GROWING AREA EA
Location - Bagaduce River
Castine, Penobscot and Brooksville

Triennial Report for 2008-2010

Report Date: 03-29-2012

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APPROVAL

Division Director:

Kohl Kanwit 3/29/12

Print name signature Date:

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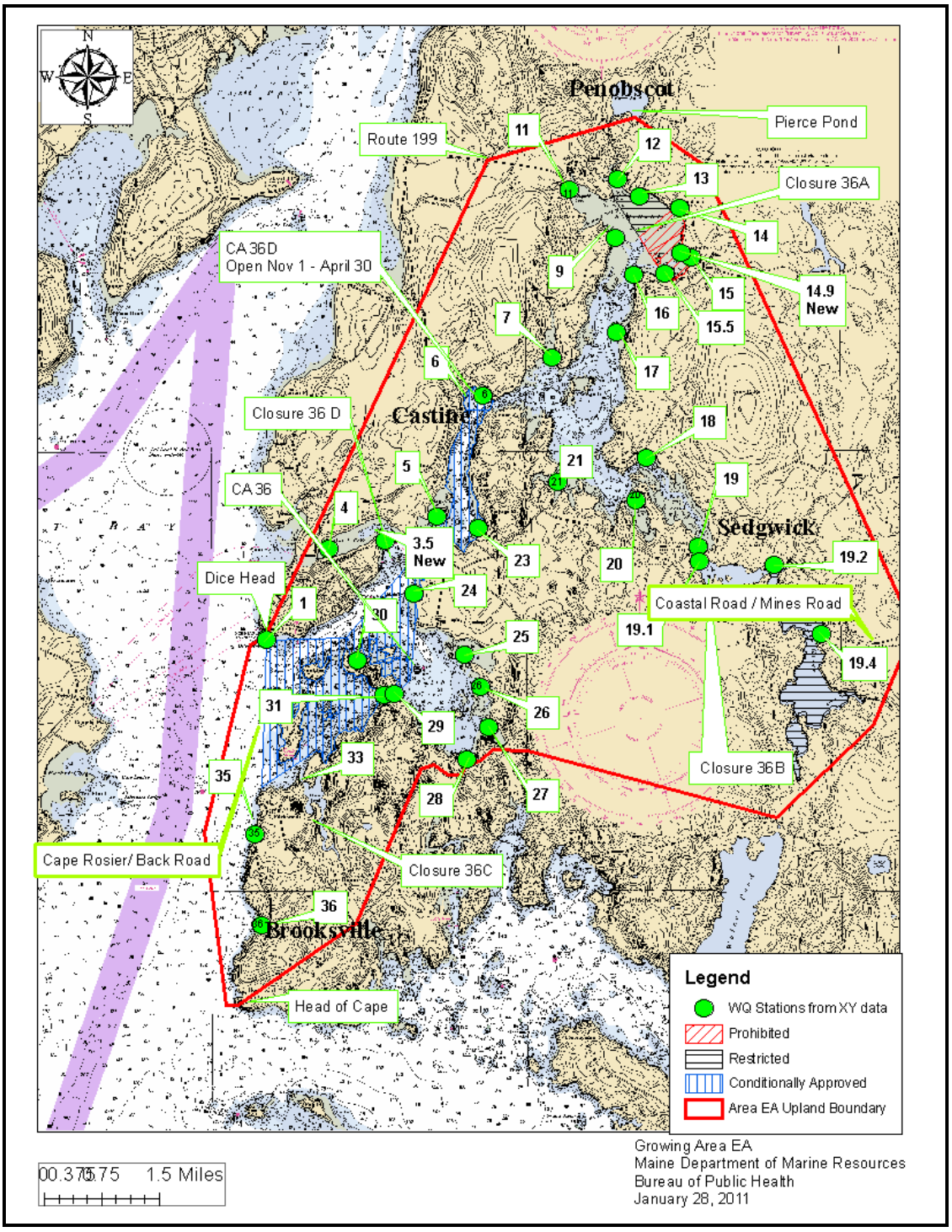


Executive Summary

This is a triennial report for growing area EA written in compliance with the requirements of the 2009 Model Ordinance and the National Shellfish Sanitation Program.

There were no new stations that were added during the 2010 season. One station, EA 13 changed class from restricted to approved on 11/5/10 based on improving water quality and shoreline survey work completed by DEP in the summer of 2010. Two stations, EA 14.9 and EA 15 changed class from restricted to prohibited on 11/5/10 because of malfunctioning septic systems found during shoreline survey by DEP. Two other stations in the Bagaduce Salt Pond EA 19.2 and EA 19.4 changed class from approved to restricted based on failing water quality during year end data review. There were three changes in classification during the 2010 review period. Pollution Area No. 36A was reduced to open the northwest portion of Hutchins Cove, Northern Bay due to water quality meeting the standard for approved harvest. The second change occurred in Pollution Area No. 36 B where an open approved portion of the Bagaduce Salt Pond had to made restricted based on year end failing water quality at end of year review. This change occurred 1/19/11. Another portion of Area No. 36A was reclassified from restricted to prohibited due to the presence of malfunctioning septic systems found during the shoreline survey conducted by DEP in the summer of 2010. One area is being recommended for an up grade in classification based on a re-evaluation of a current OBD dilution zone.

The next triennial report is due in 2013 the next sanitary survey report is due in 2019.

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 defined 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 five 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, four 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 two over-wintering locations. The other six are limited purpose sites for the over-wintering of American and European oysters.

Current Classification(s)

At the end of the 2010 review year, shellfish growing area EA had areas classified as:

Approved: 21 sample sites
(EA 1, 5, 7, 9, 11, 12, 13,15.5, 16, 17, 18,19 ,19.1, 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. 36 (B) Seal Ledge Marina 1 sample site EA 6

Restricted: Area No. 36B Upper Bagaduce River; 2 sample sites (EA 19.2, 19.4)

Prohibited: Area No. 36A Northern Bay, Malfunctioning septic and OBD; 3 sample sites (EA 14, 14.9 and 15)

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

Area No. 36 Castine WWTP two sample sites EA 3.5 and 4

Please visit the DMR website to view legal notices:

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

Activity during Review Period

Three classification changes occurred during 2010. Area No. 36A Northern Bay had a portion of Hutchins Cove go from restricted to approved on 11/15/10 based on improved water quality and the result of a shoreline survey conducted by DEP during the summer of 2010. This re-class may be found in greater detail in the Upward Classification section of this report. Another portion of Area No. 36A was reclassified from restricted to prohibited due to the presence of malfunctioning septic systems found during the shoreline survey conducted by DEP. This change occurred on 11/15/10. Area No. 36B was reclassified from approved to restricted based on failing water quality from the 2010 year end data review. This change occurred on 1/19/11 a complete write up of this change can be found later in this report. One other upward change in classification is being suggested for Area No. 36A based on a re-evaluation of a current OBD dilution zone.

There were no bypasses of the WWTP during this review period.

Conditionally Managed 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. 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.

Documentation of Pollution Sources

The following sections include information on pollution sources which do or may impact water quality in growing area EA. Pollution sources that are reviewed in this section include domestic waste, including both private inground systems and over board discharges (OBDs), marinas and mooring fields, stormwater and pollution from non-point sources (streams), farms and other agricultural activities, domestic animals and wildlife areas, and recreational areas and any new pollution sources that were identified since the last report.

Evaluation of New Pollution Sources

A sanitary survey was conducted in the town of Penobscot, Maine between June 14th and June 22nd 2010, by the Department of Environmental Protection (DEP). During the course of the survey 126 properties were inspected with two property owners denying access to two more. Fifteen properties were identified as having malfunctioning septic systems, (**highlighted in bold**), several of which drain or likely drain directly or indirectly to Northern Bay (Madore, 2010). Of the fifteen malfunctions that were found six were found to be problems that were a direct threat to water quality.

1.Southern Bay Road Map 23, Lot 35

The system is to the right rear of the home near the edge of yard. A malfunction with the septic system was noted; a breakout was present with a septic odor, ~30ft from home and ~100ft from bay.

2. Southern Bay Road Map 22, Lot 12

The leach field is to the left of the home in yard. Surveyors confirmed, with inspection of basement pipes, that not all plumbing is tied into the system. A grey water pipe leads from the left side of the home directly into the roadside ditch; the washing machine, the dishwasher and multiple sinks are all tied into the pipe draining to the roadside ditch which drains to Northern Bay, an odor was present. (See photo below).

Figure 2. Grey Water Pipe

This is the wastewater and other waste material at the outlet of the pipe in front of the property, Southern Bay Road, Map 22, Lot 12.

3. Southern Bay Road Map 22, Lot 34

The septic system is to the left of the garage. Liquid was seen coming out of the bank directly below the leach field and discharging into Winslow Stream. A dye test (green) was administered at 11:00 A.M. to determine if the septic system is malfunctioning. The site was revisited at 2:16 p.m. on the same day, June 21st, and the green dye administered earlier was visibly seeping out of bank below the leach field and draining into Winslow Stream. (See photo below.)

Figure 3. Dye Test Results

This is the green dye seen during the dye test of the septic system, Southern Bay Road, Map 22, Lot 34.

4. Southern Bay Road Map 22, Lot 11

The septic system is behind the home under raspberry bushes. There is a breakout of wastewater at the base of leach field which flows to a drainage swale, ~100yd to Winslow Stream and ~40 ft from left rear of home. A dye test using red dye was performed June 21st at 11:35 P.M. which at 2:00 P.M. confirmed the malfunctioning septic system. During significant precipitation or snowmelt, wastewater likely discharges to Northern Bay.

5. Western Country Rd. Map 22, Lot 53

There is a discharge of sanitary wastewater at the right front corner of the property to a roadside ditch. There is what appears to be a spring next to the road that is full of waste. Wastewater flows into the roadside ditch, and ultimately into Northern Bay.

6. Western Country Rd. Map 22, Lot 43

The septic system is in the field behind house & garage by the edge of the woods, ~100yd from home. There is a breakout present in leach field ~150ft from brook. There is a small drainage ditch along backside of malfunctioning leach field which leads towards Winslow Stream. The homeowner is aware of the problem and the property is for sale.

Re-Evaluation of Existing Pollution Sources

The following sections are a review of existing pollution sources in growing area EA. Pollution problems associated with domestic waste, including OBDs, which were identified prior to the last triennial re-evaluated, are evaluated in this section. Other pollution sources, including marinas and mooring fields, municipal wastewater treatment facilities, pollution associated with farms and agricultural activities, and farms which were present at the time of the last triennial review, are also reviewed.

Domestic Waste

There are four over board discharges (OBDs) that discharge their treated effluent into the waters of growing area EA (Figures 5 and 6). One OBD has been removed over the past three review years.

Figure 4. OBD 2139 Dilution Zone

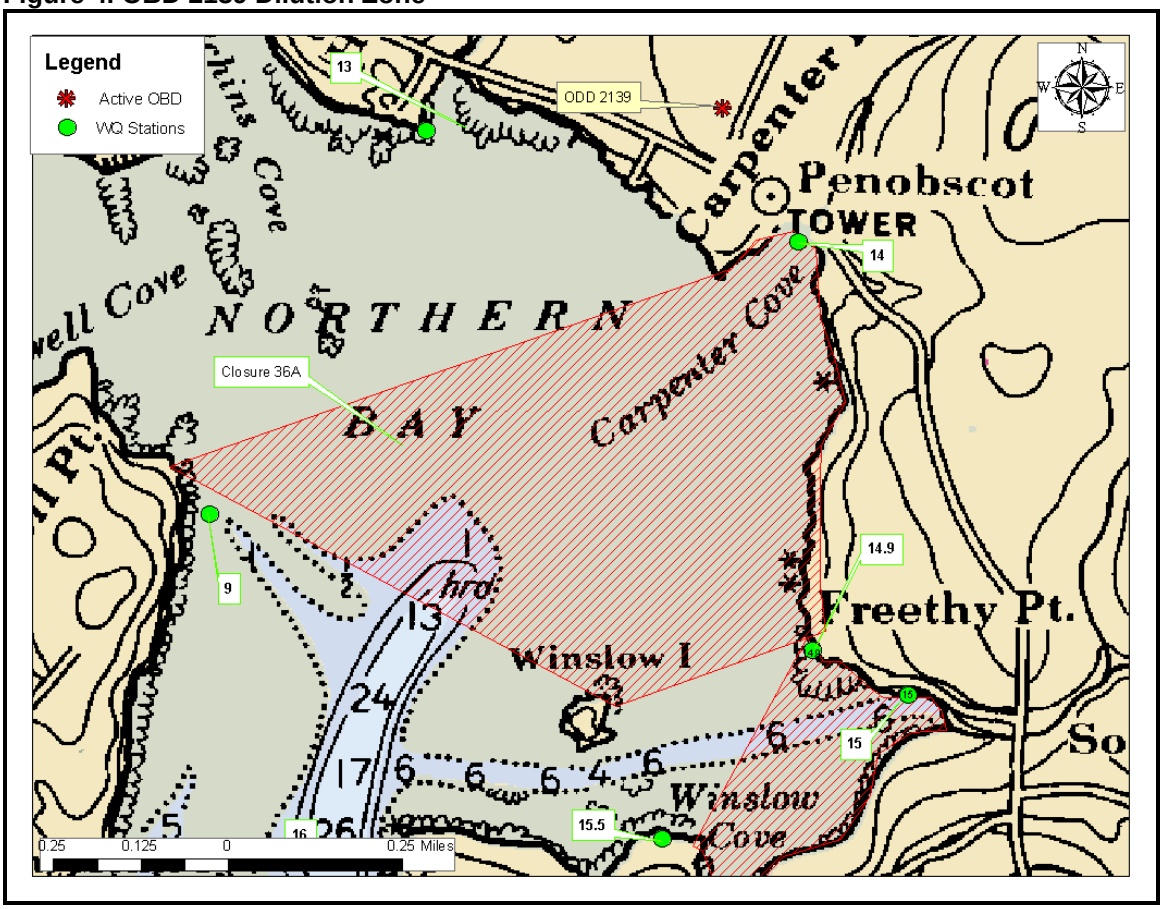
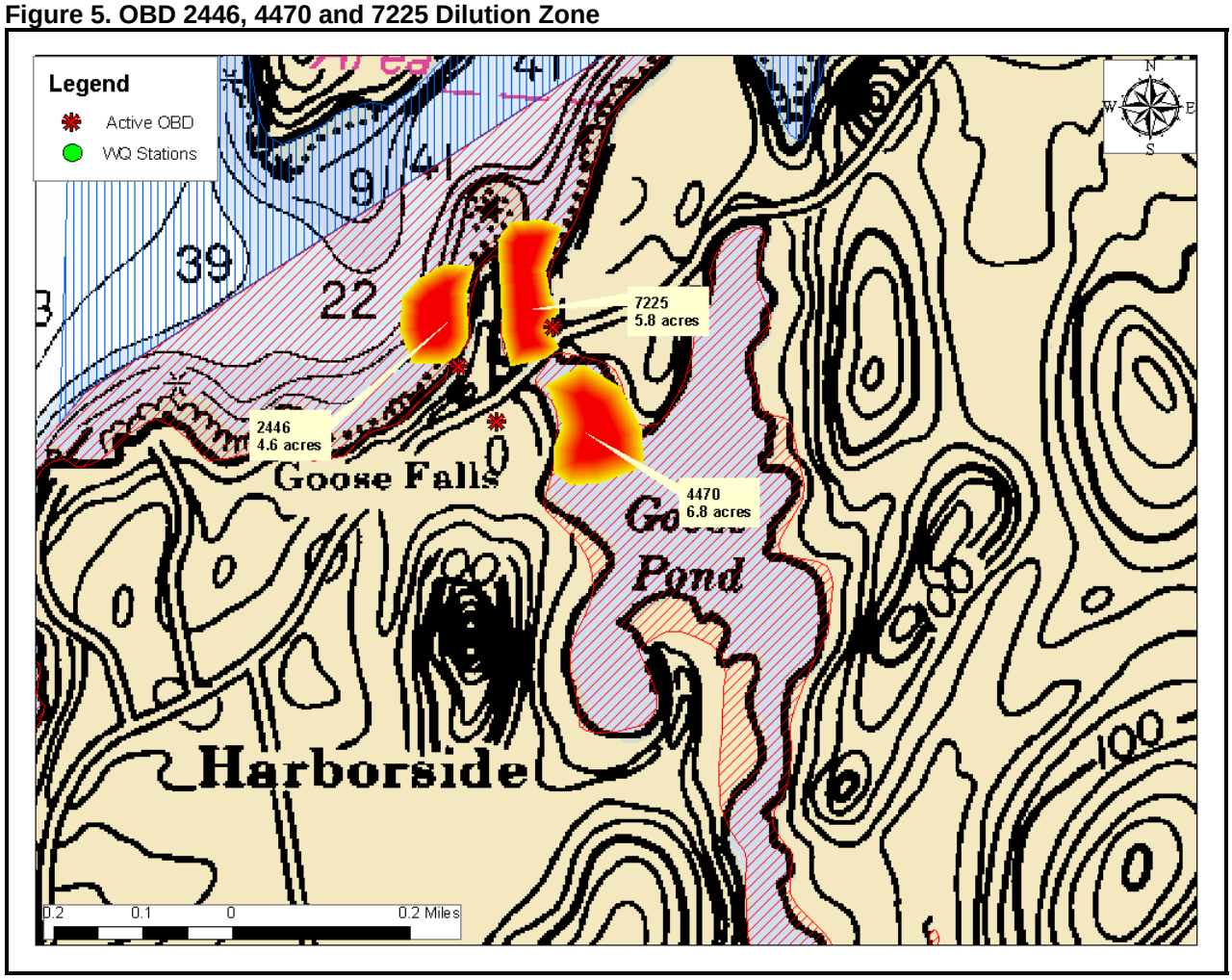


