GROWING AREA WT

Towns of
Friendship and Cushing

2021
Sanitary Survey Report

Final
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Sanitary Survey Officer signature: _____ Date:_____10/22/22_____

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Executive Summary

This is a sanitary survey report for growing area WT written in compliance with the requirements of the 2019 Model Ordinance and the National Shellfish Sanitation Program. Triennials were written in 2012, 2015 and 2018. The next triennial report for growing area WT is 2024. The next sanitary survey report for growing area WT will be 2034. There are no classification changes planned during the review year. Shoreline survey was conducted in 2014, 2015, 2016, 2017, 2018, 2019 and 2020. There were 306 properties visited during shoreline survey operations resulting in the identification of two problems, outhouses too close to shore on an island. This resulted in the creation of one new Prohibited area. As of December 31st, 2021, one outhouse has been removed. The other problem is still considered outstanding.

Description of Growing Area

Growing Area WT encompasses 33 square miles and is located in Knox County in the area between the southern tip of Martin Point Friendship and the southern tip of Gay Island Cushing. It contains the towns of Friendship (pop. 1,134) and Cushing (pop. 1,495). This growing area also contains numerous small islands. Islands with dwellings on them include: Harbor, Hall, Cranberry, Otter, Friendship, Morse, Gay, Garrison and Crotch. Monhegan Island is an island community located approximately ten miles offshore and is also part of growing area WT. Due to the remote nature of this island and challenges associated with regular monitoring, water quality and harmful algae are not monitored on Monhegan Island. The island and surrounding waters are Prohibited. A detailed boundary description for growing area WT can be found in DMR central files.

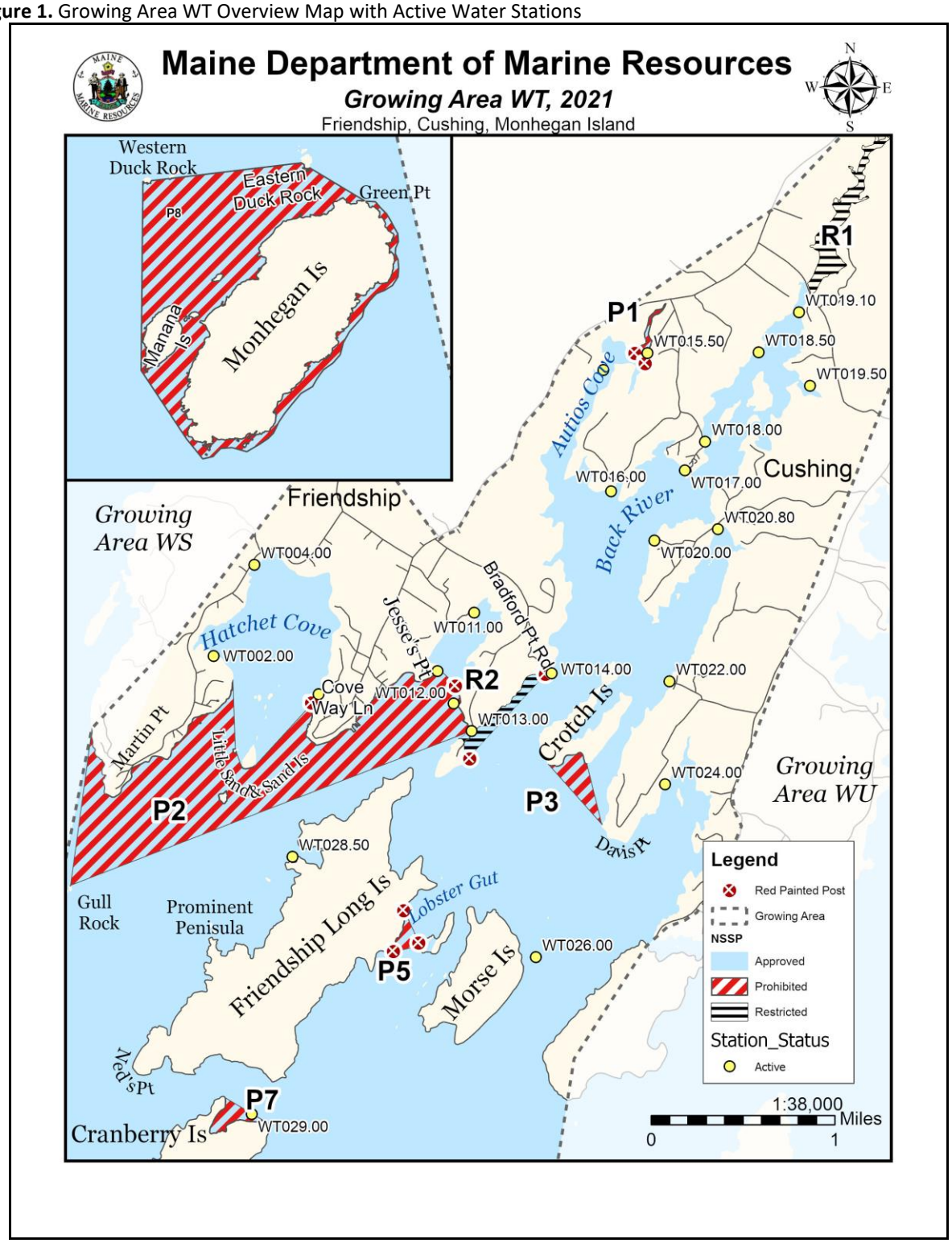
The entire region is very rural. There are no municipal treatment facilities, marinas, or industries in or near shellfish growing area WT. The Meduncook River and Back River are two small rivers that both flat out at low tide. Primary freshwater influence is from streams at the heads of these small rivers. On the islands surface runoff from rainfall is the primary source of freshwater.
The dwellings in this area utilize private in-ground septic systems or licensed overboard discharge systems (OBDs); several outhouses can still be found in this growing area. The mainland and coastal area of Shellfish Growing Area WT has a total of 11 OBDs. All of the OBDs are located in Hatchet Cove and Friendship Harbor. There are an additional 15 active OBDs on Monhegan Island. There were no OBDs removed in Growing Area WT during the 2021 review year.

