



**GROWING AREA WR
John Bay and Pemaquid River
Bristol and South Bristol**

Triennial Report for 2007-2009

Report Date: March 7, 2011

Anna Bourakovsky

APPROVAL

Division Director:

_____ Date: _____
Print name signature



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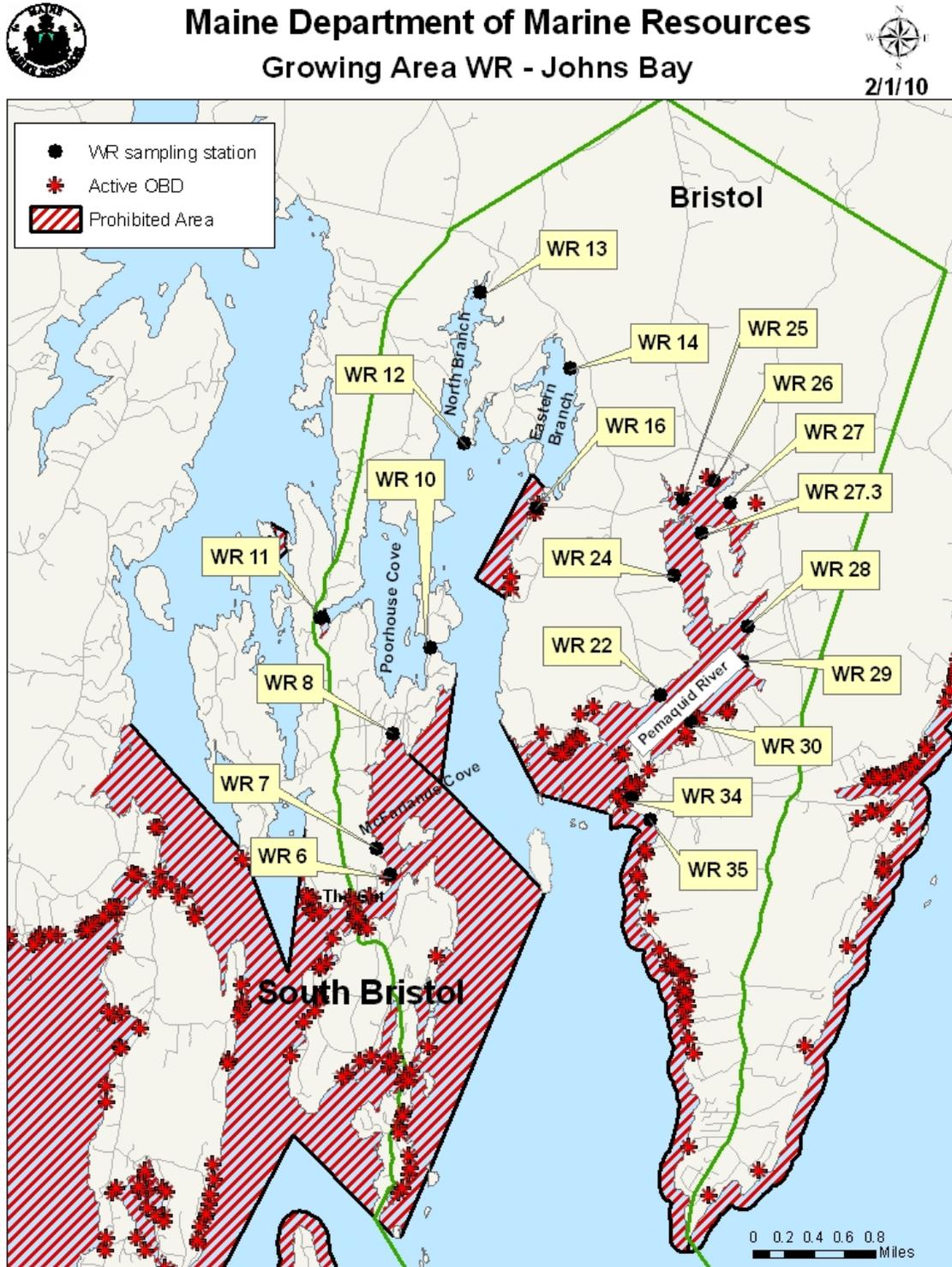
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Figure 1. Growing Area WR, with Active Water Stations





Executive Summary

This is a triennial report for growing area WR written in compliance with the requirements of the 2007 Model Ordinance and the National Shellfish Sanitation Program.