Figure 5. OBD 2446, 4470 and 7225 Dilution Zone



An overboard discharge (OBD) is the discharge of wastewater from residential, commercial, and publicly owned facilities to Maine's streams, rivers lakes, and the ocean. Commercial and residential discharges of sanitary waste have been regulated since the mid-1970 when most direct discharges of untreated waste were banned. Between 1974 and 1987 most of the "straight pipes" were connected to publicly-owned treatment works or replaced with standard septic systems. Overboard discharge treatment systems were installed for those facilities that were unable to connect to publicly-owned treatment works or unable to install a septic system because of poor soil conditions or small lot sizes.

All overboard discharge systems include a process to clarify the wastewater and disinfect it prior to discharge. There are two general types of treatment systems; mechanical package plants and sand filters. Sand filter systems consist of a septic tank and a sand filter. In such systems, the wastewater is first directed to a holding tank where the wastewater solids are settled out and undergo partial microbial digestion. The partially treated wastewater then flows from the tank into a sand filter, consisting of distribution pipes, layers of stone and filter sand, and collection

pipes within a plastic liner. The wastewater is biologically treated as it filters down through the sand, and is then collected and discharged to a disinfection unit. Mechanical package plants consist of a tank, where waste is mechanically broken up, mixed and aerated; mechanical systems require electric power, and must have an operating alarm on a separate electrical circuit that will activate if the treatment unit malfunctions due to a power failure. The aerated treated wastewater is held in a calm condition for a time, allowing for solids to settle and for the waste to be partially digested by naturally occurring bacteria. The clarified water from the tank is then pumped off the top into a disinfection unit. There are two types of disinfection units, UV and chlorinators (most common). In a chlorinator, the treated water contacts chlorine tablets and remains in a tank for at least 20 minutes where bacteria and other pathogens are killed. The treated and disinfected water is discharged from the disinfection unit to below the low water mark of the receiving waterbody (the ocean, a river, or a stream) via an outfall pipe.

OBDs are licensed and inspected by the Maine Department of Environmental Protection. At each inspection, DEP looks for tags on each treatment unit identifying the service contractor and the last date of service. If an OBD is not properly maintained, or if the OBD malfunctions, it has the potential to directly discharge untreated wastewater to the shore; therefore, preventative closures are implemented surrounding every OBD located in growing area EA (Table 1). The size of each closure is determined based on a dilution, using on the permitted flow rate of the OBD (in gallons per day, GPD), and the depth of the receiving water that each OBD discharges to; the fecal concentration used for this dilution calculation is $1.4X10^5$ FC /100 ml. All current closures are of adequate size to protect public health.

Table 1 OBD dilution zones area EA

TOWN	OBDNUM	FLOW	Mid Tide Depth	Dilution in Acres Needed
Penobscot	2139	12091	1.75	212.02
Brooksville	7225	600	3.00	6.14
Brooksville	2446	300	3.00	3.07
Brooksville	4470	300	3.00	3.07

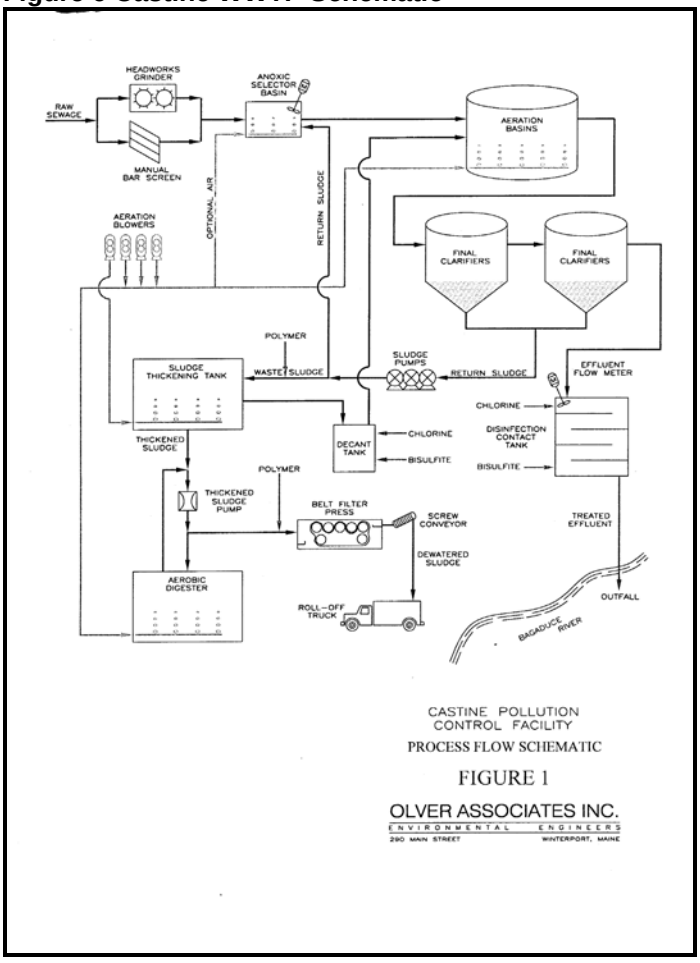
Municipal WWTP

The Town of Castine operates a municipal wastewater collection and treatment system that processes sewage generated by approximately 1,100 full-time residents, 400 seasonal residents and tourists, a small hospital, a local elementary school, several retail and small commercial establishments and approximately 500 students and staff at the Maine Maritime Academy. The collection system is approximately 5.5 miles in length and has no combined sewer overflows.

The permittee recently completed a major upgrade, increasing their monthly average design flow from 0.126 MGD to 0.2 MGD and a new peak hourly flow capacity of 1.0 MGD. The facility consists of a headworks grinder and a bypass barscreen which can be used when the grinder is taken offline for repairs. Following the headworks grinder, the influent is conveyed to a 7,100 gallon anoxic selector. Flows from the selector are then conveyed to a 97,000 gallon aeration basin fitted with coarse-bubble diffusers. Following aeration, the mixed liquor is conveyed to two

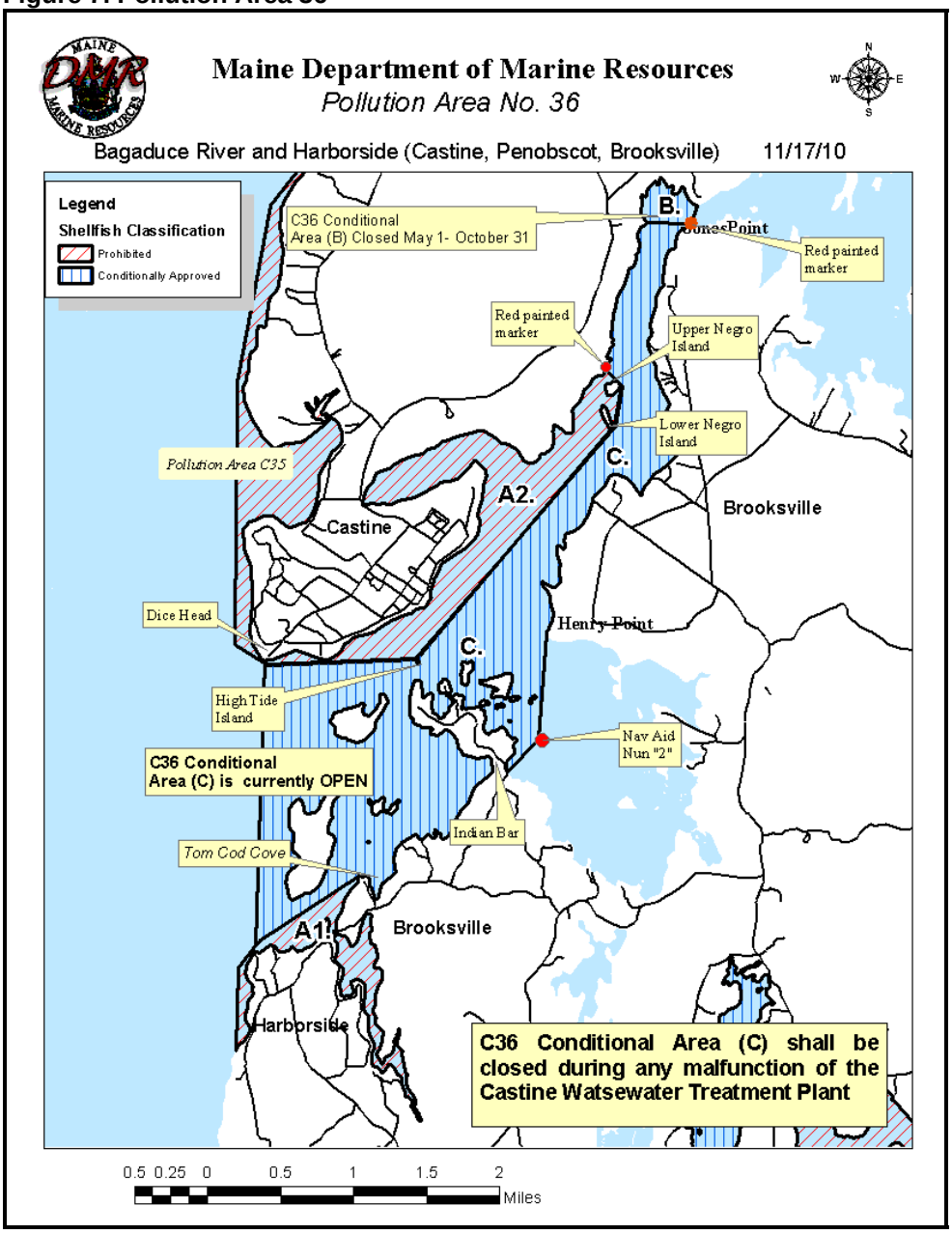
55,000 gallon secondary clarifiers. Secondary clarifier effluent is disinfected with sodium hypochlorite in a 10,000 gallon chlorine contact tank. The effluent is dechlorinated using sodium bisulfite and then discharged to the tidewaters of Castine Harbor via a 12-inch pipe which has nine feet of water over the crown of the pipe at mean tide and is exposed at mean low water. In accordance with the permittee's Toxicity Reduction Evaluation (TRE) Plan approved by DEP on May 2, 2008, the permittee will submit a TRE Report, due to DEP in December 2009, that addresses the mitigation or alleviation of the permittee's exceedences of ambient water quality standards. This report will evaluate extending and submerging the outfall pipe at all times. Upon completion, the new outfall location will change the acute dilution factor from 1:1 to 46:1 and the chronic dilution factor from 148:1 to 200:1 based on CORMIX modeling utilizing a 165 linear foot outfall extension. (http://www.epa.gov... accessed 3/14/11)

Figure 6 Castine WWTP Schematic



Based on the operation and evaluation of this facility the Department of Marine Resources maintains a current prohibited zone along with a current conditionally approved area based on the operation of the WWTP(Pollution Area 36). This area can be seen below in Figure 8.

Figure 7. Pollution Area 36



The plant has a current MOU with the department that requires immediate notification to the Department of any event that would affect the effluent or bypasses at the pump stations. The plant has currently met their obligations and the Department feels confident that they will continue to do so going forward. To determine the closure for the plant, the following dilution calculation was used: an average wet weather flow of 150,000 gpd, a fecal loading of 140,000 fc/100ml into a receiving water of an average depth of 15'. The calculation calls for a bacterial closure of 306 acres. The current closure is 623 acres making it 317 acres larger than needed. In the event of a plant bypass, there is an additional 2059 acres (C36) that closes.

Industrial Pollution

There are no industrial discharges in the study area.

Marinas

There are two marinas in the survey area one in the town of Castine with approximately 75 seasonal moorings, mainly day sailors and Academy boats. This area also includes the Maine Maritime Academy's pier for docking of its two training ships. This represents a potential pollution source since the primary ship, the State of Maine, has multiple toilet facilities on board, which are in use during the ten months that the ship is docked at Castine. The sewage is discharged to the town's sewage treatment plant via a pipeline at the pier. This area is included in the current pollution area 36.

The other marina is a seasonal facility located in the town of Penobscot. This marina deals many with pleasure boats and has 18 slips and approximately 20-25 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. (See Annual CA Review in Appendix 2)

Stormwater

Stormwater runoff is generated when precipitation from rain and snowmelt events flows over land or impervious surfaces and does not percolate into the ground. As the runoff flows over the land or impervious surfaces (paved streets, parking lots, and building rooftops), it accumulates debris, chemicals, sediment or other pollutants that could adversely affect water quality if the runoff is discharged untreated (US EPA 2009). Thus, stormwater pollution is caused by the daily activities of people within the watershed. Currently, polluted stormwater is the largest source of water quality problems in the United States.

