



GROWING AREA EG

Newbury Neck to Wonderland, Southwest Harbor

Sanitary Survey Report

2008 - 2019

Final

Hannah Horecka, Scientist I



TABLE OF CONTENTS

Executive Summary.....	4
Description of Growing Area	4
History of Growing Area Classification.....	6
Pollution Sources Survey.....	6
Summary of Sources and Location.....	6
State and Federal Licensed Waste Discharge Permits	9
Residential.....	12
Industrial Pollution	12
Marinas	13
Storm water	13
Non-Point Pollution Sources	14
Agricultural Activities.....	18
Domestic Animals and Wildlife Activity	18
Recreation Areas (beaches, trails, campgrounds, etc.).....	18
Hydrographic and Meteorological Assessment.....	19
Tides.....	19
Rainfall	19
Winds	19
River Discharge.....	19
Hydrographic Influence.....	20
Water Quality Studies	20
Water Quality Discussion and Classification Determination.....	20
Reclassifications: Reclassification addendums to the sanitary survey report are in the DMR central files.....	21
CAMP Reviews, Inspection Reports, and Performance Standards	21
Recommendation for Future Work.....	25
References.....	27
Appendix A.	28

LIST OF TABLES

Table 1. Overboard Discharges (OBDS)	10
Table 2. NPDES Permitted Discharges.....	10
Table 3. Growing area EG WWTP Dilution Calculations.	12
Table 4. Growing Area EG Residential Pollution Sources.....	12
Table 5. Stream Samples in Growing Area EG 2008-2019; Scores > 163 cfu/100ml are highlighted in red.	15
Table 6. P90 calculations for stations with a minimum of 30 samples. Geomeans and P90s not meeting current classifications are highlighted in red.....	20
Table 7. P90s for Conditional Area stations calculated using data from the open status. Geomeans and P90s not meeting current classifications are highlighted in red.	25
Table 8. Count table of samples collected in growing area EG during the 2019 season.	26



LIST OF FIGURES

Figure 1. Growing Area EG Overview Map with Active Water Stations..... 5
Figure 2. Growing Area EG, Pollution Map A..... 7
Figure 3. Growing Area EG, Pollution Map B..... 8
Figure 4. C40 Union River Bay, Surry, Ellsworth, and Trenton, Conditionally Approved area22
Figure 5. C40 Goose Cove, Trenton, Conditionally Approved area24



Executive Summary

This is a Sanitary Survey report for Growing Area EG in Hancock County written in compliance with the requirements of the 2017 Model Ordinance and the National Shellfish Sanitation Program. Two pollution areas in Growing Area EG will be reviewed for a possible upgrade in 2020; Heath Brook Cove (Trenton) and Duck Cove (Tremont). There were seven new actual or potential pollution sources found resulting in one new Prohibited area and one Prohibited area created in a conditional area. Access was denied at four properties. Water quality has shown improvement or remained consistent overall. The next sanitary survey is due in 2031 and the next triennial in 2022.

Description of Growing Area

Growing Area EG in Hancock County, Maine, extends from the southern tip of Newbury Neck, Surry to Wonderland, Southwest Harbor on Mount Desert Island and includes the towns of Surry (pop. 1,466), Ellsworth (pop. 7,741), Trenton (pop. 1,481), Bar Harbor (pop. 5,235), Mount Desert (pop. 2,053), Tremont (pop. 1,563) and Southwest Harbor (pop. 1,764) (2010 Census). The largest population concentrations in this growing area are in Surry, Ellsworth, and Bass Harbor, with many seasonal residents (June-September). Except for these three developed areas, development along the shoreline is spotty with clusters of homes separated by undeveloped land. There is one Waste Water Treatment Facility (WWTF) located in Ellsworth. There are 23 licensed overboard discharges (OBD's), one OBD was removed during the 2019 season in Bass Harbor, Tremont.

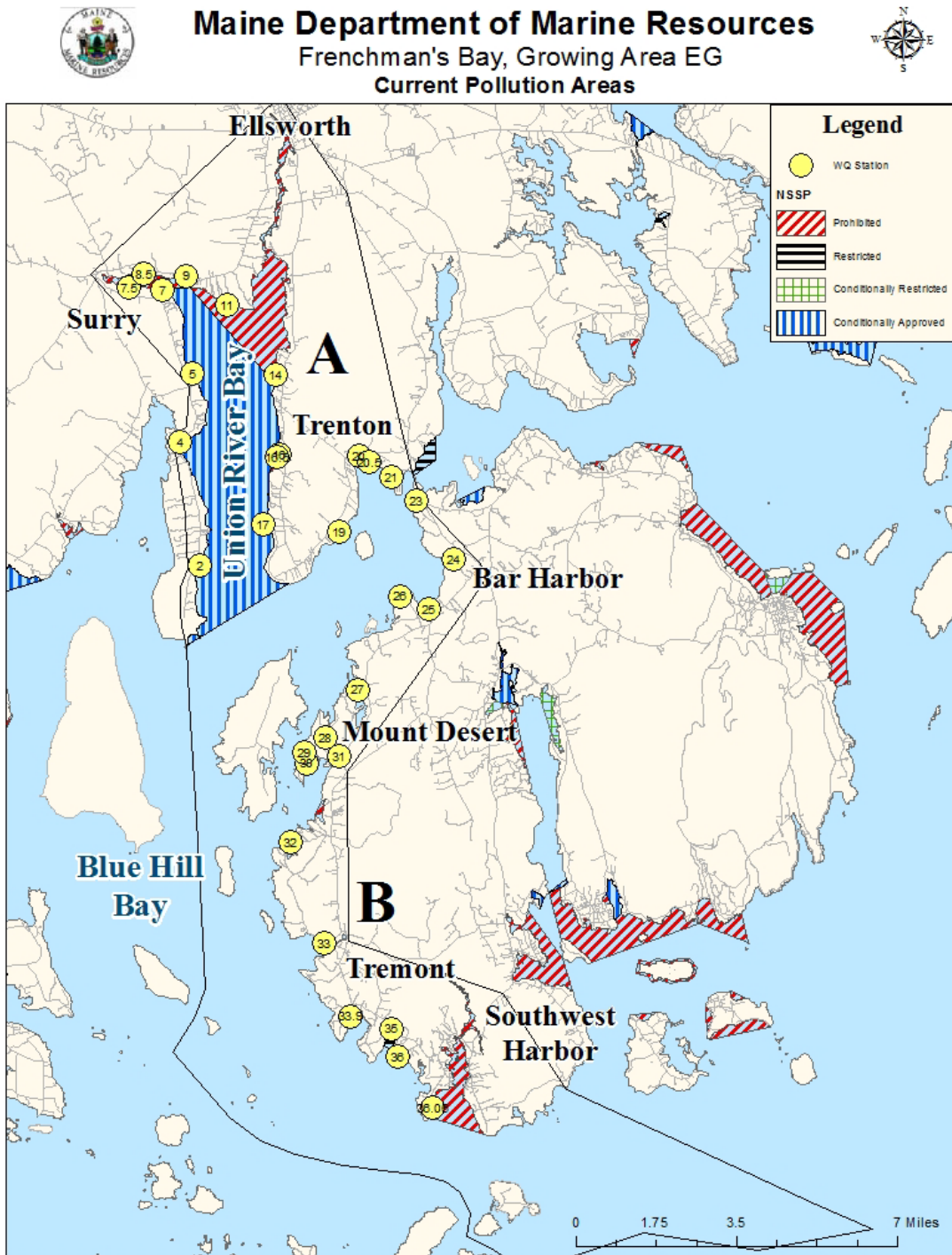
Shellfish Growing Area EG includes all the shores, flats, and coves stretching from the southern tip of Newbury Neck, Surry to Wonderland, Southwest Harbor on Mount Desert Island. The upland cover is primarily deciduous, some evergreens and wetland forest with minimal development. The Union River is a significant source of freshwater influence along the northern shores of Blue Hill Bay. Numerous brooks and small streams can be found throughout the growing area. Wildlife in the area includes migrating birds, various rodents, deer and harbor seals.