Growing area WR includes Johns Bay and Pemaquid River. Major sources of pollution in this area include private septic systems, licensed over board discharges (OBDs) and outhouses; there are no municipal waste water facilities in this area. Based on the results of the 2009 triennial growing area review, all water quality stations classified as approved were meeting their appropriate NSSP classification standard. During the 2009 review year, no new stations were added and no stations were deactivated. Over the past three review years, 8 OBDs have been removed: two in 2007, one in 2008, and five in 2009.

The next sanitary survey for growing area WR is due in 2012.

Growing Area Description

Growing Area WR (Johns Bay) is located in Lincoln County, mid-coast Maine, approximately 60 miles north of Portland (Figure 1). The growing area lies between the Damariscotta River and Muscongus Bay, and includes coastal areas of the towns of Bristol and South Bristol. A complete boundary description for this growing area can be found in DMR central files.

The shoreline is typical of mid-coast Maine, with rockbound points and shoreline separating shallow coves and harbors. The muddy and gravel bottoms in these coves frequently provide excellent habitat for soft shell clams. Within Area WR, the coves most likely to support significant populations of soft shell clams include McFarlands Cove, Poorhouse Cove, Bradstreet Cove, the North Branch, the Eastern Branch, the upper Pemaquid River, Coombs Cove and Fossetts Cove. Fresh water influence is minimal in this growing area, with no major river drainages, although small brooks and streams, many of which are intermittent, can be found throughout the growing area.

Based on the results of the 2000 Census, the town of Bristol had 1203 households and a year-round population of 2644. South Bristol had 410 households, with a year-round population of 897. The population of the towns has increased 6% and 2% respectively since 2000. Primary sources of employment in both towns are retail, construction, fishing, and manufacturing. The towns of Bristol and South Bristol both have 17 commercial shellfish license holders.

Land use in the study area is dominated by a mix of seasonal and year-round residential properties. Sections of moderate shoreline development are punctuated by large tracts of undeveloped land. Seasonal properties are being converted to year-round use throughout the area. Heaviest development is found near the Bristol Gut, along McFarlands Cove, Bradstreet Cove, Riverview Rd, Sunset Loop and Pemaquid Harbor, and in the area from Pemaquid Beach



to Pemaquid Point. Rutherford Island and Pemaquid Point both have increased summer populations with numerous groupings of old cottages on very small lots.

Current Classification(s)

At the end of the 2009 review year, shellfish growing area WR currently had areas classified as:

Approved: 4 Stations (WR 10, 12, 13 and 14)

Prohibited: 15 stations

Area No. 24-A: Johns River and Pemaquid River (South Bristol and Bristol)

Section A: John River (WR 16), due to OBDs

Section B: McFarlands Cove (WR 6, 7, and 8); due to OBDs, expired shoreline survey and lack of shellfish resource

Section C: Pemaquid River (WR 22, 24, 25, 26, 27, 28, 29, 30, 34 and 35); due to OBDs and other identified pollution sources)

Section D: Bradstreet Cove (WR 11)- due to a septic system malfunction

Area No. 24-B: John Bay (South Bristol and Bristol)- no stations, due to OBDs

There is one 'new' station (WR 27.3) located in the prohibited Pemaquid River Area of growing area WR; the station has less than 30 data points and is not evaluated against a classification standard.

Please visit the DMR website to view legal notices:

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

Activity during Review Period (2007-2009)

Activity in 2007:

January 24, 2007; (Area No. 25-B); This new rule administratively combines the areas previously described in Closed Areas No. 25-B, 25-C, part of 25-D, 25-F, and 25-G, and places them in one legal notice (25-B); and re-classifies the entire Pemaquid River as "Prohibited".

