GROWING AREA ES

Cross Island-Cape Wash, Cutler to Mowry Point, Lubec

SANITARY SURVEY REPORT

FINAL REPORT DATE: December 21, 2010

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APPROVAL

Division Director:

_____ _____ Date: _____
Print name signature

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Executive Summary

This is a sanitary survey report for growing area ES written in compliance with the requirements of the 2007 Model Ordinance and the National Shellfish Sanitation Program (NSSP). This report includes a water quality review, based on water quality data collected through 2009, as well as an evaluation of all pollution sources identified between 1997 and 2009, and a re-evaluation of major pollution sources located within the boundaries of the area. Pollution sources reviewed in this report include a wastewater treatment plant, domestic waste, including private in-ground systems and over board discharges (OBDs), marinas, recreational areas, agricultural activities, domestic animal and wildlife areas, storm water, and non-point pollution transported by streams. Hydrographic and meteorological data are also presented and discussed in this report, including assessments of tides and currents, rainfall, salinity, and river discharge. A discussion of current classifications and recommendations for future work are also presented in this report.

Since the last sanitary survey classification changes have taken place in Little Machias Bay, Little River, Bog Brook, Haycock Harbor, South Lubec and the Mowry Point areas. Current closures are based on a cluster of four residential licensed overboard discharges in Bog Brook Cove (Cutler-Trescott), a waste water treatment plant in the Town of Lubec and three areas showing non-point pollution sources in Little Machias Bay, Haycock Harbor and South Lubec. There were five (5) domestic wastewater systems in this growing area that could not be identified during the survey. Four of the five were in areas are classified approved and water quality meets approved criteria. The fifth property had a reported septic overflow that has not been confirmed. Water quality sample stations in this area do not meet approved standards and the area is classified restricted. These properties are being referred to the local town plumbing inspectors. Sample stations ES 4.00, ES 5.00, ES 12.00, ES 22.00 and ES 28.00 all show declining water quality based on a percentage of the approved standard. With the exception of ES 4.00, the remainders of these stations are in prohibited or restricted areas and meet their present classifications. There is a proposal to enlarge the Little Machias Bay restricted area because water quality does not meet approved standards at ES 4, the boundary station of restricted Area No. 55A (part D). It will be necessary to increase the size of the restricted area and establish a new sample station on the area margin. Data analysis shows that the remainder of water quality sample stations in area ES meet their NSSP classifications. All the sample stations were sampled the required minimum of 6 times during 2009. The next triennial report is due in 2012.

Growing Area Description

Growing Area ES is located southwestern section of Washington County, on the coast of Maine (Figure 1). It includes the towns of Cutler, Trescott and Lubec. Water quality in growing area ES is monitored by nineteen (19) stations (Figures 2 and 3). Classifications of growing area ES include approved, prohibited and restricted areas. A complete growing area boundary description can be found in the central files.

The growing area encompasses 108 square miles that includes the near sub-tidal waters, inter-tidal flats and a zone of upland land that extends inland to a definite up-land boundary The shoreline included in this report extends from Cross Island-Cape Wash, Cutler to Mowry Point, Lubec. The shoreline is typical to the convoluted shoreline of this section of Maine, with a series of shallow harbors with muddy and gravel bottoms separated by rock-bound points of land and bold shoreline. The upland boundary of the growing area is enclosed by a line beginning at a point off shore southwest if Cross Island; then extending north of Cross Island to Cape Wash, Cutler; then north to

a point inland of the head of Holmes Bay; then northeast to Mowry Point, Lubec; and then east to the US-Canadian boundary.

The villages and towns of Cutler (pop. 574), Trescott (pop. 2,323) and Lubec (pop.1,523) have the largest population concentrations (2007-2008 Maine Municipal Directory). Many of the homes are seasonal, and are typically occupied between the months of June and September. Development along these shores is spotty with clusters of homes separated by undeveloped land. Agricultural operations are small "family farms" with less than 10 animals. There is no heavy industry in the growing area. Work boat moorings are located in the Little River, Haycock Harbor and Baileys Mistake. There are aquaculture sites in Little River, Cutler and two areas north of Cross Island. All are for finfish; however, one of the Cross Island sites has shellfish listed on its permit. This specific site is located in waters classified approved. There are four seasonal residential licensed overboard discharges in the Bog Brook Cove area of Cutler-Trescott.

The upland land cover is predominately evergreen, deciduous and wetland forest with minimal development (Figure 4). There are several large grass hay fields. There are large conservation lands on Cross Island, the "Bold Coast" of Cutler-Trescott and at West Quoddy Head State Park. These areas operate year-round and have shore-side camping sites and/or hiking trails. Fresh water influence along these shores is predominately from numerous small streams throughout the growing area. No large rivers flow into the growing area.

Figure 5 highlights intertidal substrate that frequently provides habitat for soft shell clams. The harbors most likely to contain significant populations of soft and hard shell clams and mussels are: Little Machias Bay, Cross Island, Little River-Money Cove, Haycock Harbor, Moose Cove, Baileys Mistake, South Lubec and Mowry Point Flats.

Money Cove, Cutler, is classified prohibited and has been placed on Maine's 303(d) list for impairments due to bacteria, primarily due to unspecified sources of runoff. The 118th Legislature enacted "*An Act to Protect the States, Lakes, Rivers, and Coastal Wetlands through a Comprehensive Watershed Protection Program"* which became effective in September 1997 (Public Law 1997 Chapter 519). The law authorizes the Maine Land and Water Resources Council (MLWRC) to create and administer comprehensive watershed protection programs to ensure the development and implementation of locally supported watershed management plans. One of the requirements of the agencies involved is to establish priorities for the purpose of directing resources to the management of the water bodies on the priority list. The fundamental objective of the NPS Priority Watersheds List is to identify waters to help direct non-point source (NPS) water pollution control efforts. Financial assistance for locally supported groups developing or implementing watershed management plans and activities is made available and administered through the Maine DEP. Money Cove is listed as a priority impaired area and listed as a high priority but there is no active local group.

Figure 1. Growing Area ES

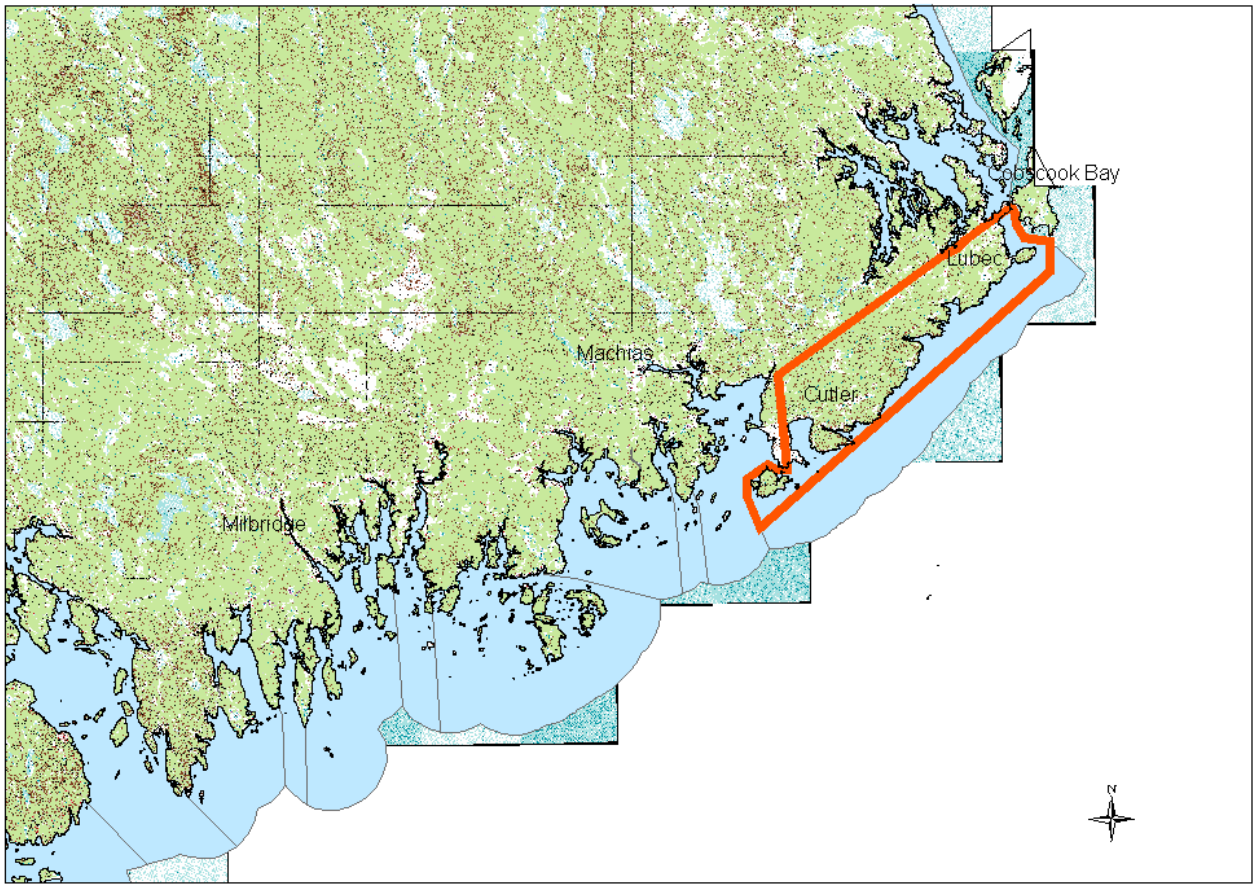
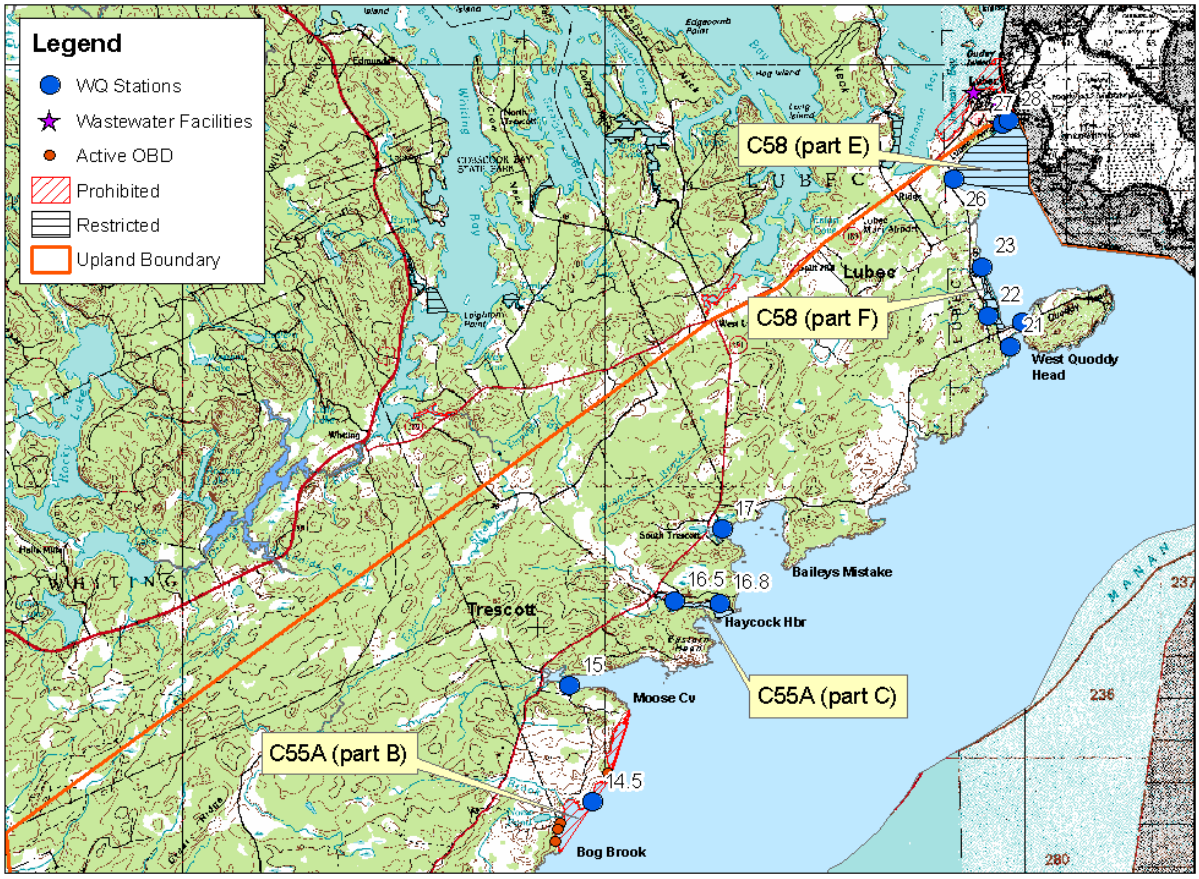


Figure 2. Growing Area ES, Southern Section

Figure 3. Growing Area ES, Northern Section



Growin Area ES, North Section
Maine Department of Marine Resources
Bureau of Public Health

Figure 4. Growing Area ES, Land Cover

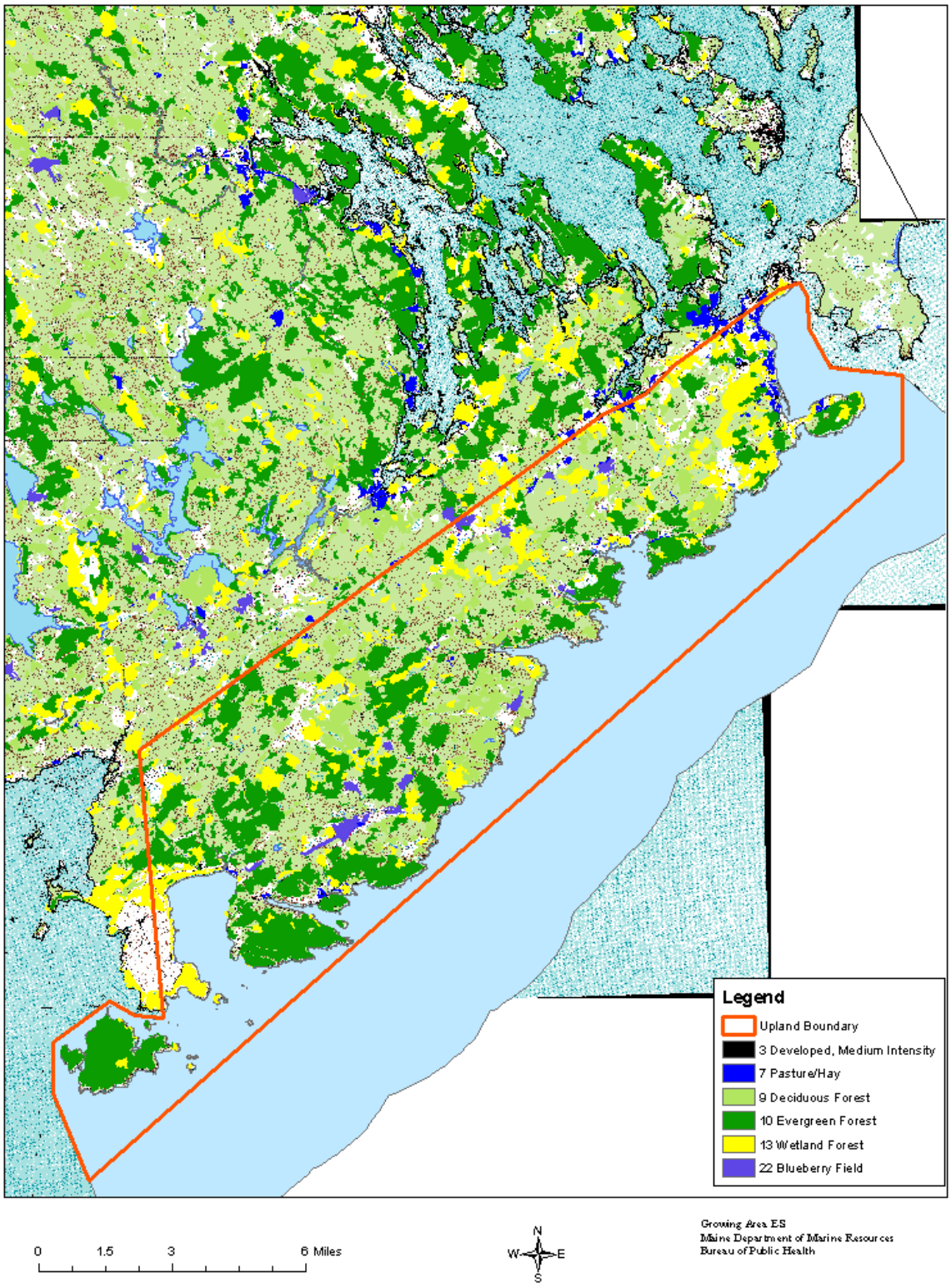
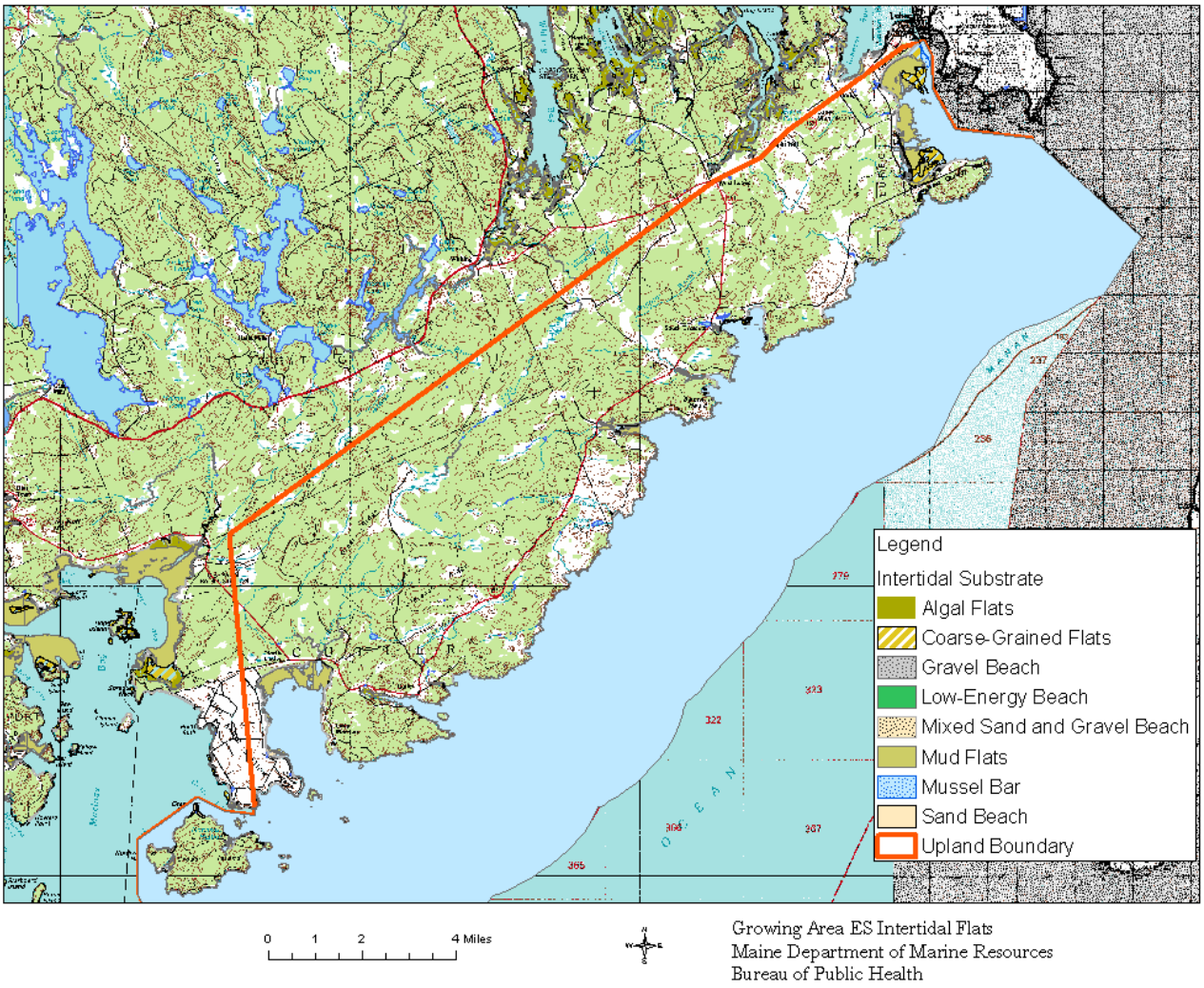


Figure 5. Area ES Intertidal Shellfish Habitat



History of Growing Area

Date of Last Survey

The last Sanitary Survey Report for growing area ES was written in 1997. Triennial evaluations were completed in 2000, 2003 and 2006.

