



**GROWING AREA EC**

**Little Deer Isle, the Island of Deer Isle including Stonington, and  
various surrounding small uninhabited islands.**

**Sanitary Survey Report**

**Report Date: August 1, 2011**

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**APPROVAL**

Division Director:

\_\_\_\_\_ Date: \_\_\_\_\_  
Print name signature



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Figure 1. Growing Area EC (north), with Active Water Stations

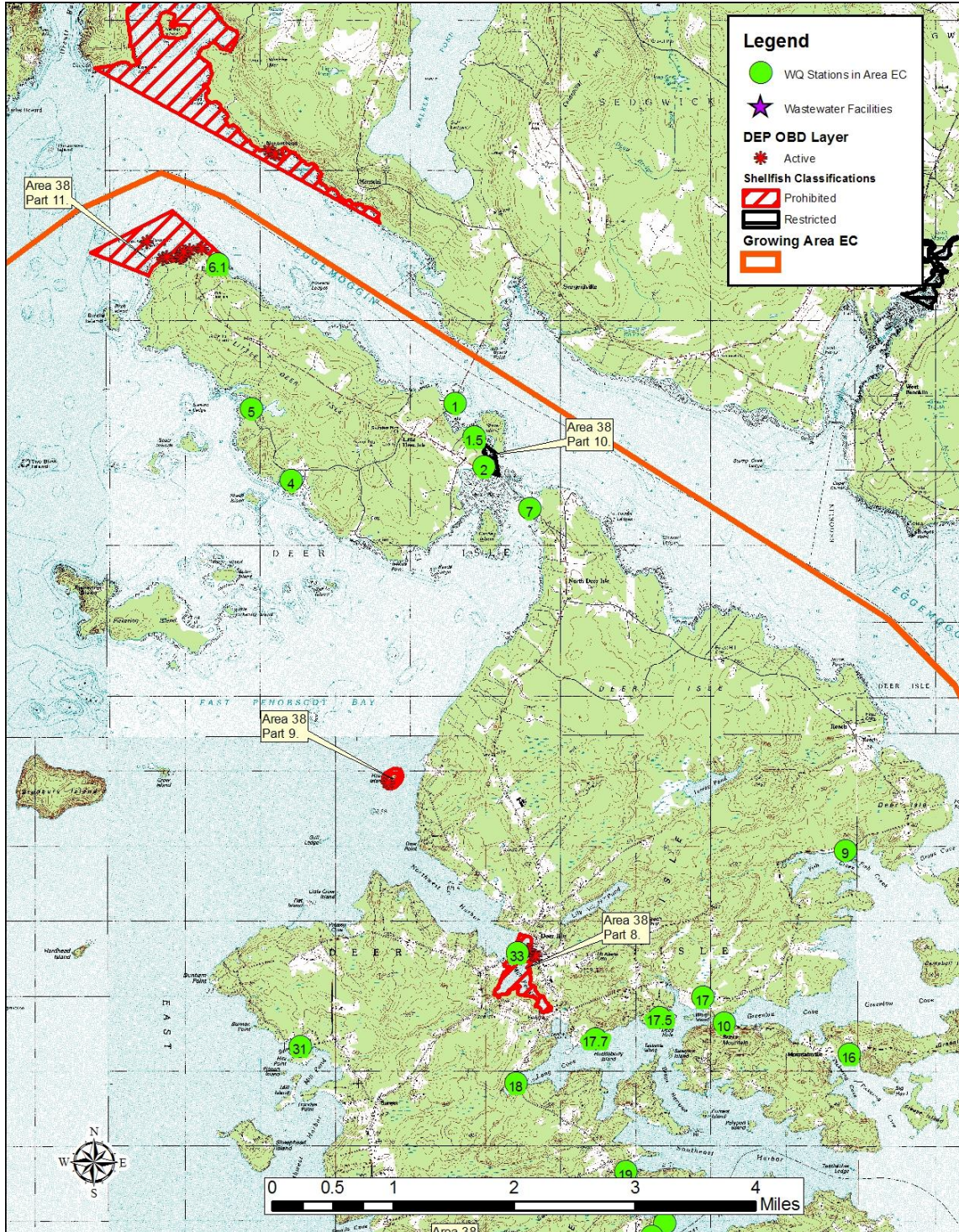




Figure 2. Growing Area EC (south), with Active Water Stations





## Executive Summary

This is a sanitary survey report for growing area EC written in compliance with the requirements of the 2009 Model Ordinance and the National Shellfish Sanitation Program. This report includes a water quality review, based on water quality data collected through 2011, as well as an evaluation of all pollution sources identified during the 2011 shoreline survey of the shores of the growing area. Pollution sources reviewed in this report include domestic waste, including private in-ground systems and overboard discharges (OBDs), recreational areas, agricultural activities, domestic animal and wildlife areas, and non-point pollution transported by streams. Hydrographic and meteorological data are discussed in this report, including assessments of tides and currents, rainfall, and salinity. A discussion of current classifications and recommendations for future work are also presented in this report.

Four coves in Growing Area EC have shown an increase in water quality scores resulting in downward classifications. No point sources were noted in the shoreline survey in Blastow Cove and Western Cove. However, a shoreline survey of the Inner Harbor, Holt Pond and Burnt Cove area revealed malfunctioning septic systems. These malfunctioning systems have been brought to the attention of the proper authorities.

Pollution sources found in Growing Area EC were two malfunctioning septic systems, twenty three licensed overboard discharge systems, and one municipal waste water treatment plant. All pollution sources are within classified areas. However, the two malfunctioning septic systems are within Restricted areas and thereby improperly classified. Those Restricted areas must be reclassified to Prohibited classification. All licensed overboard discharges and the wastewater treatment plant is within Prohibited classifications.

Recent classification changes consolidated all of the Deer Isle/Stonington area classifications into one large legal notice with modifications to some areas and a repeal of the Blastow Cove prohibited area. More detail of these classification changes can be found in the History of Growing Area Classification section of this report.

## Growing Area Description

This growing area consists of numerous islands that are located in eastern Penobscot Bay and southwestern Blue Hill Bay (Figures 1 and 2). The Islands of Deer Isle and Little Deer Isle make up the majority of this growing area, with several surrounding islands most of which are small and uninhabited. The area is primarily rural, with a low population density. It is an island community that is mostly residential with commercial fishing and tourism being the main industry. There are 23 licensed overboard discharges (OBDs), all encompassed by prohibited areas. There is one municipal waste water treatment plant (WWTP) that remains unchanged from its original design and continues to operate within its license limits.

## History of Growing Area Classification



The last complete sanitary survey was conducted in 1999 with triennial reports written for 2002, 2005, and 2008. Annual update reports were written for 2000, 2001, 2003, 2004, 2006, 2007, 2009 and 2010.

The following changes in classification have occurred since the last Triennial Report in 2008:

June 19, 2009: Amended Pollution Area No. 38 to consolidate all closures of the Deer Isle/Stonington area classifications into one large legal notice with modifications to some areas and a repeal of the Blastow Cove prohibited area. The summary is as follows:

- 37-A (Mill Pond, Deer Isle) was repealed and the description was amended into Area No. 38 part G with no changes.
- 37-B (Blastow Cove) was reclassified from prohibited to approved due to the removal of an OBD.
- 37-C (Heart Island) was repealed and the description was amended into Area No 38 part H with no changes.
- 37-E (Eggmoggin, Little Deer Isle) was repealed and the description was amended into Area No 38 part J with an expansion of the prohibited area to encompass an OBD on Pumpkin Island.
- 37-F (Stave Island) was repealed and the description was amended into Area No 38 part I with a reclassification from prohibited to restricted, to reclassify the area to the highest level possible.

An overboard discharge (OBD#2040) was removed from the head of Blastow Cove in the summer of 2008, with a visual confirmation by DMR personnel on May 6, 2009, warranting the above listed reclassification of Area 37-B.

September 7, 2010: Amended Area No. 38, Deer Isle, Stonington, and Merchants Row, to reclassify Burnt Cove, Stonington to Restricted after water quality at station EC 27 exceeded the approved P90 standard.

October 25, 2010 Monday: Amended Area No. 38, Deer Isle, Stonington, and Merchants Row, to close Webb Cove due to an oil spill from a lobster boat that sank over the weekend. Several boats were vandalized but only one sank, at the site of the Sunshine seafood facility. This occurred late Saturday night/early Sunday morning. Maine DEP was on site to supervise the recovery on Monday. The DEP reported that the spill was minor, maybe 6-10 gallons of motor oil, and did not appear to affect anything outside the immediate area of the vessel sinking (around the pier of Sunshine Seafood).

