GROWING AREA WQ

Damariscotta River
Boothbay, Edgecomb, Newcastle, Nobleboro, Damariscotta, and South Bristol

Sanitary Survey Report

2012 - 2023

Final

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August 2024

Sanitary Survey Officer signature: _____ **Date:**____**9/30/24**_____

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Executive Summary

This is a Sanitary Survey report for Growing Area WQ in Lincoln County written in compliance with the requirements of the 2019 Model Ordinance and the National Shellfish Sanitation Program. There are no classification changes planned during the review year. There was one new actual pollution source found through shoreline survey during this twelve-year period, and no new potential pollution sources found. No new prohibited areas were created as the new pollution source was already located within a Prohibited area. Access was denied at four properties. The next sanitary survey is due in 2035 and the next triennial in 2026.

Description of Growing Area

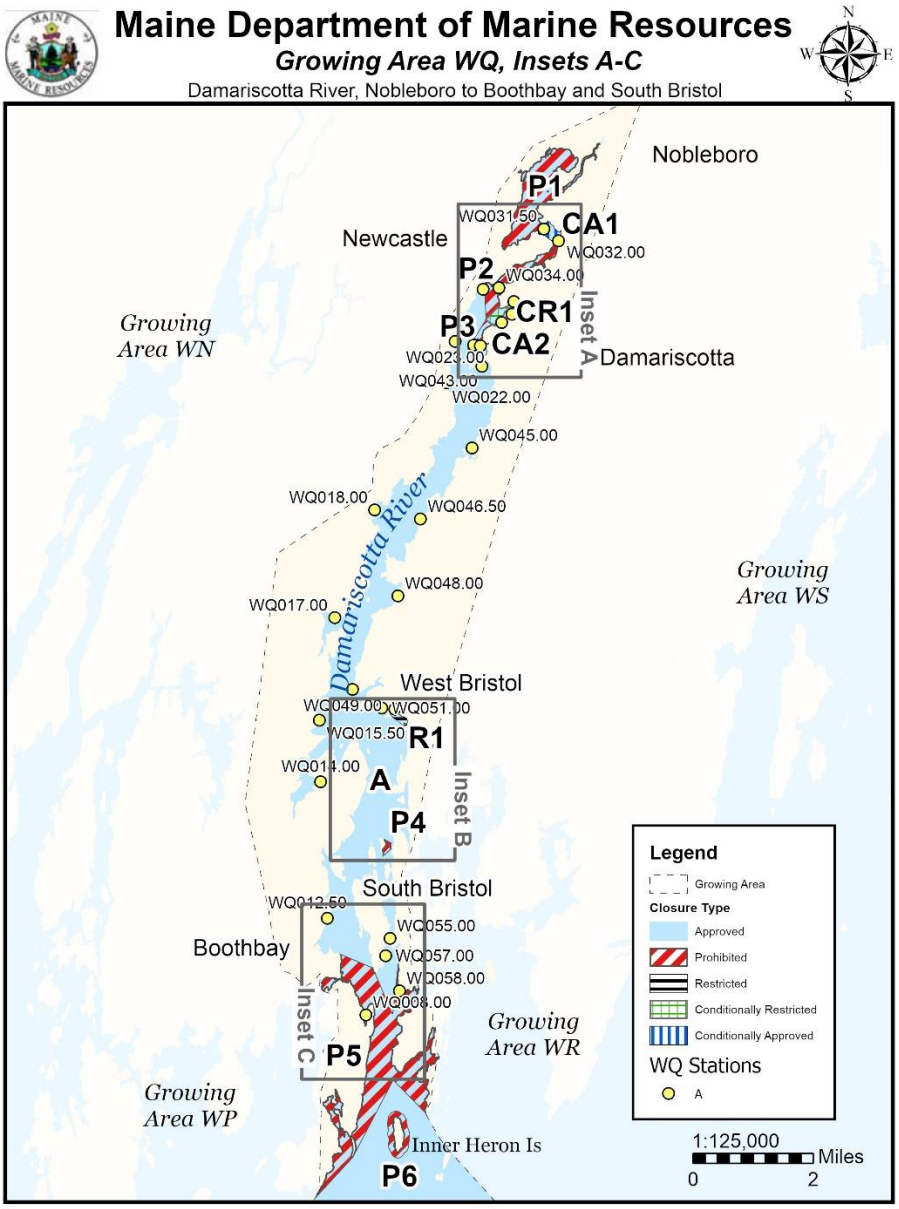
Growing Area WQ encompasses 49 square miles and is centered on the Damariscotta River in Lincoln County, Maine. The shoreline included in this growing area stretches from the northern point of the Damariscotta River in Nobleboro to the rivers southern point in Boothbay and South Bristol. The Growing Area includes the towns of Boothbay (pop. 3,003), Edgecomb (pop. 1,188), Newcastle (pop. 660), Damariscotta (pop. 1,193), South Bristol (pop. 1,127), and Nobleboro (pop. 1,791) (2020 Census). The largest population concentration is in Boothbay, with many seasonal residents (June-September). Development along the shoreline is spotty with clusters of homes separated by undeveloped land. The northernmost and southernmost sections of the Damariscotta River are the most heavily developed areas along the river. There are two wastewater treatment plants (WWTPs), located in Damariscotta and Nobleboro (Damariscotta Mills). There are 36 licensed overboard discharges (OBDs), no OBDs were removed in Growing Area WQ during the 2023 review year.

Shellfish Growing Area WQ includes all the shores, flats, and coves stretching from the northern tip of the Damariscotta River in Nobleboro to the southern tip of the river in Boothbay and South Bristol. The upland cover is primarily deciduous, some evergreens and wetland forest with some development scattered throughout. Freshwater influence along these shores is predominately from numerous brooks and small streams throughout the growing area. Damariscotta Lake, located just to the north of the growing area, is another significant source of freshwater influence. Wildlife in the area includes migrating birds, various rodents, deer, harbor seals, etcetera. Substantial numbers of rafted ducks are seen in the fall.

There are 28 active shellfish aquaculture leases, and 92 active shellfish Limited Purpose Aquaculture permits (LPAs) in this growing area. There are 11 wet storage permits issued to certified shellfish dealers in this area, all of which are offshore systems.

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 WQ Overview Map with Active Water Quality Stations



This map is provided as a courtesy. Read the provided legal notice for closure details. Closures are not shown outside of the designated growing area. Maritime navigational aids are for reference only and are not suitable for maritime navigation.