The primary method to control stormwater discharges is the use of best management practices (BMPs). In addition, most major stormwater discharges are considered point sources and require coverage under an NPDES permit. In 1990, under authority of the Clean Water Act, the U.S. EPA promulgated Phase I of its stormwater management program, requiring permitting through the National Pollution Discharge Elimination System (NPDES). The Phase I program covered three categories of discharges: (1) "medium" and "large" Municipal Separate Storm Sewer Systems (MS4s) generally serving populations over 100,000, (2) construction activity disturbing 5 acres of land or greater, and (3) ten categories of industrial activity. In 1999, US EPA issued Phase II of the stormwater management program, expanding the Phase I program to include all urbanized areas and smaller construction sites.

Although it is a federal program, in the state of Maine, the Phase II Stormwater permit is issued and regulated by the Maine DEP (Chapter 500 and 502). Under the MS4 regulations, each municipality must implement the following six Minimum Control Measures: (1) Public education and outreach, (2) Public participation, (3) Illicit discharge detection and elimination, (4) Construction site storm water runoff control, (5) Post-construction stormwater management, and

(6) Pollution prevention/good housekeeping. The permit required each city or town to develop a draft Stormwater Management Plan by September 3, 2003 that will establish measurable goals for each of the Minimum Control Measures. The Town must document the implementation of the Plan, and provide annual reports to the Maine DEP. Currently the discharge of stormwater from 28 Maine municipalities is regulated under the Phase II permit requirements, however, no municipalities located within the boundaries of growing area EA fall under these regulations. Additionally, the Maine Stormwater Management Law provides stormwater standards for projects located in organized areas that include one acre of more of disturbed area (Maine DEP 2009).

Non-Point Pollution Sources

Freshwater and tidal creeks drain to the saltwater from upland areas. A total of 38 samples were taken from freshwater streams during the 3-year review period. The results can be seen in Table 2 below.

Table 2. Stream samples area EA

Stream ID	FECAL	Salinity	Flow GPM	Date
EA00130.00	152	0	2424	10-Jun-09
EA00130.00	92	0		31-Aug-09
EA00130.00	22	0		07-Apr-10
EA00147.10	4	0	346	10-Jun-09
EA00147.10	240	0	210	31-Aug-09
EA00147.10	24	0		07-Apr-10
EA00174.10	16	0	7	10-Jun-09
EA00174.10	570	0	25	31-Aug-09
EA00174.10	158	0		07-Apr-10
EA00176.10	18	0	263	10-Jun-09
EA00176.10	200	0		31-Aug-09
EA00176.10	108	0		07-Apr-10
EA00177.10	20	0	27	10-Jun-09
EA00177.10	2	0		07-Apr-10
EA00177.10		0		31-Aug-09
EA00185.10	9.1	0	590	10-Jun-09
EA00185.10	200	0	110	31-Aug-09
EA00185.10	4	0		07-Apr-10
EA00189.10	52	4	450	10-Jun-09
EA00189.10	760	18		31-Aug-09
EA00189.10	86	2	225	07-Apr-10
EA00189.11	1600	0	<1	31-Aug-09
EA00189.11	140	0		07-Apr-10
EA00189.12	24	0		31-Aug-09
EA00202.41	1.9	0	3	10-Jun-09
EA00202.50	56	0	2065	10-Jun-09
EA00202.50	200	0		31-Aug-09
EA00202.50	10	0		07-Apr-10
EA00213.99	200	0	5	31-Aug-09

Stream ID	FECAL	Salinity	Flow GPM	Date
EA00213.99	220	0		07-Apr-10
EA00214.10	10	0	13573	10-Jun-09
EA00214.10	14	0		07-Apr-10
EA00214.10	72	0		31-Aug-09
EA00214.11	68	0		31-Aug-09
EA00214.12	76	0		31-Aug-09
EA00253.50	18	0	808	10-Jun-09
EA00265.15	50	0	1795	10-Jun-09
EA00265.15	11	0	1800	07-Apr-10

The sample taken at stream 177.10 on 8/31/09 highlighted in yellow above, has no fecal score because of inconclusive results and a reading was unable to be taken. Stream 189.11 had a score of 1600 on 8/31/09. This stream is an intermittent stream with little or no flow making its impact to the receiving waters minimal at best. The nearby water quality station EA 13 has a P90 score that meets the standard for approved harvest supporting this conclusion. The DEP also conducted a shoreline survey in this area during the summer of 2010 and found no problems in this area. To help assess rather or not a stream is impacting the receiving waters, staff took a minimum of five samples per stream and ran a dilution calculation based on average flow, average fecal score and the mid tide depth. The results of this calculation can be seen in Table 3 below. Streams that had dilution zones of less than two acres are viewed to have minimal impact and do not require closures. All other streams have closures in place either for other reasons such as OBD's, malfunctioning septic systems, or failing water quality.

Table 3. Stream Dilution Zones Area EA

Stream	Count	AVG Flow GPD	mid tide depth	avg score	Dilution in Acres Needed	Current Closure
EA00130.00	11	756,000.00	8.00	83.744	1.75	no closure
EA00147.10	10	196,200.00	5.00	130.712	1.12	no closure
EA00174.10	13	43,056.00	4.00	269.918	0.64	no closure
EA00176.10	10	123,120.00	6.00	395.225	1.77	no closure
EA00177.10	9	77,760.00	4.00	143.975	0.61	no closure
EA00185.10	13	264137	6.00	150	1.05	no closure
EA00189.10	20	310400	6.50	111.5	1.10	no closure
EA00202.50	16	378,411.42	5.00	184.092	3.05	226 acres (OBD)
EA00214.10	18	4,345,290.00	6.00	124.893	19.80	37 acres failing septic and WQ
EA00253.50	8	310,680.00	9.00	236.775	1.74	no closure
EA00265.15	8	5,325,120	3.00	44.371	17.00	600 acres failing WQ
EA00265.60	5	1,282,080.00	6.00	62.866	2.94	600 acres failing WQ
EA00265.81	5	2,363,520.00	4.00	5.333	0.69	600 acres failing WQ
EA00266.50	6	24,360.00	4.00	446.7	0.60	6.5 acres(Goat farm)
EA00283.50	7	76,320.00	4.00	105.966	0.44	no closure
EA00297.50	7	69,120.00	4.00	18.566	0.07	no closure
EA00337.50	7	815,040.00	5.00	25	0.89	no closure
EA00395.90	5	104,400.00	4.00	13.3	0.08	no closure
EA00397.10	6	84,000.00	4.00	10.066	0.05	no closure

Stream	Count	AVG Flow GPD	mid tide depth	avg score	Dilution in Acres Needed	Current Closure
EA00412.10	5	111,600.00	4.00	58	0.35	no closure

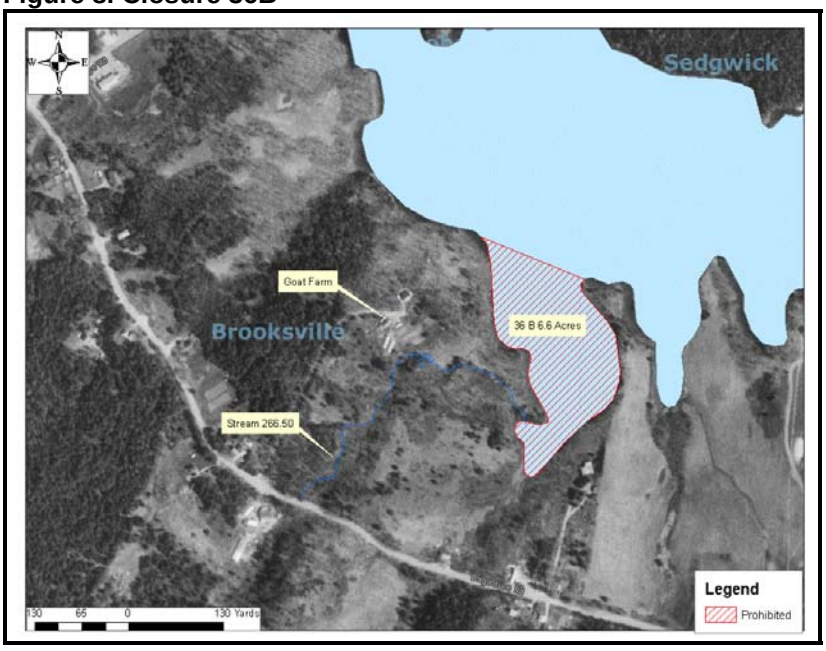
Agricultural Activities

There was only one farm that represented any potential impact to the waters of this growing area. This farm is a goat farm located in the town of Brooksville. Stream 266.50 is the stream that flows through this property. The current closure 36B currently closes the cove adjacent to the farm. Due to lack of access there is no sample station located on the margin of this closure. To verify that this closure is adequate a dilution calculation was performed using an average flow rate from all samples taken from this stream and an average fecal score using the six stream samples into a receiving water with an average depth of 4'. This calculation calls for a closure of 0.60 acres. The current closure is 6.5 acres. The data used to perform this calculation can be seen in the following table.

Table 4 Stream Data

Stream ID	Date	FECAL	Flow	Flow Unit
EA00266.50	03-Sep-98	43	1	GPM
EA00266.50	05-Jul-00	711.3	20	GPM
EA00266.50	12-Nov-02	43	40	GPM
EA00266.50	15-Apr-03	2.9	7.5	GPM
EA00266.50	06-Aug-03	1100	32	GPM
EA00266.50	24-Jul-07	780	1	GPM

Figure 8. Closure 36B



The goat farm has now grown and expanded so a study will be conducted during the 2011 season to help determine if the farm is impacting a nearby oyster aquaculture lease sight. Sample stations will be established at the margins of the lease sight and will be sampled twice monthly by boat with the cooperation of the lease holder from April through November to see if runoff from the goat farm is reaching the nearby offshore lease sight.

Domestic Animals and Wildlife Activity

The salt marshes and mudflats of the growing area provide valuable habitat to a variety of wildlife. Commonly observed bird species include a variety of gulls, sea and inland ducks, cormorants, geese, great blue herons, egrets, swans, and others. Mammals living within the growing area include dogs, cats, whitetail deer, muskrat, squirrels, chipmunks, rabbits, moles, mice, bats, shrews, weasels, skunks, raccoons, and others. Maine Inland Fish and Wildlife surveys indicate that migratory waterfowl numbers begin to increase in the early autumn months, and typically peak in late fall or early winter. Although large numbers of birds can impact the growing area water quality such occurrences are very difficult to document. No such significant water quality impacts have been documented for the area to date.

Conservation/Recreation Areas

This section of the coast of Maine is considered a significant tourism area, especially in the vicinity of Castine. There is one state park on Cape Rosier in Brooksville. This typically serves day-users. There are no known commercial or public campgrounds in Area EA. Although there are a few gravel beaches in the area, swimming in the ocean in this area is relatively rare, as the water temperatures rarely exceed 60F. The entire growing area is subject to a heavy influx of visitors during summer months. The accompanying shoreline survey of private homes and continued water quality monitoring should serve to identify any changes in water quality. Hunting also represents a form of recreation in this part of Maine. These activities take place primarily in the fall of the year.

Mining

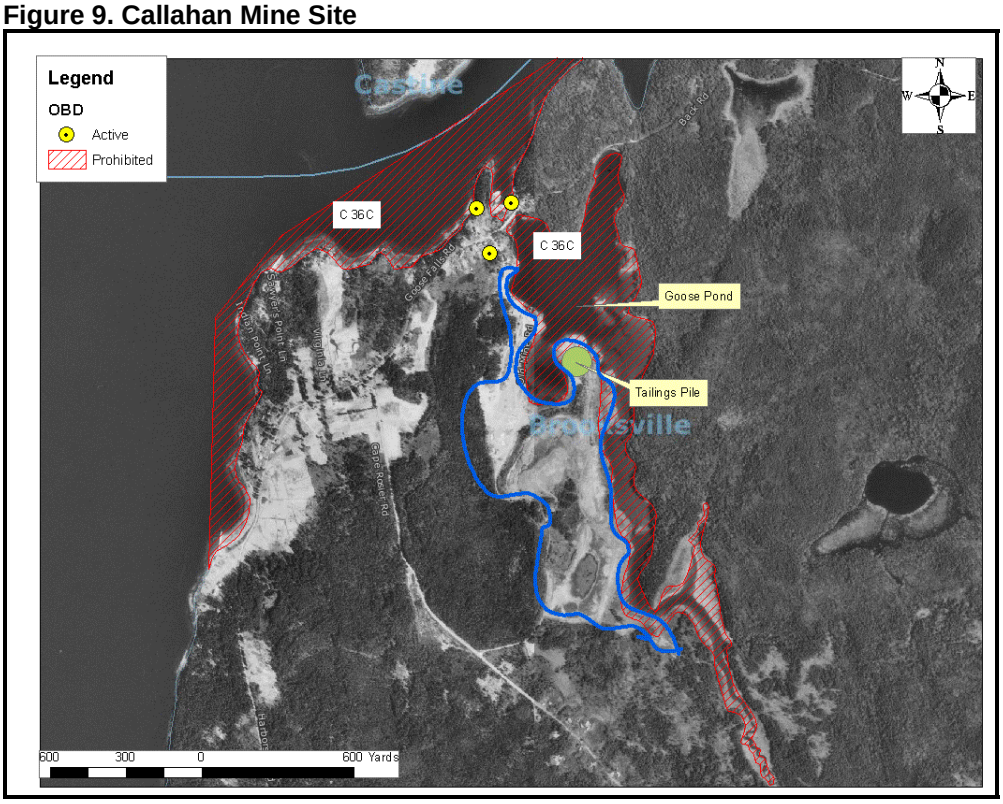
Mining at the Callahan mine site in Brooksville Maine, primarily for copper and zinc, began in the 1800s. Since then the mining has occurred periodically on-site; the latest mining effort was from 1968 to 1972. At that time the Goose Pond Estuary was drained to allow for excavation of an open pit mine in the estuary. The estuary, located adjacent to the site, has been impacted by heavy metal contaminants from the site. The following quote from the 2003 ATSDR media announcement summarizes the possible impact this site has on the growing area (www.atsdr.cdc.gov/NEWS/brooksvilleme050203.html accessed 3/14/10)

"**The Callahan Mining Corp. site is a former zinc/copper open-pit mine on the Cape Rosier peninsula in the town of Brooksville, Maine. The mine was operated adjacent to and beneath Goose Pond, which was dammed and drained during operations to allow the mining to take place. The open-pit mining operation and processes contaminated the site with metals. Since the mine ceased operations in 1972, dams preventing water from entering Goose Pond have been removed, and the pit currently is under water. Elevated levels of heavy metals, including cadmium, copper, lead and zinc, have been measured in surface water, sediments, biota, soil and waste piles on the site.**

- **The site contains physical hazards and elevated levels of heavy metals. Physical hazards could cause injury to people visiting the site.**
- **Because of the low frequency and duration of likely exposures, people exposed to heavy metals and other contaminants at the site are not expected to experience adverse health effects. Further data collected during the U.S. Environmental Protection Agency's (EPA's) remedial investigation process might modify this conclusion.**
- **Several contaminants found at the site are known to accumulate in fish and shellfish. Not enough current information exists on potential contaminant levels to fully determine whether adverse health effects are possible from eating fish or shellfish collected from on or near the site. On the basis of limited samples, people who occasionally eat mussels from Goose Cove are not likely to experience adverse health effects. However, collecting or eating shellfish (including clams, mussels and oysters) from Goose Pond, Goose Cove, and other nearby areas is banned because of elevated levels of metals and other pollution."**

At this point the total impact and the longevity of the impact are not fully known. There is currently a closure (pollution area 36 A1) in place due to overboard discharges in the area and as a cautionary measure from the possible effects of the toxins from the Callahan Mine on shellfish. The following map shows the location of the mine in growing area EA. The bold blue line outlines the original footprint of the mine.