October 28, 2010 Thursday: Amended Area No. 38, Deer Isle, Stonington, and Merchants Row, to change the Closed status to Open in Webb Cove after shellfish collected on this morning tested negative for hydrocarbons. Test was a boil and sniff test developed by NOAA and adopted for use by DMR.

January 6, 2011: Amended Area No. 38, Deer Isle, Stonington, and Merchants Row, to create three new Restricted areas; one in Blastow Cove, Deer Isle, one in Western Cove, Deer Isle, and one in Inner Harbor and Holt Pond, on the line between Deer Isle and Stonington, due to water quality not meeting approved standards.



## Current Classification(s)

At the end of the 2011 review year, shellfish growing area EC has areas classified as:

### Restricted

- Area No. 38 Part 2, Burnt Cove eastern portion (Stonington), Restricted due to non-point pollution. Sample stations associated with classification; EC 27 & 27.4.
- Area No. 38 Part 7, Northwest branch of Crockett Cove (Deer Isle and Stonington), Restricted due to non-point pollution. Sample stations associated with this classification; EC 27.8 & 28.
- Area No. 38 Part 10, Little Deer Isle to Stave Island (Deer Isle), Restricted due to non-point pollution. Sample stations associated with this classification; EC 1.5 & 2.
- Area No. 38 Part 12, Blastow Cove (Deer Isle), Restricted due to non-point pollution. Sample stations associated with this classification; EC 3.8 & 4.
- Area No. 38 Part 13, Western Cove (Deer Isle), Restricted due to non-point pollution. Sample stations associated with this classification; EC 14.
- Area No. 38 Part 14, Inner Harbor and Holt Pond (Deer Isle and Stonington), Restricted due to non-point pollution. Sample stations associated with this classification; EC 19.7, 19.9, & 20.

### Prohibited

- Area No. 38 Part 1, Burnt Cove (Stonington), Prohibited due to licensed OBD #3840.
- Area No. 38 Part 3, Burnt Hill Cove (Stonington), Prohibited due to licensed OBD #2328.
- Area No. 38 Part 4, Stonington Harbor (Stonington), Prohibited due to the presence of the Stonington Municipal Wastewater Treatment Plant and OBDs #1300, 3563, 5262, and 6143.
- Area No. 38 Part 5, St. Helena Island, Merchants Row (Stonington), Prohibited due to licensed OBD #2333.
- Area No. 38 Part 6, Devil Island, Merchants Row (Stonington), Prohibited due to licensed OBD #2298.
- Area No. 38 Part 8, Northwest Harbor and the Mill Pond (Deer Isle), Prohibited due to licensed OBDs #2344, 2544, 5357, and 6770.
- Area No. 38 Part 9, Heart Island (Deer Isle), Prohibited due to licensed OBD #7323.
- Area No. 38 Part 11, Pumpkin Island to Eggmoggin, Little Deer Isle (Deer Isle), Prohibited due to licensed OBDs #1312, 1366, 1545, 1861, 1862, 1869, 2320, 2762, 4319, and 6030.

Please visit the DMR website to view legal notices:

[http://www.maine.gov/dmr/rm/public\\_health/closures/closedarea.htm#EC](http://www.maine.gov/dmr/rm/public_health/closures/closedarea.htm#EC)

## Pollution Sources Survey

The first critical control point in a successful shellfish sanitation program (preventing food borne illness associated with shellfish consumption) is identifying areas that have good sanitary quality. One



component of a successful sanitary survey and subsequent proper classification of the growing area is the identification and evaluation of pollution sources which do or may impact the growing area. The identification and evaluation of pollution sources is known as the shoreline survey. The information obtained by conducting a thorough shoreline survey is valuable in determining, evaluating and documenting the location and direct or indirect impact of actual and potential pollution sources. Sources of bacteria include septic systems, overboard discharges, municipal and industrial discharges of wastewater, illegal sewage discharge from boats and polluted storm water runoff.

Growing Area EC survey was conducted by the DMR Public Health Shellfish Program in the summer and fall of 2011. The survey area was reviewed by a lot-by-lot inspection of shoreline properties. Parcel-based tax maps were acquired from the Towns of Deer Isle and Stonington, and used to assign a unique identifier to each lot in the survey area. Basic information on each property (land use, sewage disposal facilities, ownership, etc.) was documented from town hall records and during initial field surveys for possible pollution sources. A potential impact to the growing area (direct or indirect) was assigned to each source based on its location relative to the growing waters.

All identified pipes, tidal creeks, streams with flowing water, and other potential bacterial pollution sources located along the shore were documented and sampled during the shoreline surveys. Homes bordering the growing area were visually evaluated for malfunctioning septic systems, discharging pipes, outhouses and other potential pollution sources. Water samples were collected in sterile "Whirl-Pak" bags, labeled, and kept on ice packs in coolers until delivery to the Lamoine Water Quality Laboratory for fecal coliform analyses.

### **Identification and Evaluation of Pollution Sources**

Pollution sources found in Growing Area EC were two malfunctioning septic systems, twenty three licensed overboard discharge systems, and one municipal waste water treatment plant. All pollution sources are within classified areas. However, the two malfunctioning septic systems are within Restricted areas and thereby improperly classified. Those Restricted areas must be reclassified to Prohibited classification. All licensed overboard discharges and the wastewater treatment plant are within Prohibited classifications.

The following section of this Sanitary Survey Report provides detailed descriptions of various pollution sources that were identified during the most recent sanitary survey field work. In each sub-section, a particular type of a pollution source is listed, described and evaluated, and is accompanied by maps and tables.

#### ***Domestic Waste (IG Systems and OBDs)***

Individual septic systems are the principal form of residential wastewater treatment in rural Maine. Malfunctioning septic systems may cause sewage to back up in the home, break out through the surface of the ground, run off in surface water, or seep undetected into groundwater or cracks in the bedrock. Septic systems malfunction due to inadequate maintenance, overloading, or poor design and construction (e.g. septic systems installed before the plumbing code revision may violate current public health standards because they are sited in areas with poor soil conditions and shallow depth to bedrock). In some cases, buildings still utilize outhouses for a disposal system.





Growing area EC is predominantly serviced by private septic systems with one municipal Waste Water Treatment Plant (WWTP) in the downtown area of Stonington. These septic systems were inspected during a 12 year shoreline survey conducted in the summer and fall of 2011 by the Department. Table 1 lists the dates of inspections of the various regions of Area EC.

Of the private systems inspected only two were found to be pollution threats (Table 2 and Figure 3). Malfunctioning system EC00464.19 had a direct impact in the head of Inner Harbor, on the Deer Isle/Stonington town line and discharged into a Restricted area. This system was reported to the Deer Isle Plumbing Inspector for follow up action. The second malfunctioning system, EC00794.20, was indirectly impacting the southeastern portion of Burnt Cove, Stonington through a roadside ditching and culvert system. This malfunctioning system was replaced in June of 2011 and subsequent tests of the impacted culvert were negative.