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 WQ, Inset Map A

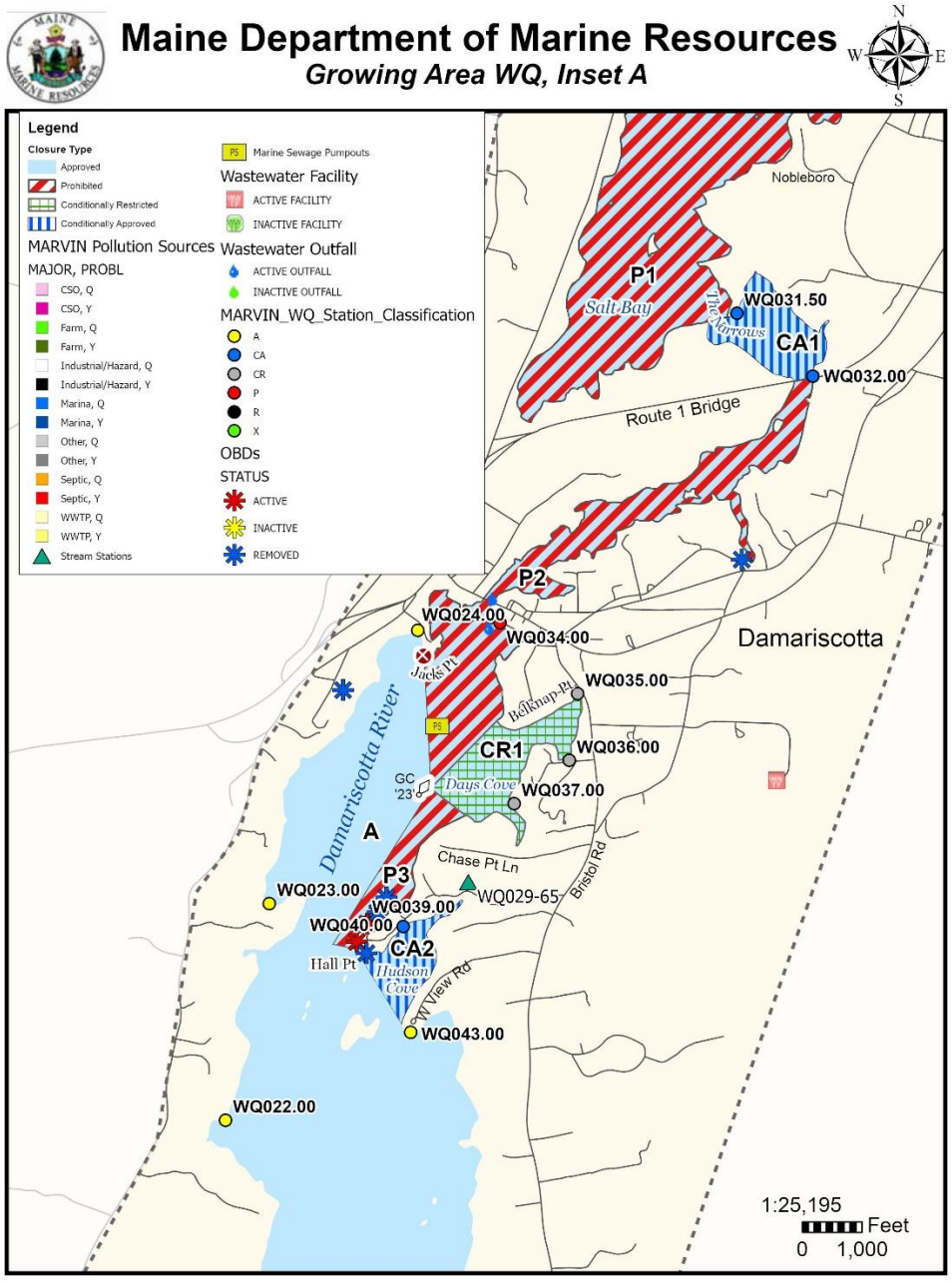
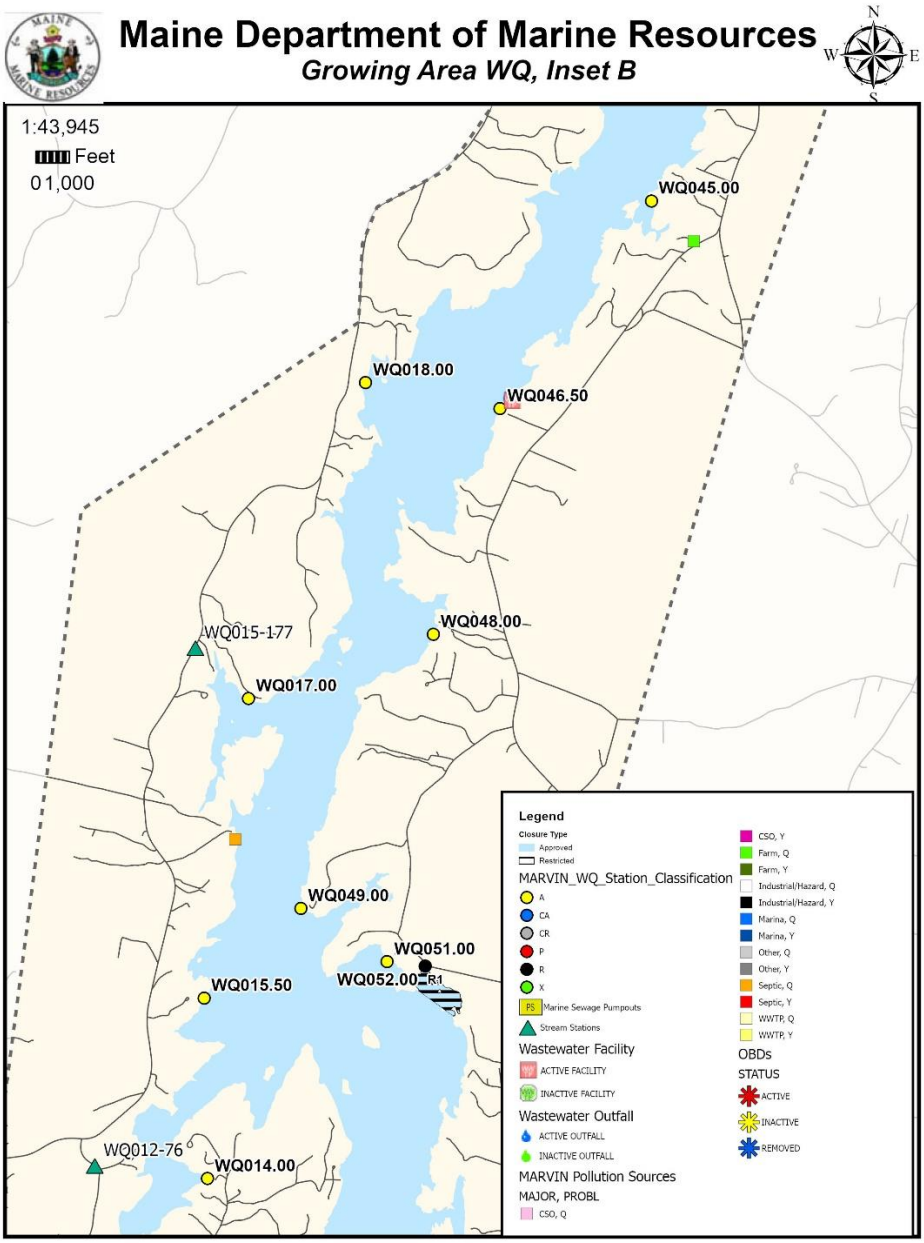
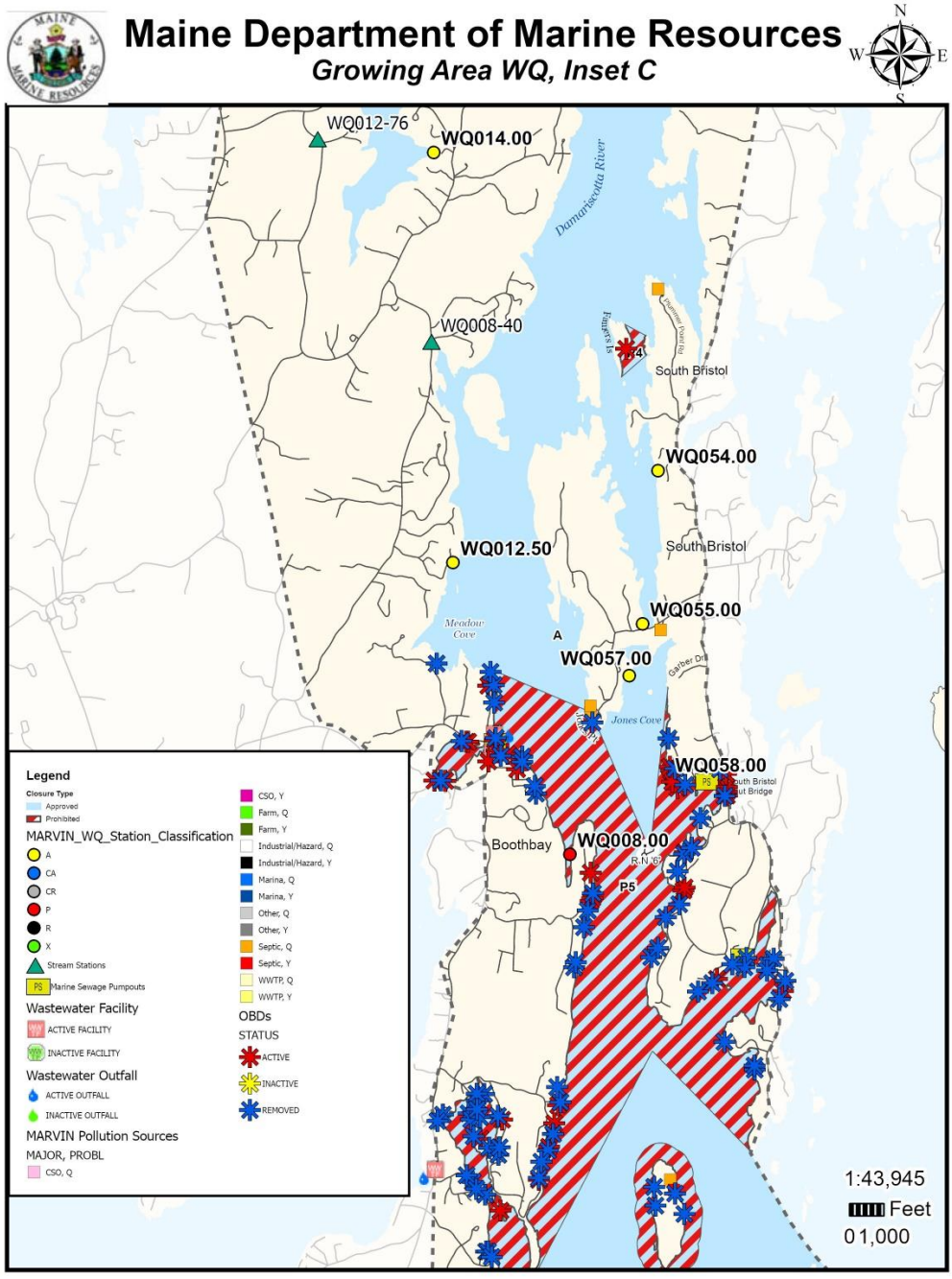