Historical Changes in Area Classifications 1997-2009

2001 – March 30, 2001; Area 55D, Great Head (Cutler) and Bog Brook Cove (Trescott): this amendment reclassified Bog Brook Cove from approved to prohibited, due to four licensed overboard discharges identified during a review of Department of Environmental Protection (DEP) records and survey of the area.

2003 – June 6, 2003; Area 56C, Haycock Harbor (Trescott); this amendment reclassified the inner harbor ("The Pool") to prohibited, due to water quality not meeting the approved standard, and

reclassified the outer harbor-Sandy Cove from prohibited to approved, due to water quality meeting the approved standard at a new margin station, ES 16.5.

2006 – August 4, 2006; Area 58, Lubec and South Lubec; this amendment reclassified Mowry Point and an un-named cove in South Lubec from prohibited to restricted for depuration, due to water quality meeting the restricted standard.
January 18, 2006; Area 55A, Cutler Harbor; the prohibited area was increased in size due to failing water quality and reclassified from prohibited to restricted due to water quality meeting the restricted standard.
January 20, 2006; Area 56C, Haycock Harbor (Trescott); this amendment reclassified the outer harbor from approved to restricted, due to water quality not meeting the approved standard.

2008 – March 3, 2008; Area 55A, Money Cove (Cutler), Bog Brook Cove (Cutler-Trescott) and Haycock Harbor (Trescott); this amendment combined Money Cove, Bog Brook Cove and Haycock Harbor closures into one single regulation, and repealed a restricted area in the Little River due to water quality meeting the approved standard. This amendment also repealed a prohibited area on Great Head, after the removal of a licensed overboard discharge and enlarges the size of the Bog Brook Cove prohibited area to enclose an identified pollution source.

2009 – March 12, 2009; Area 55A, Money Cove (Cutler), Bog Brook Cove (Cutler-Trescott), Little Machias Bay (Cutler) and Haycock Harbor (Trescott); this amendment reclassified Marsh Stream, Little Machias Bay from approved to restricted, due to water quality not meeting the approved standard.

Current Classifications

At the end of 2009, growing area ES had the following classifications:

Approved
10 stations (ES 1, 3, 8, 9, 15, 17, 21, 23, 24)

New Stations (less than 30 samples and not evaluated against a NSSP standard)
2 stations (EN 16.8, 21.5)

Restricted
Area No. 55A, Money Cove (Cutler), Bog Brook Cove (Cutler-Trescott), Little Machias Bay (Cutler) and Haycock Harbor (Trescott)
A- Money Cove; 1 station (ES 12); water quality not meeting approved standard
C- Haycock Harbor; 2 stations (ES 16.5, 16.8); water quality not meeting approved standard
D- Little Machias Bay; 2 stations (ES 4, 5); water quality not meeting approved standard
Area No. 58, Lubec and South Lubec
B- Mowry Point Flats; 3 stations (ES 26, 27, 28); water quality not meeting the approved standard
C- South Lubec (Carrying Place); 2 stations (ES 21.5, 22); water quality not meeting the approved standard

Prohibited
Area No. 55A, Money Cove (Cutler), Bog Brook Cove (Cutler-Trescott), Little Machias Bay (Cutler) and Haycock Harbor (Trescott)
A- Money Cove; 1 station (ES 12); water quality does not meet approved standard
B- Bog Brook Cove; 1 station (ES 14.5); licensed overboard discharges
Area No. 58, Lubec and South Lubec

A- Mowry Point to Popes Folly to Diamond Point; 1 station (ES 28); Lubec Wastewater Treatment Plant

Please visit the DMR website to view legal notices:

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

Conditional Areas

There are no areas classified conditionally approved or conditionally restricted in this growing area.

Pollution Source 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.

The Growing Area ES survey was conducted by the DMR Public Health Shellfish Program in the spring, summer and fall of 2009. The survey area was reviewed by a lot-by-lot inspection of shoreline properties. Parcel-based tax maps were acquired from the Towns of Cutler, Trescott and Lubec 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. A detailed discussion of the methods used to determine these analyses is found on the DMR Public Health Division SOP web page.

Growing area ES was surveyed on the following dates in 2009:

March 28, 2009 Stream sampling
August 12, 2009 Stream sampling
August 11, 2009 Cross Island to Cutler Village, Cutler
August 12, 2009 Cutler Village to Norse Pond area, Cutler
August 13, 2009 Cutler-Trescott town line to Haycock Harbor, Trescott
August 18, 2009 Haycock Harbor, Trescott to Baileys Mistake, Lubec
September 16, 2009 Baileys Mistake, Lubec to West Quoddy Head, Lubec
September 17, 2009 West Quoddy Head, Lubec to Woodward Point, S Lubec
September 21, 2009 Woodward Point, S Lubec to Mowry Point, Lubec

Identification and Evaluation of Pollution Sources

The property survey involved the on-site inspection of 542 shoreline properties, as well as upland properties that have the potential to impact the shore. Pollution sources that were evaluated include permitted point sources (OBDs), other domestic waste disposal systems, storm water discharges, non-point source pollution associated with tidal creeks/stream/wetland discharges, agricultural sources, wildlife areas, industrial waste, dredging, and marinas. Most of the inspected properties have on-site in-ground septic systems; exceptions include structures with licensed overboard discharges, outhouses, vacant/forested lots and public shore access points. The discharges impacting this growing area are presented in Tables 1, 2, and 3; these discharges are considered to be actual or potential, direct pollution sources impacting the growing area.

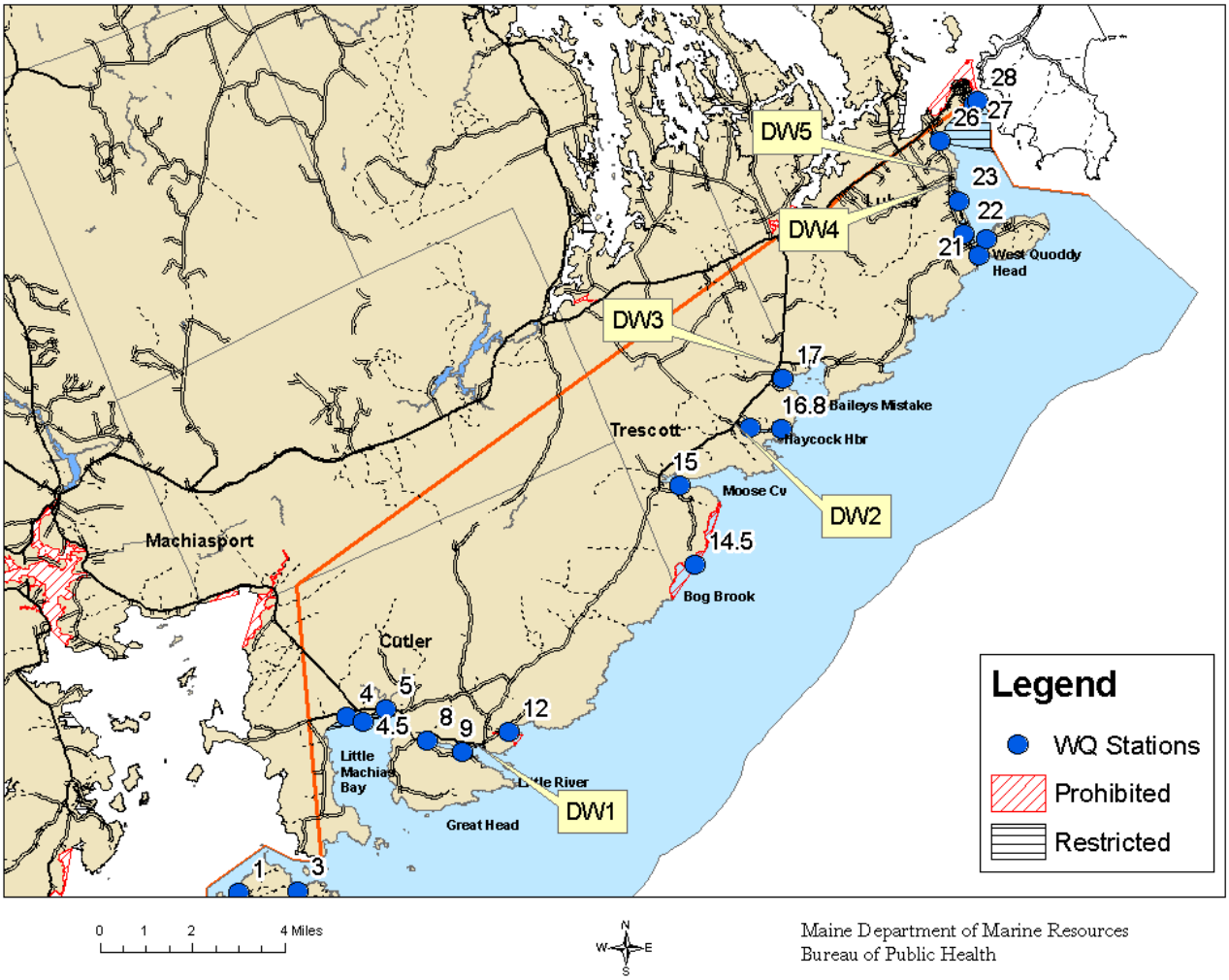
Domestic Waste

There were five (5) unidentified domestic wastewater systems in this growing area (Table 1 and Figure 6). Four of the five were in structures where no system could be identified at the time of the survey; however, no discharges, wet areas or pipes were identified impacting the shore. The water quality in these areas meets approved criteria and the areas are classified approved. The fifth property had a reported septic overflow that has not been confirmed. Water quality sample station ES 16.5 in this area does not meet approved standards and the area is classified restricted. The area boundary station, ES 16.8, meets approved criteria. These properties are being referred to the local town plumbing inspectors.

Table 1. Domestic Waste Pollution Sources

Location	Description	Sample Station Impacted	Disposition	Area Class
DW 1 ES00176.00	House on wharf No system ID'd	ES 9	Follow up with LPI-DHHS	Approved
DW 2 ES00297.50	Suspect septic overflow, upstream from cove on side road W of stream; observed pipe from house that may be impacting stream during wet weather	ES 16.5	Follow up with LPI-DHHS	Restricted
DW 3 ES00360.00	House head of tidal creek; vacant in disrepair; No system ID'd	No sample station	Follow up with LPI-DHHS	Approved
DW 4 ES00532.00	Camp and barn near water; No system ID'd,	ES 23	Follow up with LPI-DHHS	Approved
DW 5 ES00543.00	Vacant ranch house; No system ID'd	ES 23	Follow up with LPI-DHHS	Approved

Figure 6. Domestic Waste in Growing Area ES



Residential 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. When you flush a toilet or wash the dishes, the 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. DEP inspectors will look for a tag on the treatment unit identifying the service contractor and the last date of service. All mechanical systems require power, so it is important that power is supplied to the unit and that it is turned on. 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 water body (the ocean, a river, or a stream) via an outfall pipe.

Six (6) overboard discharges have been removed from the growing area since the previous survey (1997). The four remaining discharges are along the shores of Bog Brook Cove east of Cutler (Table 2 and Figure 7). They are sand processors with end-stage chlorination and discharge of the water to the ocean; all are seasonally used. A dilution calculation was completed for each OBD to determine the zone of impact in the event of an ODB malfunction (loss of chlorination). These calculations considered the depth of receiving water at mid-tide, the licensed flow rates and effluent bacterial concentrations of 140,000 fecal coliform/100 ml (worse case-loss of disinfection). These dilution zones are the minimum area required to dilute the effluent to 14 FC/100 mls. OBD closure areas are frequently larger that the calculated dilution zones due to other pollution issues in the immediate area or because of the need for defendable enforcement lines. The licensed overboard discharges listed in Table 2 are imbedded in a larger closure that exceeds the required closure area for the licensed discharges.

The Maine Department of Environmental Protection (DEP) reported that it is unknown whether there is a subsurface waste disposal alternative for the overboard discharges listed in Table 2 (March 2009). The shoreline is bold, rocky terrain which would unlikely allow for subsurface waste disposal options; for this reason, the area will remain prohibited for the immediate future.

Table 2. Active Licensed Overboard Discharges Growing Area ES

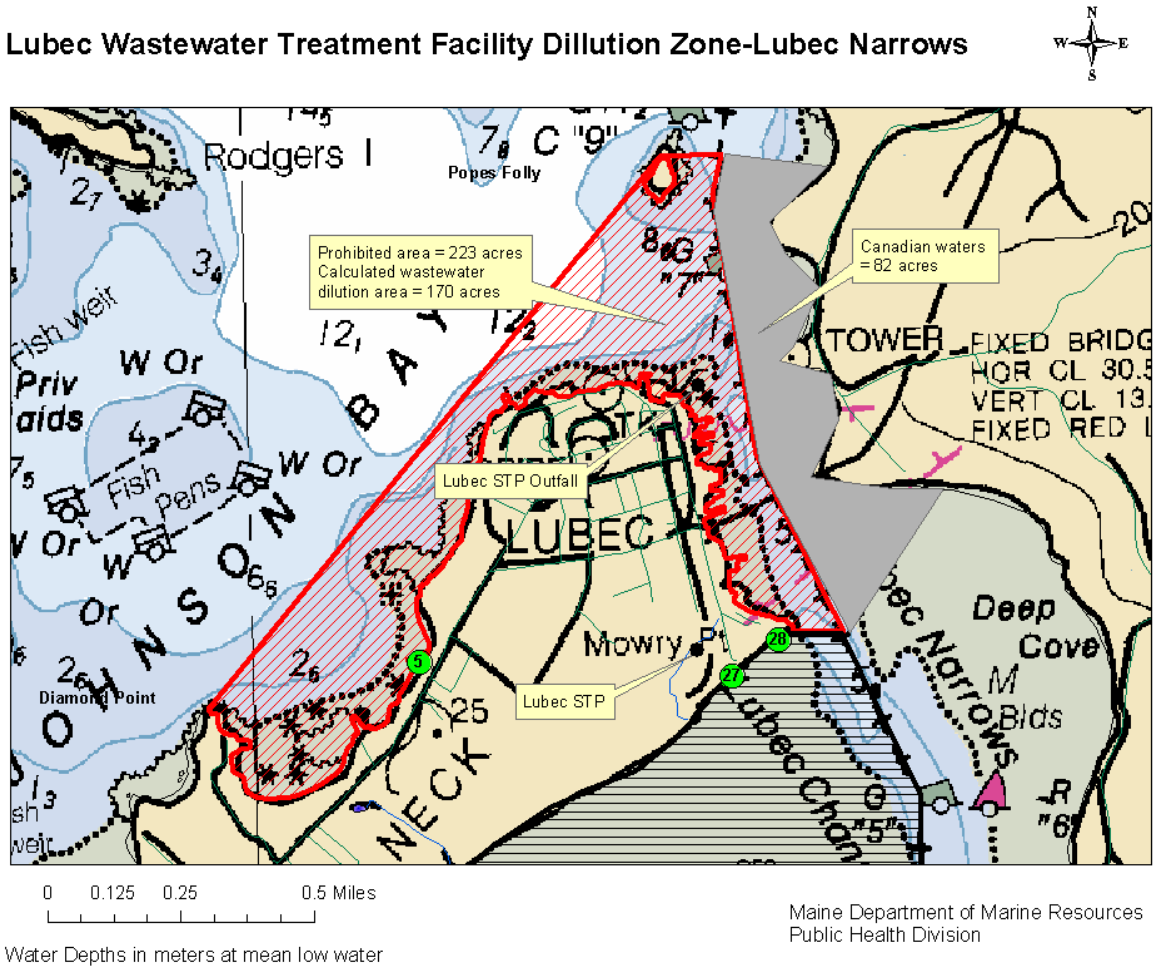
Dep ID (SLS_ID)	Town	Flow (gpd)	Depth of Receiving Waters (ft)	Required Closure Size (acres)
7824 (ES00233.00)	Cutler	120	40	0.1
3386 (ES00236.00)	Cutler	300	40	0.2
4466 (ES00239.00)	Trescott	315	40	0.2
5199 (ES00249.00)	Trescott	324	40	0.2
			Total	0.7
		Area No. 55A (part B)		123.7

Figure 7. Area ES Licensed Residential Discharges Dilution Area

Municipal Wastewater Treatment Facilities

The Town of Lubec Wastewater Treatment facility is located on Mowry Point, the southeast end of Lubec Neck (Figure 8) The outfall for the plant is located one half mile upstream in Lubec Narrows in growing area ET. Based on a 166,000 GPD licensed flow, a fecal concentration of $1.4x10^5$ FC/100ml and 30 feet of receiving water at mid tide, the calculated dilution area is 170 acres. The outfall is located in a 223 acre prohibited area within growing area ET. Because the prohibited area only extends to the mid channel (US-Canadian international boundary) of the Lubec Narrows, there is an additional 82 acres of dilution water on the Canadian side of the channel. The prohibited area boundary stations ES 27, 28 and ET 5 all meet approved standards based on the most recent 30 samples. Any bacterial impact on these stations, based on tidal stages, from the wastewater treatment plant is presently inconclusive (see "Tidal Stages" section of this report). This dilution analysis and boundary water quality stations meeting approved criteria supports the adequacy of the current prohibited area. There are currently no dye studies of the effluent impacts on the receiving water.