The town of Friendship has a year-round population of 1,134 as reported by the 2020 census. The most common sources of employment are construction, agriculture/forestry, and fishing. The town of Friendship has a municipal shellfish ordinance in place to manage the shellfish resources of the town. The town of Cushing has a year-round population of 1,495 as reported by the 2020 census. The most common sources of employment are construction, agriculture/ forestry, and fishing. Clam harvesters from the town of Cushing also have a municipal shellfish ordinance in place to manage the shellfish resources of their town. Cushing clam harvesters are part of a five-town management group which allows licensed diggers to dig in any of the participating five towns in the St George River management group. Towns participating in the five-town group include Cushing, Warren, Thomaston, South Thomaston, and St George.

There are three aquaculture leases in Growing Area WT and five Limited Purpose Aquaculture permits (LPAs). Shellfish species licensed for culture include blue mussel, American/eastern oyster, and sea scallops. Kelp species licensed for culture include Sugar, Skinny, Dulse, Winged and Nori.

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

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



History of Growing Area Classification

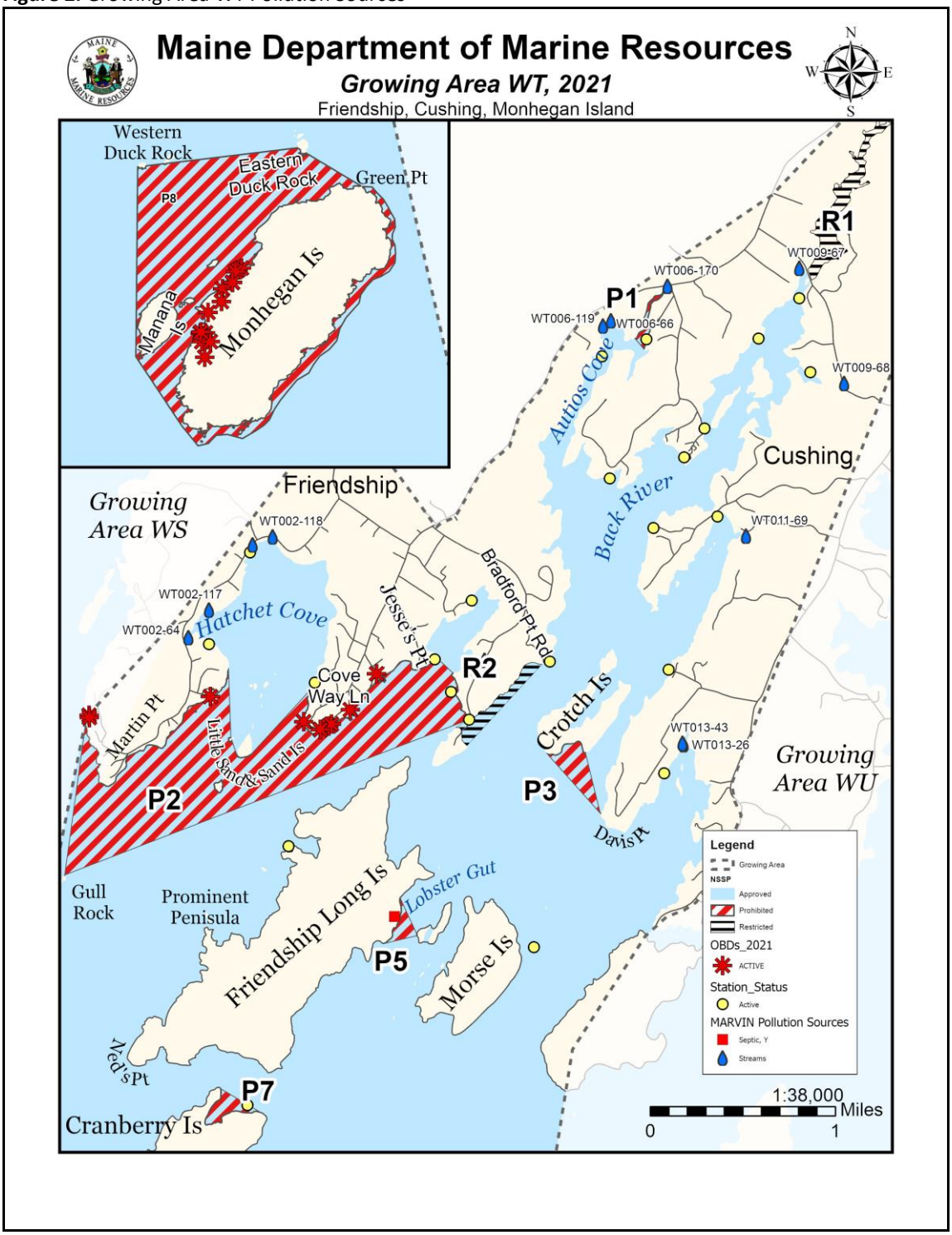
Reclassification addendums to the sanitary survey report are in the DMR central files.

Pollution Sources Survey

Summary of Sources and Location

The growing area shoreline is divided into two-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 WT Pollution Sources



State and Federal Licensed Waste Discharge Permits

Overboard Discharges (OBDs)

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.

There are a total of 24 active OBDs that discharge into the waters of Growing Area WT. Nine OBDs are located in Friendship and discharge into Muscongus Bay. Three of these OBDs share a common discharge. There are 15 active OBDs on Monhegan Island that discharge into the waters of the Atlantic Ocean. Three OBDs have been removed from the Friendship area since the 2009 Sanitary Survey and no OBDs have been removed on Monhegan Island.

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 WT. 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 $1.4X10^5$ 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)