Figure 9. Callahan Mine Site



Water Quality Review and Discussion

Table 5 lists all active approved, restricted and prohibited stations in growing area EF, with their respective Geomean and P90 calculations for 2010. All conditional samples are shown with a P90 during their open period. 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. A more detailed explanation of this transition can be found in central files.

All approved stations met their NSSP classification standard in 2010. Stations EA 3.5 and 4 highlighted in blue, meet the approved standard; these stations are located in the current WWTP prohibited zone and until the outfall pipe at the plant is extended they will remain prohibited. Station EA 14 highlighted in yellow below is currently classified as prohibited and now meets the standard for approved harvest. This station is located near the outfall of an OBD and must remain prohibited until the OBD is removed.

Table 5 2010P90

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std
EA001.00	A	30	25	2.4	0.17	9.1	4	33	180
EA003.50	P	29	29	2.9	0.45	160	11.2	31	162
EA004.00	P	30	29	3.1	0.49	300	13.4	31	166
EA005.00	A	30	25	2.4	0.19	14	4.2	33	180
EA006.00	CA	30	28	3.0	0.41	116	10.4	31	163
EA007.00	A	30	25	2.9	0.58	1700	16.4	33	180
EA009.00	A	29	25	2.8	0.37	75	8.4	33	177
EA011.00	A	30	30	3.9	0.41	20	13.3	31	163
EA012.00	A	30	30	3.5	0.39	40	11.2	31	163
EA013.00	A	30	30	4.5	0.5	64	20.2	31	163
EA014.00	P	30	29	4.3	0.51	150	19.8	31	166
EA014.90	A	27	27	4.9	0.54	126	24.6	31	163
EA015.00	P	30	28	7.6	0.55	92	38.9	31	169
EA015.50	A	23	23	3.2	0.49	122	14.1	31	163
EA016.00	A	30	30	2.3	0.22	14	4.4	31	163
EA017.00	A	30	25	2.4	0.27	22	5.5	33	180
EA018.00	A	30	25	3	0.35	30	8.7	33	180
EA019.00	A	30	26	3.4	0.47	72	14.2	32	176
EA019.10	A	30	27	4.7	0.5	62	21	32	173
EA019.20	R	30	27	5.6	0.66	1520	40.1	32	173
EA019.40	R	30	26	6.5	0.59	88	37.4	32	176
EA020.00	A	30	25	3.2	0.45	93	12.6	33	180
EA021.00	A	30	25	2.6	0.4	122	8.8	33	180
EA023.00	CA	30	30	2.3	0.22	13	4.4	31	163

EA024.00	CA	30	30	2.4	0.28	42	5.6	31	163
EA025.00	A	30	30	1.9	0.05	4	2.3	31	163
EA026.00	A	30	30	3	0.46	90	12.1	31	163
EA027.00	A	30	30	2.4	0.32	36	6.4	31	163
EA028.00	A	30	30	1.9	0.05	4	2.3	31	163
EA029.00	CA	30	30	2.6	0.4	120	8.9	31	163
EA031.00	CA	30	30	3.9	0.61	980	23.6	31	163
EA035.00	A	30	26	2.5	0.33	93	6.7	32	176
EA036.00	A	30	25	2.5	0.25	23	5.3	33	180

All stations that were active at the beginning of 2010 were sampled at least 6 times following the systematic random sampling (SRS) schedule (Table 6). At some stations, additional samples were collected under adverse conditions and others were sampled extra times to help build the data set.

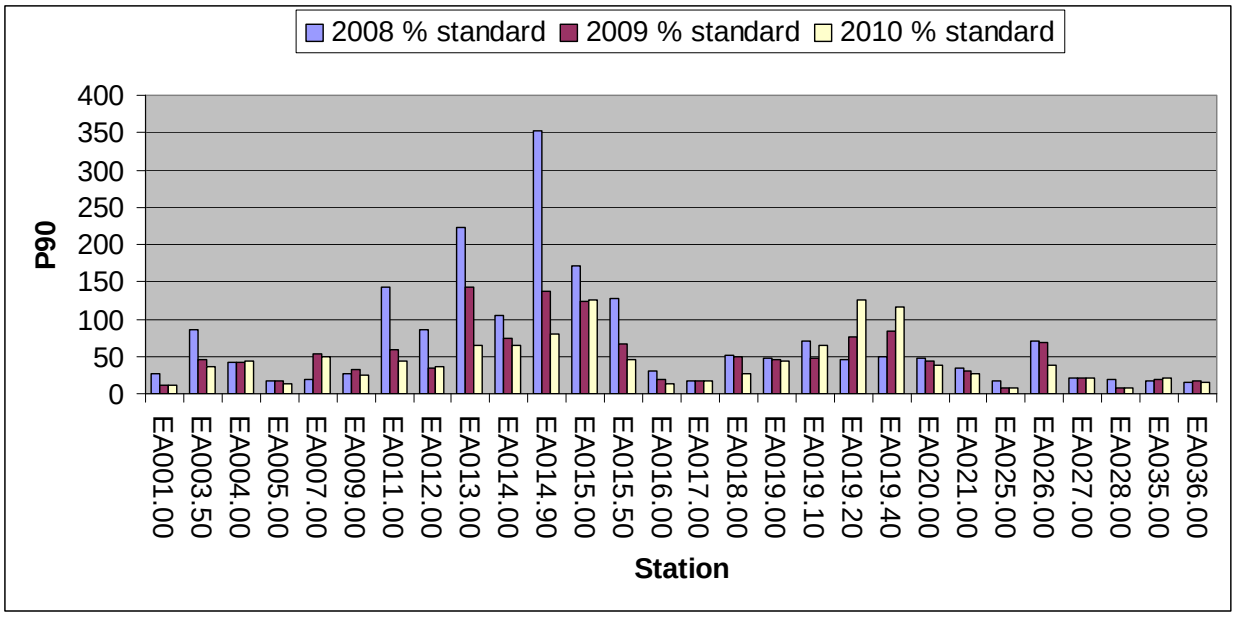
Table 6. 2010 Sample Count

Station	Class	Adverse		Extra		Random		Total	Comments
		Closed	Open	Closed	Open	Closed	Open		
EA001.00	A						6	6	
EA003.50	P					6		6	
EA004.00	P					6		6	
EA005.00	A						6	6	
EA006.00	CA					6	6	12	
EA007.00	A						6	6	
EA009.00	A						6	6	
EA011.00	A						7	7	
EA012.00	A						7	7	Reclass R to A 11/15/10
EA013.00	R		1		1		6	8	
EA014.00	P			1		7		8	
EA014.90	P		1		3		6	10	Reclass R to P 11/15/10.
EA015.00	P			1				1	Reclass R to P 11/15/10.
	R						6	6	
EA015.50	A						6	6	
EA016.00	A						6	6	
EA017.00	A						6	6	
EA018.00	A						6	6	
EA019.00	A	24	2				6	32	
EA019.10	A						6	6	
EA019.20	A				1		6	7	
EA019.40	A						6	6	
EA020.00	A						6	6	
EA021.00	A						6	6	
EA023.00	CA						12	12	
EA024.00	CA						12	12	
EA025.00	A	21					6	27	
EA026.00	A						6	6	

EA027.00	A						6	6	
EA028.00	A						6	6	
EA029.00	CA						12	12	
EA030.00	CA						7	7	Access sampled only by boat
EA031.00	CA						12	12	
EA035.00	A						6	6	
EA036.00	A						6	6	

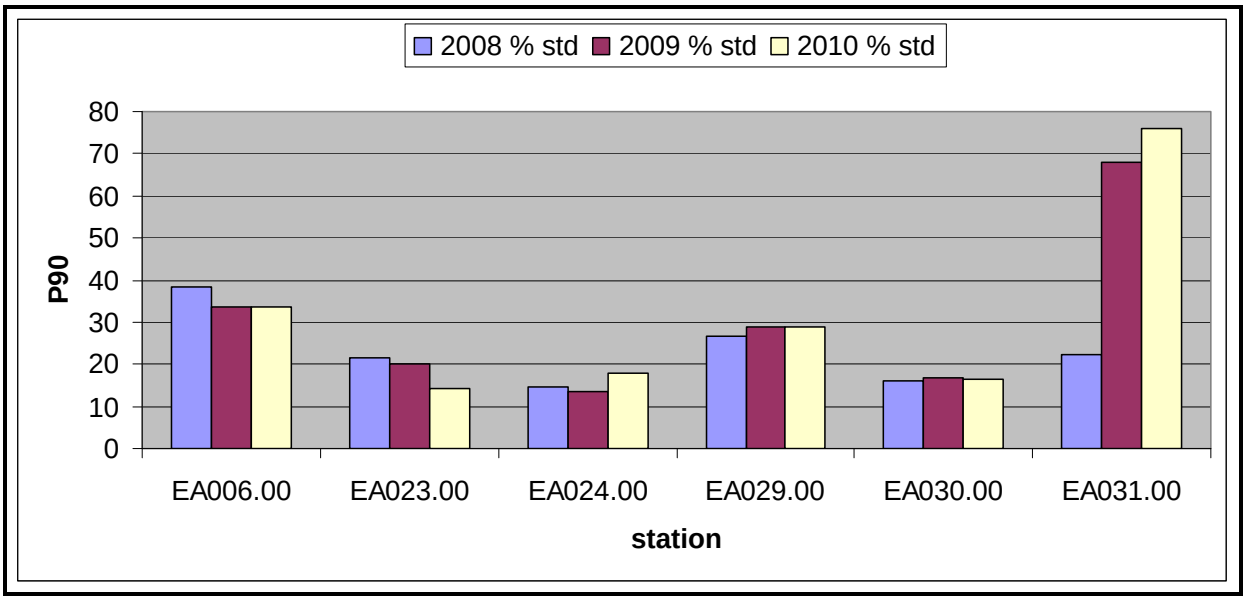
Figure 11 shows the P90 trends over the past three years for approved and restricted stations. Figure 12 shows only open status data for the conditionally approved stations. During the transition from MPN to MF analysis method, the approved standard will decrease every year, until all samples have been analyzed by the MF method. In order to show the trend of the P90 value over the years, the calculated P90 scores are expressed as a percentage of the approved standard (for approved, restricted and conditionally approved in the open status); any station showing the 2010 column on or above the 100 percent line does not meet the standard for approved classification.

Figure 10. P90 Trend Area EA



This chart shows most stations remaining consistent or trending slightly downward. Three stations EA 19.1, 19.2, and 19.4 are the exception to this and have trended upward. This area is going to have a stream study conducted during the 2011 season to help determine what may be causing his upward trend. Extra sampling will also be conducted by boat along the channel near an oyster lease sight in the area to see if the offshore waters are showing the same impact as the near shore waters.

Figure 11. CA P90 Trend Open Status



All CA stations except EA 31 have showed a consistent trend. Station EA 31 has shown an increase over the last two years but still remains below the standard for approved harvest during the open status. A review of the most recent 30 samples shows four high scores that have occurred at different tide stages and very low rainfall amounts. The only real trend is that three out of the four samples occurred in the months of November and December (Table 7).

Table 7 EA 31 Seasonal rainfall analysis

Station	48Hraintotal	Tide	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
EA031.00	0	E							1.9					
		F					1.9		38		1.9	1.9		
		H		10					2				44	
		HF									1.9			
		LE	1.9			1.9								1.9
		LF		2						1.9				
	0.05	LE					1.9							
	0.15	E											980	
	0.16	HE									6			
	0.2	E												34
	0.27	E											4	
	0.3	F						1.9						
	0.35	LE							1.9					
	0.44	L								1.9				
	0.49	H			2									
	0.55	E								1.9				
	0.8	E										3.6		

Station	48Hraintotal	Tide	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.81	F	4											
	0.83	HF												6
	1.07	F						2						
	1.58	E				1.9								
	1.9	E										2		

As this station is located in a remote area of the Penobscot River no known pollution sources have been identified that may be contributing to these high scores in the fall. This station will continue to be sampled monthly and will reevaluated at the end of the 2011 season to see if this upward trend continues.

Classification Changes

Hutchins Cove Penobscot 2010 Upgrade Proposal

As part of a request by the town of Penobscot Clam Committee the area of Hutchins Cove, Penobscot north of Hutchins point was looked at for an upgrade to approved classification based on improved water quality, the replacement of a nearby septic tank in 2008 and the results of a shoreline survey conducted by DEP during the summer of 2010. As the area involves water quality stations EA 12 and 13 these are the two stations that were analyzed for this proposed upgrade. The seasonal rainfall assessment can be seen below in Table 8 for station EA12 and Table 2 for Station EA13. This opening occurred 11/15/10.

Table 8 Stations EA 12 seasonal and rainfall assessment 2003-2010

Station	48total	Date	Sal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
12	0	Aug-03	30								21				
	0	Sep-03	30									3.6			
	0	Oct-03	27										240		
	0	Mar-04	20			3.6									
	0	Jul-04	28							7.3					
	0	Aug-05	28								2.9				
	0	Mar-06	24			2.9									
	0	May-06	26					2.9							
	0	Jul-06	24							15					
	0	Sep-06	7									16			
	0	Oct-06	28										1.9		
	0	Jun-07	29						12						
	0	Aug-07	31								4				
	0	Mar-08	0			4									
	0	Apr-08	25				1.9								
	0	Dec-08	19												13
	0	Mar-09	26			1.9									
	0	Apr-09	24				1.9								
	0	Sep-09	28									1.9			

Station	48total	Date	Sal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0	Apr-10	20				1.9								
	0	May-10	28					1.9							
		Aug-10	31								40				
	0	Sep-10	30									1.9			
		May-09	25					1.9							
	0.12	Jul-03	28							2.9					
		May-04	25					2.9							
	0.16	Sep-08	26									2			
	0.24	Jan-06	0	2.9											
	0.28	Apr-10	26				2								
	0.3	Jul-04	28							1100					
		Jun-10	27						2						
	0.37	Mar-05	0			3.6									
	0.45	May-03	25					2.9							
	0.49	Mar-09	26			1.9									
	0.54	Aug-06	26								4				
	0.55	Aug-09	24								14				
	0.58	Jan-07	13	2											
	0.65	May-03	22					43							
	0.71	May-07	20					2							
	0.86	Aug-05	27								23				
	0.91	Oct-08	30										1.9		
	1	Oct-05	22										5.7		
	1.07	Jun-09	23						2						
	1.15	Jul-05	28							2.9					
	1.18	Oct-04	29										3.6		
	1.22	Jul-08	28							4					
	1.25	Oct-07	28										16		
		Jun-08	28						6						
	1.54	May-05	8					3.6							
	1.58	Apr-09	5				2								
	1.9	Oct-09	28										10		
	2.3	Jun-07	1						16						
	2.36	Nov-04	24											43	

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 gazing between 2003 and 2005. These pastures are no longer used for livestock grazing and the nearby station EA 12 has been trending downward the last two years and currently meets the standard for approved harvest. This time frame corresponded to the high scores recorded at station EA12 shown in yellow above.

