	R	O	A	P	14	29	HF	SW	>1600
	06-Apr-09	R	O	A	R	7	15	E	S	<2
	04-May-09	R	O	A		10	24	E	SW	<2
	01-Jun-09	R	O	A	P	12	26	LE	W	<2
	03-Aug-09	R	O	A	O	20	27	E	NW	<2
	08-Sep-09	R	O	A	O	18	28	H	NW	2
EA011.00	05-Oct-09	R	O	A	P	15	28	H	SW	13
	09-Mar-09	E	O	R		0	30	HE	N	<2
	25-Mar-09	R	O	R	T	1	26	H	NW	<2
	06-Apr-09	R	O	R	P	6	16	HE	CL	<2
	16-Apr-09	E	O	R		8	23	E		<2
	04-May-09	R	O	R		12	24	HE	SE	4
	01-Jun-09	R	O	R	P	9	25	H	W	2
	03-Aug-09	R	O	A	O	21	25	H	SW	2
EA012.00	08-Sep-09	R	O	A	W	20	28	HF	CL	2
	05-Oct-09	R	O	A	P	15	28	H	SW	12
	09-Mar-09	E	O	R		0	26	H	N	<2
	25-Mar-09	R	O	R	T	0	26	H	NW	<2
	06-Apr-09	R	O	R	P	5	5	HE	CL	2
	16-Apr-09	E	O	R		8	24	E		<2
	04-May-09	R	O	R		11	25	HE	S	<2
	01-Jun-09	R	O	R	P	10	23	H	SW	2
EA013.00	03-Aug-09	R	O	R	O	23	24	H	SW	14
	08-Sep-09	R	O	R	O	21	28	HF	CL	<2
	05-Oct-09	R	O	R	P	15	28	H	SW	10
	25-Mar-09	R	C	P	T	1	28	H	NW	<2
	06-Apr-09	R	C	P	P	7	4	HE	CL	<2
	04-May-09	R	C	P		11	24	H	SW	2
	01-Jun-09	R	C	P	P	10	26	HE	W	<2
EA014.00	03-Aug-09	R	O	R	W	21	25	HF	SW	6
	08-Sep-09	R	O	R	O	19	28	HF	NW	6
	05-Oct-09	R	O	R	P	15	28	HF	SW	33
	25-Mar-09	R	C	P	T	-1	26	HF	NW	2
EA014.00	04-May-09	R	C	P		10	24	H	SW	<2
	01-Jun-09	R	C	P	P	8	10	HE	SW	20
	03-Aug-09	R	C	P	O	22	24	HF	SW	6



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Station	Date	Strategy	Status	Class	Adversity	Temp	Salinity	Tide	Wind	Col Score
EA014.90	08-Sep-09	R	C	P	O	19	28	HF	CL	<2
	05-Oct-09	R	C	P	P	16	28	HF	SW	8
	09-Mar-09	E	O	R		0	26	H	N	2
	25-Mar-09	R	O	R	T	-2	26	HF	NW	<2
	06-Apr-09	R	O	R	P	3	6	E	CL	6
	04-May-09	R	O	R		11	24	H	W	<2
	01-Jun-09	R	O	R	P	10	10	HE	SW	22
	03-Aug-09	R	O	R	O	22	25	HF	SW	4
	08-Sep-09	R	O	R	O	19	26	HF	NW	<2
	05-Oct-09	R	O	R	P	15	28	HF	W	16
	30-Nov-09	E	O	R	P	5	21	HE	SW	2
	07-Dec-09	E	O	R	S	5	2	F	CL	2
14-Dec-09	E	O	R	P	4	22	HE	NW	12	
EA015.00	25-Mar-09	R	O	R	T	0	2	HF	NW	42
	04-May-09	R	O	R		11	24	H	W	2
	01-Jun-09	R	O	R	P	13	0	HE	SW	42
	03-Aug-09	R	O	R	O	21	25	HF	SW	6
	08-Sep-09	R	O	R	O	19	28	HF	NW	4
	05-Oct-09	R	O	R	P	15	26	HF	SW	25
EA015.50	25-Mar-09	R	O	A	T	-2	22	HF	NW	<2
	06-Apr-09	R	O	A	P	5	13	E	CL	3.6
	04-May-09	R	O	A		10	25	H	W	<2
	01-Jun-09	R	O	A	P	11	25	HE	W	4