There are 4 shellfish aquaculture leases and 45 shellfish Limited Purpose Aquaculture permits (LPAs) in this growing area. There are three land-based recirculating wet storage locations in this area and four offshore wet storage locations. The activities associated with the LPAs, leases and wet storage locations are monitored in accordance with the Model Ordinance.

Below is the map with Pollution Area boundaries and growing area boundaries. Closures within the growing area can be found in legal notices in DMR central files or on the DMR website.



Figure 1. Growing Area EG Overview Map with Active Water Stations





History of Growing Area Classification

Reclassification addendums to the sanitary survey report are in the DMR central files.

Pollution Sources Survey

Summary of Sources and Location

The growing area shoreline is divided into 2-mile segments that are identified using unique Growing Area Shoreline Survey Identification (GASSID) numbers. All properties and potential pollution sources within 250 feet of the shoreline are identified and inspected. The inspection includes a property description, physical address, location of the septic system and any other relevant potential or actual pollution sources. A GPS point to identify the source location(s) and the data are entered electronically in the field and stored in DMR central files.



Figure 2. Growing Area EG, Pollution Map A (Pollution Area 40)

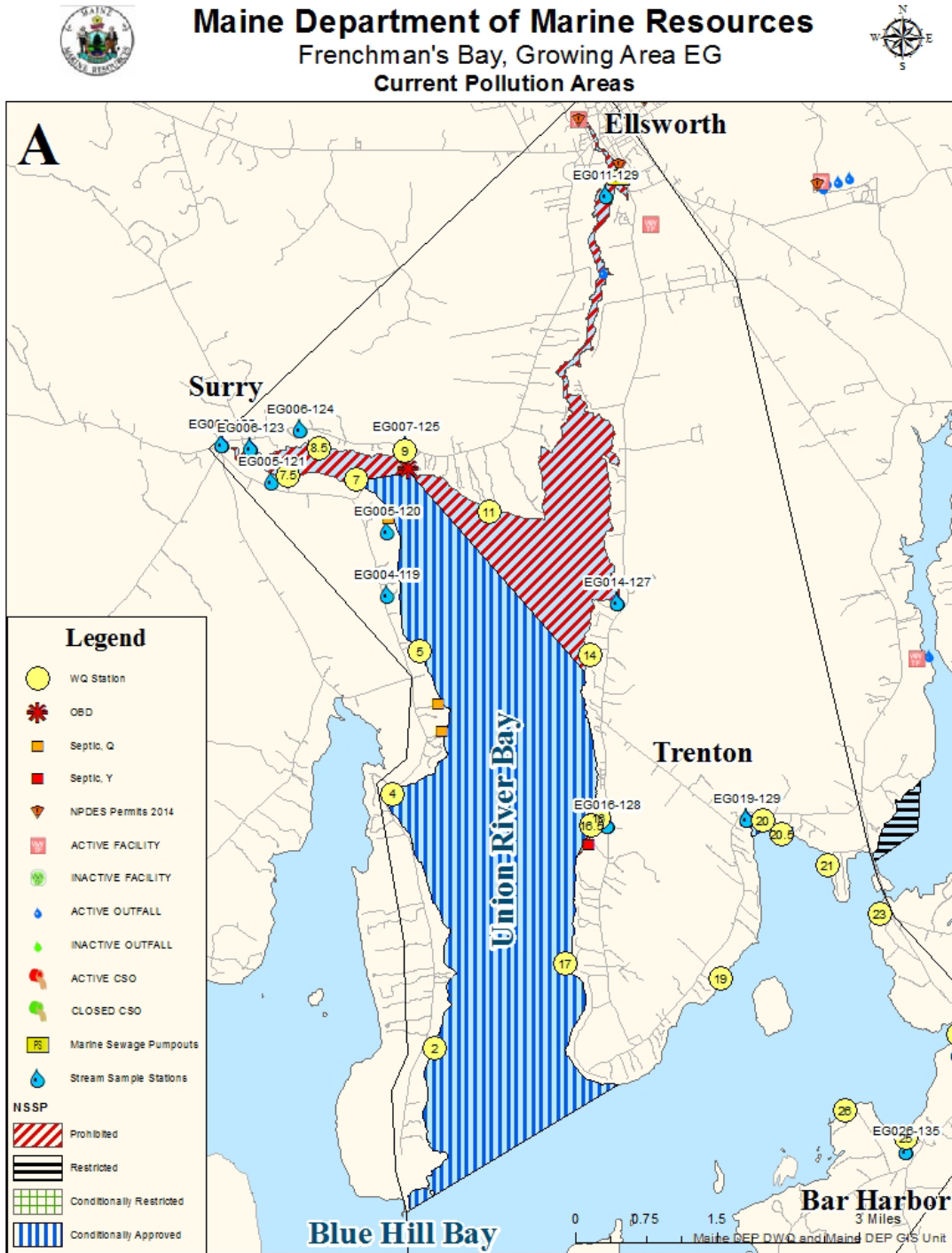
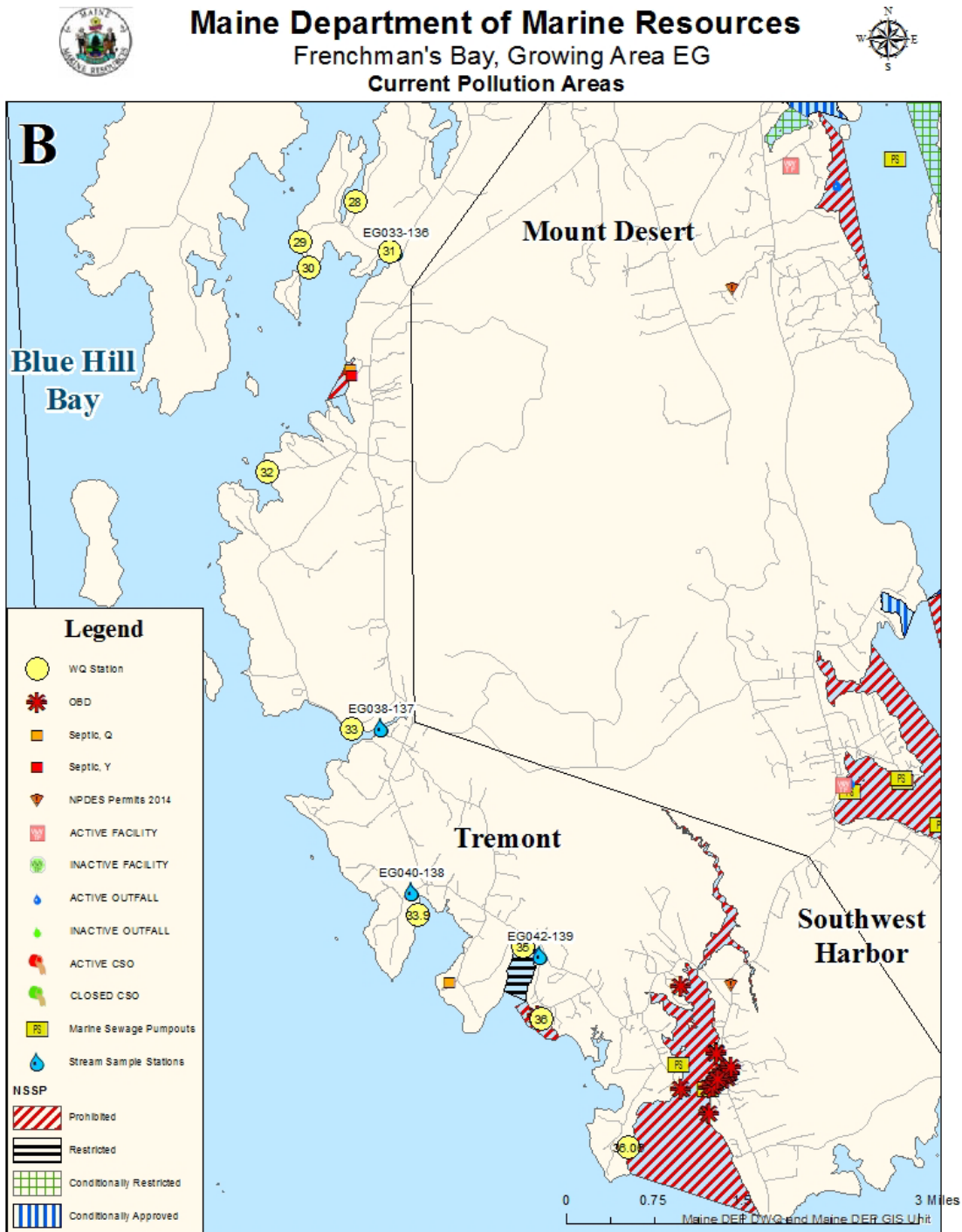