Figure 8. Lubec Wastewater Plant Dilution Zone



There is one NPDES permit located in this growing area. Atlantic Salmon of Maine has an aquaculture site for 24 salmon pens north of Cross Island, Cutler and a discharge permit (MEG130006) for fish feed

and uneaten fish feed within the Water Column and Sediment Column mixing zones which is defined as within 30 meters of the net pens. The permit specifies that domestic waste shall not be discharged from the site and must be collected and transported to an approved land based discharge facility.

Storm Water Discharges

Storm water runoff is generated from land surfaces and impervious areas including paved streets, parking lots, and building rooftops, during rainfall and snow melting events. This runoff can contain pollutants in quantities that can adversely affect water quality. Storm water pollution is caused by the daily activities of people within the watershed. Rain and snowmelt water run off streets, lawns, farms, and construction and industrial sites and pick up fertilizers, dirt, pesticides, oil and grease, and many other pollutants on the way to our rivers, lakes, and coastal waters. Storm water runoff is a contributor to coastal water pollution, often termed “non-point source pollution.”

Growing Area ES is very rural and none of the towns have storm water collection systems. Along roadways storm water culverts and ditches of varying diameters were identified during the course of the shoreline surveys. No pollution impact from these storm water conduits has been identified.

Tidal Creeks, Streams, and Wetland Discharges

Many of the coves and bays in growing area ES have freshwater streams draining to the saltwater from upland areas. Sampling of freshwater sources was conducted during low to medium runoff conditions. The streams in Table 3 are considered to be “actual pollution sources” if the geomean of the fecal coliform stream sampling results exceed 14 FC/100ml. Figure 9 shows the map location of these streams. Results from individual testing events as well as flow rates, depth of receiving waters, average gallon/minute flow and the geomean of the fecal coliform testing results are listed in Table 4 for the years 2000 to 2009. Streams with geomeans >14 FC/100ml are shaded in gray. Those streams with geomeans < 14 FC/100ml are not exceeding the approved standard. The majority of the growing area stream samples have been collected in the fall and spring and not enough summer data is available to make any conclusions as to any impacts on water quality from streams at other times of year. Additional sampling of the streams during all seasons is necessary to generate additional data.

Table 3. Streams Sampled in Growing Area ES

SLS_ID	Town	Area	Impact	Description
ES00024.50	Cutler	Little Machias Bay	PD	Eastern-Western Marsh Brooks, flows into Little Machias Bay
ES00105.10	Cutler	Little River	PD	Little River, stream into the head of Cutler Harbor
ES00218.50	Cutler	Money Cove	PD	Schooner Brook, flows into head of Money Cove
ES00226.50	Cutler	Holmes Cove	PD	Holmes Cove Brook
ES00240.50	Trescott	Bog Brook	PD	Bog Brook, flows into Bog Brook Cove
ES00262.50	Trescott	Moose Cove	PD	Micah Brook, flows into the head of Moose Cove
ES00295.50	Trescott	Haycock Harbor	PD	Wiggins Brook, flows into the head of Haycock Harbor
ES00370.50	Trescott	Baileys Mistake	PD	Tidal creek at western end of Baileys Mistake, Rt 191 bridge
ES00400.50	Lubec	Baileys Mistake N	PD	Un-named stream in the northern corner of Baileys Mistake
ES00429.50	Lubec	Hamilton Brook	PD	Hamilton Brook, drains large wetland into Hamilton Cove
ES00474.50	Lubec	Carrying	PD	Un-named stream draining into the Carrying Place

SLS_ID	Town	Area	Impact	Description
		Place E		near intersection of Quoddy Head Rd
ES00510.50	Lubec	S Lubec	AD	Drainage from animal pasture into tidal creek flowing to Carrying Place
ES00555.00	Lubec	S Lubec	AD	"Pikes Puddle", pond that drains into the cove south of Mowry Point

Table 4. Fecal Coliform Testing Results for Streams

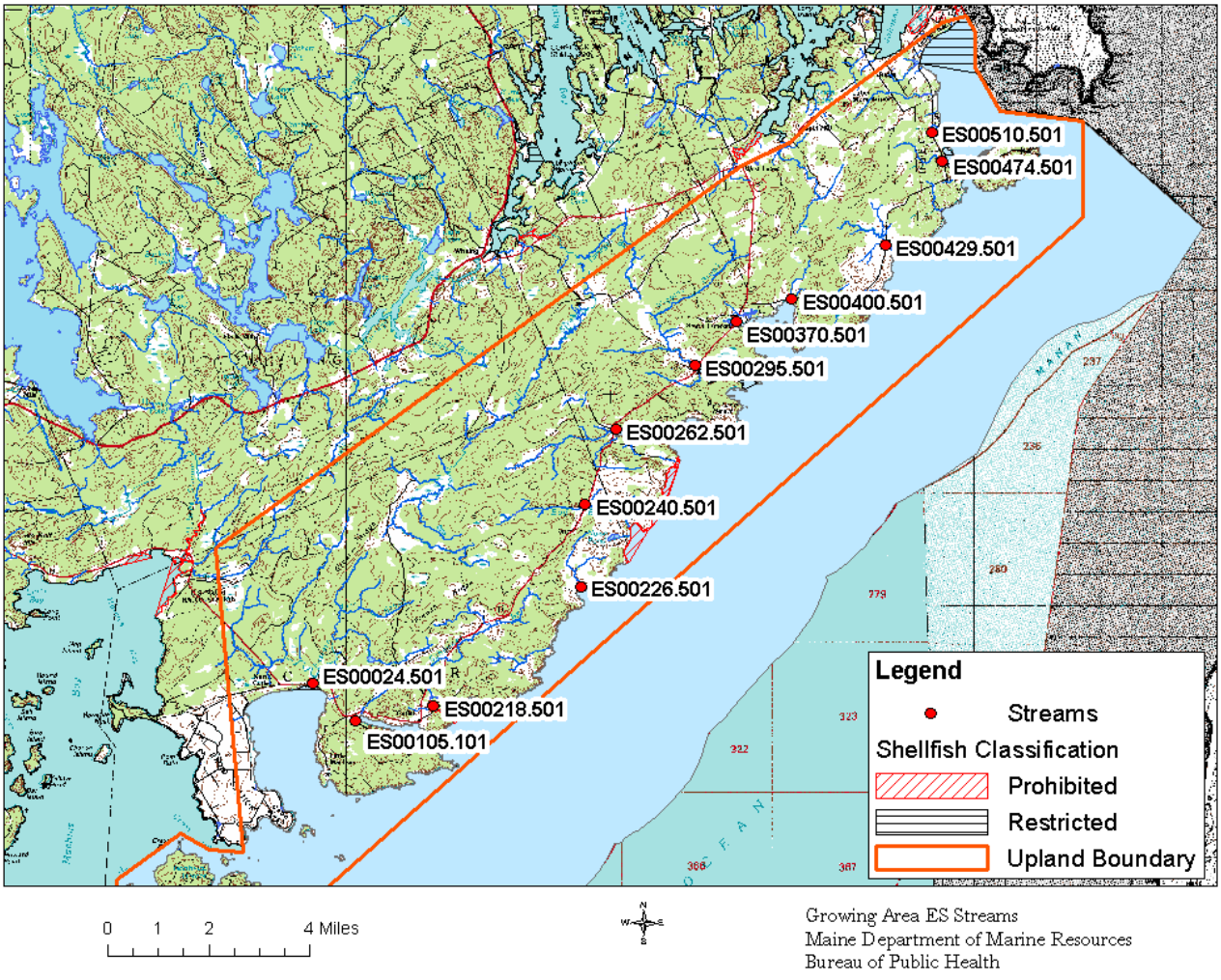
SLS_ID	Sample Date	Sample Scores FC/100 ml	Flow gpm	Receiving Water Depth ft	GM FC	Av Flow gpm	Dilution Zone acres	Remarks
ES00024.50	12/4/2000	7.3	250	10	6.1	772	0.1	Restricted area, 21.7 acres monitored by ES 5 and ES 4;
	12/10/2001	<3	400					
	11/24/2003	<3	1000					
	12/21/2005	9.1	500					
	4/28/2009	2	800					
	8/12/2009	45	1683					
ES00105.10	12/4/2000	<3	100	8	4.1	243	<0.1	Approved area, monitored by ES 8
	12/10/2001	<3	90					
	11/24/2003	<3	250					
	12/21/2005	<3	500					
	4/28/2009	4	400					
	8/12/2009	16	115					
ES00218.50	12/4/2000	<3	2500	6	5.7	1530	0.5	Prohibited area, 31.8 acres, monitored by ES 12
	12/10/2001	3.6	2000					
	11/24/2003	9.1	2000					
	12/21/2005	<3	1500					
	4/28/2009	8	1000					
	8/12/2009	16	180					
ES00226.50	11/24/2003	<3	200	20	5.6	380	<0.1	Approved area, no stations
	8/12/2009	11	359					
ES00240.50	12/4/2000	9.1	750	20	10.9	474	0.1	Prohibited area, 123.7 acres, monitored by ES 14.5
	12/10/2001	<3	500					
	11/24/2003	3.6	500					
	12/21/2005	9.1	500					
	8/12/2009	180	118					
ES00262.50	12/4/2000	15	3000	8	13.9	1673	0.9	Approved area, monitored by ES 15
	12/10/2001	9.1	2000					
	11/24/2003	23	1000					
	12/21/2005	9.1	2000					
	4/28/2009	14	1500					
	8/12/2009	18	539					
ES00295.50	12/4/2000	3.6	300	10	11.8	868	0.3	Restricted area, 77 acres, monitored by ES 16.5, 16.8
	12/4/2001	43	500					
	12/10/2001	9.1	400					
	1/8/2002	17.7	1000					
	11/24/2003	15	1000					

SLS_ID	Sample Date	Sample Scores FC/100 ml	Flow gpm	Receiving Water Depth ft	GM FC	Av Flow gpm	Dilution Zone acres	Remarks
	12/21/2005	9.1	2000					
	4/28/2009	4	1000					
	8/12/2009	27	747					
ES00370.50	12/4/2000	43	75	6	7.2	75 (tidal)	<0.1	Approved area, monitored by ES 17
	12/10/2001	<3	-					
	11/24/2003	43	-					
	12/21/2005	3.6	-					
	4/28/2009	3.6	-					
	8/12/2009	2	-					
ES00400.50	12/4/2000	<3	75	6	3.2	163	<0.1	Approved area, no station
	12/21/2005	3.6	250					
ES00429.50	12/4/2000	15	1000	20	8.7	720	0.1	Approved area, no station
	12/10/2001	9.1	750					
	11/24/2003	3.6	750					
	12/21/2005	9.1	900					
	4/28/2009	8	800					
	8/12/2009	12	118					
ES00474.50	12/4/2000	<3	100	8	4.4	670	0.1	Restricted area, 56.8 acres, monitored by ES 21.5, 22
	12/10/2001	3.6	100					
	11/24/2003	8.2	1500					
	12/21/2005	9.1	1000					
	4/28/2009	2	1200					
ES00510.50	12/21/2005	118	10	4	118	10	0.4	Restricted area, 56.8 acres, monitored by ES 21.5, 22
ES00555.00	4/28/2009	<2	40	5	17.4	45	<0.1	Approved area, , monitored by ES 26
	8/12/2009	160	45					

Eastern Marsh Stream (ES 24.50) drains a wetland with only two houses in the immediate area. Sample station ES 5, at the mouth of the stream, is presently classified restricted. The restricted area is 21.7 acres and large enough to dilute current contamination levels from the steam. Little River Stream (ES 105.10) stream samples have a geomean < 14 FC/100ml and a dilution area of less than 0.1 acre; therefore is not considered a pollution risk. Schooner Brook (ES 218.50) has a stream sample of geomean < 14 flows into a prohibited area. The prohibited classification is based on sample station ES 12 not meeting approved criteria. Holmes Cove Brook (ES 226.50) does not exceed 14 FC/100ml and is considered as no pollution risk. Bog Brook (ES 240.50) is a large conservation wetland with no development in the area. It drains into Area No. 58 (part B), a 123.7 acre prohibited area around four licensed overboard discharges. The prohibited area is adequate to dilute both the stream discharge and the effluent from the licensed discharges. Sample station ES 14.5 monitors the area and the station meets the approved standard. Micah Brook (ES 262.50), Wiggins Brook (ES 295.50), Baileys Mistake (ES 370.50 and ES 400.50) and Hamilton Brook (429.50) all show consistently low scores with geomeans < 14 FC/100ml. Carrying Place Brook (ES 474.50) and an un-named ditch (ES 510.50) is located upstream of sample station ES 22, which is classified restricted (Area 58 (part F) due to water

quality exceeding approved standards. The dilution zone and required closure area for this ditch drainage is based on the geomean (118 FC/100ml) and average daily flow (14,400 gpd) into 4 feet of water is 0.4 acres. The current restricted area for the ditch drainage in Area No. 58 (part F) is 56.8 acres and large enough to dilute the pollution to 14 FC/100ml. In addition, a new sample station ES 21.5, at the approved margin of Area No. 58 (part F), meets approved standards after 18 samplings (P90 of 12.5), confirming the margin is adequate. Pikes Puddle (ES 555.00) is a pond with a small outlet flowing over a weir into the cove east of Woodward Point. The geomean of stream samples exceeds 14 FC/100ml. Ducks and geese are frequently observed in this pond. No other pollution sources have been identified in the area. A dilution area based on the geomean and flow is <0.1 acre. Sample station ES 26 is directly in front of the outlet and meets approved standards suggesting little impact from the freshwater draining from the pond. The majority of the growing area stream samples have been collected in the fall and spring and not enough summer data is available to make any conclusions as to any impacts on water quality from streams at other times of year. Additional sampling of the streams during all seasons is necessary to generate additional data.

Figure 9. Growing Area ES Stream Sample Locations



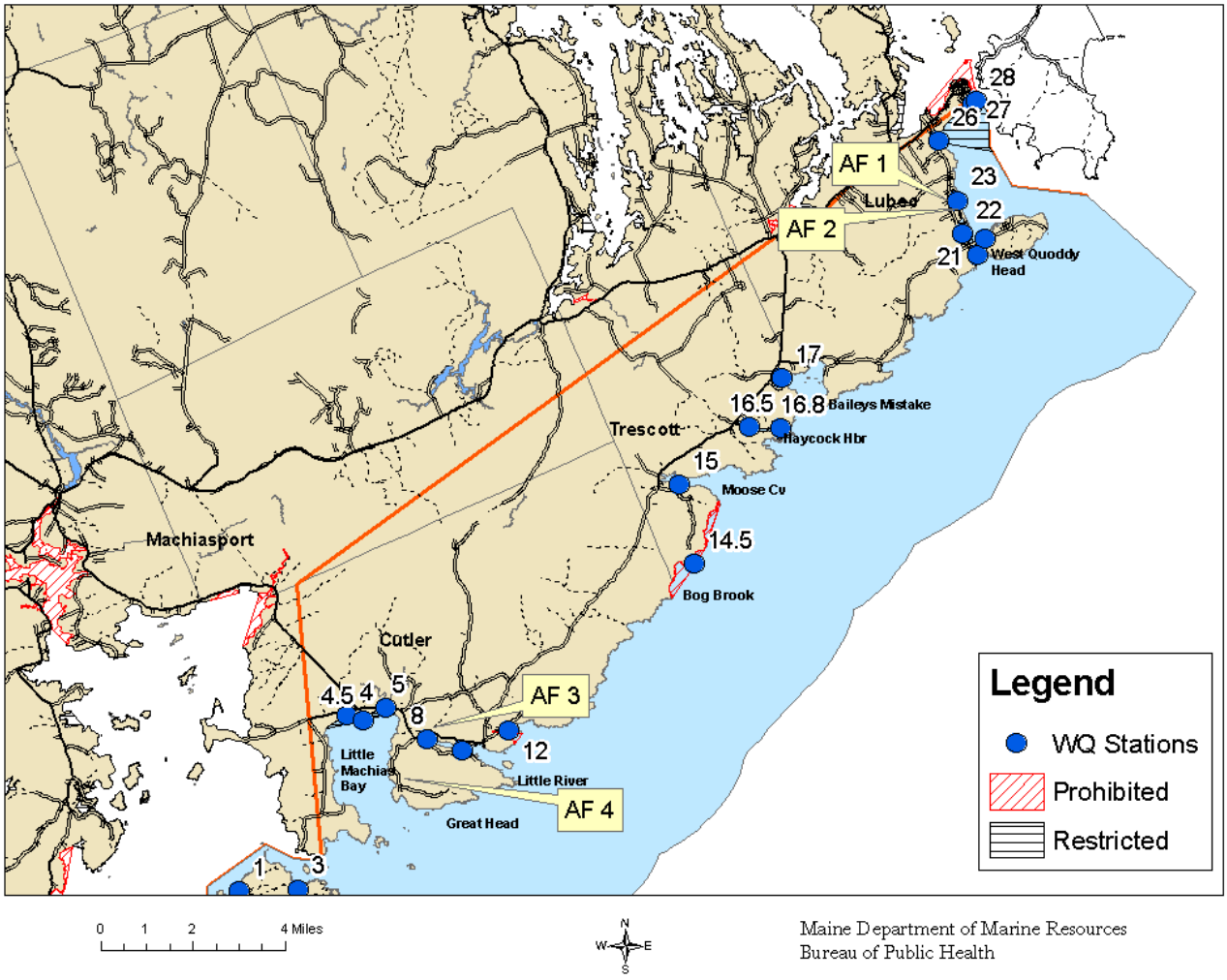
Agricultural Sources

There are no identified slaughter houses, large scale manure spreading operations or garden centers in the area. Four properties have less than 10 animals (cows, horses, sheep, domestic pets) in small enclosures (Table 5 and Figure 10). All but one of the properties have been determined not to impact adjacent shellfish harvesting areas based on pasture locations, distance of the animals from the shore, absence of animals from nearby streams or any impact on nearby water sample stations. The exception is a pasture area in South Lubec that drains into the West Quoddy Bar-Carrying Place restricted area upstream from station ES 22, a station meeting restricted standards. It is likely that the pasture is impacting the water quality of this area. This property will be referred to the local town plumbing inspector.