Table 9 EA 13 seasonal Rainfall assesment 2003-2010

Station	48total	Date	Sal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		Aug-03	30								150				
		Oct-03	28										9.1		
		Mar-04	18			3.6									
		Jul-04	28							3.6					
		Aug-04	28								1100				
		Aug-05	28								3.6				
		Mar-06	28			2.9									
		May-06	26					2.9							
		Jul-06	24							93					
		Sep-06	29									12			
		Oct-06	28										1.9		
		Jun-07	30						2						
		Aug-07	31								48				
		Apr-08	26				1.9								
		Dec-08	20												16
		Mar-09	28			1.9									
		Sep-09	28									6			
		Apr-10	22				1.9								
		May-10	28					1.9							
		Aug-10	30								20				
		Aug-10	29								2				
		Sep-10	31									12			
	0.05	May-09	24					2							
	0.12	Jul-03	28							3.6					
		May-04	26					2.9							
	0.16	Sep-08	27									6			
	0.24	Jan-06	8	460											
	0.3	Jul-04	28							23					
		Jun-10	28						2						
	0.37	Mar-05	21			2.9									
	0.45	May-03	22					3.6							
	0.51	Jan-03	28	3.6											
	0.54	Aug-06	26								64				
	0.55	Aug-09	25								6				
	0.58	Jan-07	24	2											
	0.65	May-03	24					2.9							
	0.71	May-07	22					1.9							
	0.86	Aug-05	26								93				
	0.91	Oct-08	30										1.9		
	0.93	Feb-08	26		1.9										
	1	Oct-05	22										9.1		
	1.07	Jun-09	26						1.9						

Station	48total	Date	Sal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.15	Jul-05	25							23					
	1.18	Oct-04	29										9.1		
	1.22	Jul-08	28							32					
	1.25	Oct-07	30										8		
		Jun-08	26						1.9						
	1.54	May-05	22					2.9							
	1.58	Apr-09	4				1.9								
	1.9	Oct-09	28										33		
	2.3	Jun-07	27						4						

Station 13 shows elevated scores during the months of July and August from the years 2003-2007. This corresponds to the replacement of a septic tank that occurred at a nearby property in 2008. This property was used as a seasonal rental with most of the occupancy occurring during the summer months which correspond to my high scores at this station. From 2008 to the present only one score above 31 was recorded and that was after a 48 hour rain total of 1.22". (Highlighted in blue above)

Next a tidal assessment was also completed for stations EA 12 and 13 (Table 10 and 11). 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 13 did not meet the P90 standard during the Ebb or Flood tide stage.

Table 10. Ebb Tide

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std
EA012.00	A	12	6	4.2	0.62	240	27.8	38	221
EA013.00	A	11	6	6.4	1.01	1100	135.7	38	215

Table 11. Flood Tide

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std
EA012.00	A	30	26	4.4	0.4	40	14.4	32	176
EA013.00	A	30	24	7	0.57	93	38	33	184

However when you look at the ebb and flood tide data for station 13 for the years of 2008- 2010 after the replacement of the septic tank it meets the standard for approved harvest for both tide stages. Tables 12 and 13 below:

Table 12. Ebb P90 2008-2010

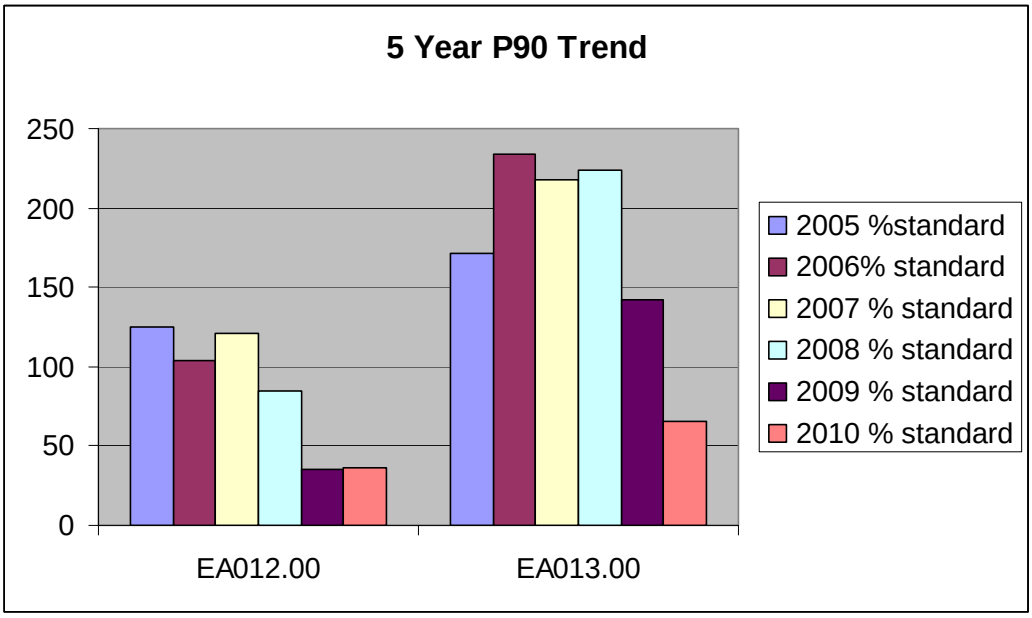
Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std
EA013.00	A	4	4	1.9	0.01	2	1.9	31	163

Table 13. Flood P90 2008-2010

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std
EA013.00	A	17	17	4.7	0.47	33	19.5	31	163

Figure 13 shows the P90 trends for stations EA 12 and 13 for the years 2005-2010. At the end of the 2010 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 12. Five year P90 Trend



Next an assessment of the streams draining into the area was completed. Table 14 shows the data for the streams from 2002-2010. The average flow in gallons per day and the average fecal score were calculated for each stream (Table 8). With this information, a dilution calculation for the stream was completed using the mid tide depth for each area.

Table 14 Stream Data Hutchins Cove

Stream ID	Date	Col score	GPM
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 15 Dilution Calculation

Stream ID	Avg. Flow GPD	Avg. FC 100/ml	Dilution zone in acres	Mid tide depth ft
EA 185.10	264137	150	1	6

To assess the impact of a small tidal stream that drains the area near station EA 13 the only data looked at was when the salinity of the sample was <5 ppt as we are trying to assess the

impact of the freshwater potion of the stream. This data can be seen in Table 16 below. Table 17 shows the dilution calculation based on the stream samples from Table 9.

Table 16. Hutchins Point Stream Data

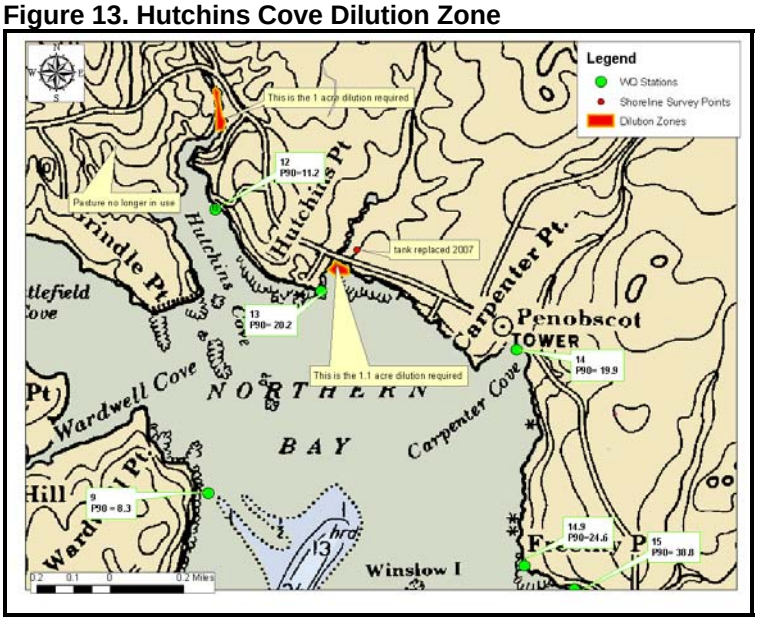
Stream ID	Sample Date	Col Score	Flow gpm	Salinity
EA00189.10	27-Nov-95	7.2	125	0
EA00189.10	21-May-97	2.9	225	2
EA00189.10	16-Nov-99	23	175	0
EA00189.10	09-Jan-02	9.1	150	0
EA00189.10	01-Oct-02	460	250	2
EA00189.10	15-Jun-05	332	195	0
EA00189.10	23-Jan-06	23	145	0
EA00189.10	10-Jun-09	52	450	4
EA00189.10	07-Apr-10	86	225	2

Table 17. Hutchins Cove Dilution Calculation

Stream ID	Avg. Flow GPD	Avg. FC 100/ml	Dilution zone in acres	Mid tide depth ft
EA 189.10	310400	111	1.1	6.5

These two dilution zone areas are small enough that they will not pose a public health risk. The dilution zones required may be seen in the map in Figure 14 below along with the dilution zones the location of the septic tank that was replaced in 2008 can also be noted along with the location of the upland pastures that were used up until 2005.

Figure 13. Hutchins Cove Dilution Zone



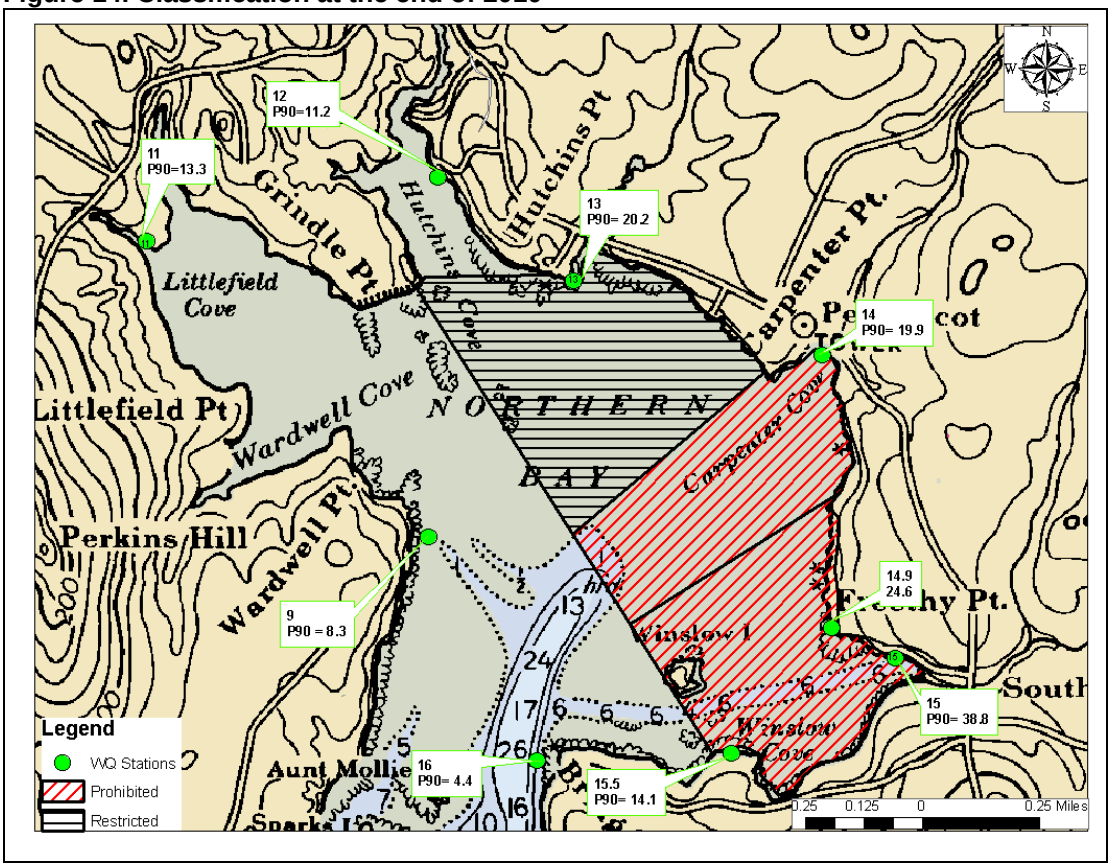
Based on this data assessment, the replacement of the faulty septic tank at property EA 00189.30, the fact the pastures in the nearby uplands are no longer being used and the results

of the shoreline survey conducted by DEP in the summer of 2010 this area should be classified for open and approved harvest.

Northern Bay

For the 2009 end of year report an assessment of the area surrounding an OBD outfall was re-evaluated. In the past, the shorelines and flats of Northern Bay, Penobscot have been classified prohibited, due to their proximity to OBD's serving a Nursing home (#2139) and an elementary school (#2465) (Figure 1). Generally, closure zones around OBD outfalls are determined using a complete mix dilution calculation based on the flow, bacterial concentrations for undisinfected 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. In 2010, the OBD serving the elementary school (#2465) was removed. Water quality has continued to improve in this area, and a request from marine patrol to adjust the current lines has prompted another evaluation of the current prohibited and restricted zone near the outfall of the remaining OBD (#2139) (Figure 15). This reclassification occurred on 2/25/11.

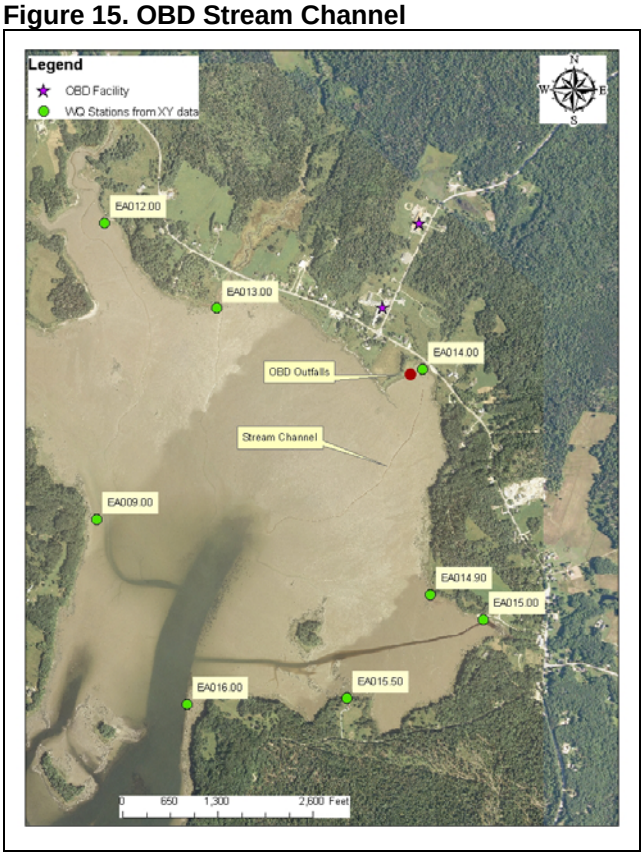
Figure 14. Classification at the end of 2010



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 12,091 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 gal – 7,500 gal in 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 operation of the tidal timer and during 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 16). 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 lower tide depths and consider the flow through the stream channel.

Figure 15. OBD Stream Channel



The current 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 (Table1). 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 additional 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 navigational 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 required a special permit notifying the marine patrol and specifying the day and time of a scheduled harvest. This would allow a physical line be constructed using wooden stakes to delineate the boundary between the restricted and prohibited zone on the day of harvest so that closure line would be easily identified. This type of closure line would not be appropriate or manageable if an approved area was adjacent to either a prohibited or restricted area.