**Table 1. Shoreline Survey Dates**

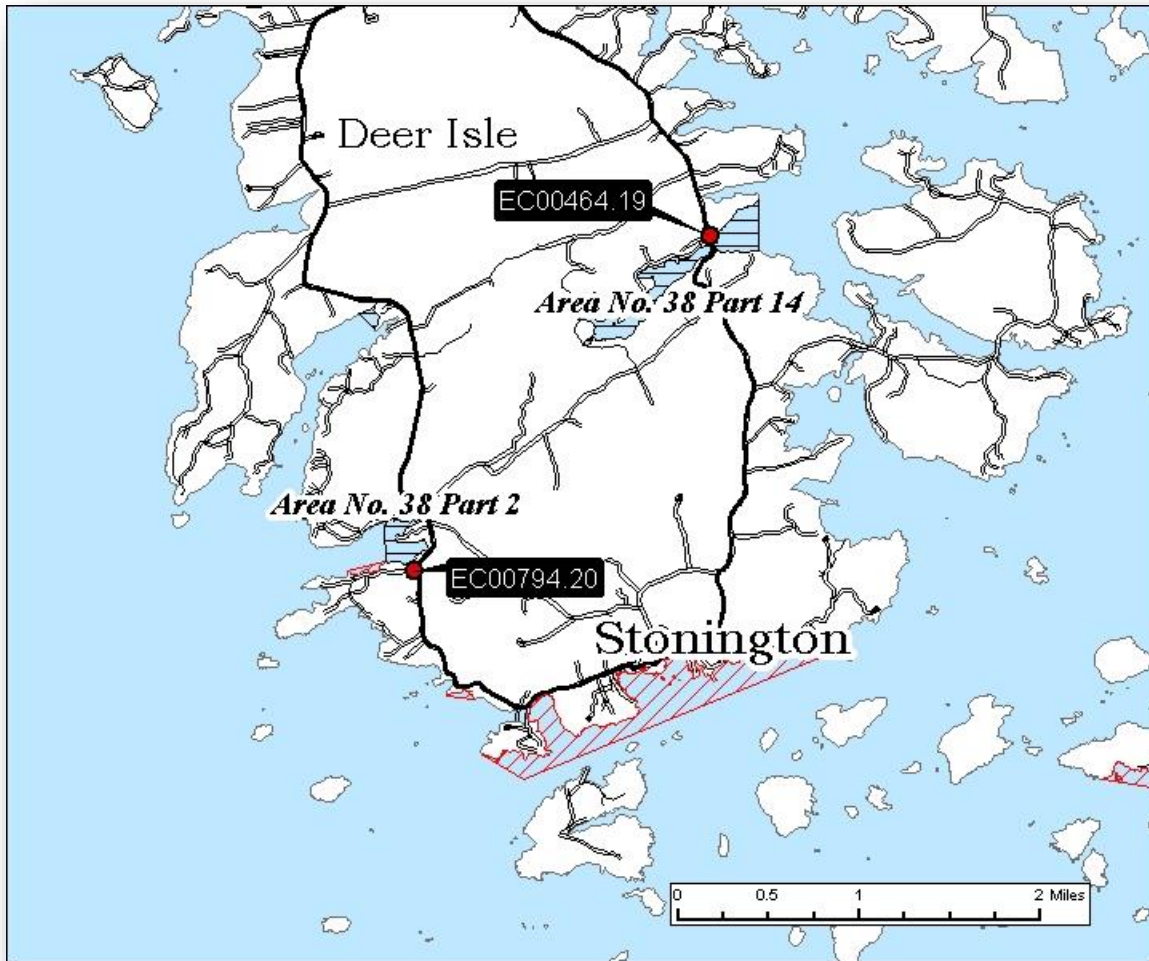
Date	Properties Inspected
5/9/11	EC00001.00 – EC00032.00
5/25/11	EC00033.00 – EC00058.00
6/13/11	EC00058.50 – EC00092.00
6/22/11	EC00093.00 – EC00132.00
7/14/11	EC00133.00 – EC00144.00
8/15/11	EC00144.40 – EC00168.00
8/16/11	EC00169.00 – EC00191.00
8/18/11	EC00192.00 – EC00215.00
9/21/11	EC00216.00 – EC00249.00
9/29/11	EC00250.00 – EC00279.00
10/12/11	EC00279.50 – EC00313.00
10/21/11	EC00314.00 – EC00349.00
10/31/11	EC00349.50 – EC00407.00
11/2/11	EC00408.00 – EC00450.00
11/3/11	EC00451.00 – EC00511.00
11/4/11	EC00512.00 – EC00544.00
11/7/11	EC00545.00 – EC00604.00
11/8/11	EC01205.00 – EC01294.00
11/10/11	EC01295.00 – EC01390.00
11/17/11	EC01114.00 – EC01204.00
	EC00605.00 – EC00731.00 Located in Prohibited Area, not surveyed.
11/22/11	EC00732.00 – EC00772.50
11/23/11	EC00773.00 – EC00795.00
11/28/11	EC00795.80 – EC00847.00
11/29/11	EC00847.50 – EC00869.00
12/5/11	EC00870.00 – EC00934.00
12/8/11	EC00969.00 – EC01093.00
12/12/11	EC01094.00 – EC01113.00
12/13/11	EC00935.00 – EC00968.00

**Table 2. Growing Area EC Domestic Pollution Sources**

SLS ID#	POLLUTION SOURCE TYPE	IMPACT	CLOSURE#
EC00464.19	Malfunctioning Septic	Actual/Direct	38, Part 14
EC00794.20	Malfunctioning Septic	Actual/Indirect	38, Part 2



Figure 3. Pollution Sources in Growing Area EC



In addition to individual private septic systems, growing area EC has twenty three licensed overboard discharges. 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's 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 then disinfect it prior to discharge. If they are not properly maintained or if they malfunction, they have the potential to discharge the harmful bacteria and other pathogens directly into the water.



The wastewater from most OBD facilities receives secondary treatment before being disinfected and discharged. 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. Wastewater is first contained in a septic tank where most of the solids settle out and are partially digested by microbes. The wastewater flows from the septic 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, collected and discharged to a disinfection unit. Mechanical package plants consist of a tank where waste is broken up, mixed and aerated. Wastes are digested by naturally occurring bacteria. The aerated treated water is held in a calm condition for a time while the solids settle to the bottom. The clarified water is pumped off the top and through a disinfection unit. Maine law requires homeowners with mechanical systems to have a contract with a licensed service contractor to maintain the unit. DEP inspectors look for a tag on the treatment unit identifying the service contractor and the last date of service. Mechanical treatment systems must have an operating alarm on a separate electrical circuit so that the alarm will activate if the treatment unit malfunctions.

Both systems discharge treated wastewater to 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.

Overboard discharges require licensing and inspections by the Maine Department of Environmental Protection (DEP). Overboard Discharge (OBD) licenses must be transferred to the new owner every time a property changes hands. If the license has expired, it must be renewed at this time. The primary exhibits for a license transfer are the completed application for transfer, a copy of the deed reflecting the new ownership and the results of a Licensed Site Evaluator's determination of the feasibility of installing an alternative to the OBD. It is the property owner's responsibility to maintain a current overboard discharge license and it must be renewed every five years. Additionally, the DEP is developing a schedule for license renewal based on the water body the OBD impacts and contacting owners according to that schedule. Before applying for renewal, the homeowner will be required to have a qualified Licensed Site Evaluator examine the property to determine if there is a technologically feasible alternative to the OBD system. Any application for renewal must include the results of a Licensed Site Evaluator's determination of the feasibility of installing an alternative to the OBD. Any new OBDs or increases in OBD flows, whether by volume or duration, are prohibited by Maine law under the Classification of Maine waters 38 M.R.S.A. §464 4.(A)(6), <<http://www.mainelegislature.org/legis/statutes/38/title38sec464.html>>. These regulations clearly state that the DEP may not issue a water discharge license for new discharges of domestic pollutants to the surface waters of the State. An increase in volume or duration beyond that already licensed is a considered a new discharge and is therefore prohibited.

The table below shows the OBDs by license number, the design flow or license flow (GPD), and the number of the Prohibited area around the discharge pipe.



**Table 3 Area EC Overboard Discharges**

OBD#	LICENSE FLOW (GPD)	CLOSURE#
3840	300	38, Part 1
2328	300	38, Part 3
1300	400	38, Part 4
3563	315	
5262	300	
6143	300	
2333	300	38, Part 5
2298	2400	38, Part 6
2344	400	38, Part 8
2544	300	
5357	300	
6770	300	
7323	100	38, Part 9
1312	450	38, Part 11
1366	400	
1545	640	
1861	360	
1862	360	
1869	400	
2320	300	
2762	300	
4319	300	
6030	300	

***Municipal Wastewater Treatment Plant(s)***

There is one WWTP within Growing Area EC. This treatment plant services the downtown Stonington area with 288 customers on the system. There are 265 household septic tanks, (1) 5,000 gal. tank, and (1) 11,000 gal. tank in the downtown area. These tanks then feed into the four pumping stations which in turn lead to the treatment plant. The treatment plant consists of (3) 64' long by 3' diameter pipes used as chlorine contact chambers. Mid-May through September effluent is chlorinated with Sodium Hypochlorite and de-chlorinated with Sodium Bisulfite. The plant has typical wet weather flows of 0.050 MGD and discharges into 30' of receiving waters at the point of discharge (14' average depth for the entire dilution zone) at mid tide, requiring a bacterial dilution zone of 78 acres in order to dilute a potential 100,000 FC/100ml of effluent down to 14 FC/100ml in the receiving waters. Figures 4 and 5 below illustrate the calculation and the locations of the pollution source, the dilution zone, and the closure lines that encompass the zone.