Table 5. Agricultural Farms in Growing Area ES

Location	Description	Sample Station Nearby	Disposition	Area Class
AF 1 ES00502.00	Animals x5 (horses, cows) in pasture, run off into ditch (ES00510.50)	ES 22	Follow up with LPI-DHHS	Restricted
AF 2 ES00510.50	Ditch draining pasture	ES 22	Likely impacted from AF 1	Restricted
AF 3 ES00113.00	10 beef cattle, manure pile	ES 8	No identified impact on ES 8 presently	Approved
AF 4 ES00081.00	Farm had sheep, but presently no animals	None in area	No identified impact on Little Machias Bay presently	Approved

Figure 10. Farms Located in Growing Area ES



Recreation, Conservation and Wildlife Areas

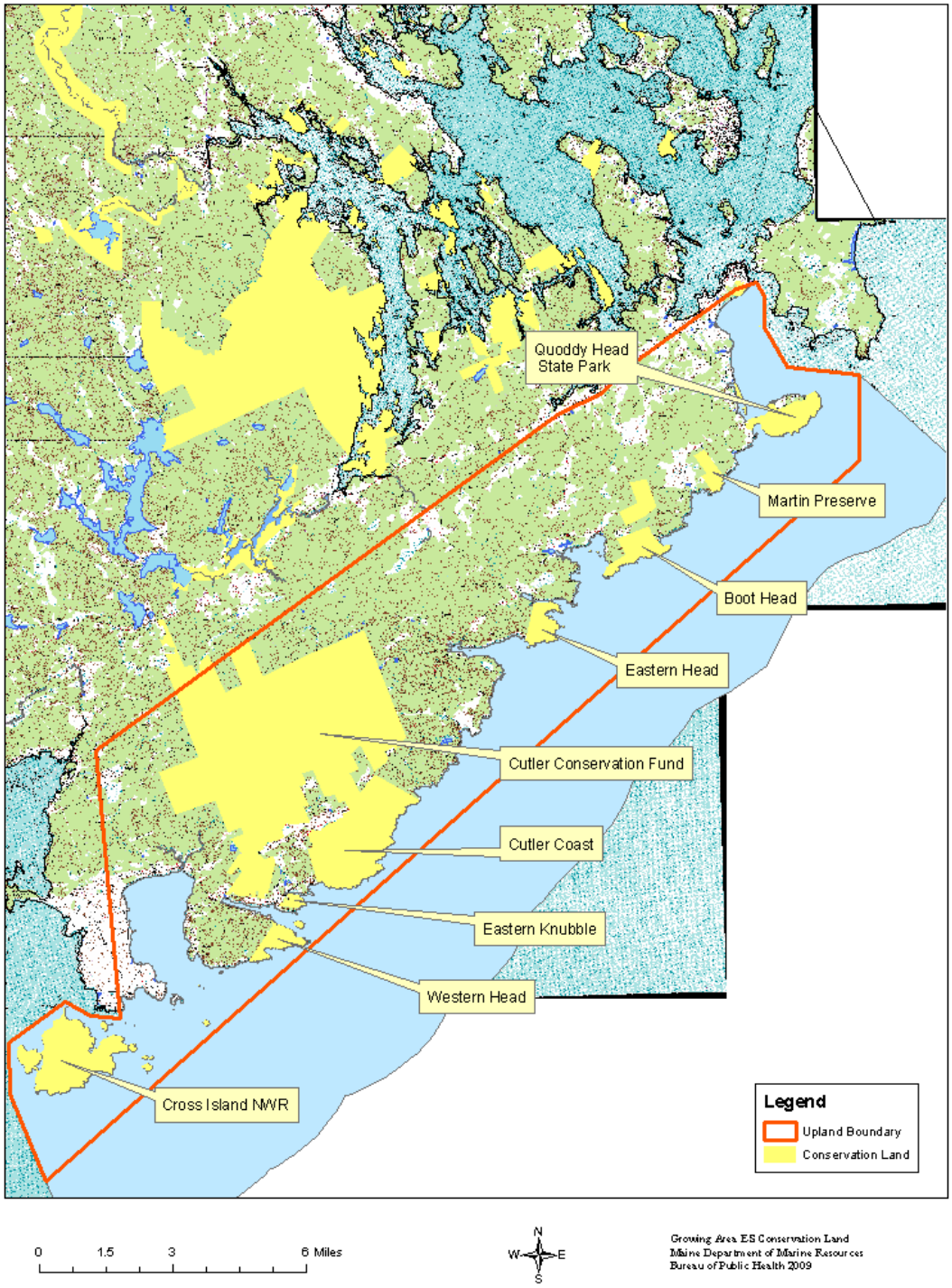
Conservation, recreational and wildlife areas may become a potential pollution source to coastal waters due to inadequately managed sanitation facilities (public bathrooms) and improper disposal of dog waste. Additionally, due to the development of trails for human recreation activities, the distribution of wildlife throughout the watershed may be altered, forcing larger populations of animals to congregate in smaller areas, and thus potentially increasing the wildlife fecal waste loading to particular areas of the shellfish growing area.

There are nine (9) large conservation lands in the area; Cross Island, along the “Bold Shore” of Cutler-Trescott and at West Quoddy Head State Park (Figure 11). These areas operate year-round and have hiking trails and shore-side remote camping sites. There are out houses on Cross Island and chemical toilets at West Quoddy Head. The “Bold Shore” sites have crude box seats over pits back from the shore in the woods. Dogs are allowed in these areas and posted recommendations are that they be on a leash and their feces collected and carried out. In 2009, a Maine Coast Heritage Trust handicap accessible conservation area was established in the Norse Cove, Trescott area. There are no commercial

campgrounds in Area ES. 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 65F.

The salt marshes and mudflats of the growing area do provide valuable habitat to a variety of small and large wildlife common to Maine. Observed bird species include a variety of gulls, sea and inland ducks, cormorants, geese, great blue herons, egrets, swans, and others. Maine Inland Fish and Wildlife surveys indicate that migratory waterfowl numbers begin to increase in the early summer months, and typically peak in late fall or early winter. Staging shorebirds need feeding areas with high concentrations of inter-tidal invertebrates. Although large numbers of birds can, in theory, pose a threat the growing area water quality, such occurrences are very difficult to document. Upland game, especially beaver, can contribute to fecal contamination that reaches the shore via streams and runoff. No significant water quality impacts have been documented from wildlife to date.

Figure 11. Conservation Land in Growing Area ES



Industrial Areas

There are no light (boat building, seafood plants) or heavy industrial facilities (chemical plants, ship building, oil refineries or manufacturing plants) in the growing area.

Dredging

There has been no dredging activity in Growing Area ES since the last sanitary survey in 1997. In 2007, appropriated federal funding was approved to design a new project to mitigate flooding damages to the South Lubec Road in Lubec, Maine. No activity has taken place to date.

Fishing Wharves or Aquaculture Sites

There are no large fish-landing wharves in the growing area. Most of the wharves in the review area are small privately owned piers for the loading or unloading of equipment, bait or catch. Little River, Cutler is the area most frequently used by commercial fishermen. There are aquaculture sites in Little River, Cutler and two areas north of Cross Island. The sites in Little River and one of the two Cross Island sites is for finfish only (Atlantic salmon). The second Cross Island site is primarily for finfish, but has a license for sea scallops, blue mussels and American oysters. All of these sites are in waters classified approved.

Marinas and Mooring Fields

Under the NSSP, any shellfish growing area within the confines of a marina proper or mooring field is presumed to be contaminated for some period of time. Therefore, no growing area within the marina proper can be classified approved. The classifications available for marina areas are conditionally approved, conditionally restricted and prohibited. The microbiological and chemical contamination associated with marinas and marina facilities may result in the contamination of shellfish and sediments in the adjacent areas. The NSSP has developed a set of evaluation criteria to be used in determining if the shellfish growing areas adjacent to marinas and mooring fields are affected by contamination associated with sewage.

The NSSP defines ‘marinas’ as an area that has 10 or more boats with heads. Each mooring field and marina in the growing area must be evaluated. Marina performance standards must be assessed annually utilizing the DMR developed evaluation form and a review of existing performance standards for those marinas that are in conditionally approved and conditionally restricted areas. The sanitary survey and triennial reviews require a marina inspection. A marina or mooring field that is in a conditional area must be inspected (and documented) prior to the area closing and opening to assure that the conditions of the management plan are met. Marina closure zone calculations are completed using the information from the inspection to input into a DMR model which was developed using the NSSP volumetric calculations.

The marina community in Maine only operates for a portion of the year due to adverse winter weather conditions. The management of marinas in Maine allows for shellfish growing areas to be available to harvesters for at least a portion of the year, to direct market harvest, by utilizing conditional area management plans.

The largest mooring field occupies the Little River, Cutler. This mooring field contains work boats only (lobster boats, trawling vessels), and is located in an area classified as approved. Because these types of work boats are day use, are not lived on and are unlikely to have marine sanitation devices (“heads”) they are not considered a health risk of discharged septic waste nor is a marina closure area necessary. Wharves provide fuel, bait and fish dealer facilities. Sample stations within this mooring area meet approved criteria. Individual moorings are scattered randomly within the growing area with Haycock Harbor and Baileys Mistake having less than four moorings respectively. There are no boat pump-outs, boat repair or boat storage facilities in Area ES. There is a small boat launching ramp in the Little River.

This ramp is primarily used as a launching site for shell fishermen, duck hunters, skiffs for larger boats and recreation fishermen.

Land Based Chemicals

Inland blueberry fields close to the marine environment use several chemicals to control the fruit fly larva and for the control of weeds and grasses. *Guthion,* a fly control chemical, is not very persistent in the environment. It is degraded to other compounds by microorganisms found in soil and water, sunlight and by reacting with water. It does not evaporate very quickly from soil and water. It attaches strongly to soil surfaces and does not easily move into groundwater below the soil surface. *Velpar* (Hexazinone) is a chemical used for weed control. This herbicide has a mechanism of action specific to plants, and therefore, has low acute toxicity in mammals. Acute over exposure can be irritating to the eyes, skin and mucous membranes. Hexazinone has a low acute toxicity and is a class D compound - not classifiable as a human carcinogen. Hexazinone has been detected at low levels, in the parts per billion (ppb) ranges in ground-water in three sites that is under or near to blueberry fields that have been treated with *Velpar.* All detections were well below the maximum exposure guides of 210 ppb set by the Maine Department of Health and Human Services (EPA's Health Advisory for drinking water is 400 parts per billion (ppb). The EPA "believes that water containing Hexazinone at or below the *Health Advisory Level* of 400 ppb is acceptable for drinking over the course of one's life, and does not pose any health risk." Published data and use regulations support minimize health risk outside of the immediate "footprint" of the field from the use of these pest sprays and for consumers of shellfish harvested in the watersheds near the chemical application sites. *Round-Up* is used for weeds resistant to *Velpar*. It is applied by hand in small doses and is used very little at this time. (Information from the Pesticides Board of Maine web site, 2009, http://www.maine.gov/dhhs/eohp/occhealth/documents/greenbook.PDF) The Lubec capped landfill is off the Boot Cove Road, South Lubec, and is 2200 feet from the water. It was capped in 1996 using the recommended remediation techniques based on the class of waste in the landfill. The landfill was last inspected in 2006 with no reported runoff, leaching or other problems identified. (MeDEP, Birk, June 2010). Both these concerns have not been identified as a risk to the consumption of shellfish harvested from nearby growing areas.

Evaluation of Pollution Sources

The structures with unidentified septic systems (DW 1, 3, 4 and 5) were not determined to be actual pollution issues impacting the shore, but only structures without any indentified septic systems. Many of the structures are seasonal and occupied in the summer only. An attempt will be made to determine the septic status of the buildings in the summer months. DW 2 (Haycock Harbor) has been reviewed by the Trescott LPI and reported as having "no problem identified". Another request will be made to the Trescott LPI to make a return visit. The failing water in Haycock Harbor at ES 16.5 supports a bacterial source impacting the cove from some source. The area will be revisited to attempt to confirm the status of the reported septic over-flow or determine if some other pollution source is present. Station ES 16.8, the new boundary station between the restricted and approved area Area No. 55-A (part C), meets approved standards after 24 samples and defends the present area closure lines. The animal pasture and ditch in South Lubec (AF 1 and 2) have very small flows and a small calculated dilution zone. Restricted Area No. 58 (part C) is also larger then the bacterial calculated dilution zone and ES 21.5, a new area boundary station, meets approved standards with a sample count of eighteen (18) samples. Efforts to correct the pollution drainage issue will be made with the local LPI or county agricultural department. "Pikes Puddle" (ES 555.00) has a geomen of its outlet stream samples that is greater then 14 FC/100ml. but the sample station ES 26 within 50 feet of the outlet meets approved standards. Unidentified pollution sources are impacting water quality sample stations at or near the mouths of Eastern Marsh Stream (ES 4, 5) and Schooner Brook (ES 12) and it has not been determined that the streams are the pollution sources. The remaining stream samples have geometric means less than 14 FC/100ml. based on available stream

sample results. The majority of the growing area stream samples have been collected in the fall and spring and not enough summer data is available to make any conclusions as to any impacts on water quality from streams at other times of year. Additional sampling of the streams is planned to generate data from all seasons. The licensed overboard discharge (OBD) dilution areas in the Bog Brook area are based on flow and bacterial concentration are adequate in size to dilute the effluent to approved standards at the margin of the prohibited area. No pollution risks have been identified from fishing or aquaculture activity or land based chemical application in the area.

Hydrographic and Meteorological Characteristics

Tides and Currents

Coastal Maine experiences a mixed, semi-diurnal tide, with diurnal inequalities that are more pronounced on spring tides. National Oceanic and Atmospheric Administration data for a station at Eastport, Maine indicate a mean tidal range of 18.35 ft, a spring tidal range of 21.18 ft, and a mean tide level of 9.60 ft above mean low water.

Currents in the area are predominantly driven by the tides. All along the coast of eastern Maine, the tide generally floods to the north and east and ebbs to the south and west. Along the coast and in the wider bays, the current seldom exceeds 2 knots. Weather conditions affect tidal ranges and current speeds, sometimes very strongly. Strong winds may reverse the direction of currents.

Table 6 lists the tide stages in minutes from low tide. During sample data entry, the stage of the tide is automatically computed based on the time of the sampling and reference to a local tide station. This results in the most accurate assigned tide stage for any individual water sample station. This tide stage information is recorded in the central MARVIN database. To examine the effects that tidal stage might have on fecal coliform concentrations, data collected under the Systematic Random sampling strategy (all months, all samples) were queried for all samples for active sample stations for the years 2000-2009.

Table 6. Tide Stages in Minutes from Low Tide

Tide stage	Minutes from Low Tide
L	(+-) 30 minutes
LF	30-90
F	91-270
HF	271-329
H	(+-) 30 minutes
HE	(-270) - (-330)
Ebb	(-90) - (-270)
LE	(-30) - (-90)

Table 7 lists area ES sample stations with P90 scores for flooding and ebbing tides. The ebbing query includes high ebb, ebb, low ebb and low tide samples. The flooding query includes low flood, flood, high flood and high tides. All of the sample stations in Area ES meet their current classification standards for flooding and ebbing tides; however sample stations ES 5, 16.5 and 28 have marked differences between flooding and ebbing (highlighted yellow).

Sample station ES 4 and 5 are located in the same bay and near Eastern Marsh Stream. Both stations had high P90 scores on flooding tides on July 28, 2009 (42, 40) and August 19, 2009 (740, 98) with a corresponding elevated score from Eastern Marsh Stream of 45 FC/100ml and salinity of 8 ppt. Rainfall totaled less than 0.2" within 72 hours of sample collection. Five of the six previous samples (2000-2009) from Eastern Marsh Stream have had low salinities (0-26) and fecal coliforms scores < 9.1 FC/100ml. The difference in P90 scores between high and low tides at station ES 16.5 suggests that the problem may be coming in with the flooding tide or that the flooding tide is forcing contaminated water from Wiggins Brook back over the flats into the head of the cove. The most recent elevated fecal coliform score for ES 16.5 are in the months between April and September and no stream samples of Wiggins Brook are available during this time period.

Sample station ES 28 shows a reverse pattern. The station has high P90 scores on the ebbing tide and low scores on the flooding tide. The restricted station ES 28 is at the southwest end of the Lubec Narrows and is the margin station between the Lubec wastewater plant prohibited area and the restricted area south of Mowry Point. In the Narrows, tidal currents flood to the northeast and ebb to the southwest. The outfall for the Lubec Wastewater Treatment plant is north of ES 28 and the effluent may be being swept southward to ES 28 on ebbing tides. The Lubec Wastewater Treatment Plant (primary treatment) discontinues chlorination of their effluent on September 30th and the greatest number of scores over 31 FC/100ml at station ES 28 might be expected after the first of October on ebbing tides; however this only happened in July, August and October samplings in 2009 and on flooding and ebbing tides (Table 8, most recent 30 samples, 2005-2009). Sample station ET 1 (inactive station), situated between the wastewater outfall and ES 28, fluctuated between 87 and 131% of the approved standard in the years 2005-2008. Analysis of the ET 1 data for these years shows three individual scores greater then 31FC/100ml in the months of May, October and November and all on flooding tides. Any tidal impact on either of these stations from the wastewater treatment plant is presently inconclusive.