Figure 3. Growing Area EG, Pollution Map B (Pollution Area 42)





State and Federal Licensed Waste Discharge Permits

Overboard Discharges (OBDs)

There are 23 overboard discharges (OBDs) that discharge their treated effluent into the waters of Growing Area EG. One OBD discharges into Contention Cove (Figure 2), one OBD discharges into the waters of Duck Cove, and 21 OBDs discharge into Bass Harbor (Figure 3). One OBD was removed from Bass Harbor in 2019, and a total of seven OBDs have been removed over the past 12 review years.

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

OBDs are licensed and inspected by the Maine Department of Environmental Protection. At each inspection, DEP looks for tags on each treatment unit identifying the service contractor and the last date of service. If an OBD is not properly maintained, or if the OBD malfunctions, it has the potential to directly discharge untreated wastewater to the shore; therefore, preventative closures are implemented surrounding every OBD located in growing area EG (Table 1. Overboard Discharges (OBDs)). The size of each closure is determined based on a dilution, using the permitted flow rate of the OBD (in gallons per day, GPD), and the depth of the receiving water that each OBD discharges to; the fecal concentration used for this dilution calculation is 1.4×10^6 FC /100 ml. Single OBD systems associated with more than one residence will have multiple permit IDs. All current closures are of adequate size to protect public health.



Table 1. Overboard Discharges (OBDs)

Pollution Area (Section)	OBD ID #	Location	Receiving Waterbody	Flow (gpd)	Acres Needed for Closure	Current Prohibited Acreage
40 (A.1)	2277	Surry	Contention Cove	300	5.9	1,968
42 (A.1)	3717	Tremont	Duck Cove	300	5.2	29
42 (A.2)	2368	Tremont	Bass Harbor	300	6.6	684
	2858	Tremont	Bass Harbor	300	20.5	
	7221	Tremont	Bass Harbor	300	6.6	
	7222	Tremont	Bass Harbor	300	6.6	
	7313	Tremont	Bass Harbor	300	6.6	
	6305	Tremont	Bass Harbor	300	6.6	
	3996	Tremont	Bass Harbor	636	13.9	
	6800	Tremont	Bass Harbor	300	6.6	
	6427	Tremont	Bass Harbor	160	3.5	
	5479	Tremont	Bass Harbor	300	6.6	
	7239	Tremont	Bass Harbor	300	6.6	
	6799	Tremont	Bass Harbor	300	6.6	
	6582	Tremont	Bass Harbor	900	19.7	
	7697	Tremont	Bass Harbor	300	6.6	
	5109	Tremont	Bass Harbor	300	6.6	
	2419	Tremont	Bass Harbor	300	6.6	
	6674	Tremont	Bass Harbor	300	6.6	
7238	Tremont	Bass Harbor	300	6.6		
7403	Tremont	Bass Harbor	540	11.8		
6108	Tremont	Bass Harbor	1800	39.5		

National Pollutant Discharge Elimination System (NPDES)

Table 2. NPDES Permitted Discharges

Pollution Area (Section)	Permit ID	Type	Facility	Waterbody
40 (A.1)	ME0102865	POTW Major	Ellsworth Water Pollution Control Facility	Union River
40 (A.1)	ME0036641	Cooling Water - Minor	Black Bear Hydro Partners, LLC	Union River

There is one wastewater treatment plant/facility (WWTP/WWTF) in growing area EG, located in Ellsworth. Since 2017 the WWTP inspection reports have been available in DMR central files. This facility discharges into a Prohibited area that is larger in area than the calculated dilution zone for the effluent (Table 3).



Ellsworth Water Pollution Control Facility-

The plant is a secondary treatment system that discharges into the Union River. Influent is domestic and commercial waste water with no significant industrial users contributing to the flow. Licensed monthly average flow is 1.62 million gallons per day (MGD). The facility can accept up to 30,000 GPD of liquid wastewater from pump-out contractors.

The waste water treatment facility provides secondary treatment via an aeration activated sludge system. Treatment consists of de-gritting, aeration basins with fine bubble aerators, circular secondary clarifiers and chlorination in a chlorine contact chamber. Disinfection is with sodium hypochlorite and de-chlorination with sodium bisulfite. The plant has standby power that allows operation of the entire treatment process. Regular maintenance is done with daily checks\repairs. There is 14 miles of collection system piping with five (5) pump stations. Effluent is discharged mainly through an 18" diameter plastic pipe that runs 150' offshore into the ocean tidewaters of Compass Harbor at 10' depth at low water. During high flows, it may also discharge through a 24" diameter pipe located on the eastern edge of the 100-foot wide federal channel limits at 8.4' depth at mean low water.

The current Prohibited area was determined using the average daily flow (0.63637 MGD) based on their daily treated flows and the average pre-chlorination scores (87,032 FC colonies/100ml) from a 2013 chlorination study of the new WWTF, built in 2012. Using these measurements and an average mid-tide depth of 18' the required Prohibited area is 674.4 acres. The average daily flow remains consistent with a 2019 daily flow of 0.627 MGD with a maximum daily average occurring on 12/15/19 with a flow of 1.862 MGD according to 2019 DEP 49 Forms provided by WWTF staff. The regulation Prohibited closure size exceeds the computed effluent dilution zone (dilution calculation=674.4 acres / closure size=1967.8 acres). A dye study was conducted in 2001 and has informed the configuration of the Prohibited area.

In the absence of actual discharge data, Maine DMR may implement a standard base line calculation using the licensed average monthly flow (1.62 MGD) and a bacterial loading estimate of partially treated wastewater (1.4×10^5). If the area is calculated using this dilution standard, adjusted for a slightly deeper mean average depth of dilution area (22 ft) this closure would require approximately 300 additional acres.

Black Bear Hydro Partners, LLC-

The discharge associated with the Black Bear Hydro Partners, LLC Ellsworth Hydro Project (Union River Dam) authorizes a daily discharge of 200,160 gallons per day (GPD) of non-contact cooling water into the Union River. This potential source of industrial pollution discharges into a Prohibited area.



Table 3. Growing area EG WWTP Dilution Calculations.