Table 18. Current Dilution Requirements for Northern Bay at Low Tide

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

In 2010, at the request of the town shellfish committee, the configuration of the closure surrounding the existing OBD outfall, as well as the method used for determining the size of the closure were re-evaluated. During this review, several concerns were identified in the method used to determine the current closure zone. The initial concern related to the applicability of using the design flow of the OBD in determining the closure size. A review of the quarterly flow data from OBD # 2139, as reported to the EPA, showed that this discharge had surpassed the permitted flow rate (Table 19). In order to protect public health, the dilution calculation should be re-calculated using the increased flow rate, to account for the worst case scenario. The second concern with the current closure involved the depth of the receiving waters that was used in completing the dilution calculation. The current calculation assumed a depth of 1 foot. However, since the calculation assumes a discharge over a 24 hour period, the average depth of receiving water should account for all depth occurring across the tidal range within a day; therefore, the average depth of the area is approximately 4.9 feet (half tide depth). However, due to the complex hydrography of the area and a documented history of discharges at low tide, the revised dilution zone should be recalculated to account for two different tidal scenarios: the 6 hour period from low tide to high tide and the 6 hour period from high tide to low tide. Finally, in addition to these two time periods, the revised dilution calculation should account for the 2.5 hour time period when the entire stream channel is exposed (low tide).

Table 19. OBD 2139 Quarterly Flow Rtes, 2007-2010

Date	Flow GPD
3/31/2007	3524
6/30/2007	4166
9/30/2007	5049.69
12/31/2007	5423
3/31/2008	6631
6/30/2008	7695
9/30/2008	7509
12/31/2008	6682
3/31/2009	12091
6/30/2009	7354
12/31/2009	7393
3/31/2010	5713
6/30/2010	4606
9/30/2010	5935

The calculation presented in Table 20 provides the required closure zone needed to adequately dilute the OBD effluent during the High Tide to Low Tide period (ebbing tide). For this calculation, a concentration of 140,000 fc/100ml, a discharge rate of 504 GPH, adjusted for a six hour time period to account for high tide to low tide time period, and an average depth of 2 feet was used. The result of this calculation indicates that a 47 acre area is needed to dilute the discharged effluent to the approved standard.

Table 20. Northern Bay OBD High Tide – Low (Ebbing) Tide Dilution

FC/100ml	**140,000**
Discharge Rate (gallons per hour)	**504**
Time of Discharge (hr)	**6**
water depth (ft)	**2**
FC per hour	2.65E+09
FC per **6** hr	7.95E+09
ml to dilute to 14FC/100ml	5.68E+10
ft^3 to dilute to 14FC/100ml	2.01E+06
Acres needed	**47**

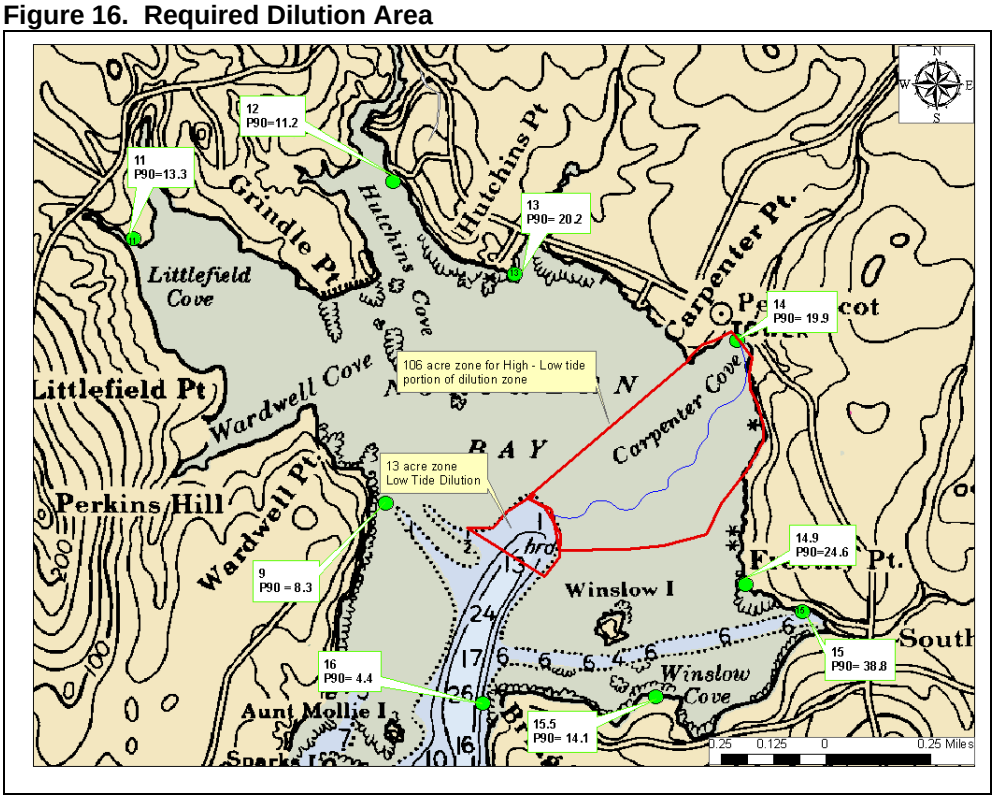
The greatest volume of water that is available to dilute the effluent occurs at the high tidal stage. On an ebbing tide, the effluent will recede with the tide along the stream channel, until the only area available for effluent dilution is limited to the water that is present in the stream channel itself, and the water located at the mouth of this channel. In establishing the appropriate closure lines surrounding this OBD, the proposed dilution zone closure lines will be drawn a minimum of 500 feet from the center of the stream channel and will extend from the shoreline to the mouth of the channel (Figure 16). To confirm that an adequate dilution is achieved at the critical low tide period, the dilution calculation was revised to account for the average depth (3 feet) of the

proposed closure area, a standard concentration (140,000FC /100 ML) and the flow over a 2.5 hour period (period of time when channel is exposed). The results of this calculation showed that an area of 13 acres, to be located at the southernmost portion of the stream channel is required to achieve adequate dilution at the low tidal stage.

Table 21. Northern Bay OBD Low Tide Period Dilution Calculation

FC/100ml	**140,000**
Discharge Rate (gallons per hour)	**504**
Time of Discharge (hr)	**2.5**
water depth (ft)	**3**
FC per hour	2.67E+09
FC per **6** hr	6.68E+09
ml to dilute to 14FC/100ml	4.77E+10
ft^3 to dilute to 14FC/100ml	1.68E+06
area needed to dilute to 14 (ft^2)	561556.8
Acres needed	**13**

Figure 16. Required Dilution Area

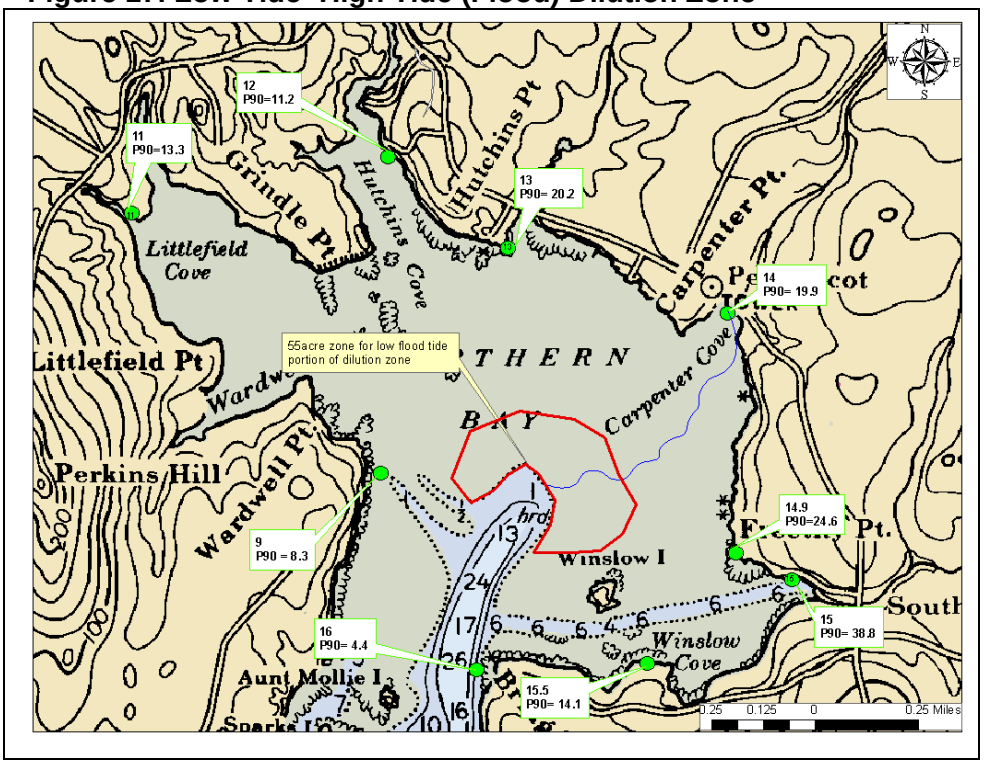


Finally, to account for the dilution zone occurring on a flooding tide, the calculation was updated using the same fecal concentration of 140,000 FC/100ml, an average depth of 3 feet (same as low tide depth), and the total discharge volume over a period of 6 hours, resulting in a required closure zone of 31 acres the (Table 22, Figure 17). Additionally, in establishing this dilution zone, it is important to account for the fact that the effluent will pool in the channel and as the tide starts to flood the surrounding flats that it will spill out over both sides of the channel. The current dilution zone does not take into account any impact to the western side of the channel.

Table 22. Low – High (Flooding) Tide Dilution

FC/100ml	**140,000**
Discharge Rate (gallons per hour)	**504**
Time of Discharge (hr)	**6**
water depth (ft)	**3**
FC per hour	2.67E+09
FC per **6** hr	1.60E+10
ml to dilute to 14FC/100ml	1.14E+11
ft³ to dilute to 14FC/100ml	4.04E+06
Acres	**31**

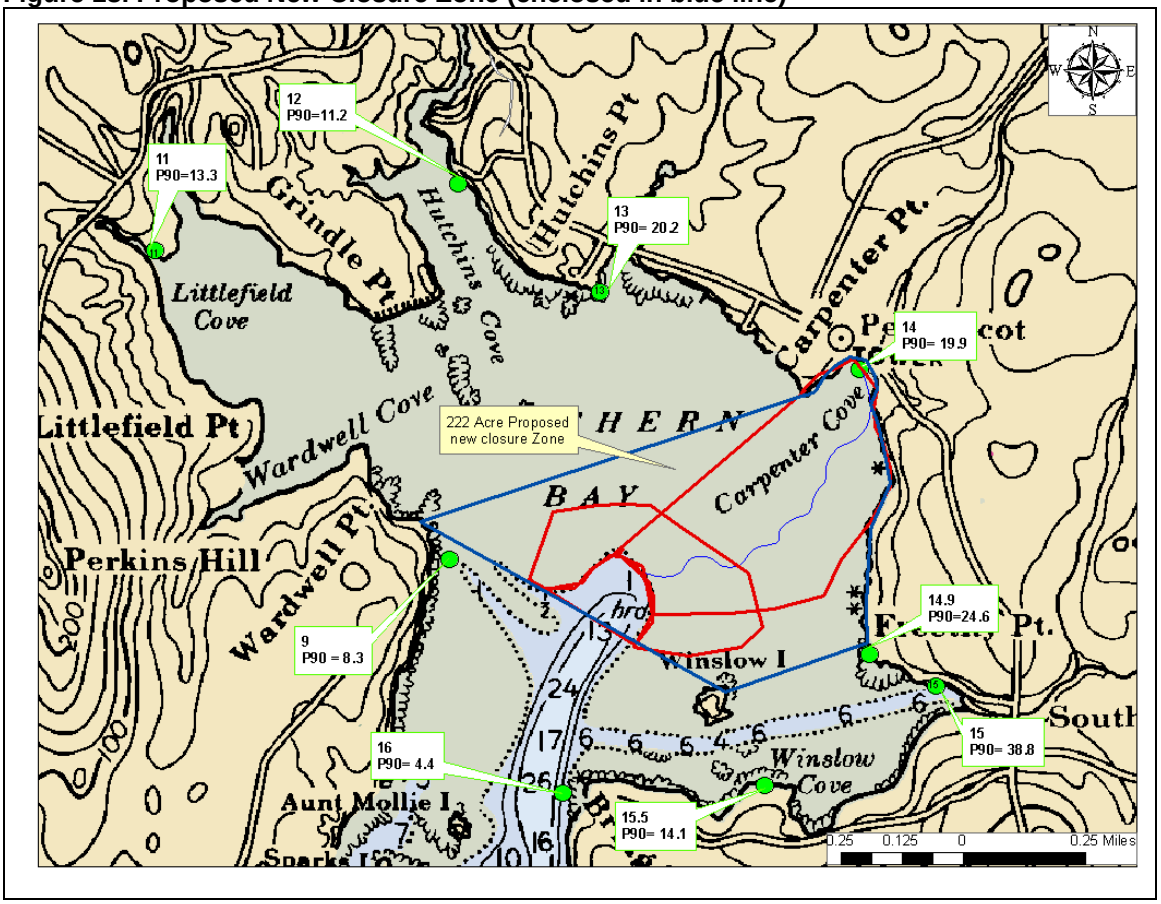
Figure 17. Low Tide- High Tide (Flood) Dilution Zone



The proposed closure area surrounding the OBD outfall accounts for the unique hydrography of Northern Bay, and provides an adequate dilution zone for the effluent across all tidal stages. The size of the proposed zone accounts for all dilution scenarios discussed in this section of the report. The new prohibited zone will close a portion of the flats on the western side of the channel. The restricted area that currently acts as a buffer and provides an additional area for effluent dilution may be repealed.

Because this OBD has a history of the discharging at all tide stages and the difficulty for Marine Patrol to enforce the current lines as they are. I believe this closure will better protect the public health as well as be easily enforceable for Marine Patrol.

Figure 18. Proposed New Closure Zone (enclosed in blue line)



Bagaduce Salt Pond Proposed Closure

The Bagaduce Salt Pond is located in the towns Sedgwick and Brooksville. This large shallow embayment does not have any large scale wild harvest. Through conversations with the MPO responsible for this area has also verified that there is no commercial harvest activity that takes place in this area. The area in question does have two aquaculture lease sights; one belonging to Jessie Leach which is a 4.13 acre oyster site and the second are 3 .01 acre sites belonging to Frank Peasley that are used for soft bag cultivation for oysters. The area had a Sanitary Survey completed in 2007 with no human sources of pollution identified in this area. This closure went into effect on 11/19/11.

As of 2009 the 2 water quality stations in question met the standard for approved harvest.