Table 7. Tide Stages versus P90 Scores (2000-2009)

	Flooding Tide							Ebbing Tide					
Station	Class	Cnt	GM	MAX	P90	Appd Std	Restr Std	Cnt	GM	MAX	P90	Appd Std	Restr Std
ES001.00	A	28	2.7	10	4.1	42	246	32	2.6	23	4.7	41	243
ES003.00	A	27	2.5	2.9	3.2	42	244	33	3	23	6.8	42	244
ES004.00	A	44	5	1200	35	42	247	16	5.8	240	35.3	41	238
ES005.00	R	44	8.8	1200	70.4	42	250	21	7.1	320	43.6	39	224
ES008.00	A	46	5.7	1100	37	42	245	16	4.8	240	25.2	40	229
ES009.00	A	20	3.8	93	15.8	38	214	12	3.8	28	16.2	32	171
ES012.00	P	18	8.8	75	40.5	37	213	12	6.7	100	47.6	33	180
ES014.50	P	17	2.8	16	6.2	37	209	13	2.1	2.9	2.6	34	187
ES015.00	A	41	4	240	14.5	43	254	19	2.7	9.1	4.7	39	224
ES016.50	R	30	5.8	1100	46.4	42	244	31	3.3	93	9.2	42	246
ES016.80	A	11	2	2.9	2.5	33	182	13	2.1	3.6	2.8	33	179
ES017.00	A	42	4.8	93	18	42	248	19	4.2	93	16.4	40	232
ES021.00	A	37	3.3	43	8.1	42	246	23	3.6	43	11.9	41	242
ES021.50	A	10	2.8	24	8.9	31	163	8	3.6	62	20.5	31	163
ES022.00	R	34	7.5	1100	58.2	43	255	26	11.5	380	88.2	40	231
ES023.00	A	37	3	93	7.8	41	242	24	3	12	5.4	42	244
ES026.00	A	32	5.4	240	31.4	42	247	28	4.6	93	16.6	41	241
ES027.00	R	32	6	1100	52.9	43	252	30	6.7	93	36.6	41	239

	Flooding Tide							Ebbing Tide					
Station	Class	Cnt	GM	MAX	P90	Appd Std	Restr Std	Cnt	GM	MAX	P90	Appd Std	Restr Std
ES028.00	R	32	4.8	440	26.6	43	256	38	8.8	270	65.9	41	243

Table 8. Station ES 28 Individual Scores

		Months										
Date	Tide	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
3/20/05	F			3.6								
4/19/05	LF				<3							
4/25/05	HE				15							
5/10/05	E					3.6						
6/7/05	E						7.3					
6/27/05	F						<3					
7/6/05	E							<3				
8/29/05	E								22			
9/7/05	HF									15		
10/25/05	F										3.6	
2/15/06	E		9.1									
3/20/06	E			3.6								
4/19/06	H				3.6							
5/31/06	HF					<3						
7/11/06	E							3.6				
9/12/06	HF									<2		
10/24/06	E										<2	
1/24/07	H	<2										
3/28/07	LE			<2								
6/13/07	HE						<2					
7/30/07	E							3.6				
9/25/07	HE									22		
11/19/07	F											2
2/4/08	E		<2									
4/2/08	E				<2							
5/27/08	L					<2						
7/15/08	HE							<2				
8/27/08	HE								<2			
10/21/08	F										2	
2/11/09	H		6									
3/31/09	F			<2								
5/26/09	HF					<2						
7/28/09	F							440				
8/19/09	HE								112			
10/13/09	LE										60	

Rainfall

The mean annual precipitation in growing area ES is approximately 48 inches (based on the mean of yearly rain fall totals at Machias, 1996-2009). The precipitation is not evenly distributed throughout the year. The wettest months of 2009 were June and October and the driest months were January, February, March, October and November. Much of the precipitation in the winter comes as snow and may affect runoff rates in spring upon melting. It is likely that after prolonged periods of dry weather, significant rainfall (>1" over 24 hours) will cause some pollution from non-point runoff. It is unclear how much of an effect major rainfall events have on water quality due to variability of ground water saturation, history of recent significant rainfall that may have washed non-point pollution sources away, hard ground or ledge or wildlife or agriculture activity. Rainfall is monitored locally at the Machias Wastewater Treatment Plant.

Significant variation in the amounts of total yearly amounts of rain have taken place since 1996 (Figure 12), with dryer years in 2001 and 2004 and wetter years most notable in 2005, 2008 and 2009. There was an increase in the overall monthly rainfall that approximated or exceeded ten inches in October of 2005, February and September of 2008 and June and October of 2009. (Figure 13). Much of this increased rain has taken place in the February-June and September-October periods. This increase in rainfall has occurred after several dry years that historically diminished runoff impact on the growing areas. An analysis of precipitation events recorded at the Machias Wastewater Treatment Plant over a 13-year period from 1997 to 2009 was used to construct a graph of the average number of storms of a given size, where size is defined as total precipitation of the storm, in a given day (Figure 14). The majority of storms were 0.5 inches or less of rain. Above this amount there is a rapid decline in the incidence number of storm rainfall totals. Large storms (i.e., those with totals over three inches) have occurred on average once per year.

Figure 12. Machias, Maine Rainfall History (1996-2009)

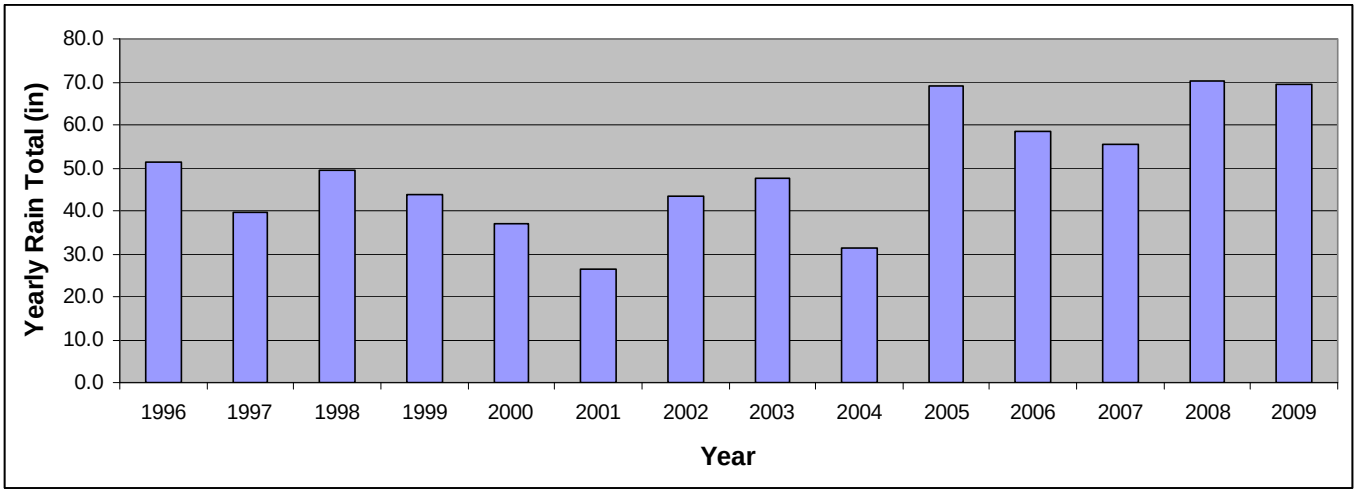


Figure 13. Mean Monthly Precipitation, Machias (2004-2009)

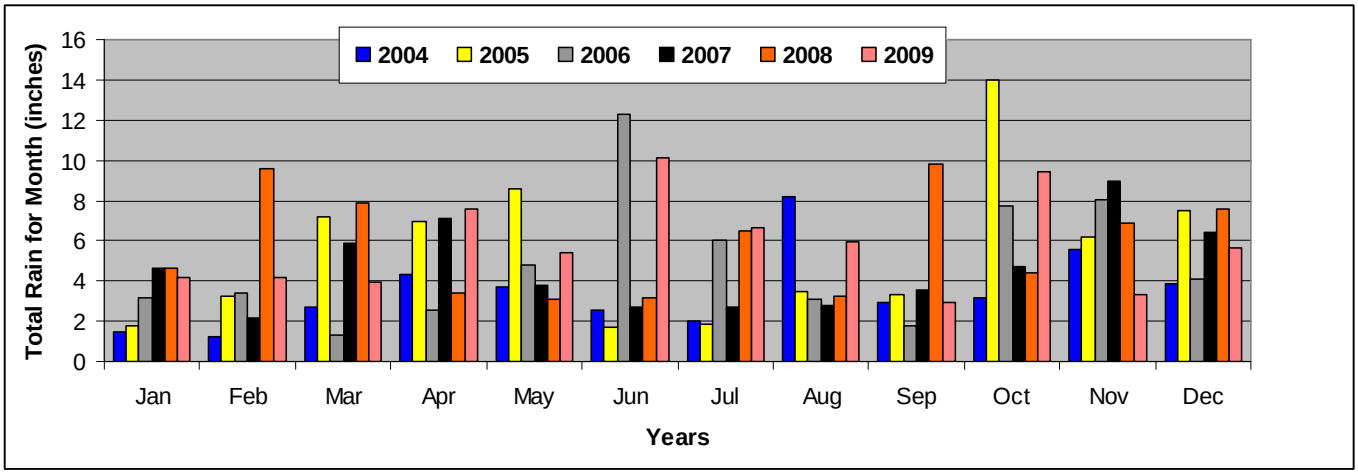
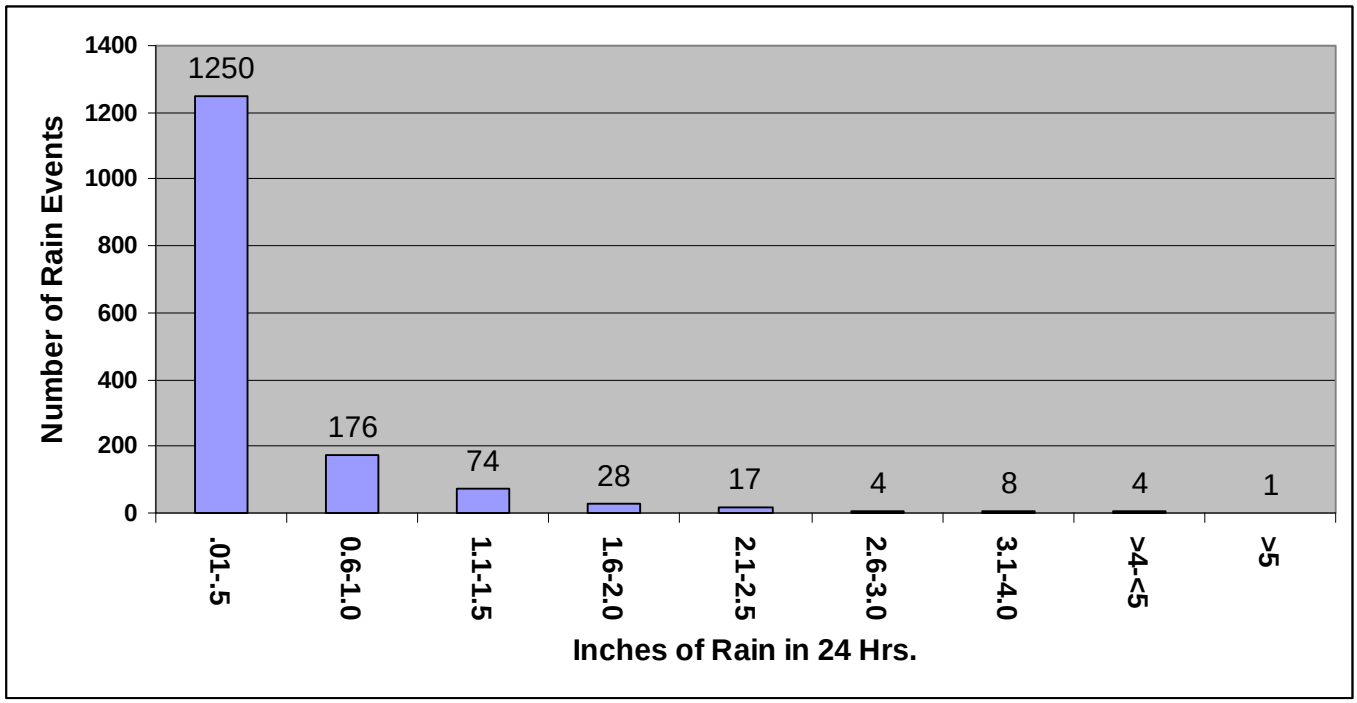


Figure 14. Distribution of Precipitation Events (data from Machias Wastewater Treatment Plant, 1997-2009)



Heavy runoff, resulting from rainfall, is known to contribute to poor water quality scores. Table 9 lists the active stations in the growing area with P90 scores in association with rainfall between 0.5-5.0 inches within 72 hours previous to the sampling date from years 2000-2009; flood data was excluded. None of the impacted stations had 30 pieces of data that fit the query criteria. Sample stations that exceed their classification standard are highlighted yellow. Stations ES 5, 16.5 and 22 are at mouths of freshwater streams and are most likely influenced by upland fresh water runoff during rain events. Impact from localized runoff is most likely at station ES 9. Animal pastures are nearby station ES 22. Table 10 shows no correlation with rainfall amounts, seasonality or years sampled for station ES 9 all samples in the years 2000-2009. Sample scores >31 FC/100 ml are randomly scattered throughout the dataset. With the exception of approved station ES 9, all stations met their classification standards using a dataset collected under these rainfall conditions.

Table 9. The Effects of Rainfall on Sample Stations in Growing Area ES

Station	Class	Cnt	MFCnt	GM	SDV	MAX	P90	Appd Std	Restr Std	Min Date
ES001.00	A	15	9	2.5	0.18	10	4.4	37	208	7/19/2000
ES003.00	A	15	9	2.4	0.18	9.1	4.1	37	208	7/19/2000
ES004.00	A	12	4	4.4	0.38	23	14	42	244	7/18/2000
ES005.00	R	13	5	7.7	0.76	460	75.9	41	237	7/18/2000
ES008.00	A	12	5	5.6	0.64	240	38.3	40	232	7/18/2000
ES009.00	A	7	5	6.9	0.72	93	62.3	35	194	4/25/2005
ES012.00	P	5	3	5.2	0.58	23	30.7	37	208	4/25/2005
ES014.50	P	7	5	2.1	0.08	2.9	2.8	35	194	10/25/2005
ES015.00	A	18	6	4.6	0.58	240	26.6	42	244	7/18/2000
ES016.50	R	16	5	10	0.82	1100	115.7	42	247	1/8/2002
ES016.80	A	7	6	2.2	0.11	3.6	3.1	33	177	2/15/2006
ES017.00	A	20	7	6.1	0.55	93	31.7	41	242	7/18/2000
ES021.00	A	20	7	3.9	0.39	43	12.7	41	242	7/18/2000
ES021.50	A	3	3	1.9	0	1.9	1.9	31	163	2/4/2008
ES022.00	R	17	5	18.2	0.81	1100	203.7	42	250	7/18/2000
ES023.00	A	21	8	3.6	0.42	93	13	41	237	7/18/2000
ES026.00	A	20	6	5.3	0.63	240	35.1	42	249	7/18/2000
ES027.00	R	17	5	4.7	0.6	240	28.3	42	250	7/18/2000
ES028.00	R	20	4	4.4	0.47	240	18.2	44	265	7/18/2000

Table 10. ES 9 Rainfall Data Analysis

Rain1-3	Rain1-4	Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3/21/05			<3									
0	0	1/24/07	<2											
0	0	5/31/06					<3							
0	0	7/24/07							<2					
0	0	9/7/05									<3			
0	0	7/15/08							64					
0	0	8/19/09								8				
0	0.18	9/12/06									5.5			
0	0.22	11/19/07											<2	
0	0.55	9/18/07									<2			
0	1.31	2/4/08		<2										
0.01	0.01	6/27/05						3.6						
0.01	0.01	5/26/09					<2							
0.01	0.2	5/22/07					<2							
0.03	0.03	7/6/05							3.6					
0.06	0.06	8/27/08								14				
0.07	0.07	10/24/06										<2		
0.1	0.1	3/28/07			<2									
0.16	0.16	10/21/08										<2		
0.2	0.2	7/28/09							<2					
0.21	0.28	4/19/06				<3								
0.25	0.25	2/11/09		<2										

Rain1-3	Rain1-4	Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.32	0.32	7/11/06							3.6					
0.34	0.34	2/15/06		<3										
0.51	0.51	4/2/08				28								
0.54	0.54	10/13/09										8		
0.57	0.65	7/18/07							<2					
0.57	0.67	5/27/08					<2							
0.76	1.92	2/20/08		<2										
1.59	1.6	3/31/09			<2									
1.69	1.7	4/25/05				93								
3.71	4.16	10/25/05										23		

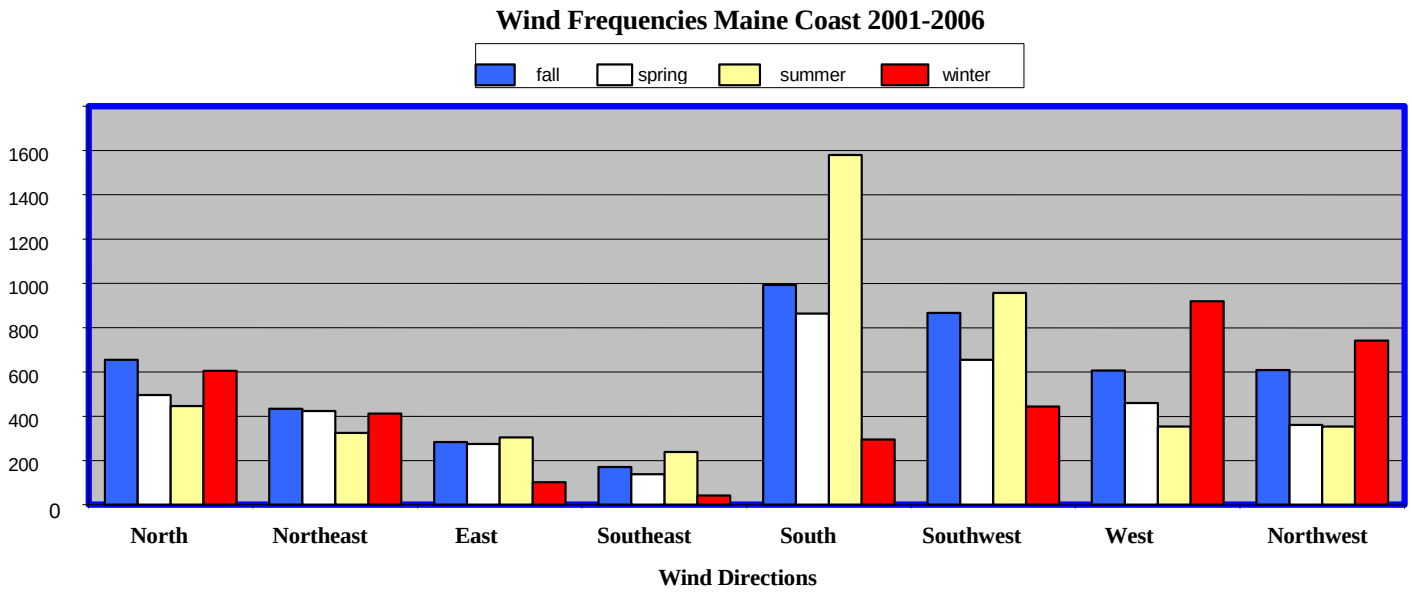
Winds

An analysis of GOMOOS data (2001-2006) show winter winds (Figure 15) along coastal Maine are typically from the west-northwest 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 15. Wind Direction Frequencies Maine Coast 2001-2006



Coastal winds are complex since they are influenced by the topography. Over land speeds are reduced. However, channels and headlands can redirect the wind and even increase the speed by funneling the wind. In general, winds have southerly components in summer and northerly ones in winter. In sheltered waters there are a large percentage of calms, particularly during the morning hours. When the existing circulation is weak and there is a difference between land and water temperatures, a land-sea breeze circulation may be set up. As the land heats faster than the water, a sea breeze is established during the day; this onshore flow may reach 15 knots or more. At night, the land cools more rapidly, often in a weak breeze off the land. In many locations, the sea breeze serves to reinforce the prevailing summer wind. Wind data specific to each sampling station has been collected since the spring of 2005. While the database now has three years of data, it is not yet adequate to determine whether wind has an impact on sample scores.