Growing Area Section	DEP Permit ID	Location	Receiving	FLOW (GPD)	Required Closure (acres)	Actual Closure (acres)
P2	6626	Friendship	Hatchet Cove	300	1.2	>585
P2	2080	Friendship	Hatchet Cove	540	3.3	>585
P2	2094	Friendship	Muscongus Bay	450	2.8	>585
P2	9142	Friendship	Muscongus Bay	450	2.8	>585
P2	9143	Friendship	Muscongus Bay	360	2.2	>585
P2	5093	Friendship	Muscongus Bay	300	1.8	>585
P2	2515	Friendship	Muscongus Bay	300	1.8	>585
P2	3011	Friendship	Muscongus Bay	300	1.8	>585
P2	1543	Friendship	Muscongus Bay	300	1.8	>585
P8	1397	Monhegan Is.	Atlantic Ocean	660	1.8	>490
P8	1404	Monhegan Is.	Atlantic Ocean	600	1.7	>490
P8	7629	Monhegan Is.	Atlantic Ocean	4800	13.4	>490
P8	6260	Monhegan Is.	Atlantic Ocean	1700	4.7	>490
P8	1369	Monhegan Is.	Atlantic Ocean	9300	25.9	>490
P8	7628	Monhegan Is.	Atlantic Ocean	1000	2.8	>490
P8	7807	Monhegan Is.	Atlantic Ocean	1645	4.6	>490
P8	1377	Monhegan Is.	Atlantic Ocean	300	0.6	>490
P8	1402	Monhegan Is.	Atlantic Ocean	300	0.6	>490
P8	9059	Monhegan Is.	Atlantic Ocean	100	0.2	>490
P8	9071	Monhegan Is.	Atlantic Ocean	600	1.2	>490
P8	9073	Monhegan Is.	Atlantic Ocean	300	0.8	>490
P8	9077	Monhegan Is.	Atlantic Ocean	1999	5.6	>490
P8	9095	Monhegan Is.	Atlantic Ocean	300	0.8	>490
P8	9121	Monhegan Is.	Atlantic Ocean	300	0.6	>490

National Pollutant Discharge Elimination System (NPDES)

Table 2. NPDES Permitted Discharges

Growing Area Section	Permit ID	Type	Facility	Waterbody
P8	ME0037427	POTW-Minor	MONHEGAN HOUSE	Atlantic Ocean
P8	ME0037508	POTW-Minor	THE TRAILING YEW, LLC	Atlantic Ocean

There are two commercial overboard discharges in Growing Area WT on Monhegan Island that require a NPDES permit. Since 2017 the WWTP inspection reports have been available in DMR central files. The wastewater facilities are operated by two of the hotels on the island. The Monhegan House and Trailing Yew Hotel both discharge into Prohibited Areas that are larger in area than the calculated dilution zones for the effluent. Both facilities are small and do not show up on the State's map of discharge facilities.

Monhegan House

The Monhegan House is a 27-room seasonal inn and restaurant complex. The facility is a commercial OBD that discharges into the Atlantic Ocean at Monhegan Harbor. It is a seasonal discharge operating from April 15- November 1st. The wastewater receives secondary treatment from an overboard discharge system designed by Advanced Onsite Solutions. The system consists of 13 tanks, of which there are two 1,500-gallon grease tanks connected to the kitchen. After passing through the grease tanks wastewater flows into three 1,500-gallon septic tanks. Wastewater from the onsite residences and hotel feeds directly into the septic tanks. Effluent from the septic tanks flows into four 1,500-gallon aeration tanks that are filled with plastic media which are connected to sixteen air pumps (4 pumps per tank). From the aeration tanks effluent flows into three 1,500 gallon settling tanks. Wastewater flows from the settling tanks to a 1,500-gallon chlorine contact tank with a tablet fed chlorinator. The contact tank feeds into a pump tank with two pumps which send the treated wastewater to a community outfall pipe which runs from the Monhegan House property downtown roads and across several properties to an outlet located next to the Monhegan Harbor breakwater.

The Trailing Yew

The Trailing Yew is an eight-building seasonal inn and restaurant complex. The facility is a commercial OBD that discharges into the Atlantic Ocean at Monhegan Harbor. All collection sewers to the various buildings are PVC gravity pipes. The Yew building, the restaurant, upstairs guest rooms and the cookhouse are served by two 1,000-gallon grease interceptors and a 1,000-gallon septic tank. This same 1,000-gallon septic tank also services the 8-bedroom Annex. All three tanks are located adjacent to the main Yew building and a long PVC gravity sewer with cleanouts conveys the discharged flow to the main secondary treatment tanks area southwest of the building known as the Seagull. The Seagull guest rooms and attached small laundry and service building, along with four other buildings containing guest rooms and a staff dormitory, are serviced by a 1,000-gallon septic tank prior to entering the main biological treatment system. The main biological treatment system components consist of three *BioCon Model San CR 1500* biological aerobic reactor tanks in series followed by two 1,000-gallon secondary settling tanks. Valving is in place to allow only BioCon units and one settling tank to be online during periods flow. Aeration is supplied by two 6 cfrn quiet aeration pumps per tank. These five tanks are followed by an in-line tab chlorinator followed by a 1,000-gallon contact tank. The final effluent is then discharged by gravity to Monhegan Harbor via a PVC OBD discharge pipe.