	Ellsworth WWTF	
Flow rate=	636,370	Gallons/day(GPD)
There are 7.481 gallons in one cu.ft., so GPD divided by 7.481=	85,065	Cu.Ft./day
There are 283 100ml units in one cu.ft., so 283 times Cu. Ft./day=	24,073,347	100ml. Units/day
Bacteria load=	87,032	FC colonies/100ml
Bacteria load times the number of 100ml. Units/day=	2,095,151,548,820	Total FC/day
or	2.10E+12	Total FC/day
FC colonies/day divided by 14=	149,653,682,059	100ml units of receiving waters for dilution.
There are 283 100ml units per cu.ft., so 100ml. Units divided by 283=	528,811,597	cu.ft. of receiving waters for dilution.
Average depth of receiving waters =	18	Ft.
Cu.ft. of receiving waters / by average depth=	29,378,422	Square ft. of surface water, or closure size.
Square ft. times 0.092903 =	2,729,344	Square meters
Square meters times 0.0002471=	674.4	acres

Residential

All residential pollution sources are reported to the local plumbing inspector (LPI). Once the system has been documented as being fixed, staff members from DMR can re-assess the water quality data and shoreline survey information to determine if the area is safe for shellfish harvest. Table 4 shows all new and pre-existing pollution sources in area EG that are considered discharges into the Growing Area and effect water quality.

Table 4. Growing Area EG Residential Pollution Sources.

Pollution Area	Location ID	Date Surveyed	Direct or Indirect	Problem	Description	Town
40 (A.2)	EG016-166	2019	Indirect	Y	Malfunctioning Cesspool	Trenton
42 (A.3)	EG034-12	2019	Indirect	Y	Malfunctioning Cesspool	Trenton

Industrial Pollution

There are no major industrial pollution sites in growing area EG such as chemical plants, steel mills, ship yards, or refineries. Black Bear Hydro Partners, LLC has a NPDES permit for cooling water discharge at the Union River Dam (Ellsworth Hydro Project) and is contained in a Prohibited area. None of the small industries (small boat builders and boat storage yards) were identified as pollution sources during the 2019 survey. All the shellfish areas adjacent to the businesses meet their present area classifications.

No small individual storage tanks for gasoline and diesel were noted outside of Prohibited areas in the growing area. These tanks are near the shore. Tanks have containment walls and booms in the event of an accidental leak in a tank or spillage when unloading. The oil response team from the Maine DEP contacts



Maine Marine Resources when a spill occurs, and a decision will be made whether a shellfish closure is necessary.

Marinas

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. Small mooring fields are scattered throughout the growing area with the largest number (groups of 10 or more moorings) of boats in Surry, Ellsworth, Mount Desert, and Tremont. There is a boat pump out facility at the Ellsworth Town Landing and two in Bass Harbor at Morris Yachts and Up Harbor Marina. All three are enclosed in prohibited areas.

Minor anchorages at Carrying Place in Surry, Bartlett Island and Bartlett's Landing in Mount Desert and at Seal Cove in Tremont serve as mooring areas for day use lobster fishing boats and day use sail and pleasure boats. These boats are generally unoccupied while anchored in the marina and are not identified as a pollution risk due to the number of boats and types of usage. Sample stations at these anchorages monitor for any changes in pollution due to boating activity.

There is one operating marina in growing area EG in located in the Prohibited area around the Ellsworth WWTF discharge (Pollution Area 40 (A.1)). It provides a marine pump out station, gas pump, public restrooms, and about 24 pleasure boats seasonally. This marina does not require any further evaluation due to its location in the prohibited area.

Bass Harbor (Pollution Area 42 (A.2)) is a major anchorage with two marine pump-out stations. Approximately 170 boats can be observed in a summer aerial photograph of the harbor. Most are day use fishing or recreational boats. Using a 10% occupancy rate of vessels with two persons on each vessel the anchorage dilution is estimated to be 26.3 acres. This anchorage is enclosed in a 684-acre Prohibited area due to the presence of the anchorage, 21 OBDs, and historically poor water quality at now inactive water quality stations in the harbor. Water quality station EG36.06 monitors the boundary of the Prohibited area.

Storm water

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

The primary method to control storm water discharges is the use of best management practices (BMPs). In addition, most major storm water discharges are considered point sources and require coverage under a NPDES permit. In 1990, under authority of the Clean Water Act, the U.S. EPA promulgated Phase I of its storm water management program, requiring permitting through the National Pollution Discharge Elimination System (NPDES). The Phase I program covered three categories of discharges: (1)



“medium” and “large” Municipal Separate Storm Sewer Systems (MS4s) generally serving populations over 100,000, (2) construction activity disturbing 5 acres of land or greater, and (3) ten categories of industrial activity. In 1999, US EPA issued Phase II of the storm water management program, expanding the Phase I program to include all urbanized areas and smaller construction sites.

Although it is a federal program, EPA has delegated its authority to the Maine DEP to administer the Phase II Small MS4 General Permit. Under the Small MS4 GP, each municipality must implement the following six Minimum Control Measures: (1) Public education and outreach, (2) Public participation, (3) Illicit discharge detection and elimination, (4) Construction site storm water runoff control, (5) Post-construction storm water management, and (6) Pollution prevention/good housekeeping. The permit requires each city or town to develop a draft Storm Water Management Plan that establishes measurable goals for each of the Minimum Control Measures. The City or Town must document the implementation of the Plan, and provide annual reports to the Maine DEP. Currently the discharge of storm water from 30 Maine municipalities is regulated under the Phase II Small MS4 General Permit however, no municipalities located within the boundaries of growing area EG fall under these regulations. Additionally, the Maine Storm Water Management Law provides storm water standards for projects located in organized areas that include one acre of more of disturbed area (Maine DEP 2009).

The city of Ellsworth has a storm water collection system which serves downtown Ellsworth, High Street, and portions of the city located on the western shore of the Union River. Storm water enters either Card Brook or the Union River directly. Past studies have shown that this urban runoff does contain fecal coliform pollution and represents a threat to the water quality in the river. This portion of the Union River is prohibited because of the WWTF.

Along roadways several storm water pipes and ditches of varying diameters were identified during the shoreline surveys. No specific impact from the storm drains has been identified.

Non-Point Pollution Sources

Non-point source (NPS) pollution is water pollution affecting a water body from diffuse sources, such as polluted runoff from agricultural areas draining into a river, significant rainfall, high river flows or astronomical high tides. Nonpoint source pollution can be contrasted with point source pollution, where discharges occur to a body of water at a sole location, such as discharges from a chemical factory, urban runoff from a roadway storm drain or from ships at sea. NPS may derive from various sources with no specific solution to rectify the problem, making it difficult to regulate. Freshwater streams, drainage from rainstorm runoff and tidal creeks can be a significant source of non-point discharge into Growing Area EG. A total of 105 samples were taken from freshwater streams during the review period (Table 5 and Figures 2 & 3).

Streams associated with consistently high scores are monitored to determine if they affect the water quality of growing area waters. The mouth of the stream at stream stations EG019-129 is enclosed in a Conditionally Approved area due to a seasonal decline in water quality at the water quality station adjacent to streams (EG20).



Table 5. Stream Samples in Growing Area EG 2008-2019; Scores > 163 cfu/100ml are highlighted in red.