Activity in 2008:

March 27, 2008: the entire growing area WR was placed under an administrative closure due to an expired shoreline survey.

April 11, 2008: several areas in John River that were classified as approved prior to the March 27 administrative closure were reclassified back to approved due to an updated shoreline



survey. Additionally, the area east of McFarlands Point, South Bristol (east of station WR 10) was reclassified from prohibited to approved due to a removal of an OBD.

Activity in 2009:

Feb 11, 2009: Area No. 24-A, Johns River and Pemaquid River (South Bristol and Bristol), amended on April 11, 2008- amendment creates a prohibited area in Bradstreet Cove (South Bristol) due to a malfunctioning septic system.

May 29, 2009: Area No. 24-A, Johns River and Pemaquid River (South Bristol and Bristol)- amendment reduces the size of the closure on the Eastern Branch of the Johns River, due to a replacement of a malfunctioning septic system.

Current Management Plan(s) for Conditional Areas

There are no conditionally managed areas in Growing Area WR.

Documentation of Pollution Sources

The following sections include information on pollution sources which do or may impact water quality in growing area WR. The section includes information on new pollution sources, identified over the past three review years, as well as updated reviews of existing pollution sources, identified prior to 2007. Pollution sources that are reviewed in this section include domestic waste, including both private inground systems and over board discharges (OBDs), marinas and mooring fields, stormwater and pollution from non-point sources (streams), farms and other agricultural activities, domestic animals and wildlife areas, and recreational areas.

Evaluation of New Pollution Sources (2007-2009)

A portion of growing area WR was re-surveyed in 2008. New actual and potential problems identified as part of this recent (2007-2009) shoreline survey work are presented in Table 1; any remediation or enforcement action taken by the town and DMR to correct the problems and protect public health is noted in bold font in Table 1, along with the description of the problem. Updates to the status of the pollution (actual vs. potential, direct vs. indirect) based on remediation action are also noted in bold in the table. Two actual pollution sources were identified over the last three years; a prohibited area was enacted surrounding each actual pollution source in order to protect public health. Locations of new actual and potential problems are presented in Figure 2. All problems were reported to codes enforcement officers of each respective town. Observed potential problems did not have evident problems at the time of inspection and shellfish harvesting areas surrounding these problems were not downgraded in classification, however properties with potential problems should be re-evaluated every three years.



Table 1. Domestic Pollution Sources, Identified 2007-2009

SLS ID	LOT TOWN	AREA NAME	Description/ Action Taken	Dist. To Shore (ft)	Impact	Survey Date	Current Area Class
WRB0307.00	Bristol	Eastern Branch	IG Malfunction/ Replaced in Oct. 2008	1000	AI/ PI	31-Mar-08	Approved (Since 5/09)
WRA0252.00	South Bristol	East Branch	Cesspool	15	PD	31-Mar-08	Approved
WRA0254.00	South Bristol	East Branch	Cesspool	25	PI	31-Mar-08	Approved
WRA0236.00	South Bristol	North Branch	Vault privy	40	PI	01-Apr-08	Approved
WRA0236.00	South Bristol	North Branch	No system found	40	PI	01-Apr-08	Approved
WRA0324.00	South Bristol	Poor House Cove	Cracked pipe	60	PI	04-Apr-08	Approved
WRA0309.00	South Bristol	Bradstreet Cove	IG Malfunction	150	AI	11-Feb-09	Prohibited