	03-Aug-09	R	O	A	O	19	27	HF	SW	2
	08-Sep-09	R	O	A	O	18	28	HF	NW	2
	05-Oct-09	R	O	A	P	14	28	F	SW	8
EA016.00	25-Mar-09	R	O	A	T	0	23	HF	NW	<2
	06-Apr-09	R	O	A	P	5	18	E	CL	<2
	04-May-09	R	O	A		10	25	HF	SW	<2
	01-Jun-09	R	O	A	P	9	25	HE	W	4
	03-Aug-09	R	O	A	O	19	26	HF	SW	<2
	08-Sep-09	R	O	A	O	18	28	HF	NW	<2
	05-Oct-09	R	O	A	P	14	28	F	SW	7.3
EA017.00	06-Apr-09	R	O	A	R	5	22	E	S	<2
	04-May-09	R	O	A		10	25	E	SW	<2
	01-Jun-09	R	O	A	P	12	27	E	W	<2
	03-Aug-09	R	O	A	O	19	27	E	SW	4
	08-Sep-09	R	O	A	O	17	28	HF	W	<2
	05-Oct-09	R	O	A	P	15	29	HF	SW	2
EA018.00	06-Apr-09	R	O	A	R	6	10	E	S	<2
	04-May-09	R	O	A		12	21	E	SW	<2
	01-Jun-09	R	O	A	P	13	24	LE	W	4



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Station	Date	Strategy	Status	Class	Adversity	Temp	Salinity	Tide	Wind	Col Score
	03-Aug-09	R	O	A	O	20	26	HE	CL	<2
	08-Sep-09	R	O	A	O	17	28	H	CL	<2
	05-Oct-09	R	O	A	P	14	28	HF	CL	2
EA019.00	06-Apr-09	R	O	A	R	4	17	E	S	2
	26-Apr-09	A	C	A	F	9	16	F	CL	<2
	27-Apr-09	A	C	A	F	7	30	HE	SW	<2
	04-May-09	R	O	A		10	22	E	SW	<2
	01-Jun-09	R	O	A	P	13	22	LE	W	2
	15-Jun-09	A	C	A	F	16	16	LE	CL	16
	16-Jun-09	A	C	A	F	16	18	E	SW	4
	17-Jun-09	A	C	A	F	16	18	E	SW	<2
	23-Jun-09	A	C	A	F	12	17	HE	E	14
	24-Jun-09	A	C	A	F	14	14	H	E	<2
	25-Jun-09	A	C	A	F	16	14	HF	S	6
	03-Aug-09	R	O	A	O	23	20	HE	CL	3.6
	27-Aug-09	A	C	A	F	18	18	HE	NW	8
	28-Aug-09	A	C	A	F	14	16	E	CL	8
	29-Aug-09	A	C	A	F	11	21	HF	SE	136
	01-Sep-09	A	C	A	F	15	16	F	CL	20
	02-Sep-09	A	C	A	F	15	16	F	CL	8
	08-Sep-09	R	O	A	O	20	22	H	CL	<2
	05-Oct-09	R	O	A	P	15	24	HF	SW	16
	28-Oct-09	A	C	A	F	5	14	LE	NE	8
29-Oct-09	A	C	A	F	6	18	LE	CL	<2	
30-Oct-09	A	C	A	F	7	16	E	SW	2	
EA019.10	24-Mar-09	R	O	A		2	16	F	N	<2
	12-May-09	R	O	A		12	18	F	S	<2
	08-Jul-09	R	O	A	P	12	14	F	CL	29
	11-Aug-09	R	O	A	P	18	20	F	NW	4
	22-Sep-09	R	O	A	O	12	25	LF	S	<2
	17-Nov-09	R	O	A	O	3	5	F	NW	62
	07-Dec-09	E	O	A	S	5	14	LF	CL	4
EA019.20	06-Apr-09	R	O	A	P	3	4	H	CL	<2
	12-May-09	R	O	A		12	10	F	S	4
	08-Jul-09	R	O	A	P	12	13	F	CL	10
	11-Aug-09	R	O	A	P	17	4	F	NW	280
	22-Sep-09	R	O	A	O	13	25	L	S	<2
	17-Nov-09	R	O	A	O	3	12	F	NW	29
EA019.40	06-Apr-09	R	O	A	P	3	4	H	CL	<2
	12-May-09	R	O	A		12	10	F	S	4
	08-Jul-09	R	O	A	P	12	8	F	CL	78