Pollution Area	Location ID	Sample Date	Pollution Type	Score cfu/100ml
40 (E.1)	EG004-119	11/14/2018	Stream	64
40 (E.1)	EG004-119	10/15/2019	Stream	22
40 (E.1)	EG005-120	11/14/2018	Stream	54
40 (A.1)	EG005-121	8/25/2010	Stream	92
40 (A.1)	EG005-121	11/14/2018	Stream	9.1
40 (A.1)	EG005-121	10/15/2019	Stream	<2
40 (A.1)	EG006-122	8/18/2010	Stream	31
40 (A.1)	EG006-122	9/28/2010	Stream	220
40 (A.1)	EG006-122	10/5/2010	Stream	12
40 (A.1)	EG006-122	4/26/2011	Stream	54
40 (A.1)	EG006-122	5/3/2011	Stream	8
40 (A.1)	EG006-122	5/17/2011	Stream	35
40 (A.1)	EG006-122	8/2/2011	Stream	1260
40 (A.1)	EG006-122	8/8/2011	Stream	580
40 (A.1)	EG006-122	8/16/2011	Stream	920
40 (A.1)	EG006-122	11/14/2018	Stream	144
40 (A.1)	EG006-122	10/15/2019	Stream	16
40 (A.1)	EG006-123	8/25/2010	Stream	42
40 (A.1)	EG006-123	9/28/2010	Stream	56
40 (A.1)	EG006-123	10/5/2010	Stream	34
40 (A.1)	EG006-123	4/26/2011	Stream	24
40 (A.1)	EG006-123	5/3/2011	Stream	5.4
40 (A.1)	EG006-123	5/17/2011	Stream	35
40 (A.1)	EG006-123	8/2/2011	Stream	42
40 (A.1)	EG006-123	8/8/2011	Stream	20
40 (A.1)	EG006-123	8/16/2011	Stream	42
40 (A.1)	EG006-123	11/14/2018	Stream	136
40 (A.1)	EG006-123	10/15/2019	Stream	14
40 (A.1)	EG006-124	8/18/2010	Stream	114
40 (A.1)	EG006-124	10/5/2010	Stream	42
40 (A.1)	EG006-124	11/14/2018	Stream	44
40 (A.1)	EG006-124	10/15/2019	Stream	72
40 (A.1)	EG007-125	8/18/2010	Stream	31



Pollution Area	Location ID	Sample Date	Pollution Type	Score cfu/100ml
40 (A.1)	EG007-125	4/26/2011	Stream	22
40 (A.1)	EG007-125	5/3/2011	Stream	2
40 (A.1)	EG007-125	5/17/2011	Stream	44
40 (A.1)	EG007-125	6/7/2011	Stream	34
40 (A.1)	EG007-125	6/13/2011	Stream	46
40 (A.1)	EG007-125	8/2/2011	Stream	280
40 (A.1)	EG007-125	8/8/2011	Stream	380
40 (A.1)	EG007-125	8/16/2011	Stream	800
40 (A.1)	EG007-125	10/15/2019	Stream	16
40 (A.1)	EG011-129	11/14/2018	Stream	122
40 (A.1)	EG011-129	9/24/2019	Stream	6
40 (A.1)	EG014-127	8/25/2010	Stream	460
40 (A.1)	EG014-127	10/5/2010	Stream	29
40 (A.1)	EG014-127	12/1/2010	Stream	<2
40 (A.1)	EG014-127	11/14/2018	Stream	100
40 (A.1)	EG014-127	9/24/2019	Stream	18
40 (A.2)	EG016-128	8/25/2010	Stream	28
40 (A.2)	EG016-128	10/5/2010	Stream	42
40 (A.2)	EG016-128	11/15/2010	Stream	<2
40 (A.2)	EG016-128	12/1/2010	Stream	<2
40 (A.2)	EG016-128	8/16/2011	Stream	24
40 (A.2)	EG016-128	11/14/2018	Stream	180
40 (A.2)	EG016-128	9/24/2019	Stream	9.1
40 (D.1)	EG019-129	7/21/2010	Stream	98
40 (D.1)	EG019-129	8/25/2010	Stream	220
40 (D.1)	EG019-129	11/15/2010	Stream	20
40 (D.1)	EG019-129	12/1/2010	Stream	12
40 (D.1)	EG019-129	6/7/2011	Stream	20
40 (D.1)	EG019-129	8/2/2011	Stream	>1600
40 (D.1)	EG019-129	8/8/2011	Stream	260
40 (D.1)	EG019-129	8/16/2011	Stream	500
40 (D.1)	EG019-129	5/11/2016	Stream	2
40 (D.1)	EG019-129	8/8/2016	Stream	700
40 (D.1)	EG019-129	11/14/2018	Stream	360
40 (D.1)	EG019-129	9/24/2019	Stream	180
42	EG025-130	9/28/2010	Stream	1520



Pollution Area	Location ID	Sample Date	Pollution Type	Score cfu/100ml
42	EG025-130	10/5/2010	Stream	124
42	EG025-130	8/18/2011	Stream	160
42	EG025-130	5/11/2016	Stream	24
42	EG025-130	8/8/2016	Stream	8
42	EG025-130	11/14/2018	Stream	240
42	EG025-131	9/28/2010	Stream	12
42	EG025-131	10/5/2010	Stream	500
42	EG025-131	11/15/2010	Stream	18
42	EG025-131	12/7/2010	Stream	40
42	EG025-131	5/10/2011	Stream	29
42	EG025-131	8/2/2011	Stream	62
42	EG025-131	8/17/2011	Stream	29
42	EG025-131	8/31/2011	Stream	68
42	EG025-132	9/28/2010	Stream	44
42	EG025-133	9/28/2010	Stream	2
42	EG025-133	10/5/2010	Stream	25
42	EG025-134	9/28/2010	Stream	86
42	EG025-134	10/5/2010	Stream	38
42	EG026-135	10/5/2010	Stream	46
42	EG026-135	5/23/2011	Stream	14
42	EG026-135	8/17/2011	Stream	4
42	EG026-135	8/31/2011	Stream	60
42	EG026-135	5/11/2016	Stream	4
42	EG026-135	8/8/2016	Stream	6
42	EG026-135	11/14/2018	Stream	136
42	EG026-135	9/24/2019	Stream	<2
42	EG033-136	11/14/2018	Stream	140
42	EG038-137	12/1/2010	Stream	2
42	EG038-137	5/11/2016	Stream	20
42	EG038-137	11/14/2018	Stream	92
42	EG040-138	5/11/2016	Stream	2
42	EG040-138	8/8/2016	Stream	2
42	EG040-138	11/14/2018	Stream	150
42	EG042-139	5/11/2016	Stream	2
42	EG042-139	11/14/2018	Stream	26
42	EG042-139	9/24/2019	Stream	36



Agricultural Activities

There are no large-scale agriculture activities in Growing Area EG. One small farm with horses was noted at Seal Cove in Tremont. This farm does not appear to be directly impacting the growing area during the 2019 shoreline survey. Pollution from small agriculture operations can be introduced into the growing area as nonpoint source pollution transported by runoff from large rainfall or snowmelt events. Smaller farms are encouraged to follow best management practices to help avoid effects animal waste and agricultural pollutants can have on water quality.

Domestic Animals and Wildlife Activity

The salt marshes and mudflats of the growing area provide valuable habitat to a variety of wildlife. Commonly observed bird species include a variety of gulls, sea and inland ducks, cormorants, geese, great blue herons, egrets, swans, and others. Mammals living within the growing area include dogs, cats, whitetail deer, muskrat, squirrels, chipmunks, rabbits, moles, mice, bats, shrews, weasels, skunks, raccoons, and others. Maine Inland Fish and Wildlife surveys indicate that migratory waterfowl numbers begin to increase in the early autumn months, and typically peak in late fall or early winter. Although large numbers of birds can, in theory, pose a threat the growing area water quality, such occurrences are very difficult to document. There are no Federal wildlife sanctuaries in this growing area. Portions of Western Mount Desert Island are located in Acadia National Park, but these lands are primarily inland. Indian Point, Bar Harbor, is part of the Nature Conservancy and is somewhat of a wildlife sanctuary. There is no deer hunting allowed on Mont Desert Island, so a large population of deer exists.

Recreation Areas (beaches, trails, campgrounds, etc.)