Table 3. Growing Area WT NPDES Discharge Dilution Calculations

Facility	Trailing Yew	Monhegan House
FC/100ml	140,000	140,000
Discharge Rate gallons/day	4800	2000
Receiving Depth	45	45
Acres	3.3	1.4

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 WT that are considered discharges into the Growing Area and effect water quality.

Table 4. Growing Area WT Residential Pollution Sources

Town	Pollution ID	Survey Date	Actual or Potential (A or P)	Direct or Indirect (D or I)	Pollution Description	Fixed Y/N	Class	Action Taken
Friendship	WT505-11	18-Sep-20	P	D	Possible outhouse within 50’ of shore	N	P	Reported to LPI

Industrial Pollution

There are no major industrial pollution sites in Growing Area WT such as chemical plants, steel mills, shipyards, or refineries. None of the businesses were identified as pollution sources during routine shoreline survey. All the shellfish areas adjacent to the businesses meet their present area classifications.

Marinas and Mooring Fields

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.

Friendship harbor is the only portion of this growing area that contains large numbers of moorings. Moorings in this area are mainly used by commercial lobster boats. The mooring area in Friendship Harbor is inside a Prohibited area. There are no marinas or mooring fields for pleasure boats.

Stormwater

There are no municipal stormwater collection systems in this growing area. Stormwater drains via overland flow to streams and river, or percolates into the ground.

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 five 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 WT 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).

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 are the major source of non-point discharge into Growing Area WT. A total of 142 samples were taken from freshwater streams during the 2009-2021 review period.

Table 5. Stream Samples in Growing Area WT 2009-2021; Scores > 163 cfu/100ml are highlighted in red.

Growing Area Section	Location ID	Sample Date	Pollution Type	Raw Score
A	WT002-118	10/19/21	Stream	13
A	WT002-64	10/19/21	Stream	76
P1	WT006-170	10/19/21	Stream	82
A	WT006-194	10/19/21	Stream	38
A	WT009-68	10/19/21	Stream	22
A	WT002-118	9/15/21	Stream	110
P1	WT006-170	9/15/21	Stream	18
A	WT006-194	9/15/21	Stream	124
R1	WT009-222	9/15/21	Stream	1480
A	WT009-68	9/15/21	Stream	14
A	WT002-118	5/4/21	Stream	32.7
A	WT002-64	5/4/21	Stream	11
P1	WT006-170	5/4/21	Stream	18
A	WT006-194	5/4/21	Stream	1.9
R1	WT009-222	5/4/21	Stream	10
A	WT009-68	5/4/21	Stream	12

Growing Area Section	Location ID	Sample Date	Pollution Type	Raw Score
A	WT002-118	4/7/21	Stream	1.9
A	WT002-64	4/7/21	Stream	1.9
P1	WT006-170	4/7/21	Stream	1.9
A	WT006-194	4/7/21	Stream	1.9
R1	WT009-222	4/7/21	Stream	1.9
A	WT009-68	4/7/21	Stream	2
A	WT002-118	11/18/20	Stream	16
A	WT002-64	11/18/20	Stream	6
A	WT006-194	11/18/20	Stream	9.1
R1	WT009-222	11/18/20	Stream	30
A	WT009-68	11/18/20	Stream	2
A	WT002-118	10/28/20	Stream	7.3
A	WT002-64	10/28/20	Stream	20
A	WT002-65	10/28/20	Stream	52
P1	WT006-170	10/28/20	Stream	11
A	WT006-194	10/28/20	Stream	18
R1	WT009-222	10/28/20	Stream	22
R1	WT009-223	10/28/20	Stream	1.9
A	WT009-68	10/28/20	Stream	8
A	WT002-64	9/23/20	Stream	4
A	WT006-194	9/23/20	Stream	20
R1	WT009-223	9/23/20	Stream	2
A	WT002-118	8/18/20	Stream	1700
A	WT002-64	8/18/20	Stream	1700
A	WT002-65	8/18/20	Stream	1700
P1	WT006-170	8/18/20	Stream	1700
A	WT006-194	8/18/20	Stream	1700
R1	WT009-222	8/18/20	Stream	1700
R1	WT009-223	8/18/20	Stream	100
A	WT009-68	8/18/20	Stream	1700
A	WT002-118	10/30/18	Stream	13
A	WT002-275	10/30/18	Stream	15
P1	WT006-170	10/30/18	Stream	31
A	WT006-193	10/30/18	Stream	36
A	WT009-67	10/30/18	Stream	180
A	WT009-68	10/30/18	Stream	30
A	WT002-118	9/19/18	Stream	160