Figure 3. Growing Area WQ, Pollution Map B*



*Permit #ME0037451, Mook Sea Farm, is a permit to discharge process water only. It does not impact water quality and there is no closure necessary. (WWTF symbol next to station WQ046.50)

Figure 4. Growing Area WQ, Pollution Map C



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 36 active overboard discharges (OBDs) that discharge their treated effluent into the waters of Growing Area WQ. Nineteen OBDs are located in Boothbay, three are located in Damariscotta, and fourteen are in South Bristol. All OBDs discharge into the Damariscotta River. No OBDs were removed in the 2023 review year, but a total of 39 OBDs have been removed over the past twelve review years.

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 WQ (Table 1). 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	OBD ID #	Location	Receiving Waterbody	Flow (gpd)	Acres Needed for Closure	Current Prohibited Acreage
P2	1519	DAMARISCOTTA	DAMARISCOTTA RIVER	450	1.4	185.4743
P2	2851	DAMARISCOTTA	DAMARISCOTTA RIVER	300	0.9	
P2	9109	DAMARISCOTTA	DAMARISCOTTA RIVER	300	1.8	
P4	7279	SOUTH BRISTOL	DAMARISCOTTA RIVER	500	2.6	13.72729
P5	1418	BOOTHBAY	LITTLE RIVER	630	3.2	1286.681
P5	2231	BOOTHBAY	DAMARISCOTTA RIVER	4600	11.8	
P5	2319	BOOTHBAY	DAMARISCOTTA RIVER	180	0.5	
P5	2364	BOOTHBAY	DAMARISCOTTA RIVER	2250	5.8	
P5	2610	BOOTHBAY	DAMARISCOTTA RIVER	300	0.8	
P5	2951	BOOTHBAY	MILL COVE	270	1.4	
P5	3279	BOOTHBAY	MILL POND	300	1.5	
P5	3589	BOOTHBAY	DAMARISCOTTA RIVER	300	0.8	
P5	3648	BOOTHBAY	LITTLE RIVER	300	1.5	
P5	3753	BOOTHBAY	DAMARISCOTTA RIVER	630	1.6	
P5	4056	BOOTHBAY	MILL POND	300	1.5	
P5	4343	BOOTHBAY	DAMARISCOTTA RIVER	270	0.8	
P5	4579	BOOTHBAY	GLEN COVE	300	1.5	
P5	4892	BOOTHBAY	DAMARISCOTTA RIVER	270	0.69	
P5	5327	BOOTHBAY	MILL POND	150	0.8	
P5	6129	BOOTHBAY	DAMARISCOTTA RIVER	1250	3.2	
P5	6131	BOOTHBAY	DAMARISCOTTA RIVER	300	0.8	
P5	6698	BOOTHBAY	BOOTH BAY	300	1.0	
P5	7208	BOOTHBAY	DAMARISCOTTA RIVER	300	0.8	
P5	7283	BOOTHBAY	DAMARISCOTTA RIVER	300	0.8	
P5	1684	SOUTH BRISTOL	THE GUT	300	0.8	
P5	1686	SOUTH BRISTOL	CHRISTMAS COVE	450	0.9	
P5	1749	SOUTH BRISTOL	DAMARISCOTTA RIVER	300	0.8	
P5	2057	SOUTH BRISTOL	DAMARISCOTTA RIVER	540	1.4	
P5	2315	SOUTH BRISTOL	JOHNS BAY	180	0.5	
P5	2434	SOUTH BRISTOL	SAMARISCOTTA RIVER	450	1.2	

Growing Area Section	OBD ID #	Location	Receiving Waterbody	Flow (gpd)	Acres Needed for Closure	Current Prohibited Acreage
P5	6219	SOUTH BRISTOL	DAMARISCOTTA RIVER	450	1.2	
P5	6965	SOUTH BRISTOL	DAMARISCOTTA RIVER	300	0.8	
P5	7656	SOUTH BRISTOL	THE GUT	300	0.8	
P5	7700	SOUTH BRISTOL	SOUTH BRISTOL GUT	360	0.9	
P5	7789	SOUTH BRISTOL	CHRISTMAS COVE	300	0.6	
P5	7898	SOUTH BRISTOL	DAMARISCOTTA RIVER	360	0.9	
P5	9098	SOUTH BRISTOL	THE GUT	300	1.2	

National Pollutant Discharge Elimination System (NPDES)

Table 2. NPDES Permitted Discharges

Growing Area Section	Permit ID	Type	Facility	Waterbody
P5	ME0037001	MINOR OUTFALL	LOBSTERMAN'S WHARF RESTAURANT	Damariscotta River
P2	ME0101516	MINOR OUTFALL	GREAT SALT BAY WWTF	Damariscotta River
P1	ME0102431	MINOR OUTFALL	GREAT SALT BAY SANITARY DIST	Damariscotta River Estuary
P2	MEG210012	SNOW DUMP	DAMARISCOTTA SNOW DUMP	Damariscotta River
P5	ME0037133	OUTFALL	DECKSZ LLC	Damariscotta River
A	ME0037451*	OUTFALL	MOOK SEA FARMS INC	Damariscotta River

*Permit ID ME0037451, Mook Sea Farm, is a permit to discharge only process water and, as such, does not impact water quality. There is no closure around this facility.

Additionally, there are four marine sewage pump outs in Growing Area WQ which are all located within appropriately sized Prohibited areas.