The concern for actual or potential pollution from recreational areas is because many of them allow dogs and some have bathroom facilities. Activities at the recreational areas may contribute to water quality problems by placing added pressure on the watershed. For instance, they may contribute to erosion (trails, building footbridges, etc.), dog waste not picked up may accumulate and wash off after rainfall, new trails may be put into areas that didn't have human activity before and they may put added pressure on wildlife to congregate in other places where we may see water quality decline.

This area of the Maine coast is considered a major tourism area. There is a park at Indian Point in Bar Harbor that offers day use only. There are also areas near Ship Harbor and Wonderland in Southwest Harbor that are used for day-hikes by visitors.

There is one large campground in the study area located at the Mount Desert Narrows in the town of Bar Harbor. It has onsite in-ground systems for dealing with sanitary waste. 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 65°F.

The entire growing area is subject to heavy influx of visitors during summer months. The primary destinations are Bar Harbor and Acadia National Park which are generally located in growing area EI.



Hydrographic and Meteorological Assessment

Tides

Coastal Maine experiences a mixed, semi-diurnal tide, with diurnal inequalities that are more pronounced on spring tides. Except for very few isolated areas with extensive saltwater marshes, tides are not considered to be contributors to fecal contamination. The National Oceanic and Atmospheric Administration data for a station at Eastport indicate a mean tidal range of 18.35 ft. The mean tidal range for most of Maine is 9 feet to 13 feet. Unlike areas with small diurnal tides, this extreme volume exchange results in significant bacterial dilutions. Currents in the area are predominantly driven by the tides.

Rainfall

The mean annual precipitation in growing area EG is approximately 44 inches and the precipitation is not evenly distributed throughout the year. The wettest months are generally April and November while August is typically the driest month. Much of the precipitation in the winter comes as snow and may affect runoff rates in spring upon melting. Flood closures are implemented when areas receive greater than two inches of rainfall in a twenty-four-hour period. Rainfall is monitored by numerous rain gauges located along the entire Maine coast and reported primarily through the Weather Underground website. Some areas of Maine have documented fecal influences resulting from rainfall of greater than one inch in a twenty-four-hour period. These areas are considered rainfall conditional areas and are Conditionally Approved based on the one-inch closure trigger. No rainfall areas have been identified in growing area EG.

Maine DMR is working collaboratively with the University of Maine on a statewide coastal project determining how various watershed characteristics influence fecal contamination of marine waters during rainfall events. This research clusters watersheds based on similar characteristics then models how rainfall and associated pollution is distributed. The model is being refined to incorporate margin watershed influences.

Winds

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 nor'easter and can reach 125 knots. In Maine, wind is not a contributor to fecal pollution because marine currents are primarily influenced by the size and duration of the normal tidal cycle.

River Discharge

The Union River is a medium sized river that discharges into the growing area in the northern part of Blue Hill Bay. The mouth of the river is classified as Prohibited due to the presence of a WWTF discharge. The Union River watershed drains the area north of Ellsworth in Hancock County. Due to its manmade origin and control, Graham Lake frequently produces heavily silted flows down into the bay. Some hydrographic work was done 2001 but the work was not completed.



There are many smaller streams that discharge into the growing area and these streams are discussed in the section about nonpoint source pollution. Stream flow in Maine exhibits seasonal variation, with the highest flows occurring in the spring (due to snowmelt, spring rains, and low evapo-transpiration) and the mid-to late fall (due to fall rains and low evapo-transpiration).

Hydrographic Influence

Water circulation in this area is dominated by tides. The mean tidal range for most of Maine is 9 feet to 13 feet. Tides are caused by the gravitational effects of the moon and sun on the ocean; other influences are heavy rainfall, low barometric pressure and strong onshore winds which will increase tides. Tide levels fluctuate during the month based on the positions of the sun, moon and earth. These fluctuations and the speed and direction of the tidal currents constantly change during a tidal cycle. Tidal currents have the greatest energy when water is pushed in and out of bays and channels during the highest and lowest tide levels. Growing area EG is subject to a semidiurnal tidal cycle with approximately two high tides and two low tides per day. The tidal cycle is 12 hours and 25 minutes long, so that high and low tides are about 50 minutes later each day.

Water Quality Studies

Map of Sampling Stations

Most marine fecal pollution of Maine waters comes from non-point sources. DMR uses Systematic Random Sampling (SRS) to monitor this influence and uses a pre-established schedule at an adequate frequency to capture all meteorological, hydrographic and/or other pollution events that trigger non-point pollution contribution. Using SRS will detect intermittent and unfavorable change in water quality and the program accepts the estimated 90th percentile (P90) as the standard to measure variance of a data set.

There are presently 31 active water sampling sites in Growing Area EG (Figure 1-Figure 3). It is recognized that access, icing, and safety considerations prevent some stations from being sampled on scheduled dates. Currently all stations in Growing Area EG meet their current NSSP classification standard. Two water quality stations (EG 16 and 35) now have water quality that meets the standards for approved area harvest and will be evaluated for an upgrade in 2020.

Water Quality Discussion and Classification Determination

P90s for all active stations with a minimum of 30 samples were calculated and all stations meet their classification standards (Table 6, Table 7). Overall the water quality in growing area EG appears to be improving or remaining constant.

Table 6. P90 calculations for stations with a minimum of 30 samples. Geomeans and P90s not meeting current classifications are highlighted in red.

Station	Class	Count	GM	SDV	MAX	P90	Min Date
EG007.50	P	30	7.3	0.56	120	38.5	6/4/2015
EG008.50	P	30	3.6	0.56	280	19.3	6/4/2015
EG009.00	P	30	4.3	0.39	22	13.8	6/4/2015
EG011.00	P	30	3.4	0.47	100	14	6/4/2015
EG016.00	P	30	3.7	0.53	66	18.2	6/4/2015



Station	Class	Count	GM	SDV	MAX	P90	Min Date
EG019.00	A	30	3.6	0.53	260	17.3	7/15/2015
EG020.50	A	30	3.4	0.57	260	18.5	6/4/2015
EG021.00	A	30	3.8	0.54	440	19.1	7/15/2015
EG023.00	A	30	3	0.38	38	9.2	6/18/2015
EG024.00	A	30	3.9	0.47	60	15.9	6/18/2015
EG025.00	A	30	3.8	0.59	340	21.7	6/18/2015
EG026.00	A	30	2	0.1	4	2.8	6/18/2015
EG027.00	A	30	2.2	0.17	10	3.8	6/18/2015
EG028.00	A	30	3	0.31	16	7.7	6/18/2015
EG029.00	A	30	2.1	0.17	10	3.6	6/3/2015
EG030.00	A	30	3.4	0.52	240	15.9	6/3/2015
EG031.00	A	30	4.5	0.54	144	22.6	6/18/2015
EG032.00	A	30	1.9	0	2	1.9	6/18/2015
EG033.90	A	30	2.7	0.41	120	9.3	6/3/2015
EG033.90	A	30	3.2	0.47	120	13.7	5/2/2016
EG035.00	R	30	4.4	0.59	480	25.5	7/15/2015
EG036.00	P	30	2.3	0.32	90	6.2	5/6/2015
EG036.06	P	30	2.5	0.46	640	10	5/6/2015

Emergency Closures: The reports summarizing emergency closures such as flood and biotoxin closures for the entire state are in the DMR central files.

Reclassifications: Reclassification addendums to the sanitary survey report are in the DMR central files.