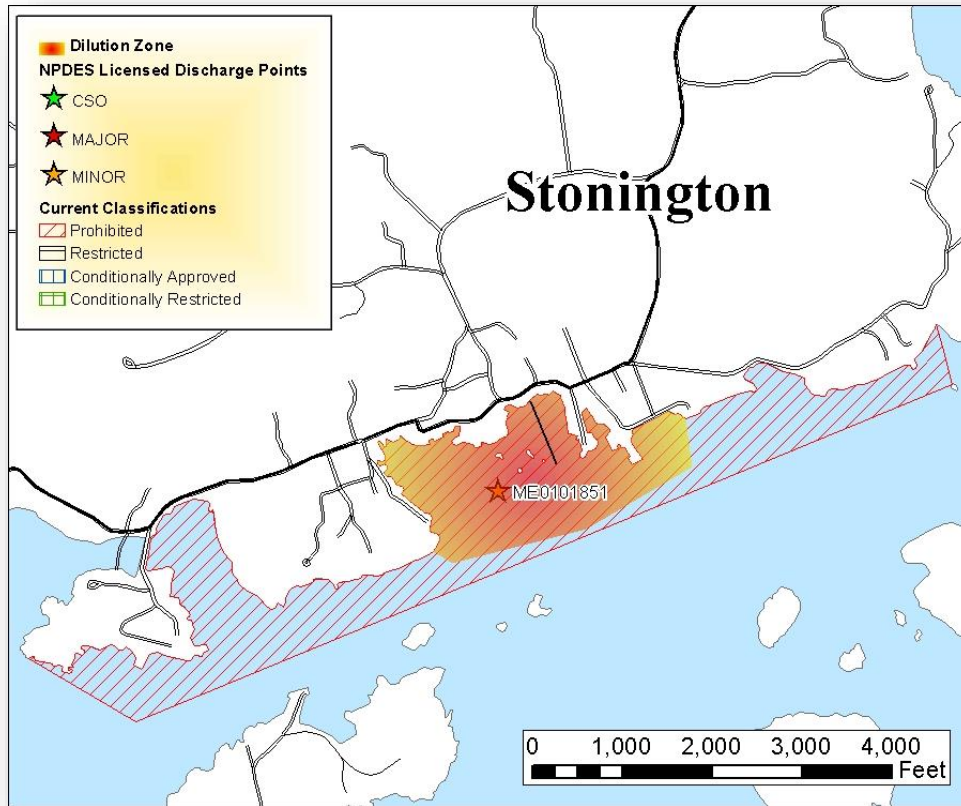


Figure 4 Stonington Wastewater Treatment Plant Dilution Calculation

	Flow rate=	50,000	Gallons/day(GPD)
	There are 7.481 gallons in one cu.ft., so GPD divided by 7.481=	6,684	Cu.Ft./day
	There are 283 100ml units in one cu.ft., so 283 times Cu. Ft./day=	1,891,458	100ml. Units/day
	Bacteria load=	100,000	FC colonies/100ml
	Bacteria load times the number of 100ml. Units/day=	189,145,836,118	Total FC/day
	or	1.89E+11	Total FC/day
Fecal coliform bacteria must be diluted down to <14 FC/100ml of water.			
	FC colonies/day divided by 14=	13,510,416,866	100ml units of receiving waters for dilution.
	There are 283 100ml units per cu.ft., so 100ml. Units divided by 283=	47,739,989	cu.ft. of receiving waters for dilution.
	Average depth of receiving waters =	14	Ft.
	Cu.ft. of receiving waters / by average depth=	3,409,999	Square ft. of surface water, or closure size.
	Square ft. times 0.092903 =	316,799	Square meters
	Square meters times 0.0002471=	78.3	acres



Figure 5 Stonington Wastewater Treatment Plant Location and Dilution Zone



### Industrial Pollution

The only National Pollutant Discharge Elimination System (NPDES) permitted waste discharge in growing area EC is for the Municipal Waste Water Treatment Plant described in the section above.

Table 4 Area EC NPDES Permits

NPDES #	FACILITY NAME	PERMIT EXP. DATE	NOTES	SLS ID#
<a href="#">ME0101851</a>	Stonington Sanitary District		Municipal WWTP	N/A

### Marinas and Mooring Fields

Billings Diesel and Marine is the only commercial marina in Growing Area EC. It primarily serves the needs of commercial vessel repair but also services a few pleasure boats in the summer season. The



marina owner claims there are about 20 day use type recreational boats there in the summer and up to approximately 8 transient live aboards. The marina calculation below allows for a worst case scenario of up to 10 live aboards with up to 2 people per boat, creating a zone of impact of 19.3 acres. The map below shows this zone to be within Prohibited area 38 Part 4.

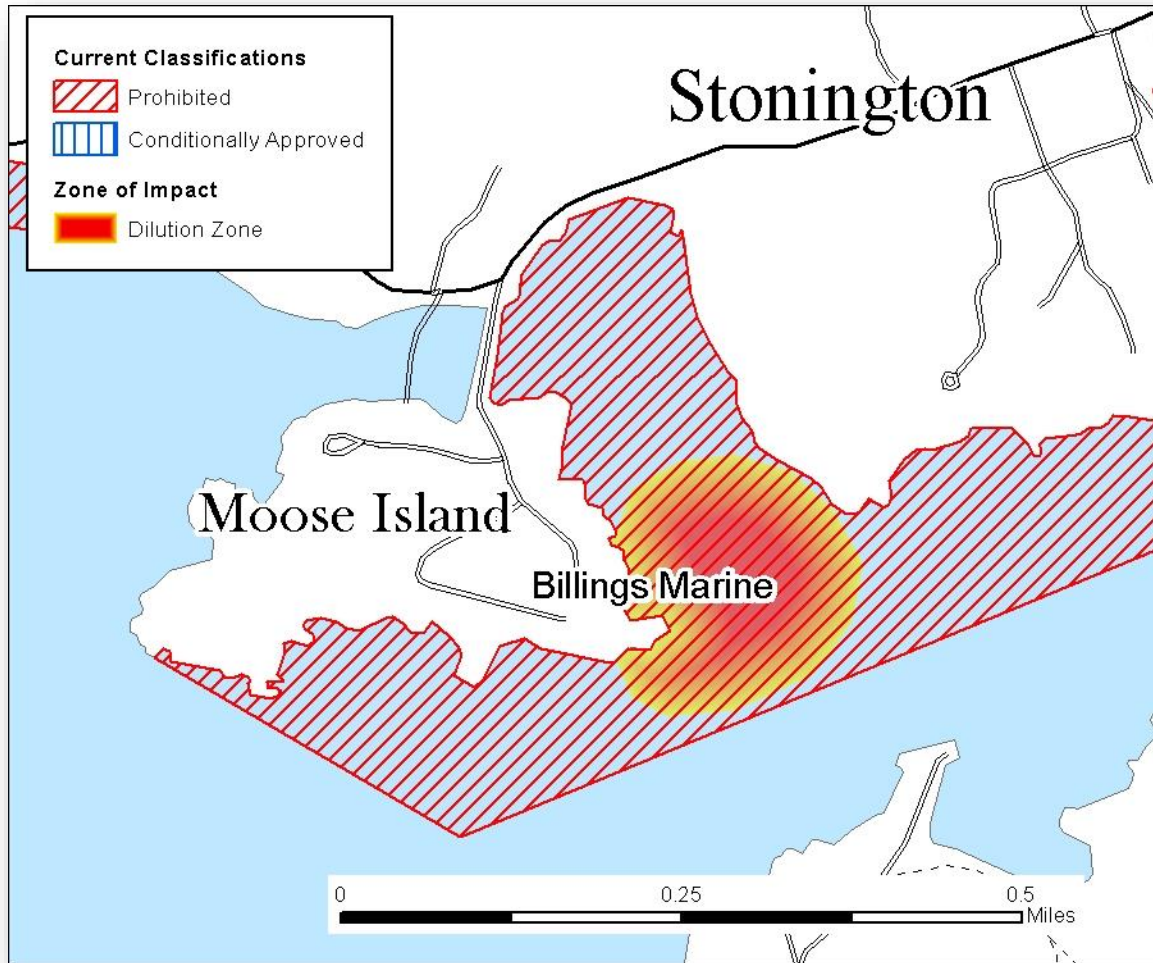
**Figure 6 Billings Marine Dilution Calculation**

	Number of boats considered to be "live aboards"=	10	
	Number of people per boat (if know n)= If unknow n, estimate 2 per boat.	2	
	Then total number of people from this marina=	20	
	Estimated number of fecal coliform colonies/person/day=	2,000,000,000	
	Total number of fecal coliform colonies/day from this marina=	40,000,000,000	
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.			
40,000,000,000	FC colonies from this marina divided by 3,962 colonies/cu.ft.=	10,095,911	cu.ft. of receiving waters for minimum dilution.
	Average depth in this marina=	12	feet
	Cu.Ft. required for dilution divided by average depth =	841,326	square feet of surface area required for this marina
	Square ft. times 0.092903 =	78,162	square meters of surface area
	Square meters times 0.002471 =	19.31	Acres





Figure 7 Billings Marine Location and Dilution Zone



### Stormwater

Growing Area EC is primarily rural with no storm water management other than a few small culverts at key points under low lying roads. Any runoff points that may have an impact on the growing area have been sampled and are detailed in the next section of this report.