There are two wastewater treatment facilities or plants (WWTF or WWTP) in growing area WQ. Since 2017 the WWTP inspection reports have been available in DMR central files. The facilities are in Damariscotta and Nobleboro (Damariscotta Mills). These facilities discharge into Prohibited, Conditionally Restricted and Conditionally Approved areas that are larger in area than the calculated dilution zones for the effluent.

Damariscotta, Great Salt Bay Sanitary District (GSBSD)-
The Great Salt Bay Sanitary District (GSBSD) is a secondary treatment lagoon system, which serves a population of approximately 3000 residents from the towns of Newcastle and Damariscotta. Influent is domestic and commercial wastewater with no significant industrial users contributing to the flow. Licensed monthly average flow is 0.268 million gallons per day (MGD).

The GSBSD has six collection system pumping stations; no bypasses or overflows are present on any of the pumping stations. There are three lagoons on site at the facility, one with a 4-million-gallon capacity, and two with 2-million-gallon capacity. The wastewater is retained in the lagoons for a total of six weeks. The plant has no bypass capability and due to its large holding capacity, the plant can shut down for more than two weeks with maximum inflow rate, if needed. The effluent is chlorinated, with a contact time of at least 20 minutes, prior to being pumped 1.5 miles to the outfall located at the Damariscotta town landing. Travel time of effluent from the facility to outfall is approximately 30 minutes. No shellfish may go direct to market from the adjacent Conditionally Restricted area due to its classification (relay or depuration only by permit) and all movement of market sized shellfish from this area to a receiving site (relay and depuration activities both require shellfish held for multiple days prior to release to market) requires prior DMR notification ensuring no risk to public health even with the short effluent travel time. The plant is staffed from 7 am to 3 pm, five days a week and a staff member is on call at night and on weekends.

The outfall is in about 10 feet of water at mean tide. The size of the current Prohibited area surrounding the outfall of the GSBSD was confirmed through a dilution study, conducted by the EPA in 1995. This study was conducted under normal flow conditions of 124,000 gallons per day (GPD). Based on the results of this study the 1000:1 dilution line was achieved within 300 ft of the effluent pipe; the size of the current prohibited area's outer edge extends approximately 1,300 ft from the outfall. In 2009, an equal mix dilution calculation was completed by DMR to confirm that the closure size surrounding this wastewater treatment facility outfall is of adequate size to protect public health. For this calculation, the 2009 average wet weather flow of 414,000 GPD, average depth at mean tide of 10 ft and a fecal concentration of 1.4*10^4 FC/100 ml was used. Assuming equal mixing dilution, the required closure size is 127 acres; the actual closure surrounding this outfall is approximately 185 acres of Prohibited area and an additional 50 acres of Conditionally Restricted area. The current closure surrounding this facility is adequate for the protection of public health.

Nobleboro (Damariscotta Mills), Great Salt Bay Mills Facility-
Great Salt Bay Sanitary District Wastewater Treatment Facility serves approximately 59 residences in Damariscotta Mills. The Mills Facility provides secondary treatment of wastewater via settling in individual tanks; one five-thousand-gallon septic tank, two, two-thousand-gallon septic tanks, and biological treatment through a covered sand filter bed system. The tanks are pumped at least once every three years on a rotating basis. Licensed monthly average flow is 0.015 million gallons per day (MGD).

This facility is not authorized to receive septage waste. Wastewater collected from the individual septic tanks is pumped to two 106 foot by 52-foot sand filter beds that are operated in the alternating mode. The effluent is then chlorinated (sodium hypochlorite) prior to discharge into the Great Salt Bay. There are 3 pumping stations located at Mill Pond at the Bridge (Lakeside), Bayview at the intersection of Ladds Rd and Bayview Rd, and at the plant (influent pumps to the sand filters). All pump stations are equipped with automated alarms which allow for 24-hour monitoring of potential system malfunctions due to power failure, equipment breakdown, or high water.

The outfall is in about 4.7 feet of water at mean tide. In 2009, an equal mix dilution calculation was completed by DMR to confirm that the closure size surrounding the Mills facility outfall is of adequate size to protect public health. For this calculation, the 2009 average wet weather flow of 19,176 GPD, average depth at mean tide of 4.7 ft and a fecal concentration of 1.4*10^5 FC/100 ml was used. Assuming equal dilution, the required closure size is 125.2 acres; the actual closure is over 500 acres. The current closure surrounding the Mills Facility is adequate to protect public health.

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 3 shows all new and pre-existing pollution sources in area WQ that are considered discharges into the growing area and affect water quality.

Table 3. Growing Area WQ Residential Pollution Sources.

Growing Area Section	Location ID	Date Surveyed	Direct or Indirect	Problem	Description	Town
P6	WQ047-33	2015	Indirect	Y	~1” gap in pipe from northern house; close to shore	South Bristol

Industrial Pollution

There are no major industrial discharges in Growing Area WQ. The majority of shoreline along the Damariscotta River is very rural. There are several boat yard operations located in the towns of East Boothbay and South Bristol that fall within the National Pollution Discharge Elimination permits (NPDES) permitting guidelines; however, these are already contained within established Prohibited areas in the lower portion of the river.

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. There are nine marine facilities in Growing Area WQ. None require a management plan. Eight of the nine facilities are in Prohibited areas. Riverside Boatyard is the only facility in an Approved area; however, it is a boat repair facility and does not have dockage or moorings for any boats.

Adjacent to the Ocean Point Marina facility in East Boothbay are the Hodgdon Yacht Yard and the Washburn and Doughty Yard. Hodgdon Yachts builds multi-million-dollar mega-yachts inside two large (200 + feet) sheds. The Washburn and Doughty facility builds large off-shore tugs and ferries. The Washburn and Doughty facility is several hundred feet long. Both of these facilities are required to follow strict OSHA standards. No dock space or moorings are available for cruising boats at these facilities. All three above mentioned facilities are located within Prohibited area P5.

Table 4. List of marinas located in Growing Area WQ.

Growing Area Section	Type	Town	Waterbody
P2	Damariscotta Town Landing	Damariscotta	Damariscotta River
A	Riverside Boatyard	Damariscotta	Damariscotta River
P5	Ocean Point Marina	Boothbay	Damariscotta River

Growing Area Section	Type	Town	Waterbody
P5	Hodgdon Yachts	Boothbay	Damariscotta River
P5	Washburn and Doughty	Boothbay	Damariscotta River
P5	Spar Shed Marina	Boothbay	Damariscotta River
P5	Little River Boat Club	Boothbay	Damariscotta River
P5	Gamage Shipyard	South Bristol	Damariscotta River
P5	Coveside Marina	South Bristol	Christmas Cove

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 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 WQ 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).

No specific impact from storm water has been identified in Growing Area WQ.

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. Non-point 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 WQ. A total of 121 samples were taken from freshwater streams during the review period (Table 5, Figures 2-4).

Streams associated with consistently high scores are monitored to determine if they affect the water quality of growing area waters. The mouth of the streams at stream stations WQ028-95 and WQ028-28 are enclosed in a Conditionally Restricted area. The mouth of the stream at stream station WQ029-65 is enclosed in a Conditionally Approved area based on season; high scores at this station tend to occur during the seasonally closed period between June 1st and October 31st.

Table 3. Stream Samples in Growing Area WQ 2012-2023; Scores > 163 CFU/100ml are highlighted in red.