CAMP Reviews, Inspection Reports, and Performance Standards

Annual Review of C40 Union River Bay, Ellsworth WWTF Conditional Area Management Plan

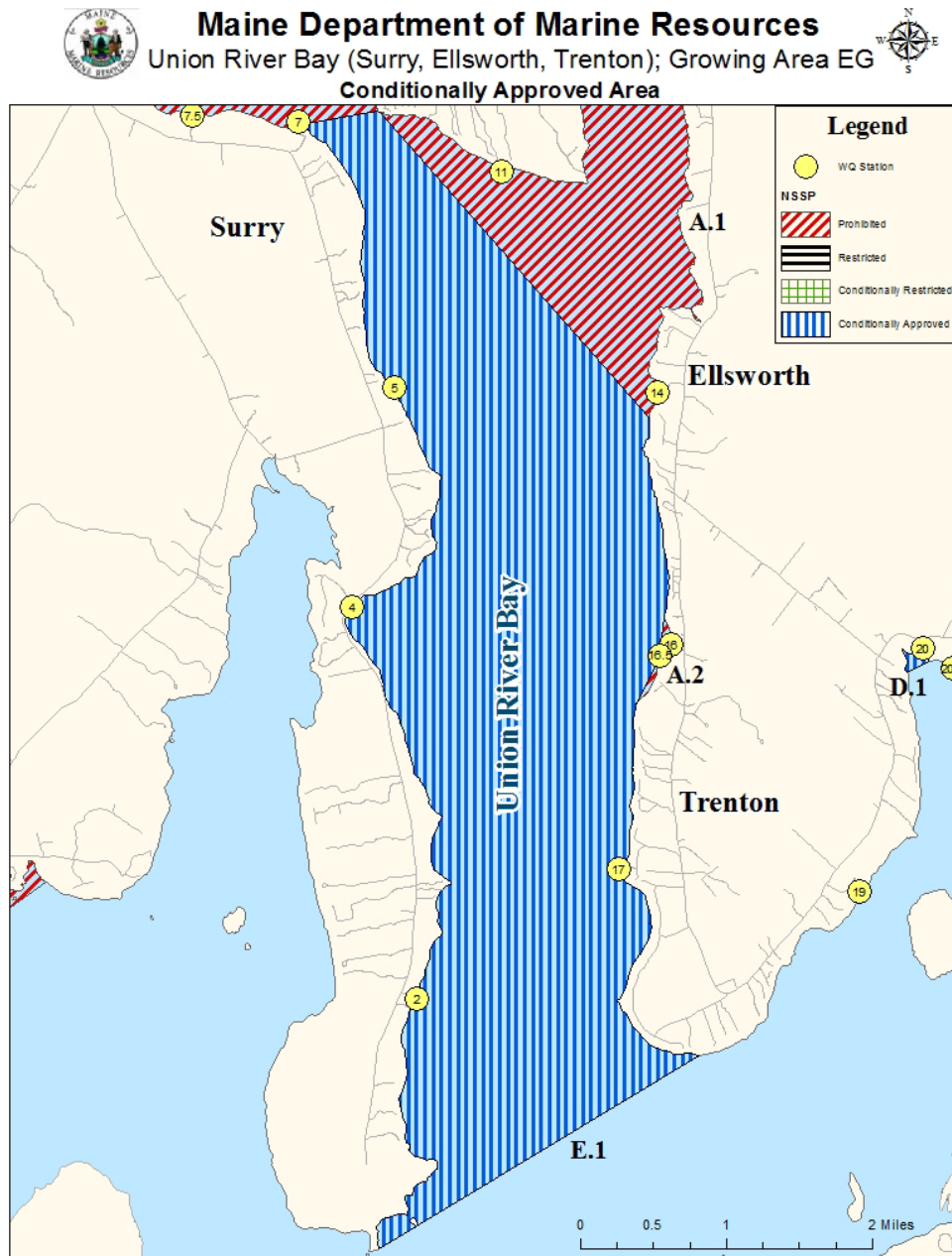
Scope

Pollution Area 40(E.1) in the Union River Bay, Surry, Ellsworth, and Trenton is classified as Conditionally Approved based on operation of the Ellsworth WWTF. This area is north of a line beginning at the southeast tip of burnt point on Newbury Neck (Surry) and running northeast to a red painted post on the shore at the south prominence of oak point (Trenton); AND west of a line beginning at a red painted post on the north shore of the mouth of Heath Cove (approximately 450 yards northwest of where State Route 230 crosses Heath Brook), then running south to a red painted post located on the south shore of the cove (approximately 320 yards west of where State Route 230 crosses Heath Brook), then running southwest to a red painted post on the next prominent point of land (near the end of Fire Lane 253); AND south of a line beginning at a red painted post located on the shore approximately 500 yards south of Bluff Point (Trenton), extending northwest to a red painted post on the most southern prominence of the east side of Contention Cove (Surry), then running west approximately 980 yards



across Patten Bay to the top of Poignant Point (Surry). This area is classified as Conditionally Approved based on WWTF function. This Conditional Area is monitored by water quality stations EG 2, 4, 5, 7, 14, 16.5, and 17.

Figure 4. C40 Union River Bay, Surry, Ellsworth, and Trenton, Conditionally Approved area





Compliance with management plan

The Union River Bay Conditional Area remains in compliance with the current conditional area management plan (CAMP). Waste water treatment facility staff adequately report all bypass events and the area is closed to harvest within the reactionary window for emergency events. See CAMP annual reviews and/or Growing Area annual and triennial reports for information on annual compliance with the current CAMP.

Adequacy of reporting and cooperation of involved persons

The town of Ellsworth has an effective and cooperative local sewage plant operation staff. Waste water treatment facility staff report any sewage bypass events to the department immediately when an untreated sanitary waste discharge occurs. Reporting is done through the Maine Department of Marine Resources website or through the Maine Department of Marine Resources' Pollution Event Reporting Hotline.

Compliance with approved growing area criteria

The area continues to meet the criteria for Approved harvest during the open status based on a P90 calculations of 8.7 cfu/100ml at EG2, 10.6 cfu/100ml at EG4, 22.3 cfu/100ml at EG5, 14.6 cfu/100ml at EG7, 10.2 cfu/100ml at EG14, 17.1 cfu/100ml at EG16.5, and 11.6 cfu/100ml at EG17 during the open status (Table 7) and no other known point sources of pollution.

Water sampling compliance history

Water samples are collected at least monthly during the open status and throughout the year (Table 8). The P90 value meets the standard for Approved harvest during the open status (Table 7).

Analysis-Recommendations

The Union River Bay Conditionally Approved area continues to meet the standards for Approved harvest during the open status and remains in compliance with the CAMP. Recommend continued water quality monitoring and open communication with waste water treatment facility staff to ensure continued compliance with the CAMP Annual Review of C40 Union River Bay, Surry, Ellsworth, and Trenton Conditional Area Management Plan