### Non-Point Pollution Sources (streams, etc)

Growing Area EC has 28 streams that were sampled to determine their potential impact on the shellfish beds (Table 5, Figure 8). Samples and flow measurements are taken at the end of the low tide cycle and just before flooding waters begin to back up the stream flow, in order to isolate data that is most representative of the stream itself. Streams EC00849.50, EC01142.80, and EC01383.50 showed an elevated fecal counts in their most recent samples. These streams should be resampled to see if there



is a consistent trend that would adversely impact water quality in the receiving waters. Sample station EC 27.8 is located approximately 500 yards away and within the same cove as stream EC00849.50. This station meets approved standards with a geometric mean of 3.2 FC/100ml, and a P90 calculation of 11.6 FC/100ml. Stream EC01142.80 flows through a wooded area not impacted by human development. The elevated sample score on 5/11/2011 is most likely from wildlife or the natural breakdown or organic material in the wooded environment. Sample station EC 1.5 is located approximately 75 yards away from stream EC01383.50. This station meets approved standards with a geometric mean of 4 FC/100ml, and a P90 calculation of 23.4 FC/100ml. This station and stream are both within Restricted Area 38 Part 10. Although the station currently meets Approved standards, the area remains Restricted due to a high standard deviation and P90 calculations that did not meet Approved standards in recent years.

**Table 5. Stream Sample Results**

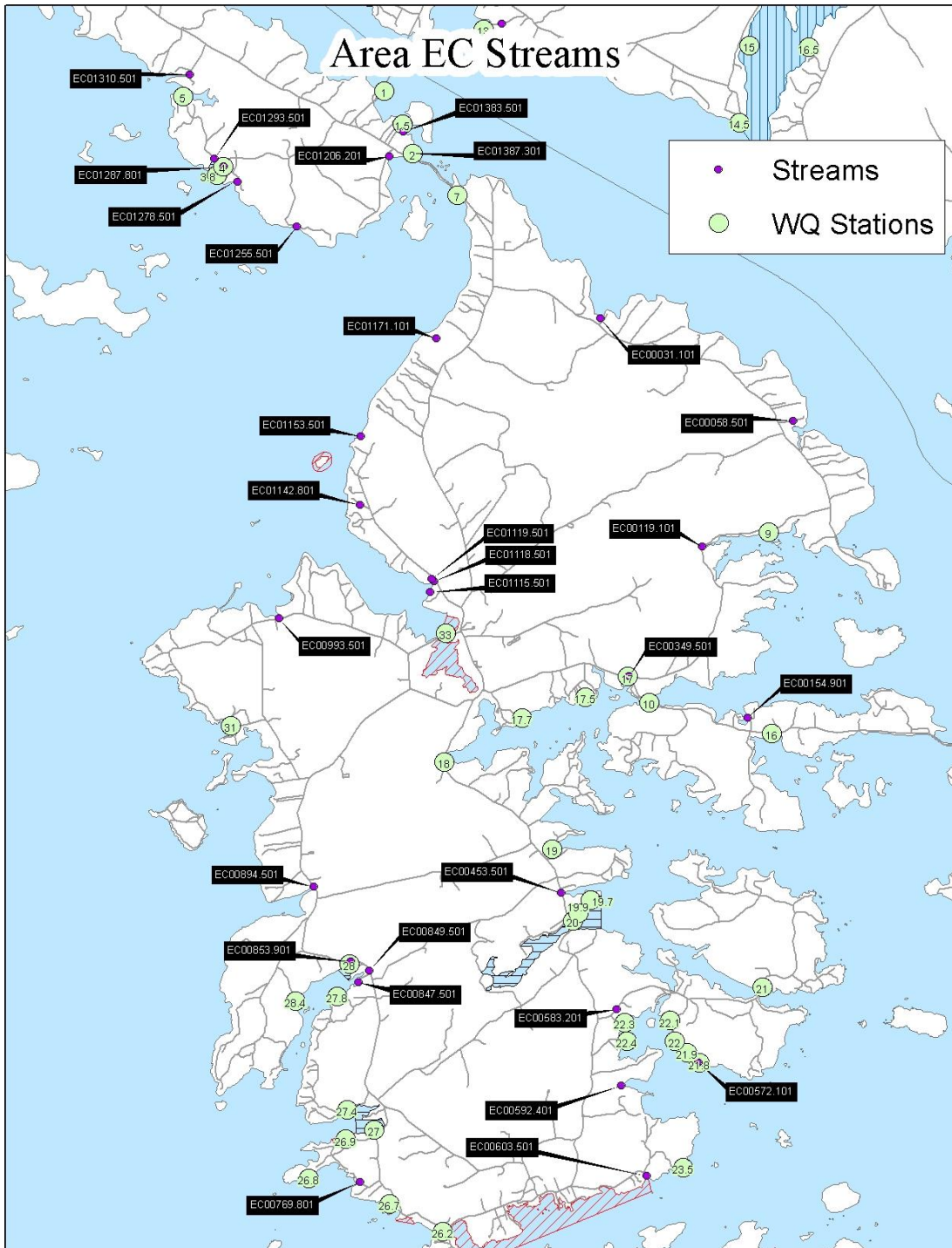
SLS ID	SAMPLE DATE	FC/100ml	FLOW RATE(GPM)	COMMENTS
EC00031.10	11/18/2008	27	1046	
	4/13/2011	8	2673	
EC00058.50	11/18/2008	4	28006	
	4/13/2011	13	3543	
EC00119.10	11/18/2008	18	3137	
	5/10/2011	36	143	
EC00154.90	11/18/2008	4	76	
	5/10/2011	1.9	32	
	8/16/2011	122	45	
EC00349.50	11/18/2008	4	1441	
	5/10/2011	2	474	
EC00453.50	5/10/2011	1.9	31	
EC00572.10	11/18/2008	3.6	183	
	5/10/2011	1.9	67	
EC00583.20	11/18/2008	380	1836	
	5/10/2011	36	309	
EC00592.40	11/18/2008	4	751	
	5/10/2011	2	296	
EC00603.50	11/18/2008	22	1167	
	5/10/2011	1.9	119	
EC00769.80	11/18/2008	30	1115	
	5/10/2011	1.9	108	
EC00847.50	11/18/2008	82	1544	
	5/10/2011	136	236	
EC00849.50	11/18/2008	58	66	
	5/10/2011	22	103	
	8/16/2011	600	5	Needs follow up sampling
EC00853.90	11/18/2008	29	5977	
	5/10/2011	16	760	
EC00993.50	11/18/2008	16	2196	
	5/10/2011	3.6	611	



SLS ID	SAMPLE DATE	FC/100ml	FLOW RATE(GPM)	COMMENTS
EC01115.50	11/18/2008	10	185	
	5/11/2011	6	75	
EC01118.50	5/11/2011	1.9	67	
EC01119.50	11/18/2008	18	826	
	5/11/2011	10	1616	
EC01142.80	11/18/2008	42	303	
	5/11/2011	280	660	Needs follow up sampling
EC01153.50	11/18/2008	20	1293	
	5/11/2011	12	785	
EC01171.10	11/18/2008	2	817	
	5/11/2011	31	404	
EC01206.20	11/18/2008	29	1183	
	4/13/2011	22	162	
EC01255.50	11/18/2008	31	372	
	4/13/2011	1.9	404	
EC01278.50	11/18/2008	38	323	
	4/13/2011	1.9	287	
EC01287.80	11/18/2008	22	43	
	4/13/2011	12	135	
EC01293.50	11/18/2008	4	981	
	4/13/2011	1.9	363	
EC01310.50	11/18/2008	2	305	
	4/13/2011	2	132	
EC01383.50	4/13/2011	6	45	
	10/5/2011	920	0.5	Restricted Area 38 Part 10



Figure 8 Stream Sample Locations





### ***Agricultural Activities***

Agricultural activities are limited to personal gardens at a few residential sites that do not have an adverse impact on water quality.

### ***Domestic Animals and Wildlife Activity***

Domestic animals are limited to household pets and homeowners employ best management practices to keep pet waste from affecting shellfish harvest areas. There are no designated wildlife areas within Growing Area EC.