	11-Aug-09	R	O	A	P	17	4	F	NW	80



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Station	Date	Strategy	Status	Class	Adversity	Temp	Salinity	Tide	Wind	Col Score
EA020.00	22-Sep-09	R	O	A	O	13	22	L	S	<2
	17-Nov-09	R	O	A	O	3	15	F	NW	12
	06-Apr-09	R	O	A	R	7	17	E	S	<2
	04-May-09	R	O	A		10	24	E	SW	<2
	01-Jun-09	R	O	A	P	13	25	E	W	2
	03-Aug-09	R	O	A	O	22	25	HE	SW	2
	08-Sep-09	R	O	A	O	19	26	H	CL	<2
EA021.00	05-Oct-09	R	O	A	P	14	28	HF	W	6
	06-Apr-09	R	O	A	R	5	24	E	S	<2
	04-May-09	R	O	A		10	24	E	SW	<2
	01-Jun-09	R	O	A	P	12	27	LE	W	<2
	03-Aug-09	R	O	A	O	20	26	E	SW	<2
	08-Sep-09	R	O	A	O	18	27	HE	CL	<2
EA023.00	05-Oct-09	R	O	A	P	14	28	H	W	2
	05-Jan-09	R	O	CA		2	28	LE	CL	<2
	02-Feb-09	R	O	CA		1	30	L	CL	<2
	09-Mar-09	R	O	CA		0	30	HE	N	<2
	06-Apr-09	R	O	CA	R	3	26	E	S	<2
	04-May-09	R	O	CA		8	25	E	SW	<2
	01-Jun-09	R	O	CA	P	10	28	LE	W	2
	07-Jul-09	R	O	CA	P	14	26	F	SE	5.4
	03-Aug-09	R	O	CA	O	19	25	E	CL	10
	08-Sep-09	R	O	CA	O	15	30	H	W	<2
	05-Oct-09	R	O	CA	P	13	30	HF	SW	<2
	02-Nov-09	R	O	CA	O	8	30	HE	NW	5.5
01-Dec-09	R	O	CA	P	5	31	E	N	<2	
EA024.00	02-Feb-09	R	O	CA		1	30	LF	CL	<2
	09-Mar-09	R	O	CA		0	30	HE	N	<2
	24-Mar-09	E	O	CA		2	30	HF	N	<2
	06-Apr-09	R	O	CA	R	4	28	E	S	<2
	04-May-09	R	O	CA		7	26	E	SW	2
	01-Jun-09	R	O	CA	P	11	28	LF	W	2
	07-Jul-09	R	O	CA	P	14	26	F	SE	6
	03-Aug-09	R	O	CA	O	20	22	E	CL	<2
	08-Sep-09	R	O	CA	O	16	29	HF	CL	<2
	05-Oct-09	R	O	CA	P	15	30	HE	SW	<2
	02-Nov-09	R	O	CA	O	8	30	HE	NW	3.6
	01-Dec-09	R	O	CA	P	3	26	E	NW	2
EA025.00	05-Jan-09	R	O	CA		2	28	LE	CL	<2
	06-Apr-09	R	O	A	R	4	24	E	SE	2
	04-May-09	R	O	A		8	22	E	SW	2
	01-Jun-09	R	O	A	P	9	28	LF	W	2



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Station	Date	Strategy	Status	Class	Adversity	Temp	Salinity	Tide	Wind	Col Score	
	03-Aug-09	R	O	A	O	20	24	E	CL	<2	
	08-Sep-09	R	O	A	O	16	30	HF	CL	<2	
	05-Oct-09	R	O	A	P	15	30	HE	CL	<2	
	28-Oct-09	A	C	A	F	6	30	L	NE	<2	
	29-Oct-09	A	C	A	F	7	30	L	E	<2	
	30-Oct-09	A	C	A	F	6	28	E	SW	2	
EA026.00	06-Apr-09	R	O	A	R	5	24	E	SE	<2	
	04-May-09	R	O	A		10	24	E	SW	<2	
	01-Jun-09	R	O	A	P	11	26	LF	W	2	
	03-Aug-09	R	O	A	O	20	24	E	CL	<2	
	08-Sep-09	R	O	A	O	16	29	HF	CL	<2	