Growing Area Section	Location ID	Sample Date	Pollution Type	Raw Score
CR1	WQ028-28	19-Sep-12	Stream	74
CA2	WQ029-65	19-Sep-12	Stream	>1600
A	WQ014-190	01-Nov-12	Stream	12
A	WQ014-132	01-Nov-12	Stream	36
CR1	WQ028-28	23-Sep-14	Stream	74
R1	WQ035-1	23-Sep-14	Stream	5.5
CR1	WQ028-170	23-Sep-14	Stream	2
CR1	WQ028-95	23-Sep-14	Stream	12
CR1	WQ028-95	20-Oct-14	Stream	64
CA2	WQ029-65	20-Oct-14	Stream	400
R1	WQ035-1	20-Oct-14	Stream	66

Growing Area Section	Location ID	Sample Date	Pollution Type	Raw Score
CR1	WQ028-28	20-Oct-14	Stream	560
CR1	WQ028-170	20-Oct-14	Stream	4
A	WQ014-132	27-Apr-16	Stream	<2
A	WQ015-177	27-Apr-16	Stream	8
R1	WQ035-1	27-Apr-16	Stream	9.1
A	WQ012-76	27-Apr-16	Stream	4
R1	WQ035-1	12-May-16	Stream	2
CR1	WQ028-28	12-May-16	Stream	<2
A	WQ014-132	12-May-16	Stream	<2
CR1	WQ028-170	12-May-16	Stream	46
CR1	WQ028-95	12-May-16	Stream	20
CA2	WQ029-65	12-May-16	Stream	<2
A	WQ015-177	12-May-16	Stream	10
A	WQ013-41	15-Jun-16	Stream	4
A	WQ012-76	15-Jun-16	Stream	29
A	WQ015-43	15-Jun-16	Stream	10
A	WQ008-40	15-Jun-16	Stream	<2
A	WQ014-132	15-Jun-16	Stream	2
A	WQ014-190	15-Jun-16	Stream	580
A	WQ015-177	15-Jun-16	Stream	16
R1	WQ035-1	13-Jul-16	Stream	9.1
CR1	WQ028-95	13-Jul-16	Stream	20
A	WQ015-177	13-Jul-16	Stream	36
CR1	WQ028-170	13-Jul-16	Stream	<2
CR1	WQ028-28	13-Jul-16	Stream	1340
A	WQ014-132	14-Jul-16	Stream	11
A	WQ014-132	12-Sep-16	Stream	116
A	WQ015-42	12-Sep-16	Stream	1120
R1	WQ035-1	21-Sep-16	Stream	44
CR1	WQ028-170	21-Sep-16	Stream	52
CR1	WQ028-95	21-Sep-16	Stream	16
A	WQ014-132	21-Sep-16	Stream	30
CA2	WQ029-65	21-Sep-16	Stream	64
R1	WQ035-1	29-Sep-16	Stream	20
CR1	WQ028-95	29-Sep-16	Stream	62
CR1	WQ028-170	29-Sep-16	Stream	64
A	WQ008-40	18-Oct-16	Stream	2

Growing Area Section	Location ID	Sample Date	Pollution Type	Raw Score
A	WQ014-132	18-Oct-16	Stream	16
A	WQ015-43	18-Oct-16	Stream	8
R1	WQ035-1	29-Nov-16	Stream	22
A	WQ015-42	24-Oct-17	Stream	13
A	WQ014-190	19-Dec-17	Stream	<2
CA2	WQ029-65	26-Jun-19	Stream	1540
CR1	WQ028-95	26-Jun-19	Stream	>1600
A	WQ014-190	01-Jul-19	Stream	58
A	WQ015-42	01-Jul-19	Stream	110
A	WQ008-40	01-Jul-19	Stream	54
A	WQ012-76	01-Jul-19	Stream	8
A	WQ014-132	01-Jul-19	Stream	4
A	WQ015-42	28-Aug-19	Stream	18
A	WQ008-40	28-Aug-19	Stream	1280
A	WQ012-76	28-Aug-19	Stream	38
A	WQ014-132	11-Sep-19	Stream	<2
A	WQ008-40	11-Sep-19	Stream	22
A	WQ012-76	11-Sep-19	Stream	116
A	WQ015-42	11-Sep-19	Stream	42
R1	WQ035-1	02-Oct-19	Stream	114
CA2	WQ029-65	02-Oct-19	Stream	760
CR1	WQ028-28	02-Oct-19	Stream	156
CR1	WQ028-95	02-Oct-19	Stream	106
R1	WQ035-1	09-Oct-19	Stream	48
CA2	WQ029-65	09-Oct-19	Stream	>1600
CR1	WQ028-95	09-Oct-19	Stream	36
CR1	WQ028-28	09-Oct-19	Stream	74
A	WQ014-190	15-Oct-19	Stream	42
A	WQ012-76	15-Oct-19	Stream	4
A	WQ015-42	15-Oct-19	Stream	158
A	WQ014-132	15-Oct-19	Stream	34.5
A	WQ008-40	15-Oct-19	Stream	23.6
CR1	WQ028-28	23-Oct-19	Stream	>1600
CA2	WQ029-65	23-Oct-19	Stream	>1600
R1	WQ035-1	23-Oct-19	Stream	106
CR1	WQ028-95	23-Oct-19	Stream	>1600
CA2	WQ029-65	05-Aug-20	Stream	520

Growing Area Section	Location ID	Sample Date	Pollution Type	Raw Score
CR1	WQ028-28	05-Aug-20	Stream	340
CR1	WQ028-95	05-Aug-20	Stream	280
A	WQ008-40	26-Aug-20	Stream	26
CR1	WQ028-95	01-Sep-20	Stream	340
CR1	WQ028-28	01-Sep-20	Stream	740
CR1	WQ028-28	13-Oct-20	Stream	<2
CA2	WQ029-65	13-Oct-20	Stream	6
CR1	WQ028-95	13-Oct-20	Stream	>1600
CR1	WQ028-95	13-Oct-20	Stream	>1600
CR1	WQ028-28	13-Oct-20	Stream	<2
CR1	WQ028-28	02-Dec-20	Stream	90
A	WQ008-40	02-Dec-20	Stream	46
CA2	WQ029-65	02-Dec-20	Stream	150
CR1	WQ028-95	02-Dec-20	Stream	98
A	WQ015-177	04-May-22	Stream	<2
A	WQ008-40	04-May-22	Stream	<2
A	WQ012-76	04-May-22	Stream	<2
A	WQ012-76	01-Jun-22	Stream	31
A	WQ015-177	01-Jun-22	Stream	14
CA2	WQ029-65	01-Jun-22	Stream	1440
A	WQ008-100	01-Jun-22	Stream	<2
A	WQ012-76	06-Sep-22	Stream	120
A	WQ008-40	06-Sep-22	Stream	4
A	WQ015-177	06-Sep-22	Stream	520
CA2	WQ029-65	06-Sep-22	Stream	>1600
A	WQ008-40	05-Oct-22	Stream	8
A	WQ015-177	05-Oct-22	Stream	30
A	WQ012-76	05-Oct-22	Stream	2
CA2	WQ029-65	12-Apr-23	Stream	124
A	WQ015-177	12-Apr-23	Stream	<2
A	WQ015-177	10-May-23	Stream	10
CA2	WQ029-65	10-May-23	Stream	12
CA2	WQ029-65	06-Sep-23	Stream	25
A	WQ015-177	06-Sep-23	Stream	22
CA2	WQ029-65	04-Oct-23	Stream	16
A	WQ015-177	04-Oct-23	Stream	82

Agricultural Activities

There are no large-scale agriculture activities in growing area WQ. Smaller farms were noted at Clark Cove in South Bristol (horses), Jones Cove in South Bristol (horses), Prentiss Cove in South Bristol (horses), Salt Marsh Cove in Edgecomb (two small farms with sheep, goats, llamas and chickens), just south of Meadow Cove in Boothbay (horses), and Salt Bay in Nobleboro (chickens). 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. None of these small farms appeared to be directly impacting the growing area during the most recent shoreline survey.

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. No wildlife activity appears to be directly impacting growing area WQ.