River Discharge

There are no rivers located in growing area ES.

Salinity

It is well recognized that freshwater influence from runoff can contribute to elevated bacterial loading near shore. Figure 16 graphs the standard deviations of the salinities of each of the sample stations in area ES. Those sample stations with standard deviations greater that 5.0 show high variability of the salinities of individual samplings. Stations ES 5, 8, 12, 15, 16.5, 17, 21.5 and 22 all have freshwater streams flowing into the areas adjacent to the sample site.

Figure 16. Sample Stations Standard Deviations of Salinities

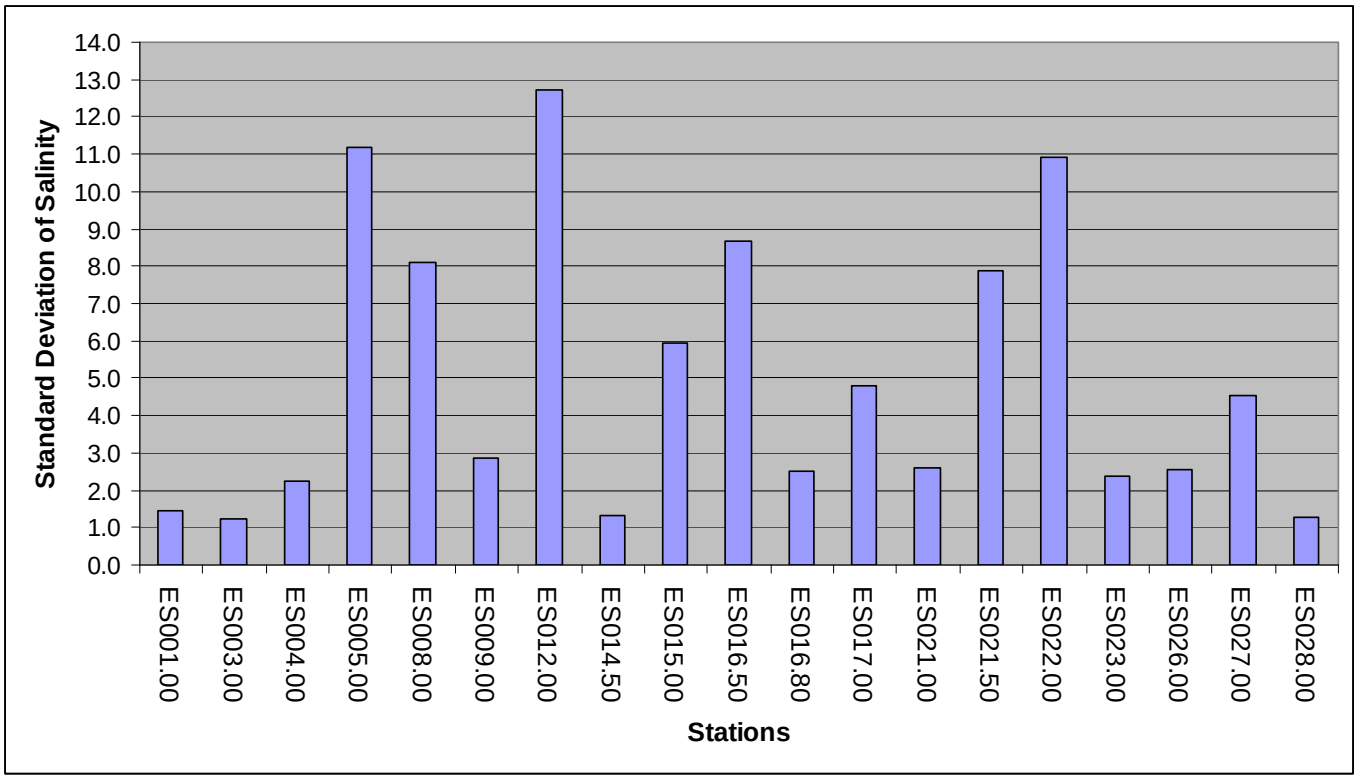


Table 11 shows the details of the fecal coliform sample scores with salinities for the sample stations with high variability in Figure 15. The scores that were > 31 FC/100ml are highlighted yellow. Stations 5, 12, 16.5 and 22, all prohibited or restricted in classification, show low and elevated scores at all salinities (0-32 ppt) suggesting a intermittent freshwater impact on the ocean water or an intermittent pollution source independent of freshwater impacting the area. To determine whether the streams are the primary pollution source, an intensive bacterial sampling of each stream would be necessary to get year round data. Stations ES 8, 15, 17 and 21.5, all classified as approved, have varied sample scores with the majority of sample salinities being 15 to 32 ppt. suggesting less of an impact from the freshwater streams on the ocean water at the sample site.

Table 11. Analysis of Stations with Salinity High Variability

		Salinity ppt											
Station	**Date**	**0-2**	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
ES005.00	3/28/00											<3	
	5/2/00											3.6	
	5/30/00											<3	
	7/18/00											11	
	9/19/00											<3	
	10/24/00												<3
	3/27/01											<3	
	6/6/01										<3		
	7/10/01				460								
	9/18/01											75	
	10/17/01						>1100						
	10/22/01					9.1							
	3/26/02								<3				
	4/30/02	3.6											
	5/28/02						3.6						
	7/15/02								75				
	9/17/02					93							
	10/8/02											15	
	3/25/03	3.6											
	4/30/03								<3				
	6/2/03											3.6	
	7/15/03											9.1	
	9/16/03										9.1		
	10/28/03										23		
	3/23/04			3.6									
	4/28/04	<3											
	6/2/04										<3		
	7/13/04									3.2			
	9/15/04											9.1	
	10/25/04											<3	
	3/20/05											<3	
	3/21/05		3.6										
	4/25/05					93							
	6/27/05										<3		
	7/6/05										<3		
	9/7/05										9.1		
	10/25/05									31.4			
	2/15/06							<3					
	3/20/06											<3	
	4/19/06								<3				
	5/31/06						15						
	7/11/06					93							
	9/12/06							44					
	10/24/06											<2	

		Salinity ppt											
Station	**Date**	**0-2**	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
	1/24/07			<2									
	3/28/07									<2			
	5/22/07	8											
	7/24/07	18											
	9/18/07	20											
	11/19/07											<2	
	2/4/08	2											
	2/20/08									<2			
	4/2/08	2											
	5/27/08	42											
	7/15/08							54					
	8/27/08										14		
	9/15/08								320				
	9/16/08											22	
	10/21/08										4		
	2/11/09											2	
	3/31/09	2											
	5/26/09								2				
	7/28/09			40									
	8/19/09											98	
	10/13/09											2	
		0-2	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
ES008.00	3/28/00									<3			
	5/2/00										<3		
	5/30/00											<3	
	7/18/00											9.1	
	9/19/00												<3
	10/24/00												<3
	3/27/01											<3	
	6/6/01											<3	
	7/10/01								43				
	9/18/01											93	
	10/17/01									460			
	10/22/01										15		
	3/26/02										<3		
	4/30/02								<3				
	5/28/02									43			
	7/15/02										3.6		
	9/17/02											9.1	
	10/8/02											43	
	3/25/03									<3			
	4/30/03								3.6				
	6/2/03							43					
	7/15/03											<3	
	9/16/03										3.6		

		Salinity ppt											
Station	**Date**	**0-2**	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
	10/28/03									23			
	3/23/04											<3	
	5/10/04											<3	
	6/2/04								3.6				
	7/13/04											23	
	9/15/04											9.1	
	10/25/04							3.6					
	3/21/05	3.6											
	4/25/05									3.6			
	6/27/05											3.6	
	7/6/05									1100			
	9/7/05											3.6	
	10/25/05	240											
	2/15/06									<3			
	4/19/06									<3			
	5/31/06								3.6				
	7/11/06											3.6	
	9/12/06	8											
	10/24/06										<2		
	1/24/07									<2			
	3/28/07											<2	
	5/22/07	2											
	7/18/07											<2	
	7/24/07											<2	
	8/29/07											4	
	9/18/07									6			
	11/19/07									2			
	2/4/08									2			
	4/2/08										2		
	5/27/08										<2		
	7/15/08											4	
	8/27/08								9				
	10/21/08										2		
	2/11/09										<2		
	3/31/09	2											
	5/26/09									<2			
	7/28/09										2		
	8/19/09											14	
	10/14/09											2	
		0-2	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
ES012.00	3/21/05		<3										
	4/25/05			23									
	6/27/05											<3	
	7/6/05										<3		
	9/7/05					23							
	10/25/05	23											

		Salinity ppt											
Station	**Date**	**0-2**	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
	2/15/06											<3	
	4/19/06										<3		
	5/31/06			75									
	8/15/06							43					
	9/12/06								12.7				
	10/24/06										<2		
	1/24/07	2											
	3/28/07											<2	
	5/22/07	8											
	7/24/07							42					
	9/25/07											29	
	11/19/07		2										
	2/4/08		2										
	4/2/08			<2									
	5/27/08		4										
	7/15/08											6	
	8/27/08										38		
	10/21/08											1.9	
	2/11/09									10			
	3/31/09	<2											
	5/26/09	16											
	7/28/09	34											
	8/19/09											10	
	10/13/09	100											
		0-2	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
ES015.00	3/28/00									<3			
	5/2/00											3.6	
	5/30/00											<3	
	7/18/00											<3	
	9/19/00												<3
	10/24/00												<3
	3/27/01											<3	
	5/15/01						43						
	6/6/01										<3		
	7/10/01											<3	
	9/18/01											3.6	
	10/22/01											<3	
	3/26/02											<3	
	4/30/02									<3			
	5/28/02											<3	
	7/15/02											<3	
	9/17/02										<3		
	10/8/02											23	
	3/25/03									<3			
	4/30/03								<3				
	6/2/03							43					

		Salinity ppt											
Station	**Date**	**0-2**	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
	7/15/03											3.6	
	9/16/03											<3	
	10/28/03									3.6			
	3/23/04											<3	
	5/10/04											<3	
	6/2/04											9.1	
	7/13/04											<3	
	9/15/04											<3	
	10/25/04									3.6			
	3/21/05				3.6								
	4/25/05										3.6		
	6/27/05										9.1		
	7/6/05										<3		
	9/7/05											<3	
	10/25/05						240						
	2/15/06											<3	
	4/19/06									<3			
	5/31/06											<3	
	7/11/06											<3	
	9/12/06											2	
	10/24/06										<2		
	1/24/07										<2		
	3/28/07										<2		
	5/22/07	<2											
	7/24/07										6		
	9/18/07											2	
	11/19/07										4		
	2/4/08										<2		
	4/2/08									<2			
	5/27/08											<2	
	7/15/08											18	
	8/27/08											2	
	10/21/08											<2	
	2/11/09											2	
	3/31/09											<2	
	5/26/09											<2	
	7/28/09									2			
	8/19/09											4	
	10/13/09											<2	
		0-2	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
ES016.50	10/22/01											3.2	
	11/19/01											<3	
	11/28/01										<3		
	12/4/01											<3	
	12/10/01											<3	
	1/8/02											<3	

		Salinity ppt											
Station	Date	0-2	3-5	6-8	9-11	12-14	15-17	18-20	21-23	24-26	27-29	30-32	33-35
	1/29/02						<3						
	2/21/02			9.1									
	2/25/02			<3									
	3/6/02		<3										
	3/26/02										<3		
	4/23/02						<3						
	4/30/02					9.1							
	5/22/02									<3			
	5/28/02											<3	
	7/15/02											3.6	
	9/17/02				93								
	10/8/02											<3	
	4/30/03										<3		
	6/2/03				1100								
	7/15/03											<3	
	9/9/03											<3	
	9/16/03											43	
	10/28/03											23	
	3/23/04										<3		
	4/28/04								<3				
	6/2/04										3.6		
	7/13/04											<3	
	9/15/04											3.6	
	10/25/04											<3	
	3/20/05											<3	
	4/25/05		150										
	6/27/05										3.6		
	7/6/05										3.6		
	8/29/05											<3	
	9/7/05											240	
	10/25/05		23										
	3/20/06											<3	
	4/19/06							<3					
	5/31/06											<3	
	7/11/06											3.6	
	9/12/06											4	
	10/24/06										<2		
	1/24/07									<2			
	3/28/07										<2		
	5/22/07	28											
	7/24/07											8	
	9/18/07											<2	
	11/19/07									<2			
	3/18/08											<2	
	4/2/08									<2			
	5/27/08											<2	

		Salinity ppt											
Station	**Date**	**0-2**	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
	7/15/08											4	
	8/27/08											<2	
	10/21/08											<2	
	2/11/09										<2		
	3/31/09									<2			
	5/26/09											<2	
	7/28/09											<2	
	8/19/09											<2	
	10/13/09										<2		
		0-2	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
ES017.00	3/28/00								<3				
	5/2/00											<3	
	5/30/00										<3		
	7/18/00											3	
	9/19/00											<3	
	10/24/00												<3
	3/27/01											<3	
	5/15/01								23				
	6/6/01											<3	
	7/10/01											3.6	
	9/18/01											9.1	
	10/22/01											<3	
	3/26/02										<3		
	4/30/02											<3	
	5/28/02											<3	
	7/15/02											<3	
	9/17/02									93			
	10/8/02											<3	
	3/25/03								<3				
	4/30/03										<3		
	6/2/03											3.6	
	7/15/03											<3	
	9/16/03											23	
	10/28/03											21	
	3/23/04											<3	
	4/28/04										23		
	6/2/04										3.6		
	7/13/04											<3	
	9/15/04											9.1	
	10/25/04									23			
	3/21/05								<3				
	4/25/05									43			
	6/27/05										93		
	7/6/05											9.1	
	9/7/05											3	
	10/25/05						43						

		Salinity ppt											
Station	**Date**	**0-2**	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
	2/15/06											<3	
	4/19/06										3.6		
	5/31/06											<3	
	7/11/06											7.3	
	9/12/06											10	
	10/24/06											10	
	1/24/07											<2	
	4/11/07											<2	
	6/13/07											2	
	7/24/07											2	
	9/18/07											2	
	11/19/07									6			
	2/4/08											<2	
	2/20/08										<2		
	4/2/08											<2	
	5/27/08											2	
	7/15/08											8	
	8/27/08											<2	
	10/21/08											6	
	2/11/09											2	
	3/31/09	2											
	5/26/09											<2	
	7/28/09									2			
	8/19/09											25	
	10/14/09											<2	
		0-2	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
ES021.50	7/18/07											<2	
	7/30/07											<2	
	8/29/07											<2	
	9/25/07											62	
	10/24/07											24	
	11/26/07											<2	
	2/4/08								<2				
	4/2/08										<2		
	5/27/08											<2	
	7/15/08											<2	
	8/27/08											12	
	11/3/08					8							
	2/11/09											<2	
	3/31/09	<2											
	5/26/09											2	
	7/28/09											<2	
	8/19/09											<2	
	10/14/09											<2	
		0-2	**3-5**	**6-8**	**9-11**	**12-14**	**15-17**	**18-20**	**21-23**	**24-26**	**27-29**	**30-32**	**33-35**
ES022.00	3/28/00			9.1									

		Salinity ppt											
Station	Date	0-2	3-5	6-8	9-11	12-14	15-17	18-20	21-23	24-26	27-29	30-32	33-35
	5/2/00										3.6		
	5/30/00										3.6		
	7/18/00											3.6	
	9/19/00												<3
	10/24/00												<3
	3/27/01											<3	
	5/15/01			240									
	6/6/01											<3	
	7/10/01											<3	
	9/18/01											9.1	
	10/22/01											3	
	3/26/02						23						
	4/30/02				23								
	5/28/02											9.1	
	7/15/02											3	
	9/17/02	43											
	10/8/02											3.2	
	3/25/03	<3											
	4/30/03					9.1							
	6/2/03									1100			
	7/15/03											<3	
	9/16/03											<3	
	10/28/03									93			
	3/23/04											<3	
	5/10/04											3.6	
	6/2/04										<3		
	7/13/04											3.6	
	9/15/04											<3	
	10/25/04										3.6		
	3/21/05			3.6									
	4/25/05						93						
	6/27/05										<3		
	7/6/05										<3		
	9/7/05											240	
	10/25/05		150										
	2/15/06											<3	
	4/19/06					21							
	5/31/06								3.6				
	7/11/06										240		
	9/12/06											4	
	10/24/06											4	
	1/24/07											<2	
	4/11/07		<2										
	5/22/07	12											
	7/30/07											8	
	9/25/07											56	

		Salinity ppt											
Station	Date	0-2	3-5	6-8	9-11	12-14	15-17	18-20	21-23	24-26	27-29	30-32	33-35
	11/26/07									18			
	2/4/08						<2						
	4/2/08										6		
	5/27/08											<2	
	7/15/08								46				
	8/27/08											36	
	11/3/08					24							
	2/11/09								<2				
	3/31/09	2											
	5/26/09							6					
	7/28/09	28											
	8/19/09									380			
	10/14/09			18									

Seasonal Effects on Fecal Coliform Concentrations

To examine the effects that season may have on fecal coliform levels in growing area ES, the historical fecal coliform data of the ambient stations were grouped according to season:

Winter was defined as December, January, and February
Spring was defined as March, April, and May
Summer was defined as June, July, and August
Fall was defined as September, October, and November

To focus the analysis on relatively current data, this geometric mean analysis included fecal coliform results of the most recent 30 samples (Table 12). The collection dates were queried to conform to the seasonal groupings discussed above and any sample date flood samplings were eliminated as variables from the data set. There appears to be significant differences between the Summer-Fall vs. Winter-Spring seasons. The elevated geomean values are shaded yellow. The summer and fall season increases are likely a result of increased seasonal activity (fishing boats, summer houses, and increased use of seasonal septic facilities). For those areas affected, the period of increased pollution and the greatest risk of shellfish pollution contamination is during early summer (May) in to mid fall (October). This period coincides with the most active harvesting season and the most intensive testing by the DMR.

Of the seasonally impacted stations, approved stations ES 4 and 21.5, restricted stations ES 5, 22 and 27 and prohibited station ES 12 are affected. No seasonal source has been identified for the pollution in these areas; however the Lubec Wastewater Treatment Plant (primary treatment) discontinues chlorination of their effluent on September 30th and the greatest number of scores over 31 FC/100ml at station ES 27 is in September and October.