	05-Oct-09	R	O	A	P	15	30	HE	SW	46	
EA027.00	06-Apr-09	R	O	A	R	4	26	E	SE	<2	
	04-May-09	R	O	A		11	22	LE	SW	<2	
	01-Jun-09	R	O	A	P	11	28	LF	W	<2	
	03-Aug-09	R	O	A	O	21	24	E	CL	2	
	08-Sep-09	R	O	A	O	16	28	HF	CL	<2	
		05-Oct-09	R	O	A	P	15	29	HE	CL	<2
EA028.00	05-Jan-09	R	O	CA		3	28	LE	CL	2	
	06-Apr-09	R	O	A	R	5	25	E	SE	<2	
	04-May-09	R	O	A		10	24	LE	SW	<2	
	01-Jun-09	R	O	A	P	10	28	LF	W	<2	
	03-Aug-09	R	O	A	O	21	23	E	CL	4	
	08-Sep-09	R	O	A	O	16	28	HF	W	<2	
		05-Oct-09	R	O	A	P	15	29	HE	W	2
EA029.00	05-Jan-09	R	O	CA		3	29	LE	CL	<2	
	02-Feb-09	R	O	CA		1	30	LF	CL	<2	
	09-Mar-09	R	O	CA		1	28	H	N	<2	
	06-Apr-09	R	O	CA	R	5	25	E	SE	<2	
	04-May-09	R	O	CA		10	22	LE	SW	<2	
	01-Jun-09	R	O	CA	P	11	29	LF	W	<2	
	07-Jul-09	R	O	CA	P	14	20	F	SE	40	
	03-Aug-09	R	O	CA	O	20	24	E	SW	2	
	08-Sep-09	R	O	CA	O	16	28	HF	CL	2	
		05-Oct-09	R	O	CA	P	14	30	HE	NW	<2
		02-Nov-09	R	O	CA	O	8	28	E	NW	120
	01-Dec-09	R	O	CA	P	3	30	E	NW	6	
EA030.00	06-Apr-09	R	O	CA	R	6	22	E	SE	<2	
	04-May-09	R	O	CA		11	22	LE	SW	<2	
	01-Jun-09	R	O	CA	P	11	28	F	W	<2	
	03-Aug-09	R	O	CA	O	22	22	E	SW	<2	
	08-Sep-09	R	O	CA	O	18	29	HF	CL	<2	



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Station	Date	Strategy	Status	Class	Adversity	Temp	Salinity	Tide	Wind	Col Score
EA031.00	05-Oct-09	R	O	CA	P	15	30	HE	CL	2
	05-Jan-09	R	O	CA		3	29	LE	CL	<2
	02-Feb-09	R	O	CA		0	30	LF	CL	2
	09-Mar-09	R	O	CA		1	28	H	N	2
	06-Apr-09	R	O	CA	R	5	16	E	SE	<2
	04-May-09	R	O	CA		12	18	LE	SW	<2
	01-Jun-09	R	O	CA	P	12	27	F	W	2
	07-Jul-09	R	O	CA	P	14	20	F	SE	38
	03-Aug-09	R	O	CA	O	20	18	E	SW	<2
	08-Sep-09	R	O	CA	O	17	28	F	W	<2
	05-Oct-09	R	O	CA	P	14	29	E	SW	2
02-Nov-09	R	O	CA	O	8	27	E	NW	980	
01-Dec-09	R	O	CA	P	3	25	E	NW	34	
EA033.00	06-Apr-09	R	C	P	R	4	20	E	SE	<2
EA035.00	06-Apr-09	R	O	A	R	5	16	E	SE	<2
	04-May-09	R	O	A		10	16	LE	SW	<2
	01-Jun-09	R	O	A	P	11	26	F	W	<2
	03-Aug-09	R	O	A	O	19	21	E	SW	4
	08-Sep-09	R	O	A	O	17	28	F	W	<2
05-Oct-09	R	O	A	P	13	28	E	SW	<2	
EA036.00	06-Apr-09	R	O	A	R	5	18	E	SE	<2
	04-May-09	R	O	A		10	16	LE	SW	<2
	01-Jun-09	R	O	A	P	10	26	F	W	<2
	03-Aug-09	R	O	A	O	21	20	E	CL	4
	08-Sep-09	R	O	A	O	15	28	F	W	<2
05-Oct-09	R	O	A	P	13	29	E	SW	<2	