Growing Area Section	Location ID	Sample Date	Pollution Type	Raw Score
A	WT002-275	9/19/18	Stream	320
A	WT006-193	9/19/18	Stream	76
A	WT006-193	9/19/18	Stream	134
A	WT009-67	9/19/18	Stream	860
A	WT009-68	9/19/18	Stream	112
A	WT002-118	4/17/18	Stream	280
A	WT002-275	4/17/18	Stream	18
P1	WT006-170	4/17/18	Stream	74
A	WT006-193	4/17/18	Stream	54
A	WT009-67	4/17/18	Stream	62
A	WT009-68	4/17/18	Stream	8
A	WT002-118	9/3/15	Stream	24
A	WT002-64	9/3/15	Stream	3.6
A	WT002-65	9/3/15	Stream	18
P1	WT006-170	9/3/15	Stream	38
A	WT006-66	9/3/15	Stream	64
A	WT009-68	9/3/15	Stream	100
A	WT009-67	7/23/15	Stream	1.9
A	WT009-68	7/23/15	Stream	1.9
A	WT002-118	7/22/15	Stream	160
A	WT002-64	7/22/15	Stream	114
A	WT002-65	7/22/15	Stream	62
P1	WT006-170	7/22/15	Stream	160
A	WT006-66	7/22/15	Stream	72
A	WT002-118	6/24/15	Stream	40
A	WT002-64	6/24/15	Stream	66
A	WT002-65	6/24/15	Stream	108
P1	WT006-170	6/24/15	Stream	180
A	WT006-66	6/24/15	Stream	36
A	WT009-67	6/24/15	Stream	148
A	WT009-68	6/24/15	Stream	48
A	WT002-118	4/14/15	Stream	11
A	WT002-64	4/14/15	Stream	1.9
A	WT002-65	4/14/15	Stream	1.9
P1	WT006-170	4/14/15	Stream	46
A	WT006-66	4/14/15	Stream	1.9
A	WT009-67	4/14/15	Stream	2

Growing Area Section	Location ID	Sample Date	Pollution Type	Raw Score
A	WT009-68	4/14/15	Stream	2
P1	WT006-170	10/9/14	Stream	340
P1	WT006-170	10/1/14	Stream	2
A	WT006-66	10/1/14	Stream	25
P1	WT006-170	9/30/14	Stream	30
A	WT006-66	9/30/14	Stream	18
A	WT006-119	10/15/12	Stream	16
A	WT006-119	10/10/12	Stream	26
A	WT002-118	9/12/12	Stream	22
A	WT002-118	9/12/12	Stream	22
A	WT002-64	9/12/12	Stream	22
A	WT002-64	9/12/12	Stream	22
A	WT002-65	9/12/12	Stream	92
A	WT002-65	9/12/12	Stream	92
A	WT006-119	9/12/12	Stream	36
A	WT006-119	9/12/12	Stream	36
P1	WT006-170	9/12/12	Stream	12
A	WT006-66	9/12/12	Stream	70
A	WT006-66	9/12/12	Stream	70
A	WT009-67	9/12/12	Stream	20
A	WT009-67	9/12/12	Stream	20
A	WT009-68	9/12/12	Stream	130
A	WT009-68	9/12/12	Stream	130
A	WT011-69	9/12/12	Stream	16
A	WT011-69	9/12/12	Stream	16
A	WT013-26	9/12/12	Stream	78
A	WT013-43	9/12/12	Stream	24
A	WT006-119	8/27/12	Stream	56
P1	WT006-170	8/27/12	Stream	24
A	WT006-119	5/24/12	Stream	78
A	WT006-66	5/24/12	Stream	33
A	WT006-119	8/3/10	Stream	31
P1	WT006-170	8/3/10	Stream	100
A	WT009-68	8/3/10	Stream	142
P1	WT006-170	6/16/10	Stream	10
P1	WT006-170	6/9/10	Stream	78
A	WT006-119	6/7/10	Stream	96