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

There are at least eighteen distinct conservation areas within growing area WQ totaling over 1,000 acres of undeveloped land. All the areas allow dog walking and other human activities but have limited or no sanitary pollution facilities available to the public. Many of the areas have specifications on camping; however, these areas are not closely monitored by the municipalities. Most of the conservation parcels are located on the shores of areas that are classified as Approved; water quality is routinely monitored and there is no indication that water quality is adversely affected by the presence of the conservation parcels or by human or animal activities within these conservation/preserve areas.
In addition to conservation parcels, there are seven state owned islands that are used for nesting by colonial water birds and are a portion of the Coast of Maine Wildlife Management Area. Trespass to these areas is prohibited during specific periods (typically early spring through July or August) unless written permission is obtained from the Regional Wildlife Biologist.

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 Walpole (a village in South Bristol) indicate a mean tidal range of 9.35 ft. The mean tidal range for most of Maine is nine feet to 13 feet. Currents in the area are predominantly driven by the tides.

Rainfall

The mean annual precipitation in growing area WQ is approximately 49 inches and the precipitation is not evenly distributed throughout the year. The wettest months are generally October through December 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 three-quarters inch to greater than one inch in a twenty-four-hour period. These areas are considered rainfall conditional areas and are Conditionally Approved based on a three-quarters or one-inch closure trigger. No rainfall areas have been identified in growing area WQ.

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 Damariscotta River is a 19-mile-long tidal river that begins at the outlet of Damariscotta Lake at Damariscotta Mills. The lake's outlet winds south before reaching tidewater at Great Salt Bay. The river is navigable for nearly the entire nineteen miles or up to the bridge between Newcastle and Nobleboro. The river contains many bends and twists as it makes its way southward and current can be strong at some of the narrow sections.

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). There are no large river discharges into growing area WQ. There are many small streams that discharge into the growing area and these streams are discussed in the section about non-point source pollution.

Hydrographic Influence

Water movement in growing area WQ is predominantly influenced by tides. The area is subject to a semidiurnal tidal cycle with two high tides and two low tides per day. Daily tidal cycle is 12 hours and mean high tide is a little over ten feet with spring tides potentially exceeding 12 feet. 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.

Currents also contribute to water movement in the Damariscotta River. In some narrow sections of the river, such as the area to the east of Fort Island, currents can be strong as the tides change.

In 1999, an effluent dye study for the Mills facility was conducted by Bigelow labs, in order to determine the effluent dilution from the Mills. The study tracked the wastewater plume, as it moved through the Great Salt Bay. The study was conducted after a significant precipitation event, with effluent discharge flows of 12, 000 GPD. The results of the study showed that the effluent is highly diluted in the Salt Bay, with most areas of the bay exhibiting dilution rates between 1:1000 and 1:10,000 or greater at both low and high tidal stages. Currently, the majority of Great Salt Bay is classified as prohibited (516 acres), with an additional 42 acres in the southernmost part of the Bay (just North of Rt 1) classified as conditionally approved, based on the performance at the Mills Facility.

Water Quality Studies

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 28 active water sampling sites in Growing Area WQ and no investigative stations. One station was deactivated while two investigative stations were activated in July of 2023. It is recognized that access, icing, and safety considerations prevent some stations from being sampled on scheduled dates. Currently all stations in Growing Area WQ meet their current NSSP classification standard.

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 (Tables 6, 7). The percent change in P90 from 2022 to 2023 was calculated and eleven stations showed a substantial increase in P90 score. Ten of the stations that showed a substantial percentage of increase in P90 score still have low scores and are not in danger of failing to meet their classification standards. The one remaining water quality station that has shown a substantial percentage decline in water quality (WQ052.00) was already classified as Restricted and is not failing to meet its classification standards. Overall, the water quality in growing area WQ appears to be remaining constant.

Table 4. P90 calculations for stations with a minimum of 30 samples.

Station	Class	Count	GM	SDV	MAX	P90	Min_Date
WQ012.50	A	30	2.1	0.24	38	4.4	6/3/2019
WQ014.00	A	30	3.9	0.45	68	15	5/6/2019
WQ015.00	A	30	2.8	0.39	70	9	10/22/2018
WQ015.50	A	30	2.3	0.25	38	4.9	5/6/2019
WQ017.00	A	30	2.8	0.33	72	7.7	5/6/2019
WQ018.00	A	30	2.2	0.21	16	4.3	5/6/2019
WQ022.00	A	30	2.9	0.39	40	9.4	5/6/2019
WQ023.00	A	30	3.8	0.45	240	14.9	5/6/2019
WQ024.00	A	30	3.6	0.43	96	13.2	5/6/2019
WQ043.00	A	30	2.9	0.33	40	7.9	5/6/2019
WQ045.00	A	30	2.4	0.21	10	4.4	5/6/2019
WQ046.50	A	30	2.1	0.18	16	3.7	6/3/2019
WQ048.00	A	30	1.9	0.05	4	2.3	5/6/2019
WQ049.00	A	30	2.1	0.18	16	3.7	5/6/2019

Station	Class	Count	GM	SDV	MAX	P90	Min_Date
WQ051.00	A	30	2.4	0.28	46	5.7	5/6/2019
WQ054.00	A	30	2.2	0.23	28	4.4	5/6/2019
WQ055.00	A	30	3.1	0.51	860	14.4	5/6/2019
WQ057.00	A	30	2.6	0.36	78	7.8	5/6/2019
WQ008.00	P	30	2.2	0.27	46	4.9	5/6/2019
WQ034.00	P	30	3.8	0.32	27	10	5/6/2019
WQ039.00	P	30	3.8	0.4	36	12.5	5/13/2019
WQ058.00	P	30	2.1	0.13	6	3.1	5/6/2019
WQ052.00	R	30	6.1	0.63	320	40	5/6/2019

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.

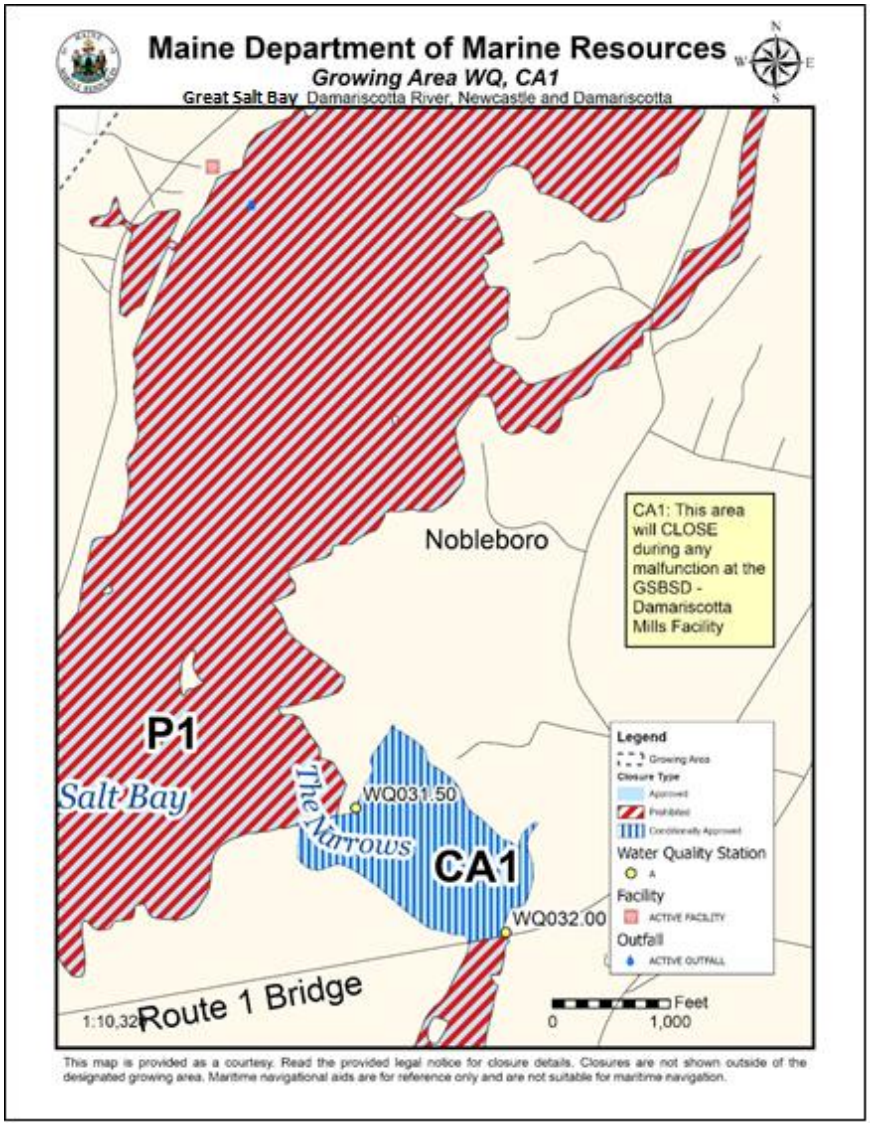
CAMP Reviews, Inspection Reports, and Performance Standards