Table 23. 2009 P90

Station	Class	Count	MF Count	Geo mean	Std. dev	Max	P90	App. Std	Res std
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

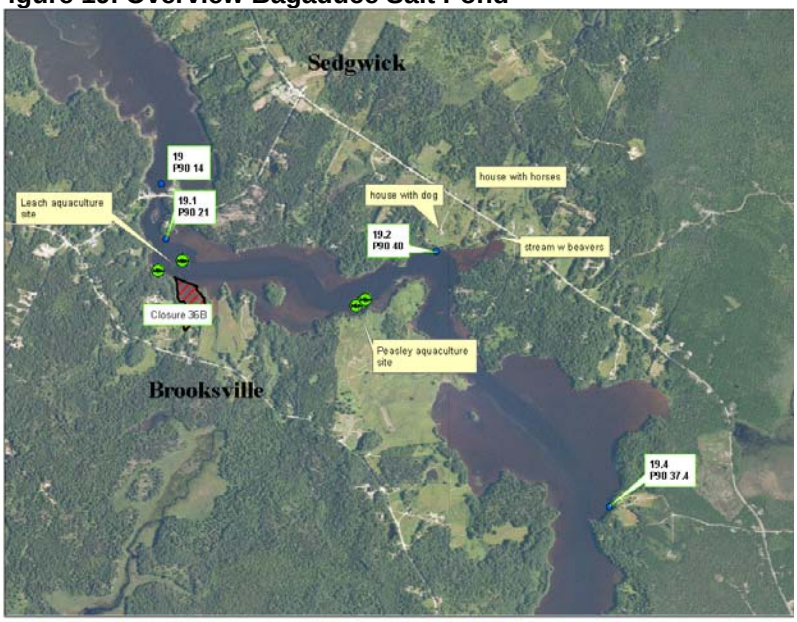
An end of year review of 2010 data showed that these two stations EA 19.4 and EA 19.2 were now exceeding the standard for approved harvest.

Table 24. 2010 P90

Station	Class	Count	MF Count	Geo mean	Std. dev	Max	P90	App. Std	Res std
EA019.20	A	30	27	5.6	0.66	1520	40.1	32	173
EA019.40	A	30	26	6.5	0.59	88	37.4	32	176

A shoreline survey was again conducted on 12/2/10 and no human source problems were identified. Fresh beaver activity was noted on Camp Stream just to the east of station 19.2 and the lawn in front of station 19.2 slopes towards the shore and does have dog feces present. The residence between Camp Stream and station 19.2 has two horses however the pasture is over 100’ from the stream with a large grass barrier between the pasture and the stream. No large concentrations of horse manure were noted but during heavy rainfall events it is possible contamination does reach the shoreline. This would also be the case from the lawn in front of station 19.2 with a large rainfall event being needed for any contamination to reach the waters of the Bagaduce Salt Pond. The map below shows (Figure 20) the Bagaduce Salt Pond with all stations and both aquaculture sites along with the location of Camp Stream, a small horse pasture and a lawn that slopes towards the shore with a dog. The distance from where the dog is kept to the shore is approximately 220 of grass barrier’.

Figure 19. Overview Bagaduce Salt Pond



A review of the most recent 30 samples for station 19.4 and 19.2 shows that the last samples of the 2010 season taken on 10/27/10 were elevated. The sample taken at station 19.2 also showed a very low salinity of only 3 ppt and occurred after a 48 hour rainfall total of >2". Based on the low salinity, the rainfall total of > 2" and the proximity of station 19.2 to Camp Stream it is most likely that the stream is the conduit for the pollution affecting station 19.2.

Table 25. Most Recent 30 Samples

Station	24Total	48Total	Sal	Date	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
EA019.20	0	0	0	19-Mar-08	4								
			2	17-Oct-06								11	
			4	02-Apr-07		1.9							
			6	10-Apr-07		1.9							
			7	06-Apr-10		1.9							
			15	27-Apr-10		2							
			21	10-Jun-08				3.6					
			22	28-Mar-06	2.9								
			24	31-Jul-07					10				
			25	22-Sep-09							1.9		
			28	25-Sep-07							1.9		
			30	24-Aug-10						12			
		0.04	12	30-May-07			4						
		0.2	15	15-May-06			3.6						
		0.4	8	14-Apr-08		1.9							
EA019.20		3.9	12	17-Nov-09									29
	0.03	0.03	17	18-Apr-06		2.9							

Station	24Total	48Total	Sal	Date	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
	0.14	0.14	9	14-Oct-08								1.9	
	0.16	0.16	4	11-Aug-09						280			
	0.2	0.9	10	12-May-09			4						
	0.32	0.32	20	28-Aug-06						2			
	0.39	0.4	28	23-Jul-08					1.9				
	0.4	1.58	4	06-Apr-09		1.9							
	0.65	0.65	15	11-Jul-06					7.2				
	0.68	0.68	13	08-Jul-09					10				
	0.81	0.81	21	27-Oct-08								20	
	0.94	1.57	20	08-Jun-10				4					
	1.07	1.37	25	13-Jul-10					10				
	1.19	1.19	15	27-Nov-07									6
	1.22	2.07	3	27-Oct-10								1520	

A review of stream samples collected at Camp Stream which drains into the Bagaduce Salt Pond can be seen in Table 26 below.

Table 26. Stream Data

Stream ID	FECAL	FLOW RATE	DATE
EA00265.15	23	499	10/1/2002
EA00265.15	23	650	8/6/2003
EA00265.15	146	819	7/24/2007
EA00265.15	50	1795	6/10/2009
EA00265.15	11	1800	4/7/2010
EA00265.15	6	7500	12/7/2010

The average flow is 2,177 gpm and average fecal score is 44 based on these scores a dilution calculation was run these results can be seen in table 27.

Table 27. stream Dilution Calculation

Stream ID	AVG FECAL	AVG FLOW RATE GPD	AVG Depth ft (mid tide)	Dilution in acres needed
EA00265.15	44	5,325,120	3	17

Figure 21 below shows the area around Camp Stream to be 18.5 acres which makes it bigger than what the dilution calculation calls for. Based on this calculation and the failing water quality at station 19.2 a new closure line should be at the point of land just to the west of station EA 19.2. This proposed new line can be seen in Figure 2 below. Everything to the east of this line will become restricted and the area to the west of this line will remain approved. This new restricted zone will also encompass that area near station EA 19.4.

Figure 20. proposed New Closure Line Bagaduce Salt Pond

As for station 19.4 a survey conducted on 12/2/10 found no problems or possible sources for the pollution. There are no nearby streams that impact the area around this station and there is only one house located near this station. A review of the last 30 samples shows that most high scores seem to occur during July- October and after .5" of rain. (Table 28)

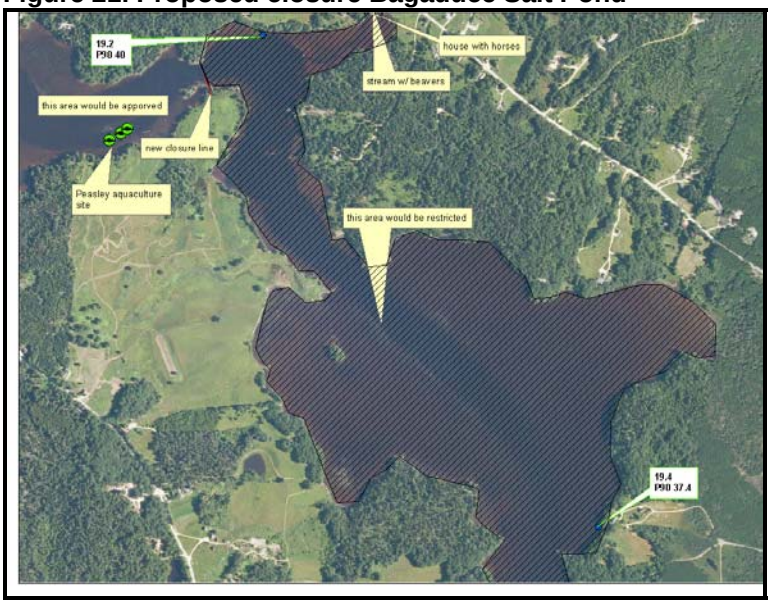
Table 28. EA 19.40

Station	24Total	48Total	Sal	Date	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
EA019.40	0	0	0	19-Mar-08	6								
			3	02-Apr-07		1.9							
			7	10-Apr-07		6							
			8	06-Apr-10		1.9							
			12	28-Mar-06	2.9								
			15	27-Apr-10		1.9							
			22	17-Oct-06								2	
				10-Jun-08				4					
				22-Sep-09							1.9		
			24	31-Jul-07					6				
			27	25-Sep-07							29		

Station	24Total	48Total	Sal	Date	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
			29	24-Aug-10						2			
		0.04	20	30-May-07			1.9						
		0.2	15	15-May-06			3.6						
		0.4	8	14-Apr-08		1.9							
		3.9	15	17-Nov-09									12
	0.03	0.03	18	18-Apr-06		2.9							
	0.14	0.14	7	14-Oct-08								1.9	
	0.16	0.16	4	11-Aug-09						80			
	0.2	0.9	10	12-May-09			4						
	0.32	0.32	20	28-Aug-06						4			
	0.39	0.4	28	23-Jul-08					2				
	0.4	1.58	4	06-Apr-09		1.9							
	0.65	0.65	14	11-Jul-06					43				
	0.68	0.68	8	08-Jul-09					78				
	0.81	0.81	20	27-Oct-08								20	
	0.94	1.57	13	08-Jun-10				27					
	1.07	1.37	24	13-Jul-10					80				
	1.19	1.19	9	27-Nov-07									13
	1.22	2.07	16	27-Oct-10								88	

No pollution sources were identified that may be causing the elevated scores at station EA 19.4 but the data suggests it may be a seasonal as well as rainfall issue. The proposed closure line based on the stream dilution for station 19.2 will make this area restricted. (Figure 22 below)

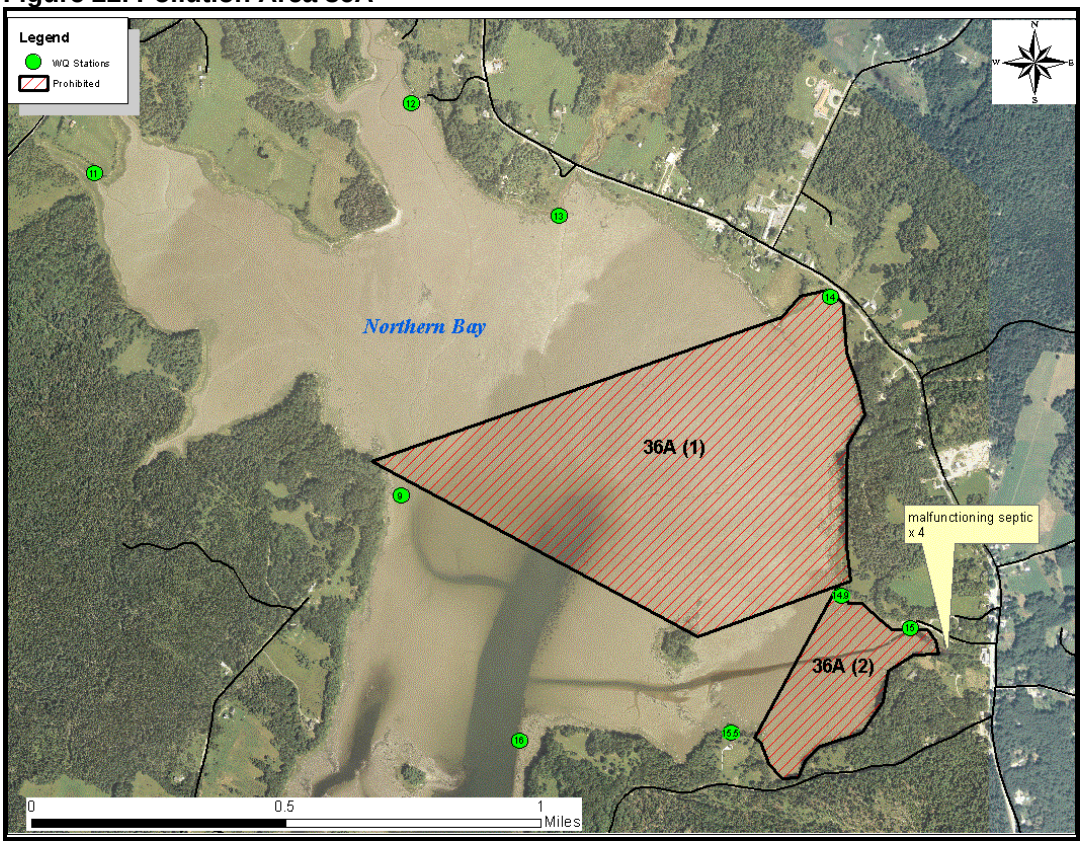
Figure 21. Proposed closure Bagaduce Salt Pond



Shoreline Survey Activity

A sanitary survey was conducted in the town of Penobscot, Maine between June 14th and June 22nd 2010, by the Department of Environmental Protection (DEP). During the course of the survey 126 properties were inspected and they were denied access to two more. Fifteen properties were identified as having malfunctioning septic systems, several of which drain or likely drain directly or indirectly to Northern Bay (Madore, 2010). Of the fifteen malfunctions that were found six were found to be problems that were a direct threat to water quality, A area that was already classified s restricted was reclassified to prohibited near the mouth of Winslow Stream in the town of Penobscot based on this survey. This reclassification took place on 11/15/10 and can be seen in figure 23 below. The area in question is 36A (2).

Figure 22. Pollution Area 36A



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.

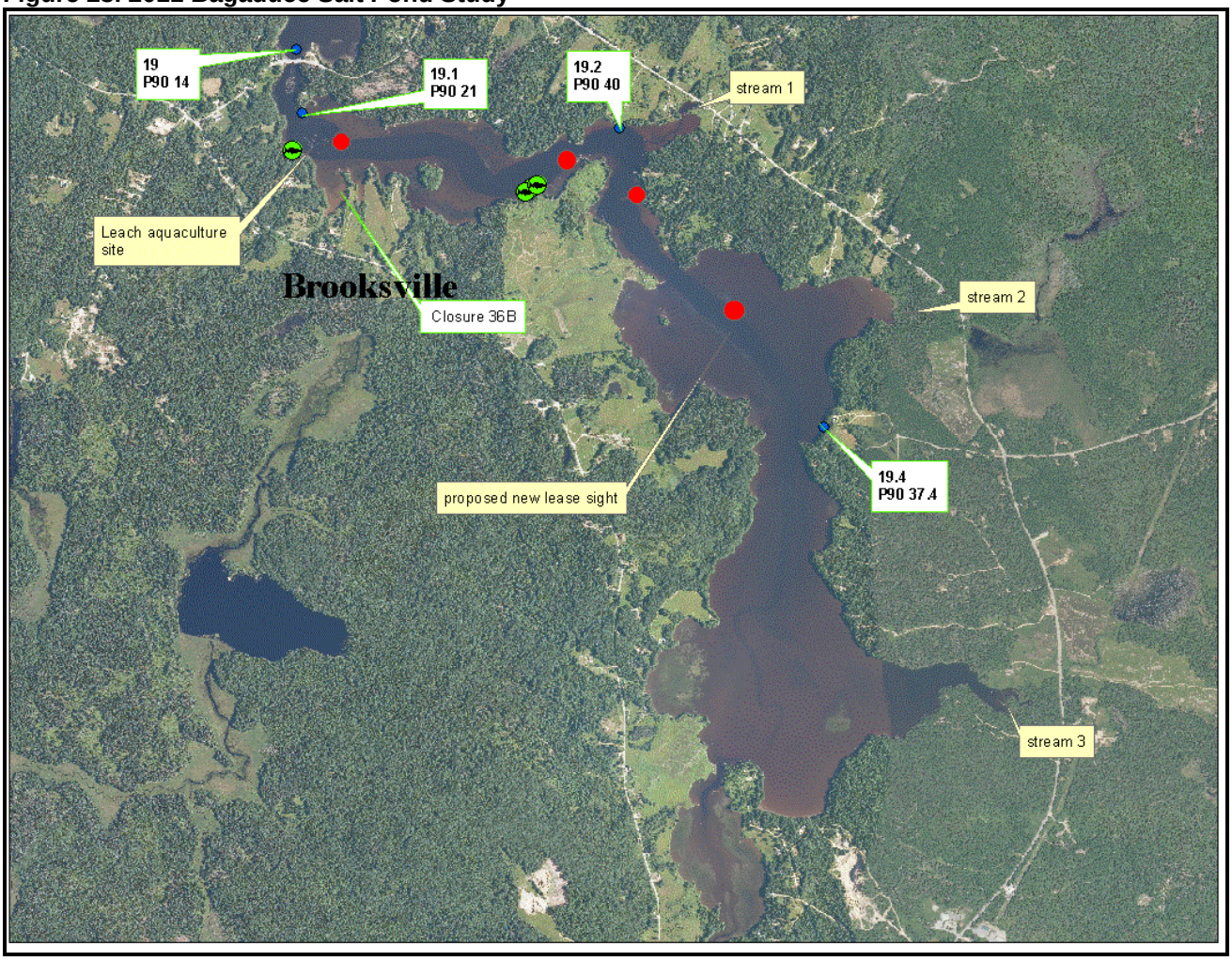
For more information about aquaculture leases located in growing area EA, please visit the aquaculture web site:

Maine Aquaculture Lease Inventory

Recommendation for Future Work

The area around the Bagaduce Salt Pond is going to have a stream study conducted around EA 19.2 and 19.4 to help with stream dilution calculations and help determine what might be causing the failing water quality at station 19.4. In addition to this stream study boat samples are going to be collected at the margins of the nearby aquaculture sight as well as the channel leading to station EA 19.4. These samples are being collected to determine if any impact from upland runoff is impacting the aquaculture site and deeper waters of the nearby channel. This is being done as an individual is trying to establish a new aquaculture lease sight in this area and would like to see if this area may be reclassified from restricted to approved. The streams that are going to be sampled are labeled as streams 1, 2 and 3 and the new sample sights to be taken by boat are shown by the red dots. See Figure 24 below.