Growing Area Section	Location ID	Sample Date	Pollution Type	Raw Score
P1	WT006-170	6/7/10	Stream	240
A	WT009-68	6/7/10	Stream	42
A	WT006-119	6/2/10	Stream	120
A	WT009-68	6/2/10	Stream	260
A	WT004-25	3/17/10	Stream	102
A	WT002-117	8/27/09	Stream	31
A	WT002-118	8/27/09	Stream	72
A	WT002-64	8/27/09	Stream	60
A	WT002-65	8/27/09	Stream	56
A	WT004-25	8/27/09	Stream	1700
A	WT006-119	8/27/09	Stream	142
A	WT006-66	8/27/09	Stream	46
A	WT009-67	8/27/09	Stream	640
A	WT009-68	8/27/09	Stream	69
A	WT006-119	4/27/09	Stream	4

Agricultural Activities

Shellfish Growing Area WT has very few farming operations near the shore. The farms consist of small back yard paddocks consisting of one or more horses, some chickens, sheep, or a few goats. On Blueberry Lane, in east Friendship, there is a blueberry field consisting of approximately 50 acres on a rise above the Meduncook River. The blueberry fields are located at least 400 feet from the shore. The fields at this site are burned annually. No information is available regarding fertilization practices. Smaller farms are encouraged to follow best management practices to help avoid effects animal waste and agricultural pollutants can have on water quality. Small farms did not appear to be directly impacting the Growing Area during routine shoreline survey.

Wildlife Activity

The fields, back coves, 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.

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

There are no large parks, public beaches, or campgrounds in Growing Area WT. Most of the shoreline is privately owned and there are few public access points. A boat ramp at the end of Bradford Point Road is a popular location for kayakers to launch boats and is often a popular "hangout" spot. Dogs are occasionally seen at the launch area. Friendship can be popular with transient boaters and a couple of coves could provide anchorage although there are no large areas that are popular for anchoring. There are four nature preserves with recreational trails in the Growing Area. Martin Point Wildlife Refuge and Nelson Nature Preserve are located on the western side of the Growing Area with Cross Cushing Nature Preserve and Pleasant Point Preserve on the eastern side. Only Cross Cushing and Martin Point preserves have trails that go to the shore. Nelson Nature and Pleasant Point preserves have trails that are all greater than 500 feet from the shore.

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 feet. The mean tidal range for most of Maine is nine 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 WT is approximately 47 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 WT.

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

Shellfish growing area WT has two small river systems within the growing area boundaries. Back River and Meduncook River both flat out at low tide and both river systems flow from wetland areas. Back River has two streams that flow into the head of the river. Pollution sources have been found along streams. There are not currently any outstanding problems. The Meduncook River flows from a large wetland area that forms a salt pond before draining into the river at sampling station WT19. This area was downgraded in classification from Approved to Restricted on June 20, 2007 due to deteriorating water quality.

Due to the small size of both of these river systems, no river flow monitoring has been done. The greatest freshwater impact to the water quality in this area comes from the streams at the head of these small rivers, the stream at station WT019.50 and the stream at the head of Hornbarn Cove in Cushing.

Hydrographic Influence

Water circulation in Muscongus Bay is dominated by tides. The tidal range in Muscongus Bay is approximately 10 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 WT is subject to a semidiurnal tidal cycle with 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 50 minutes later each day.

Water Quality Studies

A map of sampling stations is available in the overview section of this document.
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 currently 24 active water sampling sites in Growing Area WT. It is recognized that access, icing and safety considerations can prevent some stations from being sampled on scheduled dates. Currently all stations in Growing Area WT meet their current NSSP classification standard.