Table 12. Geometric Means for Seasonally Impacted Sample Stations

Station	Class	Winter	Spring	Summer	Fall
ES001.00	A		2.3	3.0	2.3
ES003.00	A		2.3	2.9	2.3
ES004.00	A	2.5	3.3	14.0	3.4

Station	Class	Winter	Spring	Summer	Fall
ES005.00	R	2.2	5.0	12.4	7.6
ES008.00	A	2.1	2.5	7.6	5.9
ES009.00	A	2.1	4.3	5.1	3.7
ES012.00	P	3.3	6.4	13.6	10.4
ES014.50	new	2.5	2.2	2.4	2.2
ES015.00	A	2.2	2.6	6.1	4.0
ES016.50	R	1.9	4.1	5.8	6.7
ES016.80	A	2.3	2.4	2.1	1.9
ES017.00	A	2.2	4.1	4.9	9.9
ES021.00	A	2.2	3.3	3.6	4.4
ES021.50	new	1.9	1.9	2.7	12.3
ES022.00	R	2.2	5.9	15.7	17.2
ES023.00	A	2.2	3.8	2.8	3.9
ES026.00	A	2.8	4.8	6.0	5.3
ES027.00	R	2.2	3.4	5.1	20.2
ES028.00	R	3.2	3.9	7.1	9.3

Table 13 below is individual seasonal analysis of the high-lighted stations in Table 12. Individual samplings that exceed 31 FC/100ml. are high-lighted yellow. For these stations the greatest bacterial impacts are from May through to October. Bacterial levels from early winter to mid spring are low and likely a result of little runoff (frozen precipitation), and decreased shoreline activity.

Table 13. Seasonal Analysis by Month

		Month										
Station	Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
ES004.00	3/21/05			23								
	4/25/05				7.3							
	6/27/05						<3					
	7/6/05							<3				
	9/7/05									9.1		
	10/25/05										23	
	2/15/06		<3									
	4/19/06				<3							
	5/31/06					<3						
	7/11/06							>1100				
	9/12/06									<2		
	10/24/06										<2	
	1/24/07	4										
	3/28/07			<2								
	6/13/07						2					
	7/24/07							<2				
	9/18/07									<2		
	11/19/07											<2
	2/4/08		<2									
	4/2/08				20							
	5/27/08					2						

		Month										
Station	**Date**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**
	7/15/08							6				
	8/27/08								<2			
	10/21/08										<2	
	2/11/09		<2									
	3/31/09			<2								
	5/26/09					<2						
	7/28/09							42				
	8/19/09								740			
	10/13/09										<2	
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**
ES005.00	9/7/05									9.1		
	10/25/05										31.4	
	2/15/06		<3									
	3/20/06			<3								
	4/19/06				2.9							
	5/31/06					15						
	7/11/06							93				
	9/12/06									44		
	10/24/06										<2	
	1/24/07	<2										
	3/28/07			<2								
	5/22/07					8						
	7/24/07							18				
	9/18/07									20		
	11/19/07											<2
	2/4/08		2									
	2/20/08		<2									
	4/2/08				2							
	5/27/08					42						
	7/15/08							54				
	8/27/08								14			
	9/15/08									320		
	9/16/08									22		
	10/21/08										4	
	2/11/09		2									
	3/31/09			2								
	5/26/09					2						
	7/28/09							40				
	8/19/09								98			
	10/13/09										2	
		Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**
ES012.00	3/21/05			<3								
	4/25/05				23							
	6/27/05						<3					

		Month										
Station	Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
	7/6/05							<3				
	9/7/05									23		
	10/25/05										23	
	2/15/06		<3									
	4/19/06				<3							
	5/31/06					75						
	8/15/06								43			
	9/12/06									12.7		
	10/24/06										<2	
	1/24/07	2										
	3/28/07			<2								
	5/22/07					8						
	7/24/07							42				
	9/25/07									29		
	11/19/07											2
	2/4/08		2									
	4/2/08				<2							
	5/27/08					4						
	7/15/08							6				
	8/27/08								38			
	10/21/08										<2	
	2/11/09		10									
	3/31/09			<2								
	5/26/09					16						
	7/28/09							34				
	8/19/09								10			
	10/13/09										100	
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
ES021.50	7/18/07							<2				
	7/30/07							<2				
	8/29/07								<2			
	9/25/07									62		
	10/24/07										24	
	11/26/07											<2
	2/4/08		<2									
	4/2/08				<2							
	5/27/08					<2						
	7/15/08							<2				
	8/27/08								12			
	11/3/08											8
	2/11/09		<2									
	3/31/09			<2								
	5/26/09					2						
	7/28/09							<2				
	8/19/09								<2			

		Month										
Station	Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
	10/14/09										<2	
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
ES022.00	3/28/00			9.1								
	5/2/00					3.6						
	5/30/00					3.6						
	7/18/00							3.6				
	9/19/00									<3		
	10/24/00										<3	
	3/27/01			<3								
	5/15/01					240						
	6/6/01						<3					
	7/10/01							<3				
	9/18/01									9.1		
	10/22/01										3	
	3/26/02			23								
	4/30/02				23							
	5/28/02					9.1						
	7/15/02							3				
	9/17/02									43		
	10/8/02										3.2	
	3/25/03			<3								
	4/30/03				9.1							
	5/27/08					<2						
	7/15/08							46				
	8/27/08								36			
	11/3/08											24
	2/11/09		<2									
	3/31/09			2								
	5/26/09					6						
	7/28/09							28				
	8/19/09								380			
	10/14/09										18	
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
ES027.00	6/27/05						<3					
	7/6/05							3				
	8/29/05								14			
	9/7/05									43		
	10/25/05										240	
	2/15/06		<3									
	3/20/06			<3								
	4/19/06				<3							
	5/31/06					<3						
	7/11/06							23				
	9/12/06									<2		

		Month										
Station	Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
	10/24/06										<2	
	1/24/07	<2										
	4/11/07				<2							
	6/13/07						<2					
	7/30/07							<2				
	9/25/07									46		
	11/19/07											<2
	2/4/08		<2									
	4/2/08				2							
	5/27/08					2						
	7/15/08							<2				
	8/27/08								8			
	10/21/08										<2	
	2/11/09		2									
	3/31/09			<2								
	5/26/09					<2						
	7/28/09							134				
	8/19/09								40			
	10/14/09										3.6	

Summary discussion concerning actual or potential transport effects on pollution to the harvest area

The most important aspects of hydrography and meteorology and its influence on pollutant transport in growing area ES is the impact of rainfall events between 0.5-2.0 inches within 72 hours of sampling with resultant upland runoff from both point and non-point sources. Rainfall is heaviest in April-May and October-November and snowmelt in the late spring adds to the runoff. Sample stations impacted are ES 5, 8, 9, 12, 16.5, 22, 26, 27 and 28. Tides along the coast are significant enough in the volume of water moving between ebbing and flooding that pollution dispersion is rapid. Any elevated fecal testing results are more likely a localized pollution source. Stations likely impacted by tidal stages are ES 5, ES 16.5 and ES 28. Seasonally effects are most evident in the summer and fall months at ES 4, 5, 12, 21.5, 22 and 27. No cause has been identified. Low salinities at sample stations near freshwater inflows show that there is a significant contribution of fresh water into the estuaries. Insufficient stream sampling results during all seasons precludes any conclusion as to whether streams in the area are a pollution source during any particular time period. Fecal coliform values varied for all stations regardless of salinities suggesting that fresh water inputs may be having a direct impact on bacterial loading but not in all cases. 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

There are presently nineteen (19) active water sampling stations in Growing Area ES (Figures 17 and 18). They are collected by vehicle from near-shore stations in Random Run 17 under the systematic random sampling protocol (SRS). Sample stations are established to monitor known or potential pollution

sources and on the margins of established closures. Sampling is done year-round and run scheduling times are varied to distribute sample dates throughout the years. It is recognized that access, icing and safety considerations prevent some stations being sampled on scheduled dates. Detailed information of active sample stations is in Table 14.

Figure 17. Sampling Stations, North Portion

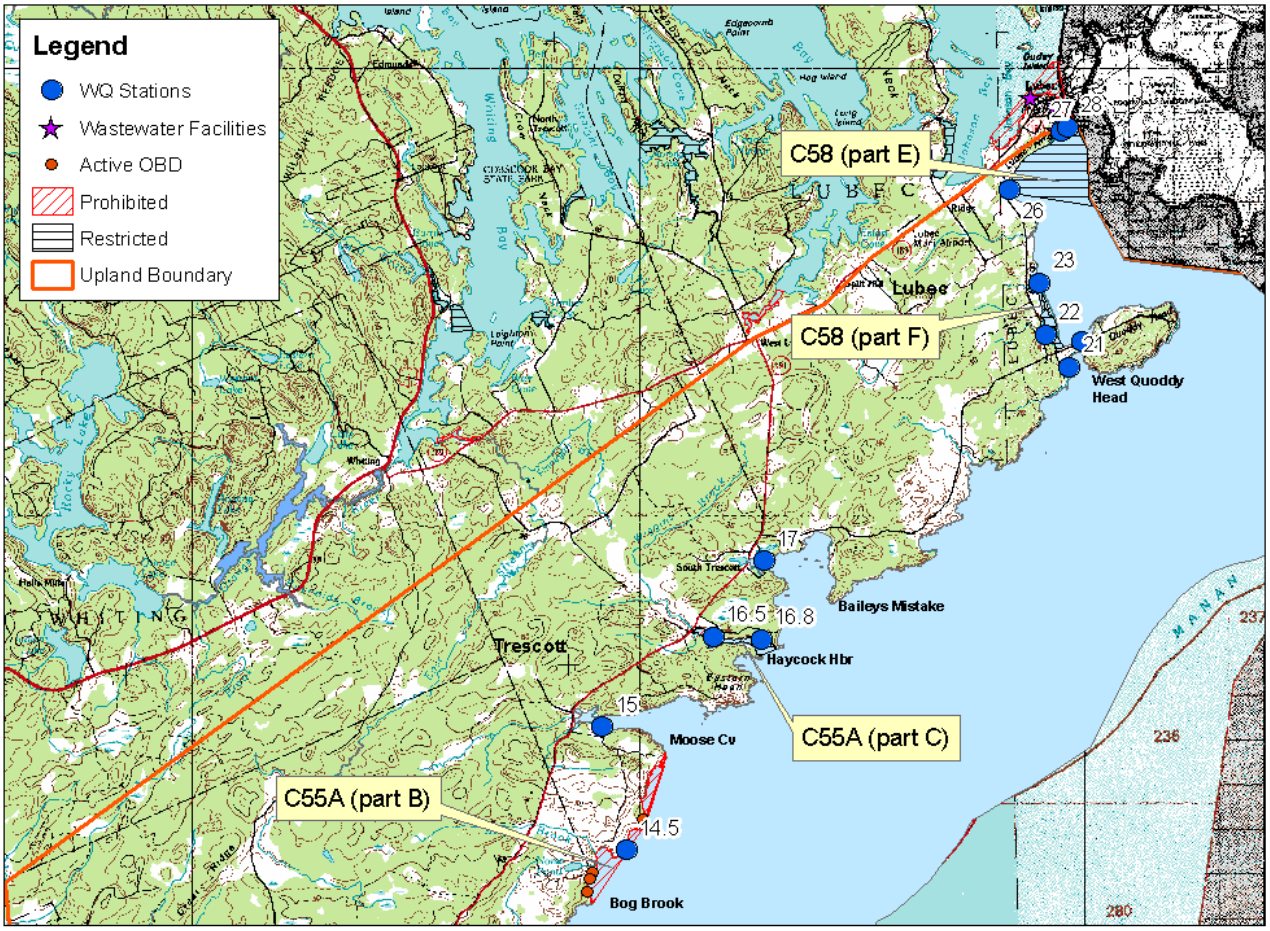


Figure 18. Sampling Stations, Southern Portion

Table 14. Active Random Sampling Stations 2009

Pollution Type (Pol Type): Point (P) or Non-Point (NP)

Station	Class	Pol Type	Sample Run	Justification	Directions	Comments
ES001.00	A	NP	04B	Near aquaculture pens and fresh water input	Northwest Harbor, Cross Island	
ES003.00	A	NP	04B	Monitoring station near resource area and Hurricane Island summer operation	Northeast Harbor, Cross Island	
ES004.00	A	NP	17	Monitoring station, resource	Little Machias Bay, Cutler	

Station	Class	Pol Type	Sample Run	Justification	Directions	Comments
				area		
ES005.00	R	NP	17	Monitoring station, resource area, stream	Eastern Marsh Brook, Cutler	Reclass- A to R 3-12-09
ES008.00	A	NP	17	Monitoring station, resource area, stream	Little River, Cutler, head of cove	Reclass- A to R 1-06; Reclass- R to A 3-08
ES009.00	A	NP	17	Monitoring station, resource area	Little River, Cutler- at old dam site "the ruins"	Reactivated 12-04; Reclass P to R 1-06; Reclass- R to A 3-08
ES012.00	P	NP	17	Survey station, resource area, margin of closure	Money Cove, Cutler	Reactivated 12-04
ES014.50	P	P	17	Margin of closure	Bog Brook Cv, Trescott	New Station 12-04
ES015.00	A	NP	17	Monitoring station, resource area	Moose Cove, Trescott	
ES016.50	R	NP	17	Monitoring station, resource area	Inner Haycock Hbr, Trescott	Reclass-CP to OA met open criteria NP 6-03; Reclass OA to R 1-06
ES016.80	New	NP	17	Monitoring station, resource area; restricted area margin	Outer Haycock Hbr, Trescott	New Station 2-06
ES017.00	A	NP	17	Monitoring station, resource area	Baileys Mistake, Trescott	
ES021.00	A	NP	17	Monitoring station, resource area	Carrying Place Cove, Lubec	
ES021.50	New	NP	17	Margin of restricted area	South Lubec, West Quoddy Head Rd	New Station 7-07
ES022.00	R	NP	17	Monitoring station, resource area, waters fail	Quoddy Bar, Lubec	Reclass P to R 8-06
ES023.00	A	NP	17	Monitoring station, resource	West Quoddy Bar, Lubec	

Station	Class	Pol Type	Sample Run	Justification	Directions	Comments
				area		
ES026.00	A	NP	17	Monitoring station, resource area, stream; restricted area margin	Woodward Point, Lubec.	Reclass-P to A; Mis-classified in stadata; error identified during mid-year review.
ES027.00	R	NP	17	Monitoring station, resource area, stream nearby; in restricted area	Lubec Neck, Lubec, Mowry Cove	Reclass P to R 8-06
ES028.00	R	P	17	Monitoring station, resource area, Lubec Village WWTP outfall area margin	Lubec Neck, Lubec- Mowry Point.	10-19-04-viruses in clams; Reclass P to R 2-09

Fecal coliform data for the most recent 30 samples, collected under the Systematic Random sampling program, are presented in Table 15. Data collected after extreme weather events (Flood Events), defined as rainfall >2.0 inches within 24 hours, were excluded from the analyses because automatic "emergency" closures are usually implemented in all Maine shellfish waters following such heavy rainfall events. NSSP criteria for the data shown in Table 12 indicate that stations meeting criteria for approved waters, which stipulate geometric means below 14 FC/100ml, and estimated 90th percentiles below the approved standard. Some sample stations are classified prohibited, regardless of P90 values that meet approved criteria, because of known actual point sources that require closed areas. "New" stations have less then 30 samples and were recently established to define closure margins. With the exception of ES 4, highlighted in yellow, all approved and restricted stations met their NSSP standard at the end of 2009. ES 4 did not meet approved standards at the end of 2009. (reclassified from approved to restricted on June 14, 2010).

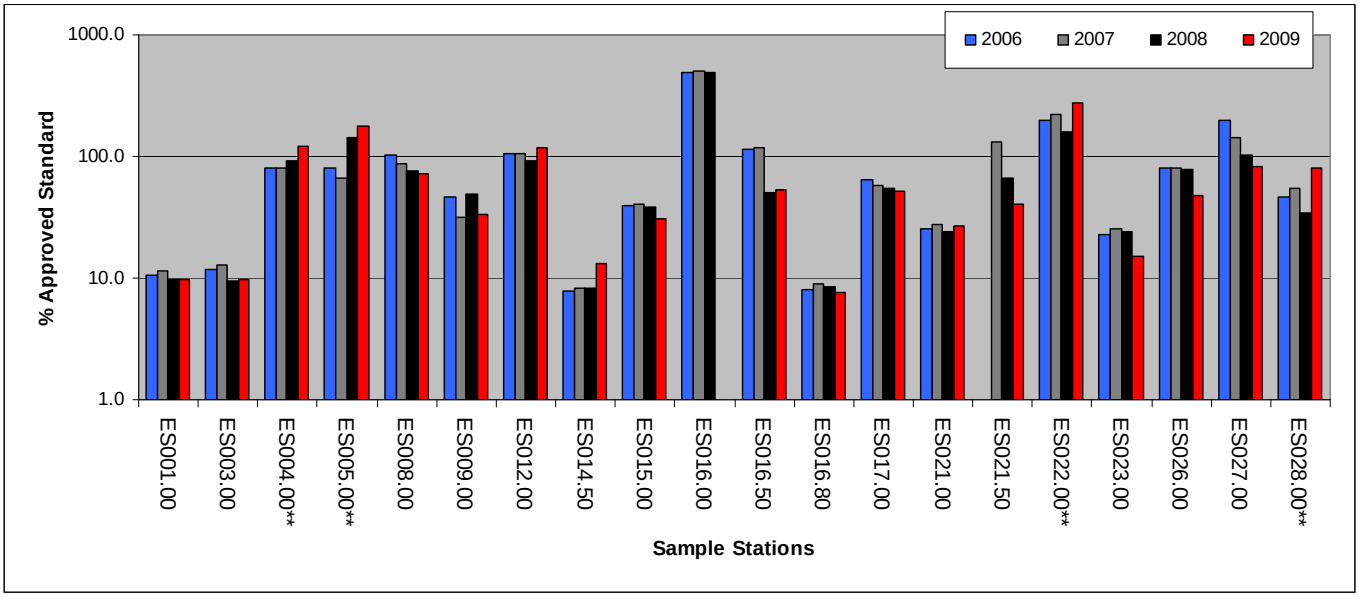
Table 15. Sample Station P90 Scores for Most Recent 30 Samples (2004-2009)

Station	Class	Count	MFCnt	GM	SDV	MAX	P90	Appd_Std	Restr_Std
ES001.00	A	30	20	2.3	0.14	10	3.5	36	199
ES003.00	A	30	20	2.2	0.14	9.1	3.5	36	199
ES004.00	A	30	20	5.1	0.73	1200	44.2	36	199
ES005.00	R	30	23	8.4	0.66	320	60.3	34	187
ES008.00	A	30	22	4	0.62	1100	25.3	35	191
ES009.00	A	30	22	3.4	0.41	64	11.7	35	191
ES012.00	P	30	20	7.9	0.56	100	41.9	36	199
ES014.50	P	30	20	2.5	0.21	16	4.7	36	199
ES015.00	A	30	20	3.1	0.42	240	11	36	199
ES016.50	R	30	20	3.8	0.54	240	19.2	36	199

Station	Class	Count	MFCnt	GM	SDV	MAX	P90	Appd_Std	Restr_Std
ES016.80	new	24	20	2.1	0.08	3.6	2.7	33	180
ES017.00	A	30	21	4.3	0.48	93	18.1	35	195
ES021.00	A	30	20	3.2	0.37	43	9.7	36	199
ES021.50	new	18	18	3.1	0.46	62	12.5	31	163
ES022.00	R	30	20	11.7	0.72	380	98.5	36	199
ES023.00	A	30	21	2.5	0.24	23	5.3	35	195
ES026.00	A	30	20	3.9	0.5	240	17.1	36	199
ES027.00	R	30	20	4.7	0.61	240	29.6	36	199
ES028.00	R	30	20	5.4	0.68	440	27.9	36	199

Figure 19 displays the P90 percentage of the approved standard for the individual sample stations for the period 2006-2009. The "% approved standard" axis is a logarithmic scale. Restricted classified stations are ES 5, 16, 16.5, 22, 27 and 28. Stations ES 12 and 14.5 are prohibited classified stations. The remaining sample stations are approved stations. Those sample stations that have percents values that have increased over this time period are marked with a "**" coding at the end of the sample station number. Approved stations with percentages > 90% may be at risk of downward classification. ES 4 has exceeded 100% and was reclassified from approved to restricted on June 14, 2010.