Annual Review of CA1 Upper Damariscotta River, Damariscotta Conditional Area Management Plan

Scope

Growing Area Section WQ CA1, located in the southernmost portion of Great Salt Bay, is classified as Conditionally Approved based on the proper functioning of the Great Salt Bay Sanitary District WWTF (Mills Facility) (Figure 5). This Conditionally Approved section of the Damariscotta River is south of a line running between two unnamed points of land, locally known as The Narrows, located between an area approximately 600 yards north of the Route 1 bridge AND north of the Route 1 bridge. This area is classified as Conditionally Approved based on wastewater treatment plant function. It is monitored by water quality stations WQ031.50 and WQ032.00.

Figure 5. CA1 Upper Damariscotta River, Damariscotta Conditionally Approved area



Compliance with management plan

The Upper Damariscotta Conditional Area remains in compliance with the current conditional area management plan (CAMP). Wastewater 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 for information on annual compliance with the current CAMP.

Adequacy of reporting and cooperation of involved persons
The Great Salt Bay Sanitary District WWTF in Damariscotta Mills has an effective and cooperative sewage plant operation staff. Wastewater 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 restricted growing area criteria
The area continues to meet the criteria for Conditionally Approved harvest based on a P90 calculations (WQ031.50 at 8 CFU/100ml and WQ032.00 at 12.7 CFU/100mL) during the open status (Table 7) and no other known point sources of pollution.

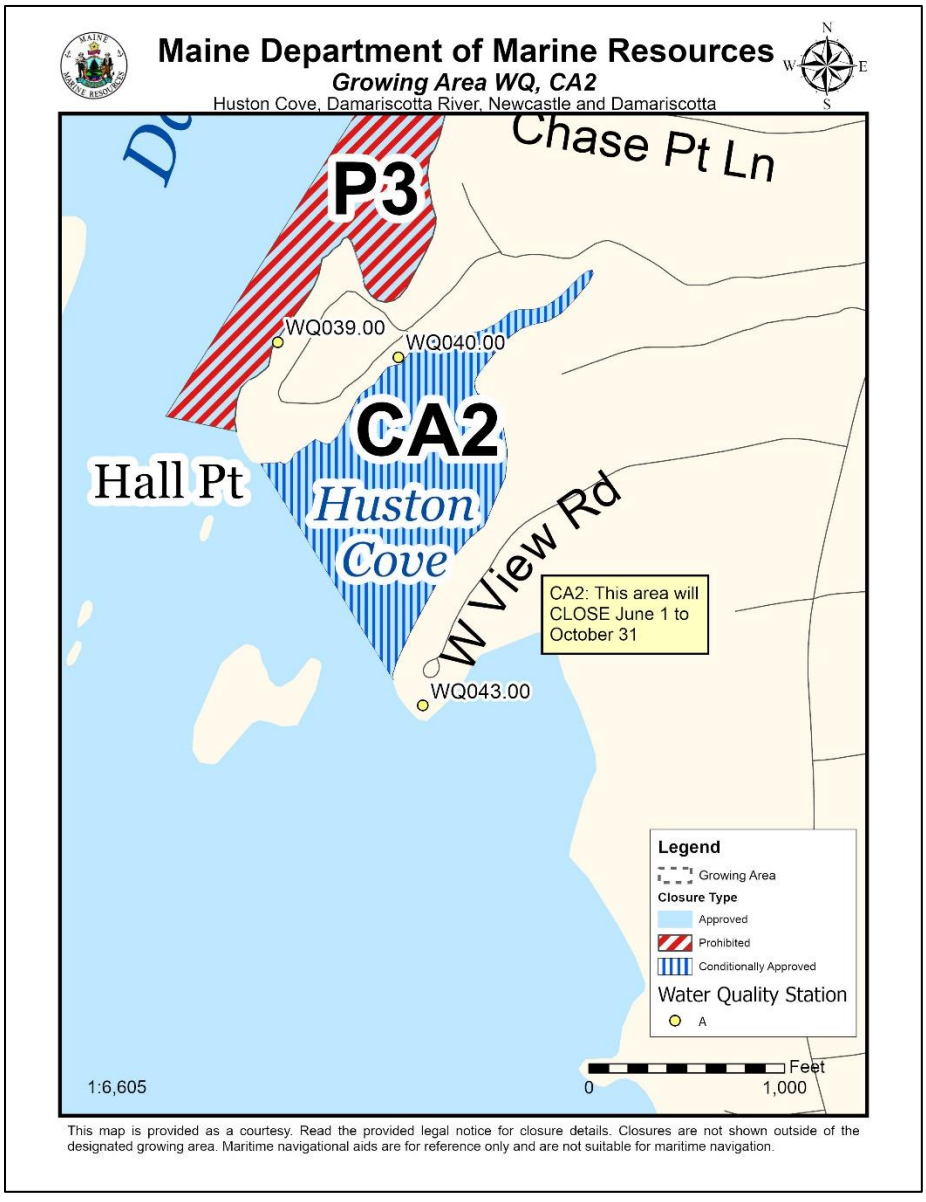
Water sampling compliance history
Water samples are collected at least six times during the open status and throughout the year (Table 8). The P90 value meets the standard for Conditionally Approved harvest during the open status (Table 7).

Analysis-Recommendations
The Upper Damariscotta Conditionally Approved area continues to meet the standards for Conditionally Approved harvest during the open status and remains in compliance with the CAMP. Recommend continued water quality monitoring and open communication with wastewater treatment facility staff to ensure continued compliance with the CAMP.

Annual Review of CA2 Huston Cove, Damariscotta Conditional Area Management Plan

Scope
Growing Area CA2 Huston Cove in Damariscotta is classified as Conditionally Approved seasonally with the open status for harvest from November 1 through May 31 (Figure 6). This area is north and east of a line beginning at the southwestern tip of Hall Point running southeast to the opposite shore. This area is classified as Conditionally Approved based on a seasonal increase in fecal coliform scores. This Conditional Area is monitored by water quality station WQ040.00 with WQ043.00 serving as a boundary station.

Figure 6. CA2 Huston Cove, Damariscotta Conditionally Approved area



Compliance with management plan

The Huston Cove Conditional Area remains in compliance with the current conditional area management plan (CAMP). See CAMP annual reviews 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 restricted growing area criteria
The area continues to meet the criteria for Approved harvest during the open status of November 1 through May 31 based on P90 calculations (WQ040.00 at 10.5 CFU/100ml; WQ043.00 at 7.9 CFU/100ml) during the open status and no other known sources of pollution in the area.