Water Quality Discussion and Classification Determination

Table 6. P90 calculations for stations with a minimum of 30 samples.

Station	Class	Count	GM	SDV	MAX	P90	Min_Date
WT002.00	A	30	3.7	0.46	140	15	10/18/2016
WT004.00	A	30	3.2	0.43	160	12	10/18/2016
WT008.00	A	30	2.4	0.28	28	5.5	10/18/2016
WT011.00	A	30	2.5	0.25	20	5.4	10/18/2016
WT014.00	A	30	2.1	0.17	14	3.5	5/24/2017
WT015.00	A	30	3.1	0.36	29	9.5	10/18/2016
WT015.50	A	30	3.6	0.38	42	11	12/14/2016
WT016.00	A	30	3.2	0.39	64	10	12/14/2016
WT017.00	A	30	3	0.45	102	12	12/14/2016
WT018.00	A	30	3.1	0.39	60	10	10/18/2016
WT018.50	A	30	2.9	0.34	35	8.2	10/18/2016
WT019.10	A	30	4.1	0.4	27	14	10/18/2016
WT019.50	A	30	3.4	0.38	22	11	10/18/2016
WT020.00	A	30	2.2	0.18	11	3.9	10/18/2016
WT020.80	A	30	3.2	0.37	44	9.7	12/14/2016
WT022.00	A	30	2.6	0.26	22	5.8	10/18/2016
WT024.00	A	30	3.4	0.59	1700	20	10/18/2016
WT026.00	A	30	2	0.09	5.5	2.6	5/24/2017
WT028.50	A	30	1.9	0.05	4	2.3	5/24/2017
WT031.00	A	30	1.9	0.08	5.5	2.5	5/24/2017
WT010.00	P	30	6	0.74	1700	55	10/18/2016
WT012.00	P	30	4.1	0.58	260	23	10/18/2016
WT029.00	P	30	2	0.1	5.5	2.7	5/24/2017
WT013.00	R	30	4.8	0.68	480	36	10/18/2016

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

There are no conditional areas in growing area WT.

Recommendation for Future Work

There are no classification changes planned during the review year. All water quality stations meet their respective classification standard. Streams should continue to be sampled to monitor their potential impact on growing area waters. Tidal influence on pollution input should also be investigated if water quality appears to degrade. Growing area WU to the east is influenced by seasonal high-tides and has Conditional Areas that are managed based on tidal height.

Table 7. Count table of samples collected in Growing Area WT during the 2021 season

Station	Class	Closed	Open	Samples Required
WT002.00	A		6	6
WT004.00	A		6	6
WT008.00	A		6	6
WT010.00	P	6		6
WT011.00	A		6	6
WT012.00	P	6		6
WT013.00	R		6	6
WT014.00	A		6	6
WT015.00	A		6	6
WT015.50	A		6	6
WT016.00	A		6	6
WT017.00	A		6	6
WT018.00	A		6	6
WT018.50	A		6	6
WT019.10	A		6	6
WT019.50	A		6	6
WT020.00	A		6	6
WT020.80	A		6	6
WT022.00	A		6	6
WT024.00	A		6	6

Station	Class	Closed	Open	Samples Required
WT026.00	A		6	6
WT028.50	A		6	6
WT029.00	P	6		6
WT031.00	A		6	6

References

National Shellfish Sanitation Program: Guide for the Control of Molluscan Shellfish, 2019 Revision;
Town Information, Maine Census Data, https://www.maine.gov/dep
NPDES Data, https://www.epa.gov/npdes-permits/maine-final-individual-npdes-permits
Precipitation Information, https://www.weatherbase.com/
U.S. Food and Drug Administration. Applied Concepts in Sanitation Surveys of Shellfish Growing Areas: Course #FD2042 (Training Manual), Volumes I and II.
Licensed discharge information, Maine Department of Environmental Protection, Augusta, Maine
Data Layers, Maine Office of GIS, Augusta, Maine

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

Reference Material

An interactive map is available on the DMR website for reference. This map includes water quality station locations, end of year P90 scores, current classifications, and other information.
https://www.maine.gov/dmr/shellfish-sanitation-management/maps/index.html