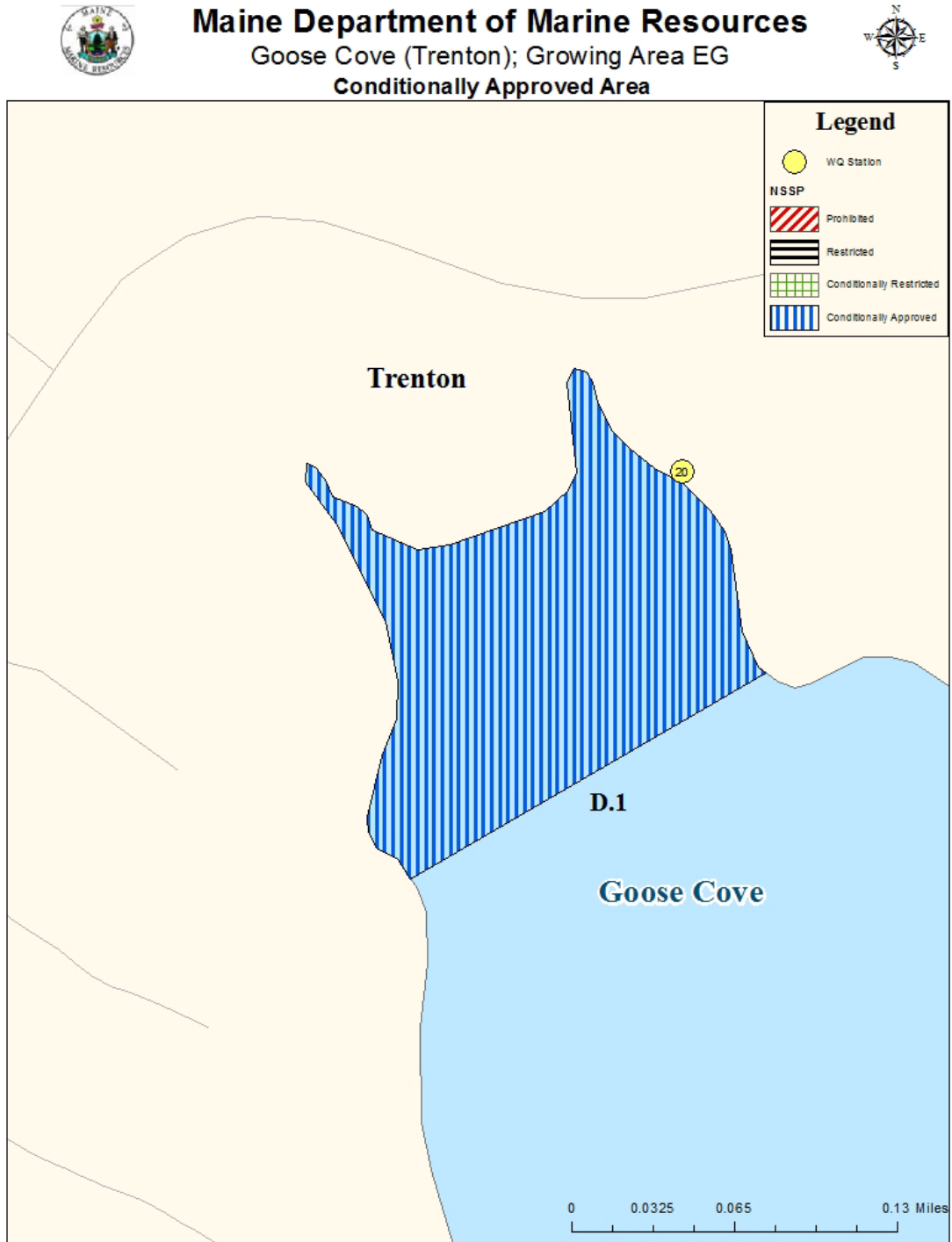
Annual Review C40 Goose Cove, Trenton, Conditional Area Management Plan

Scope

Pollution Area 40(D.1) Goose Cove in Trenton is classified as Conditionally Approved seasonally with the open status for harvest from December 1 through May 31 (Figure 5).. This area is north of a line beginning at a red painted post located on the eastern shore of Goose Cove approximately 375 yards southeast from the mouth of McFarland Brook then running west to a red painted post located on the western shore of the cove approximately 300 yards southwest from the mouth of McFarland Brook. This area is classified as Conditionally Approved based on season. This Conditional Area is monitored by water quality station EG20.



Figure 5. C40 Goose Cove, Trenton, Conditionally Approved





Compliance with management plan

The Goose Cove, Trenton, Conditional Area remains in compliance with the current conditional area management plan (CAMP). The area meets classification for approved harvest during the open status and does not pose a risk to public health. See CAMP annual reviews and/or Growing Area annual and triennial reports for information on annual compliance with the current CAMP.

Adequacy of reporting and cooperation of involved persons

No reporting is required for this Conditional Area.

Compliance with approved growing area criteria

The area continues to meet the criteria for Approved harvest during the open status of December 1 through May 31 based on a P90 calculation of 11 cfu/100ml during the open status and no other known sources of pollution.

Water sampling compliance history

Water samples are collected at least monthly during the open status and throughout the year (Table 8).. The P90 value meets the standard for Approved harvest during the open status (Table 7).

Analysis-Recommendations

The Goose Cove, Trenton, Conditionally Approved area continues to meet the standards for seasonal Approved harvest during the open status and remains in compliance with the CAMP. Recommend continued water quality monitoring to ensure continued compliance with the CAMP.

Table 7. P90s for Conditional Area stations calculated using data from the open status. Geomeans and P90s not meeting current classifications are highlighted in red.

Station	Class	Count	GM	SDV	MAX	P90	Min Date
EG002.00	CA	30	2.7	0.38	86	8.7	7/10/2017
EG004.00	CA	30	3.2	0.4	82	10.6	7/10/2017
EG005.00	CA	30	4.2	0.56	520	22.3	7/10/2017
EG007.00	CA	30	3.4	0.49	124	14.6	7/10/2017
EG014.00	CA	30	3.3	0.37	25	10.2	7/10/2017
EG016.50	CA	30	3.9	0.49	102	17.1	7/10/2017
EG017.00	CA	30	3.2	0.43	78	11.6	7/10/2017
EG020.00	CA	30	3.2	0.41	62	11	12/2/2015

Recommendation for Future Work

Water quality stations EG16 (Heath Brook Cove) and EG35 (Duck Cove) meet the standard for Approved harvest at end of year 2019 and will be evaluated for a possible upgrade in 2020. No stations in growing area EG required a downgrade due to end of year 2019 P90 scores.



Table 8. Count table of samples collected in growing area EG during the 2019 season.

Stations	Class	C	O	Total	Samples Required	Comments
EG002.00	CA	5	12	17	12	Flood run
EG004.00	CA		12	12	12	
EG005.00	CA		12	12	12	
EG007.00	CA		12	12	12	
EG007.50	P	6		6	6	
EG008.50	P	6		6	6	
EG009.00	P	6		6	6	
EG011.00	P	6		6	6	
EG014.00	CA		12	12	12	
EG016.00	P	6		6	6	
EG017.00	CA		12	12	12	
EG019.00	A	4	6	10	6	Flood run
EG020.00	CA	4	7	11	6	
EG020.50	A		6	6	6	
EG021.00	A		6	6	6	
EG023.00	A		6	6	6	
EG024.00	A		6	6	6	
EG025.00	A		6	6	6	
EG026.00	A		6	6	6	
EG027.00	A		6	6	6	
EG028.00	A		6	6	6	
EG029.00	A	5	6	11	6	Flood run
EG030.00	A		6	6	6	
EG031.00	A		6	6	6	
EG032.00	A		6	6	6	
EG033.00	A	5	6	11	6	Flood run
EG033.90	A		11	11	6	
EG035.00	R		6	6	6	
EG036.00	P	6		6	6	
EG036.06	P	6		6	6	



References

National Shellfish Sanitation Program: Guide for the Control of Molluscan Shellfish, 2017 Revision;

Tide and Wind data, GOMOSS Internet site, West Penobscot Bay Buoy, 2001-2003.

Climatic and hydrographic information, US Coast Guard Coastal Pilot, 2005 edition

U.S. Food and Drug Administration (2001). Applied Concepts in Sanitation Surveys of Shellfish Growing Areas: Course #FD2042 (Training Manual), Volumes I and II.

Town information, 2007-2008 Maine Municipal Directory, Maine Municipal Association, Augusta, Maine 04330

Licensed discharge information, Maine Department of Environmental Protection, Augusta, Maine

Data Layers, Maine Office of GIS, Augusta, Maine

Rainfall data, National Weather Service, Caribou, Maine

Maine Combined Sewer Overflow 2016 Status Report, Maine Department of Environmental Protection, April 2017



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.

GM = 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, Approved standard is 31, Restricted standard is 163

Min_Date = oldest date sampled included in the calculations.

X- Investigative Station