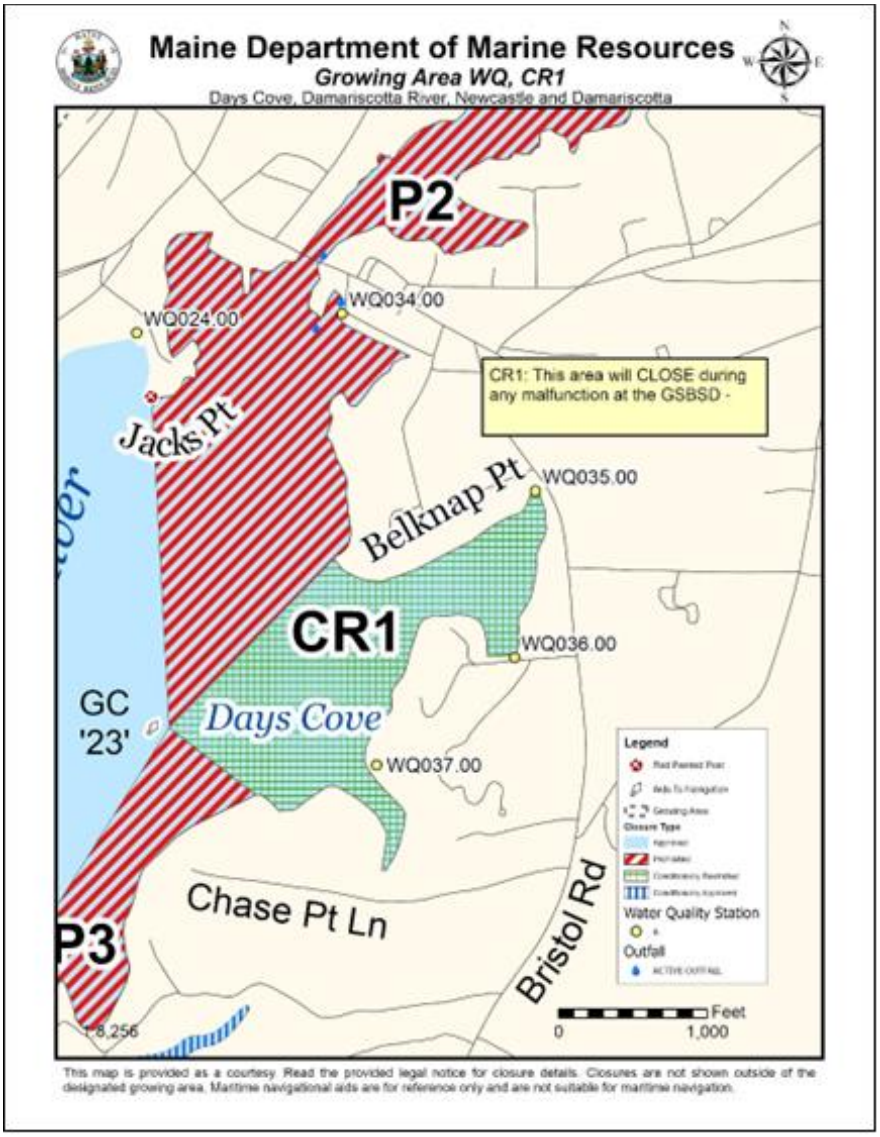
Water sampling compliance history
Water samples are collected at least six times open status and throughout the year (Table 8). The P90 value meets the standard for Approved harvest during the open status (Table 7).

Analysis-Recommendations
The Huston Cove seasonal 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.

Annual Review of CR1 Days Cove, Damariscotta Conditional Area Management Plan

Scope
Growing Area Section WQ CR1, Days Cove in Damariscotta, is classified as Conditionally Restricted based on the proper functioning of the Great Salt Bay Sanitary District WWTF in Damariscotta (Figure 7). This Conditionally Restricted section of the Damariscotta River is from a prominent point of land at the tip of Belknap Point, then runs southwest to green navigational can C23, then southeast to a prominent point north of Chase Ln. This area is classified as Conditionally Restricted based on wastewater treatment plant function. It is monitored by water quality stations WQ035.00, WQ036.00 and WQ037.00.

Figure 7. CR1 Days Cove, Damariscotta Conditionally Restricted area



Compliance with management plan

The Days Cove Conditionally Restricted area remains in compliance with the current conditional area management plan (CAMP). Wastewater 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 for information on annual compliance with the current CAMP.

Adequacy of reporting and cooperation of involved persons
The Great Salt Bay Sanitary District WWTF in Damariscotta has an effective and cooperative sewage plant operation staff. Wastewater 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 restricted growing area criteria
The area continues to meet the criteria for Conditionally Restricted harvest based on a P90 calculations (WQ035.00 at 32.9 CFU/100ml, WQ036.00 at 40.7 CFU/100mL and WQ037.00 at 20.9 CFU/100mL) during the open status (Table 7) and no other known point sources of pollution.

Water sampling compliance history
Water samples are collected at least six times during the open status and throughout the year (Table 8). The P90 value meets the standard for Conditionally Approved harvest during the open status (Table 7).

Analysis-Recommendations
The Days Cove Conditionally Restricted area continues to meet the standards for Conditionally Restricted harvest during the open status and remains in compliance with the CAMP. Recommend continued water quality monitoring and open communication with wastewater treatment facility staff to ensure continued compliance with the CAMP.

Table 5. P90s for Conditional Area stations calculated using data from the open status.

Station	Class	Count	GM	SDV	MAX	P90	Min_Date
WQ031.50	CA	30	3.2	0.31	24	8	1/7/2020
WQ032.00	CA	30	3.4	0.44	62	12.7	1/7/2020
WQ040.00	CA	30	3.1	0.4	150	10.5	3/6/2019
WQ035.00	CR	30	5.8	0.58	520	32.9	9/23/2019
WQ036.00	CR	30	6.7	0.6	460	40.7	8/21/2019
WQ037.00	CR	30	4.7	0.5	400	20.9	9/23/2019

Recommendation for Future Work

Growing Area WQ continues to have consistent and acceptable water quality. No stations showed significant upward trends in 2023 with the exception of WQ052.00 which is still meeting its Restricted classification. There are no recommendations for classification changes in the 2024 season.

Table 6. Count table of samples collected in growing area WQ during the 2023 season.

Station	Class	C	O	X	Total	Samples Required	Comments
WQ008.00	P	6			6	6	
WQ012.50	A		6		6	6	
WQ014.00	A		2		6	6	Station activated to A 7/14/23
	X			4			
WQ015.50	A		2		6	6	Station activated to A 7/14/23
	X			4			
WQ017.00	A		6		6	6	
WQ018.00	A		6		6	6	
WQ022.00	A		6		6	6	
WQ023.00	A		6		6	6	
WQ024.00	A		6		6	6	
WQ031.50	CA		6		6	6	
WQ032.00	CA		6		6	6	
WQ034.00	P	6			6	6	
WQ035.00	CR		7		7	6	
WQ036.00	CR		7		7	6	
WQ037.00	CR		7		7	6	
WQ039.00	P	6			6	6	
WQ040.00	CA	3	6		9	6	
WQ043.00	A		6		6	6	
WQ045.00	A		6		6	6	
WQ046.50	A		6		6	6	
WQ048.00	A		6		6	6	
WQ049.00	A		6		6	6	
WQ051.00	A		6		6	6	
WQ052.00	R		6		6	6	
WQ054.00	A		6		6	6	
WQ055.00	A		6		6	6	
WQ057.00	A		6		6	6	

Station	Class	C	O	X	Total	Samples Required	Comments
WQ058.00	P	6			6	6	

References

National Shellfish Sanitation Program: Guide for the Control of Molluscan Shellfish, 2023 Revision

Tide and Wind data, NOAA Tides & Currents

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.

Population information, United States Census Bureau 2020 Decennial Census

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

Data Layers, Maine Office of GIS, Augusta, Maine

Rainfall data, NOAA Precipitation Averages

United States Environmental Protection Agency; https://www.epa.gov/

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/fisheries/shellfish/shellfish-closures-and-aquaculture-leases-map