**Conservation/Recreation Areas (beaches, trails, etc.)**

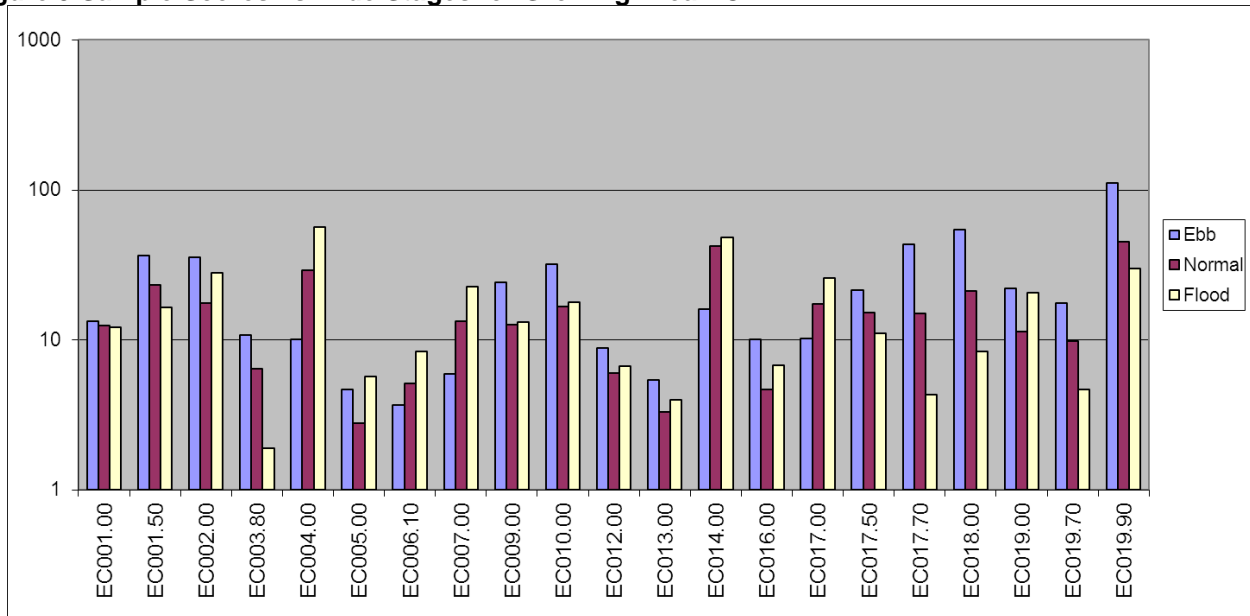
This growing area is made up of islands of various sizes that are subject to very cold deep water currents. As a result, beaches are not used for swimming. There are no conservation areas in this growing area.

**Hydrographic and Meteorological Assessment**

**Tides**

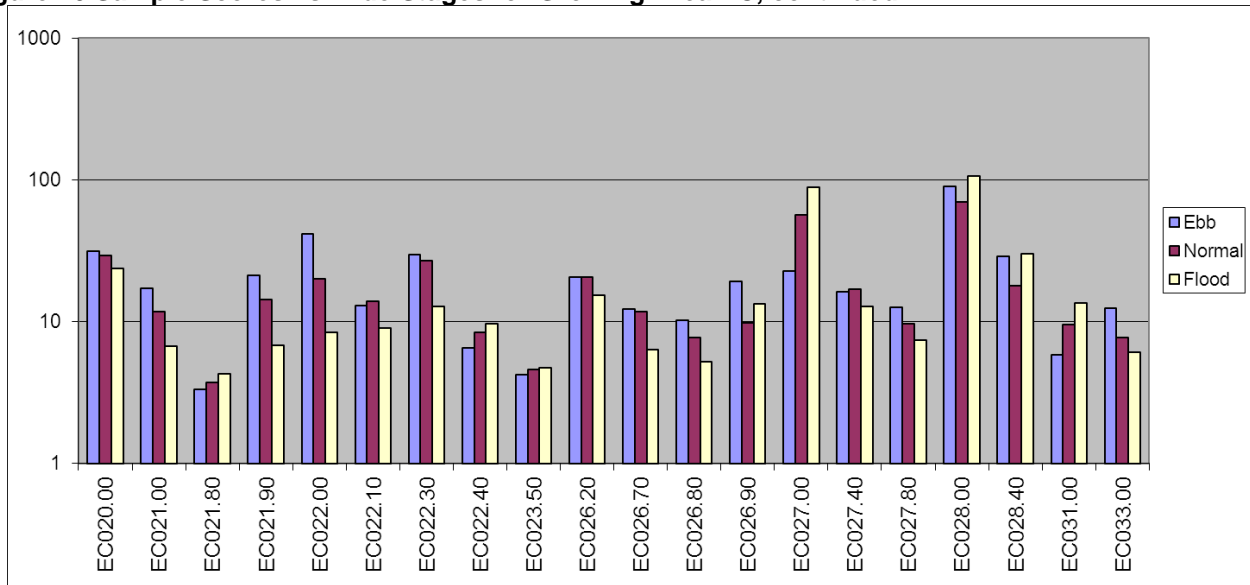
This area is subject to a semi-diurnal tidal cycle which presents two high tides and two low tides per lunar day. The mean range of tide is 10 feet in this region of the coast. Because of this large tidal range, some sampling stations are dry at low tide. As a result, these stations will not have sample data during the low or lower tide stages. Figures 9 and 10 show SRS data collected between 2007 and 2011 grouped by tidal stage with P90 scores recalculated using this data grouping. Data provided for the Ebb tide calculation include high ebb, ebb, low ebb and low tide samples. Data for the Flood tide calculation include low flood, flood, high flood and high tide samples. Classification of each sample station is noted in the figure. This graph serves as a comparison of fecal coliform levels of ebb tides and flood tides against all tides.

**Figure 9 Sample Scores vs. Tide Stages for Growing Area EC**





**Figure 10 Sample Scores vs. Tide Stages for Growing Area EC, continued**



### Rainfall

In order to investigate how water quality is impacted by rainfall events which do not necessitate an emergency flood closure, a rainfall assessment for all stations in growing area EC was completed. Each water quality station as plotted on a graph showing fecal coliform levels against rainfall amounts for 72 hours prior to sample collection. The graphs are in Appendix B of this report. Station EC 27 showed a trend indicating a predictable increase as a result of high runoff. This station is encompassed by Restricted Area 38 Part 2. During the 2011 shoreline survey a malfunctioning septic system was discovered in the watershed impacting this station. This system is discussed in the Domestic Waste part of the Pollution Sources Survey section of this report.

### Winds

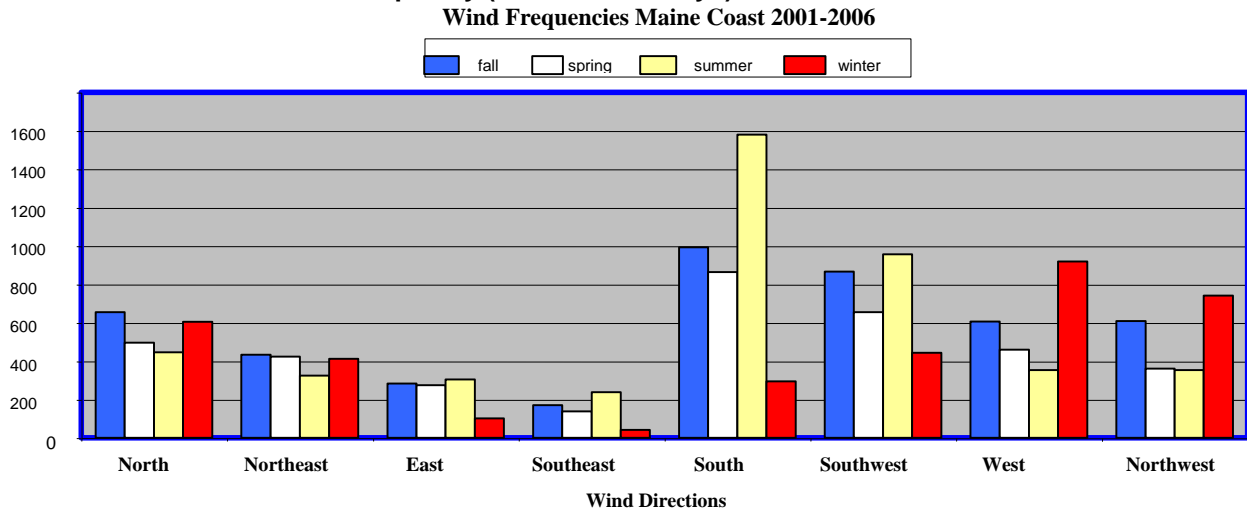
An analysis of GOMOOS data (2001-2006) show winter winds (Figure 8) along coastal Maine are typically from the south and west during clear periods and from the northeast during storms. Migratory weather systems cause winds that frequently change in strength and direction.

Gulf of Maine winds are generally westerly, but often take on a northerly component in winter and a southerly one in summer. Strongest winds are generated by lows and cold fronts in fall and winter and by fronts and thunderstorms during spring and summer. Extreme winds are usually associated with a hurricane or severe northeaster and can reach 125 knots. Sustained winds of 100 knots occur about every 50 years on average; gusts are usually about 30 percent higher.