Figure 23. 2011 Bagaduce Salt Pond Study



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Sanitary Survey Northern Bay and Drainage Areas to Northern Bay, Penobscot, Maine

August 12th, 2010: Madore

www.epa.gov/region01/npdes/permits/2009/finalme0101192permit.pdf
Accessed 3/14/11

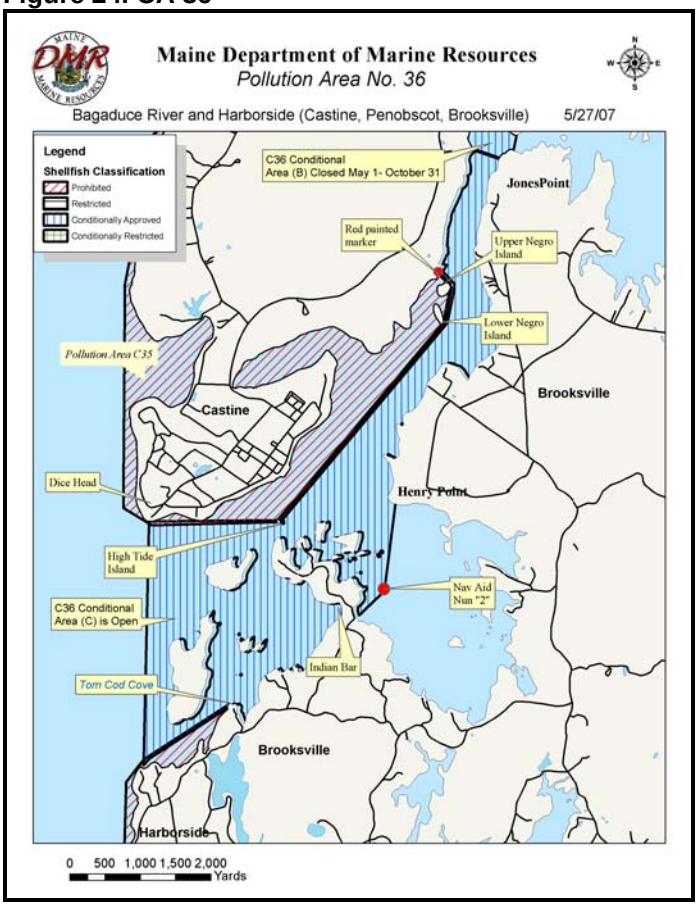
www.atsdr.cdc.gov/NEWS/brooksvilleme050203.html: Accessed 3/14/10)

Appendix A. Annual Review of 36 WWTP Conditional Area Management Plan

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 24. CA 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 CA 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 repeal and promulgation 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. This CA has 5 sample sites; EA 23, 24, 29, 30, and 31. The CA samples meet the standard for open and approved harvest during its open phase as shown in table 1 below.

Compliance with approved (or restricted) growing area criteria

All CA stations met the NSSP standard for approved harvest during their open phase.

Table 29 2010 P90 during open phase

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std
EA023.00	CA	30	30	2.3	0.22	13	4.4	31
EA024.00	CA	30	30	2.4	0.28	42	5.6	31
EA029.00	CA	30	30	2.6	0.4	120	8.9	31
EA031.00	CA	30	30	3.9	0.61	980	23.6	31

CA= Conditionaly Approved
MF Count= number of current samples analyzed using membrane filtration

Water sampling compliance history

The CAMP requires that samples be taken at least monthly during its open phase. Table 2 below shows the CA samples taken during the 2010 sampling season. Station EA 31 was not sampled during March because of ice. It was sampled twice during July to make up for this missed sample.

Table 30 Tabulated data 2010

Station	Date	Status	Class	Strategy	Tide	Temp	Sal	Wind	Score
EA023.00	04-Jan-10	O	CA	R	F	3	30	NW	1.9
EA023.00	01-Feb-10	O	CA	R	H	2	29	NW	13
EA023.00	16-Mar-10	O	CA	R	HE	4	31	N	1.9
EA023.00	05-Apr-10	O	CA	R	L	6	24	W	1.9
EA023.00	03-May-10	O	CA	R	HF	7	28	SW	1.9
EA023.00	01-Jun-10	O	CA	R	F	11	30	CL	1.9
EA023.00	06-Jul-10	O	CA	R	LE	15	28	SW	1.9
EA023.00	02-Aug-10	O	CA	R	F	17	30	W	1.9
EA023.00	22-Sep-10	O	CA	R	H	14	32	SW	1.9
EA023.00	04-Oct-10	O	CA	R	E	11	30	CL	1.9
EA023.00	01-Nov-10	O	CA	R	E	8	27	NW	2
EA023.00	01-Dec-10	O	CA	R	L	6	30	S	1.9
EA024.00	04-Jan-10	O	CA	R	F	3	30	NW	1.9
EA024.00	01-Feb-10	O	CA	R	H	1	28	NW	42
EA024.00	16-Mar-10	O	CA	R	HE	5	32	N	1.9
EA024.00	05-Apr-10	O	CA	R	L	6	20	SW	1.9
EA024.00	03-May-10	O	CA	R	F	7	28	SW	1.9
EA024.00	01-Jun-10	O	CA	R	F	10	28	CL	1.9
EA024.00	06-Jul-10	O	CA	R	LE	15	27	SW	1.9
EA024.00	02-Aug-10	O	CA	R	F	15	29	SW	1.9
EA024.00	22-Sep-10	O	CA	R	H	14	31	SW	1.9
EA024.00	04-Oct-10	O	CA	R	E	11	32	CL	4
EA024.00	01-Nov-10	O	CA	R	E	7	28	NW	1.9
EA024.00	01-Dec-10	O	CA	R	L	6	30	S	1.9
EA029.00	04-Jan-10	O	CA	R	F	3	30	NW	3.6
EA029.00	01-Feb-10	O	CA	R	H	2	30	NW	1.9
EA029.00	16-Mar-10	O	CA	R	H	5	31	N	1.9
EA029.00	05-Apr-10	O	CA	R	L	8	18	SW	1.9
EA029.00	03-May-10	O	CA	R	F	7	24	SW	1.9
EA029.00	01-Jun-10	O	CA	R	F	11	29	CL	1.9
EA029.00	06-Jul-10	O	CA	R	LE	15	27	SW	1.9
EA029.00	02-Aug-10	O	CA	R	F	17	29	CL	1.9
EA029.00	22-Sep-10	O	CA	R	HF	15	31	CL	1.9
EA029.00	04-Oct-10	O	CA	R	E	11	30	CL	5.4
EA029.00	01-Nov-10	O	CA	R	E	7	30	NW	1.9
EA029.00	01-Dec-10	O	CA	R	L	6	29	S	2
EA031.00	04-Jan-10	O	CA	R	F	3	30	NW	4
EA031.00	01-Feb-10	O	CA	R	H	1	25	NW	10
EA031.00	05-Apr-10	O	CA	R	LE	8	14	CL	1.9
EA031.00	03-May-10	O	CA	R	F	5	28	SW	1.9
EA031.00	01-Jun-10	O	CA	R	F	11	28	CL	1.9
EA031.00	06-Jul-10	O	CA	R	LE	15	27	SW	1.9

Station	Date	Status	Class	Strategy	Tide	Temp	Sal	Wind	Score
EA031.00	28-Jul-10	O	CA	R	H	20	28	SW	2
EA031.00	02-Aug-10	O	CA	R	LF	18	28	W	1.9
EA031.00	22-Sep-10	O	CA	R	HF	14	30	SW	1.9
EA031.00	04-Oct-10	O	CA	R	E	11	30	CL	3.6
EA031.00	01-Nov-10	O	CA	R	E	7	29	NW	4
EA031.00	01-Dec-10	O	CA	R	LE	6	29	S	1.9

Analysis-Recommendations
This management plan works and needs no changes at this time.

Appendix B. Annual Review of 36B Seal Ledge Marina Conditional Area Management Plan

Scope
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 WQ 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. 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)($2.0x10^9$ FC/person)
29 x 2 = 58
58 x 2E9 = 116E9

Dilution Required
Dilution Volume (L) = FC Load/(14FC/100ml*1000ml/L)

Fecal coliform bacteria must be diluted down to <14 FC/100ml of water
There are 283 100ml units in one cubic foot
Therefore, the bacteria must be diluted down to 14FC x 283 units per cubic foot, OR 3,962 colonies per cu.ft.

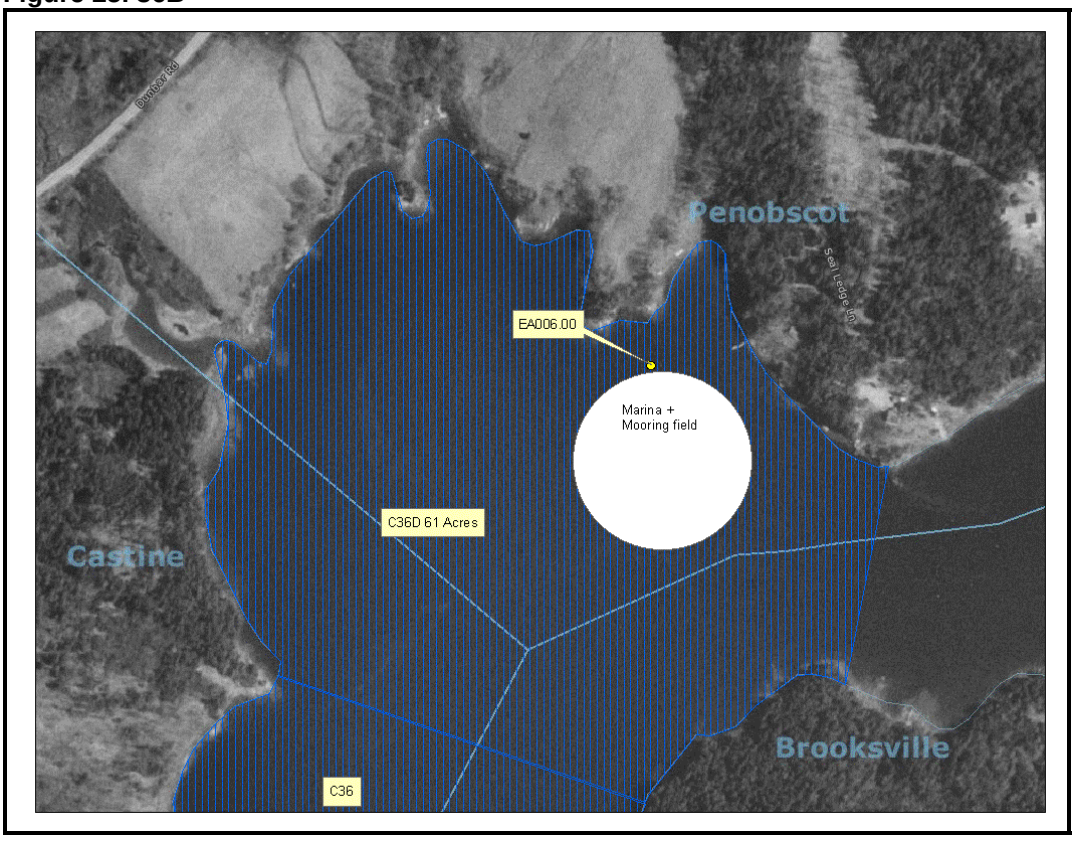
$$\frac{116E9FC}{3962colonies/ft3}$$ = 29,278,142 cu feet of receiving water for minimum dilution

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 250908 square meters. This closure allows for the digging 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

Figure 25. 36B



Compliance with management plan

An inspection of the marina on 10/28/10 showed no boats and the docks being pulled. At this time the marina was in the process of pulling out boats and docks. On 4/28/10 the marina was also inspected by the Lamoine Boat Crew. No boats were present and the docks were still being placed.

Compliance with approved (or restricted) growing area criteria

The management plan calls for sampling Water Quality Station EA 6 of this area at least once a month during the approved season. The data supports approved classification for the period between November 1 and April 30 (attached station map).

As illustrated in the tables below, the data shows that the water quality station in the immediate area of the Seal Ledge Marina (EA 6) passes approved area standards during the open period.

Table 31 2010 P90 Open Status

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std
EA006.00	CA	30	28	3	0.41	116	10.4	31

Water sampling compliance history

This station is sampled monthly during its open phase as shown in table

Table 32 EA 6 tab data 2010

Station	Date	Status	Class	Strategy	Tide	Temp	Sal	Wind	Score
EA006.00	04-Jan-10	O	CA	R	F	3	28	NW	1.9
EA006.00	01-Feb-10	O	CA	R	HE	1	29	NW	2
EA006.00	16-Mar-10	O	CA	R	E	5	31	CL	1.9
EA006.00	05-Apr-10	O	CA	R	LF	7	24	W	1.9
EA006.00	03-May-10	C	CA	R	HF	8	24	SW	1.9
EA006.00	01-Jun-10	C	CA	R	F	10	29	CL	1.9
EA006.00	06-Jul-10	C	CA	R	L	16	28	SW	18
EA006.00	02-Aug-10	C	CA	R	F	17	30	SW	1.9
EA006.00	22-Sep-10	C	CA	R	H	14	31	CL	1.9
EA006.00	04-Oct-10	C	CA	R	HE	12	30	CL	5.4
EA006.00	01-Nov-10	O	CA	R	LE	8	30	NW	2
EA006.00	01-Dec-10	O	CA	R	L	7	28	CL	1.9

Analysis-Recommendations
This management plan works and needs no changes 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.