Figure 19. ES Sample Station % Approved Standard Trends (2006-2009)



All approved, prohibited and restricted that were active at the end of 2009 were sampled at least 6 times following the systematic random sampling (SRS) schedule (Table 16 and Appendix B). Some stations were samples additional times during adverse conditions for flood reopening sampling. ES 16 and ES 25 are discontinued stations that were no longer sampled after April 2009 or sampled in error during makeup sampling. Station ES 28 is embedded within the restricted area at Mowry Point, Lubec. At the 2008 year-end review of ES sample stations, it was determined that the station was miss-classified and ES 28 was reclassified from prohibited to restricted. It is the margin station between Pollution Area No. 58, parts D and E. The station is required to meet restricted criteria.

Table 16. ES Samples Collected in 2009

Station	Current Class	Adverse (Flood)	Random		Grand Total	Notes
		Closed	Closed	Open		
ES001.00	A			6	6	
ES003.00	A			6	6	
ES004.00	A	3		6	9	Flood Station, extra reopening samples
ES005.00	R	10		6	16	Flood Station, extra reopening samples
ES008.00	A	9		6	15	Flood Station, extra reopening samples
ES009.00	A	13		6	19	Flood Station, extra reopening samples
ES012.00	P		6		6	
ES014.50	P		6		6	
ES015.00	A			6	6	
ES016.00	R			2	2	Discontinued station in April
ES016.50	R			6	6	
ES016.80	A			6	6	
ES017.00	A	3		6	9	
ES021.00	A			6	6	
ES021.50	A			6	6	
ES022.00	R			6	6	
ES023.00	A			6	6	
ES025.00	P		1		1	Discontinued station in 1990, sampled in error 8/19/09
ES026.00	A			6	6	
ES027.00	R			6	6	
ES028.00	P		1		6	Station actually located in restricted area. Error in classification.
	R			5		

Water Quality Discussion and Determination of Area Classification

Current classifications in Area ES are supported by SRS water sampling and the current shoreline survey studies with the exception of ES 4. Areas of known actual or potential pollution are in prohibited or restricted areas. Station ES 4 has exceeded 100% of the approved standard and a downward classification of the area is necessary (reclassified from approved to restricted on June 14, 2010). The area is remote and no pollution source has been identified. Stations ES 4 and 5 are within the same bay and have four scores that exceed 31 FC/100ml on the same dates suggesting that they were impacted by the same pollution source. Sample stations ES 5, ES 12, ES 22 and ES 28 have all shown an upward percent trending from previous years indicating a decline in water quality. These stations are presently classified restricted or prohibited; therefore no classification changes are required at this time for these stations. Stations ES 16.5, ES 26, and ES 27 have had a downward percent trending supporting improving water quality in these areas. The remainder of the area's sample station percentages have

remained static with unchanging water quality. All the sample stations were sampled the required minimum of 6 times during 2009.

Conclusions

Growing Area ES has environmental and human impacts similar to the remainder of the Maine coast east of Penobscot Bay. Coastal community development is rapidly expanding with homes and businesses near the mainland shores and on islands. This development increases the potential pollution risks to the traditional shellfish harvesting areas and the newly emerging shellfish aquaculture business. Licensed discharges, environmental factors and seasonality have the greatest pollution impacts on the growing area. Pollution loading is most likely originating on the near shore land and impacting the harvesting areas and ocean waters by non-point wide-spread runoff, streams and ditches or licensed discharges. Random sampling supports the shoreline survey studies with elevated fecal coliform scores in areas where bacterial pollution sources have been identified. The heaviest sampling effort is during the late spring to late fall period due to winter weather constraints. Seasonality, high and ebbing tides and rainfall between 0.5-2.0 inches within 72 hours increases the pollution risk to the harvesting waters at stations ES 5, 8, 9, 12, 16.5, 22, 26, 27 and 28. Sample stations ES 5, ES 12, ES 22 and ES 28 have all shown an upward percent trending from previous years indicating a decline in water quality. Station ES 4 is the boundary station for Pollution Area No. 55A (part D) and has had un-explained elevated scores in July and August, no longer meets approved criteria and will be reclassified restricted. Review of the shoreline survey data, pollution source impact evaluations, analyses of tidal, seasonal, and rainfall effects, ambient water quality data and the hydrographic information supports the remaining classifications of the growing area.

Changes in Classification Required

The station, ES 4, on the margin between the restricted area and approved area at the head of Little Machias Bay, no longer meets approved standards. It will be necessary to increase the size of the restricted area to include ES 4. Marsh Stream flows into the head of Little Machias and is monitored by ES 5, a restricted station. The current calculated dilution zone minimum required closure area for the stream is 0.1 acres (1,111,680 GPD, 6.1 FC/100 ml, 10’ receiving waters) and the current regulation closure is 21.7 acres. A new margin station will be established on the restricted margin and sampled by boat during sample run 4B.

No source for the declining water quality at ES 4 has been identified though the sample site location is a frequently used access point for the shores of Little Machias Bay. The western shore of the bay is a naval communication facility with armed security perimeters and limited access. There have been three isolated incidences of fecal scores >31 FC/100 ml at ES 4 since June 2005 (most recent 30 samples time frame). These scores include a >1100 FC/100 ml (occurring on July 11, 2006), 42 FC/100 ml (occurring on July 28, 2009) and 740 FC/100 ml (occurring on August 19, 2009), suggesting a seasonal impact period of July and August. None of the three spikes in bacterial scores was associated with rainfall greater than 0.5 inch within 3 days previous to the sampling. There are no active sample stations meeting approved classification standards within 4 miles of the proposed closure lines. The proposed increase in the restricted area margins are based on access to the corners of the closure lines, the distance to the next approved stations, the over-size of the area (110 acres) and the relatively low bacterial risks at ES 4 and 5. Figure 20 displays the required enlarged restricted area.

Figure 20. Required Expansion of Little Machias Bay Restricted Area

Recommendation for Future Work

1. Stream samples from all seasons for 2012 triennial report.
2. Increased sampling at ES 4, 5, 8, 9, 12 and 26 under rainfall conditions to increase database to further assess the impact of rainfall on fecal coliform
3. Re-survey the ES 4 area in July and August to determine the cause of the recent elevated scores.
4. Revisit PS2 in summer when house is occupied.

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Tax map data, Town of Lubec

Tax map data, Town of Whiting

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

APPENDIX B. Sample Data for 2009

Station	Date	Strategy	Open/ Closed	Class	Adversity	Temp	Salinity	Tide	Wind	Col Score
ES001.00	5/11/2009	R	O	A	P	7	32	H	S	<2
	5/26/2009	R	O	A		7	31	H	S	<2
	7/29/2009	R	O	A	P	13	30	F	S	<2
	8/19/2009	R	O	A	O	15	30	E	S	<2
	9/30/2009	R	O	A	P	13	30	E	SW	<2
	10/19/2009	R	O	A	P	9	32	E	N	<2
ES003.00	5/11/2009	R	O	A	P	6	29	H	S	<2
	5/26/2009	R	O	A		8	30	H	S	<2
	7/29/2009	R	O	A	P	13	30	F	S	<2
	8/19/2009	R	O	A	O	15	30	E	CL	<2
	9/30/2009	R	O	A	P	13	31	E	SW	<2
	10/19/2009	R	O	A	P	9	32	E	N	<2
ES004.00	2/11/2009	R	O	A		0	31	F	SE	<2
	3/31/2009	R	O	A	S	3	31	F	N	<2
	5/26/2009	R	O	A		13	32	F	SW	<2
	7/28/2009	R	O	A	P	19	30	HF	SW	42
	8/19/2009	R	O	A	O	17	30	HF	SW	740
	10/13/2009	R	O	A	P	10	30	E	CL	<2
	10/28/2009	A	C	A	F	7	31	E	NE	<2
	10/29/2009	A	C	A	F	5	32	HE	N	2
	10/30/2009	A	C	A	F	6	30	HE	SW	<2
ES005.00	2/11/2009	R	O	A		0	31	F	SE	2
	3/31/2009	R	O	R	S	3	0	F	N	2
	4/26/2009	A	C	R	F	9	2	F	S	10
	4/27/2009	A	C	R	F	6	11	F	S	2
	5/26/2009	R	O	R		13	22	F	SW	2
	6/23/2009	A	C	R	F	14	0	F	NE	240
	6/24/2009	A	C	R	F	13	2	F	N	100
	6/25/2009	A	C	R	F	13	4	F	N	20
	7/7/2009	A	C	R	F	6	30	H	N	<2
	7/8/2009	A	C	R	F	10	31	H	E	2
	7/9/2009	A	C	R	F	19	27	H	S	4
	7/28/2009	R	O	R	P	19	7	HF	SW	40
	8/19/2009	R	O	R	O	18	30	HF	SW	98
	9/1/2009	A	C	R	F	11	18	H	NW	33
	9/2/2009	A	C	R	F	13	0	HF	SW	24
	10/13/2009	R	O	R	P	10	30	E	E	2
ES008.00	2/11/2009	R	O	A		0	28	F	SE	<2
	3/31/2009	R	O	A	S	3	1	F	N	2
	4/26/2009	A	C	A	F	8	23	F	S	<2
	4/27/2009	A	C	A	F	10	18	F	S	5.5
	5/26/2009	R	O	A		15	25	F	SW	<2
	6/23/2009	A	C	A	F	14	5	F	NE	200
	6/24/2009	A	C	A	F	12	20	F	N	40
	7/7/2009	A	C	A	F	8	20	H	SE	33

Station	Date	Strategy	Open/ Closed	Class	Adversity	Temp	Salinity	Tide	Wind	Col Score
	7/8/2009	A	C	A	F	10	25	H	E	13
	7/9/2009	A	C	A	F	17	30	H	SE	2
	7/28/2009	R	O	A	P	20	29	HF	SW	2
	8/19/2009	R	O	A	O	19	30	HF	SW	14
	9/1/2009	A	C	A	F	11	30	H	NW	4
	9/2/2009	A	C	A	F	14	30	HF	SW	14
	10/14/2009	R	O	A	P	10	32	E	NW	2
ES009.00	2/11/2009	R	O	A		0	32	F	SE	<2
	3/31/2009	R	O	A	S	2	18	L	N	<2
	4/26/2009	A	C	A	F	8	24	F	S	<2
	4/27/2009	A	C	A	F	9	20	F	S	2
	5/26/2009	R	O	A		12	30	F	SW	<2
	6/23/2009	A	C	A	F	11	4	F	NE	118
	6/24/2009	A	C	A	F	12	20	F	N	31
	6/25/2009	A	C	A	F	13	28	F	N	6
	7/7/2009	A	C	A	F	6	30	H	E	16
	7/8/2009	A	C	A	F	10	31	H	E	2
	7/9/2009	A	C	A	F	12	30	H	SE	2
	7/28/2009	R	O	A	P	20	28	HF	SW	<2
	8/19/2009	R	O	A	O	17	30	HF	SW	8
	9/1/2009	A	C	A	F	11	28	H	NW	<2
	9/2/2009	A	C	A	F	13	30	HF	SW	2
	10/13/2009	R	O	A	P	10	30	E	E	8
	10/28/2009	A	C	A	F	7	24	E	NE	<2
	10/29/2009	A	C	A	F	7	26	HE	N	2
	10/30/2009	A	C	A	F	6	31	HE	SW	<2
ES012.00	2/11/2009	R	C	P		0	26	F	SE	10
	3/31/2009	R	C	P	S	3	0	F	N	<2
	5/26/2009	R	C	P		15	2	F	SW	16
	7/28/2009	R	C	P	P	20	0	F	SW	34
	8/19/2009	R	C	P	O	18	30	HF	SW	10
	10/13/2009	R	C	P	P	11	2	E	E	100
ES014.50	3/31/2009	R	C	P	S	2	31	LF	N	<2
	4/8/2009	R	C	P	P	3	30	E	N	<2
	5/26/2009	R	C	P		12	30	F	SW	<2
	7/28/2009	R	C	P	P	17	26	F	SW	10
	8/19/2009	R	C	P	O	17	30	H	SW	16
	10/13/2009	R	C	P	P	10	30	E	E	2
ES015.00	2/11/2009	R	O	A		0	31	HF	SE	2
	3/31/2009	R	O	A	S	2	32	LF	N	<2
	5/26/2009	R	O	A		13	30	F	SW	<2
	7/28/2009	R	O	A	P	19	26	F	SW	2
	8/19/2009	R	O	A	O	18	30	H	SW	4
	10/13/2009	R	O	A	P	10	30	E	E	<2
ES016.00	2/11/2009	R	O	R		1	31	HF	SE	<2
	3/31/2009	R	O	R	S	3	2	F	N	2
ES016.50	2/11/2009	R	O	R		1	29	HF	SE	<2
	3/31/2009	R	O	R	S	2	25	LF	N	<2
	5/26/2009	R	O	R		13	31	F	SW	<2
	7/28/2009	R	O	R	P	18	30	F	SW	<2

Station	Date	Strategy	Open/ Closed	Class	Adversity	Temp	Salinity	Tide	Wind	Col Score
	8/19/2009	R	O	R	O	17	30	H	SW	<2
	10/13/2009	R	O	R	P	10	29	LE	E	<2
ES016.80	3/31/2009	R	O	A	S	2	25	LF	N	<2
	4/8/2009	R	O	A	P	4	24	E	N	<2
	5/26/2009	R	O	A		12	32	F	SW	<2
	7/28/2009	R	O	A	P	18	30	F	SW	2
	8/19/2009	R	O	A	O	16	30	H	SW	<2
	10/13/2009	R	O	A	P	10	30	LE	E	<2
ES017.00	2/11/2009	R	O	A		0	32	HF	SE	2
	3/31/2009	R	O	A	S	2	2	F	N	2
	5/26/2009	R	O	A		13	32	F	SW	<2
	7/28/2009	R	O	A	P	19	26	F	SW	2
	8/19/2009	R	O	A	O	16	30	H	SW	25
	10/14/2009	R	O	A	P	10	31	E	NW	<2
	10/28/2009	A	C	A	F	7	30	E	NE	4
	10/29/2009	A	C	A	F	7	32	HE	N	<2
	10/30/2009	A	C	A	F	6	32	HE	SW	<2
ES021.00	2/11/2009	R	O	A		1	32	H	SE	<2
	3/31/2009	R	O	A	S	2	31	F	N	2
	5/26/2009	R	O	A		13	32	HF	SW	<2
	7/28/2009	R	O	A	P	17	30	F	SW	<2
	8/19/2009	R	O	A	O	15	30	H	SW	6
	10/14/2009	R	O	A	P	10	30	E	NW	4
ES021.50	2/11/2009	R	O	A		1	30	H	SE	<2
	3/31/2009	R	O	A	S	2	2	F	N	<2
	5/26/2009	R	O	A		13	31	HF	SW	2
	7/28/2009	R	O	A	P	17	30	F	SW	<2
	8/19/2009	R	O	A	O	15	30	H	SW	<2
	10/14/2009	R	O	A	P	10	30	E	NW	<2
ES022.00	2/11/2009	R	O	R		1	22	H	SE	<2
	3/31/2009	R	O	R	S	2	0	F	N	2
	5/26/2009	R	O	R		14	18	HF	SW	6
	7/28/2009	R	O	R	P	19	0	F	SW	28
	8/19/2009	R	O	R	O	16	25	HE	SW	380
	10/14/2009	R	O	R	P	10	6	E	NW	18
ES023.00	2/11/2009	R	O	A		1	31	H	SE	<2
	3/31/2009	R	O	A	W	2	20	F	N	<2
	5/26/2009	R	O	A		13	32	HF	SW	2
	7/28/2009	R	O	A	P	17	31	F	SW	<2
	9/21/2009	R	O	A	O	12	32	F	NW	2
	10/14/2009	R	O	A	P	9	26	E	NW	2
ES025.00	8/19/2009	R	C	P	O	15	30	HE	SW	4
ES026.00	2/11/2009	R	O	A		1	31	H	SE	<2
	3/31/2009	R	O	A	S	2	23	F	N	<2
	5/26/2009	R	O	A		13	30	HF	SW	<2
	7/28/2009	R	O	A	P	17	30	F	SW	<2
	8/19/2009	R	O	A	O	15	30	HE	SW	28
	10/14/2009	R	O	A	P	10	30	E	NW	<2
ES027.00	2/11/2009	R	O	R		1	30	H	SE	2
	3/31/2009	R	O	R	S	2	31	F	N	<2

Station	Date	Strategy	Open/ Closed	Class	Adversity	Temp	Salinity	Tide	Wind	Col Score
	5/26/2009	R	O	R		13	31	HF	SW	<2
	7/28/2009	R	O	R	P	17	30	F	SW	134
	8/19/2009	R	O	R	O	15	30	HE	SW	40
	10/14/2009	R	O	R	P	10	31	E	NW	3.6
ES028.00	2/11/2009	R	C	P		1	31	H	SE	6
	3/31/2009	R	O	R	S	2	31	F	N	<2
	5/26/2009	R	O	R		13	31	HF	SW	<2
	7/28/2009	R	O	R	P	17	30	F	SW	440
	8/19/2009	R	O	R	O	15	30	HE	SW	112
	10/13/2009	R	O	R	P	10	30	LE	E	60