In the open seas, away from the influence of land, winds are stronger and less complex. From December through March, winds are mainly out of the west through north with gales occurring about 6 to 12 percent of the time. In general, wind speeds increase with distance from the coast. If winds persist for a long time over a long fetch they will generate rough seas. In the Gulf of Maine, winter wind speeds of 15 knots or more persist for more than 12 hours about 70 to 80 percent of the time. However these winds often shift and a new fetch is established. Summer winds are usually out of the south through southwest, and gales are infrequent. During the spring and fall, winds are more variable.

**Figure 11. Wind Direction and Frequency (in number of days)**



## Summary of Hydrographic and Meteorological Assessment

There is no consistent pattern from station to station showing a trend of higher sample scores during a particular tide cycle.

Station EC 27 showed a trend indicating a predictable increase in sample scores as a result of high runoff. During the 2011 shoreline survey a malfunctioning septic system was discovered in the watershed impacting this station. It is within Restricted Area 38 Part 2.

Wind currents along the coast have not been identified to have an effect on pollution travel due to the lack of sufficient data. Tidal currents are likely strong enough to limit any wind effects on pollution travel.

## Water Quality Review





Table 6 lists all active approved, restricted, and prohibited stations in Growing Area EC, with their respective Geomean and P90 calculations for 2011. Please refer to Appendix A for a key to interpreting the headers on the columns of Table 6. The approved and restricted standards for each station are also displayed in this table.

All approved and restricted stations met their NSSP classification standard in 2011.

**Table 6. Geomean and P90 Scores, Growing Area EC, 2007-2011**

STATION	CLASS	COUNT	MFCNT	GEO_MEAN	SDV	MAX	P90	APPD_STD	RESTR_STD
EC001.00	A	30	30	3	0.47	80	12.4	31	163
EC001.50	A	30	30	4	0.59	160	23.4	31	163
EC002.00	R	30	30	3.9	0.5	120	17.5	31	163
EC003.80	new	7	7	2.5	0.31	13	6.4	31	163
EC004.00	R	30	30	4.3	0.64	1020	29	31	163
EC005.00	A	30	30	2	0.11	8	2.8	31	163
EC006.10	A	30	30	2.2	0.28	62	5.1	31	163
EC007.00	A	30	30	3.1	0.48	120	13.3	31	163
EC009.00	A	30	30	3.4	0.44	35	12.6	31	163
EC010.00	A	30	30	3.9	0.49	72	16.8	31	163
EC012.00	A	30	30	2.5	0.3	42	6	31	163
EC013.00	A	30	30	2.1	0.15	11	3.3	31	163
EC014.00	R	30	30	5.2	0.7	1380	42	31	163
EC016.00	A	30	30	2.3	0.24	22	4.7	31	163
EC017.00	A	30	30	4.2	0.48	34	17.4	31	163
EC017.50	A	30	30	2.8	0.56	420	15.2	31	163
EC017.70	A	30	30	2.9	0.54	1700	15	31	163
EC018.00	A	30	30	3.6	0.6	1700	21.3	31	163
EC019.00	A	30	30	3.1	0.43	48	11.3	31	163
EC019.70	R	12	12	3.5	0.34	24	9.8	31	163
EC019.90	R	30	30	5.6	0.7	600	44.9	31	163
EC020.00	R	30	30	4.5	0.63	520	29.1	31	163
EC021.00	A	30	30	3	0.45	124	11.7	31	163
EC021.80	A	30	30	2.2	0.17	8	3.7	31	163
EC021.90	A	30	30	2.9	0.53	420	14.2	31	163
EC022.00	A	30	30	3.7	0.57	500	20	31	163
EC022.10	A	30	30	3.6	0.45	62	13.9	31	163
EC022.30	A	30	30	3.5	0.68	1700	26.7	31	163
EC022.40	A	30	30	2.5	0.4	128	8.4	31	163
EC023.50	A	30	30	2.3	0.23	16	4.6	31	163
EC026.20	A	30	30	3.8	0.57	360	20.6	31	163
EC026.70	A	30	30	2.9	0.47	300	11.7	31	163
EC026.80	A	30	30	2.5	0.38	96	7.7	31	163
EC026.90	P	30	30	2.9	0.4	180	9.8	31	163
EC027.00	R	30	30	5.7	0.77	1260	56.2	31	163



STATION	CLASS	COUNT	MFCNT	GEO_MEAN	SDV	MAX	P90	APPD_STD	RESTR_STD
EC027.40	A	30	30	3.6	0.51	80	16.8	31	163
EC027.80	A	30	30	3.1	0.38	38	9.6	31	163
EC028.00	R	30	30	7.5	0.75	300	69.7	31	163
EC028.40	A	30	30	3.7	0.53	114	18	31	163
EC031.00	A	30	30	2.8	0.4	68	9.5	31	163
EC033.00	P	30	30	2.9	0.32	18	7.7	31	163

Table 7 shows the samples collected in area EC in 2011. All of the stations were sampled a minimum of six times following the systematic random sampling strategy (SRS) over the course of the sampling season. Station EC 3.8 was sampled one extra time since it is a new station.

**Table 7. EC Samples Collected in 2011**

Station	Class	Adverse		Extra		Random		Total	Comments
		Closed	Open	Closed	Open	Closed	Open		
EC001.00	A						6	6	
EC001.50	A						6	6	
EC002.00	R						6	6	
EC003.80	new				1		6	7	Extra sample on 6/6/11
EC004.00	R						6	6	
EC005.00	A						6	6	
EC006.10	A						6	6	
EC007.00	A						6	6	
EC009.00	A						6	6	
EC010.00	A						6	6	
EC012.00	A						6	6	
EC013.00	A						6	6	
EC014.00	R						6	6	
EC016.00	A						6	6	
EC017.00	A						6	6	
EC017.50	A						6	6	
EC017.70	A						6	6	



Station	Class	Adverse		Extra		Random		Total	Comments
		Closed	Open	Closed	Open	Closed	Open		
EC018.00	A						6	6	
EC019.00	A						6	6	
EC019.70	R						6	6	
EC019.90	R						6	6	
EC020.00	R						6	6	
EC021.00	A						6	6	
EC021.80	A						6	6	
EC021.90	A						6	6	
EC022.00	A						6	6	
EC022.10	A						6	6	
EC022.30	A						6	6	
EC022.40	A						6	6	
EC023.50	A						6	6	
EC026.20	A						6	6	
EC026.70	A						6	6	
EC026.80	A						6	6	
EC026.90	P					6		6	
EC027.00	R						6	6	
EC027.40	A						6	6	
EC027.80	A						6	6	
EC028.00	R						6	6	
EC028.40	A						6	6	
EC031.00	A						6	6	
EC033.00	P					6		6	



Figures 12 and 13 show the P90 trends over the past three years, for all Approved, Restricted and Prohibited stations in growing area EC. 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; any station on or above 100 percent does not meet the standard for approved classification.

In 2010, station EC 27 did not meet the approved standard and was downgraded in classification to Restricted. As a result of the 2010 year end P90 calculations, Stations EC 4, 14, and 19.9 did not meet the Approved standard and were downgraded to Restricted classification.

**Figure 12. Area EC P90 Scores for All Stations (expressed as the percent of the approved standard), 2008-2011**

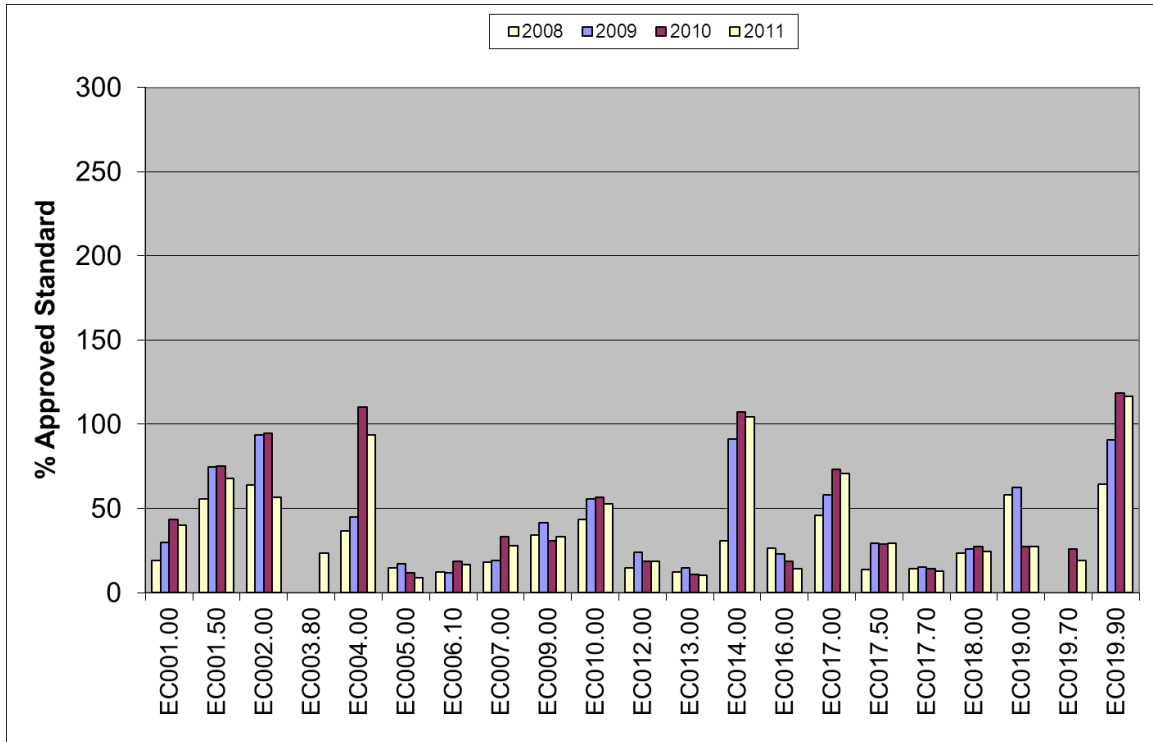
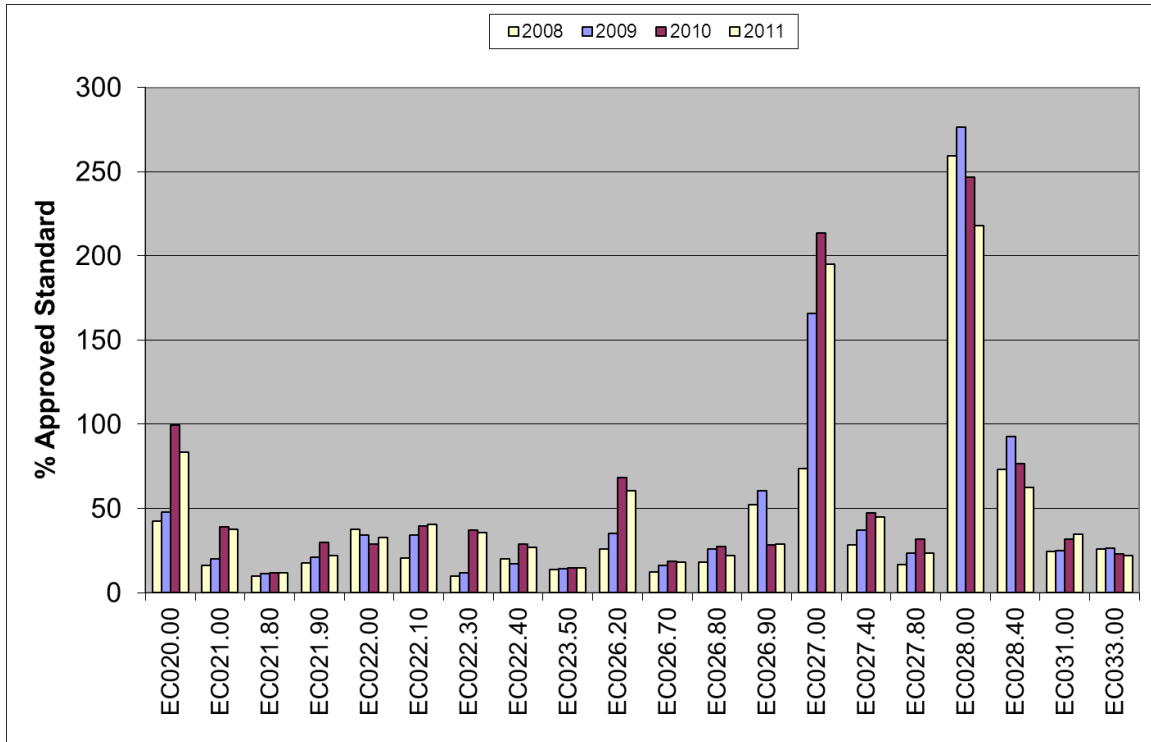


Figure 13 Area EC P90 Scores for All Stations (expressed as the percent of the approved standard), 2008-2011 continued



Approved area stations with a P90 calculation that has reached 80% or more of the Approved Classification standard were analyzed to determine if there is a seasonal impact. Only station EC 22.3 meets that criterion. The table below shows the sample dates and scores. No trend indicating a predictable increase as a result of seasonality was detected. The high scores found on May 19, 2010 and Sept. 27, 2011 were isolated events.

**Table 8 EC 22.3 Monthly P90 Results**

EC 22.3	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
4/10/2007			1.9							
5/30/2007				1.9						
7/31/2007						4				
9/26/2007								1.9		
10/23/2007									2	
11/27/2007										4
2/11/2008	1.9									
4/14/2008			1.9							
6/10/2008					1.9					
7/23/2008						1.9				
10/29/2008									1.9	
11/18/2008										2
3/24/2009		1.9								
5/12/2009				1.9						
7/22/2009						10				
8/11/2009							1.9			
9/22/2009								2		
11/23/2009										1.9



EC 22.3	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
4/27/2010			1.9							
5/19/2010				380						
6/8/2010					1.9					
7/13/2010						6				
8/24/2010							1.9			
10/26/2010									16	
3/29/2011		1.9								
4/5/2011			1.9							
6/6/2011					1.9					
6/21/2011					1.9					
8/9/2011							1.9			
9/27/2011								1700		

### Water Quality Discussion and Classification Determination

Non-point pollution appears to be the contributing factor to the increase in fecal coliform levels in the vicinity of Blastow Cove (station EC 4) and Western Cove (EC 14). The shoreline survey of that area did not reveal any point sources of pollution however; there has been a steady decline in water quality at those stations which resulted in a downward reclassification from Approved to Restricted, on January 6, 2011 after the 2010 year end data analysis.

Inner Harbor and Holt Pond (stations EC 19.9 and 20), has also shown an increase in water quality scores requiring a downward reclassification from Approved to Restricted on January 6, 2011 after the 2010 year end data analysis. However, a shoreline survey in the summer of 2011 revealed a malfunctioning septic system (EC00464.19) was the most likely cause of the elevated scores.

Burnt Cove, Stonington (station EC 27) has shown an increase in water quality scores warranting a downward reclassification from Approved to Restricted on Sept. 7, 2010, after water quality exceeded the approved P90 standard.



**Aquaculture/Wet Storage Activity**

There are six aquaculture sites and one wet storage site in shellfish growing area EC. These sites are all located in approved areas. Information on these lease sites is shown below and is also available at the DMR aquaculture website at:

<http://www.maine.gov/dmr/aquaculture/leaseinventory/index.htm>

**Table 9 Aquaculture Lease Sites in Area EC**

Site ID	Name	Primary Species	Expiration Date
PEN LD2	Virginia Olsen	Oysters/Blue Mussels	2/20/2013
PEN SI	Friendship International	Green Sea Urchins	3/30/2012
PEN SN1	Jack Hamblem Jr.	Blue Mussels	7/31/2015
PEN SN2	Jack Hamblem Jr.	Blue Mussels	5/29/2015
PEN STH	Downeast Aquaculture	Blue Mussels	3/15/2016
PEN STH2	Pemaquid Mussel Farms	Blue Mussels	1/26/2020

**Table 10 Wet Storage Sites in Area EC**

Cert. No.	Name	Area Classification
ME 201 SP	Carter's Seafood	Approved

**Conclusion**

New pollution sources in the form of malfunctioning septic systems were located in Inner Harbor and Burnt Cove. The system in Burnt Cove was replaced with a new in ground system before the writing of this report. The Inner Harbor system has been brought to the attention of the local plumbing inspector and is currently in the process of abatement. Progress will be monitored in 2012 and the area will be reviewed for possible upward reclassification when abatement is complete

Overall water quality for Growing Area EC remained consistent with years past. Growing Area EC will continue to be monitored under the current systematic random sampling protocol.

No upgrades in classification are being proposed at this time.

**Recommendation for Future Work**

Intensify shoreline survey work in all restricted areas through cooperation with DEP and dye test potential malfunctions in the area.

Monitor the abatement process of the Inner Harbor malfunctioning system.





## Appendix A. 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 = 90<sup>th</sup> percentile

APPD\_STD = the 90<sup>th</sup> 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 90<sup>th</sup> percentile, at or below which the station would meet Restricted criteria.