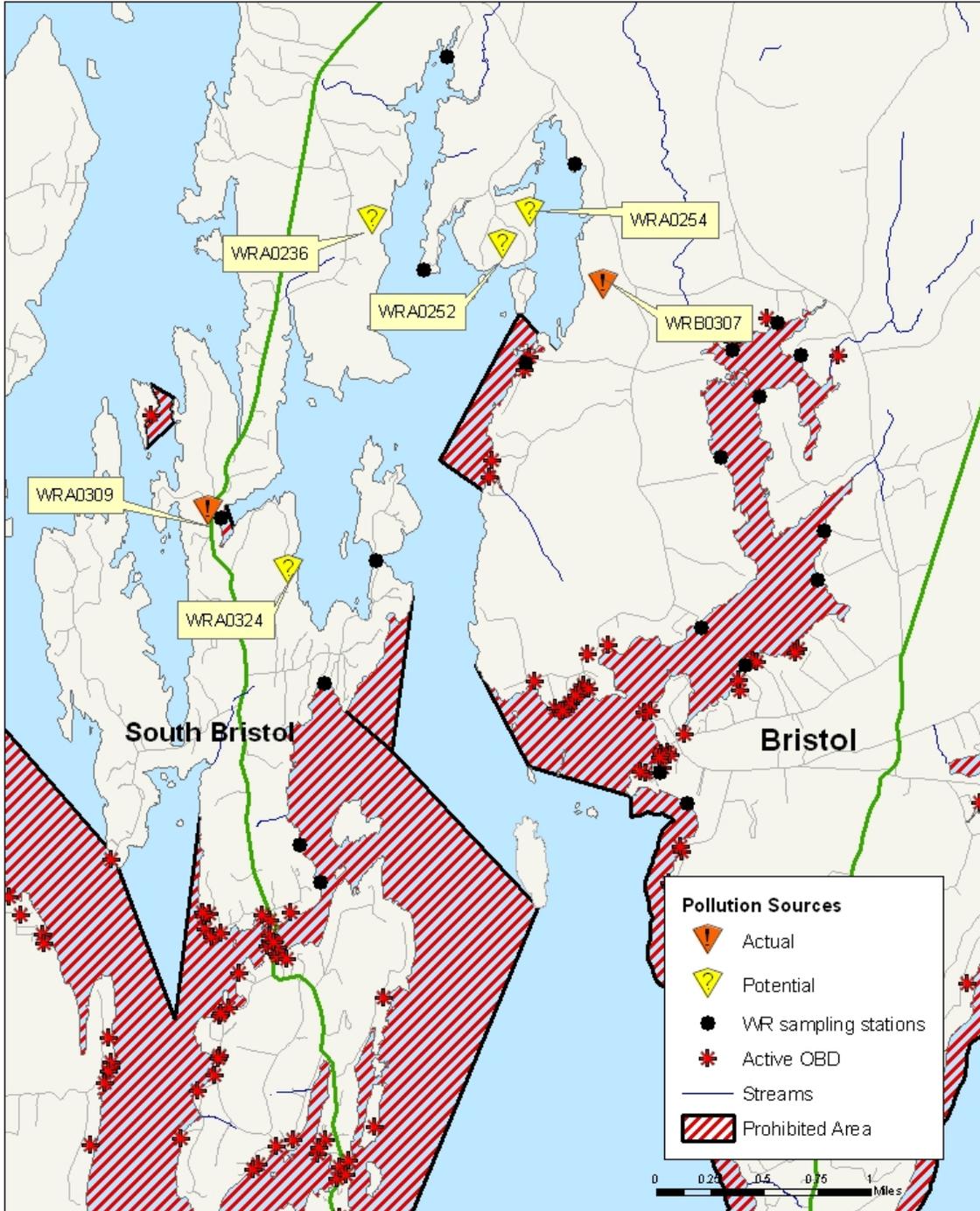
Figure 2. New Domestic Pollution Sources in Area WR (2007-2009)



Maine Department of Marine Resources Growing Area WR - New Pollution Sources



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Re-Evaluation of Existing Pollution Sources

The following sections are a review of existing pollution sources in growing area WR. Pollution problems associated with domestic waste, including OBDs, which were identified prior to the last sanitary survey (written after 2006) are re-evaluated. Other pollution sources, which were present at the time of the last triennial review, are also reviewed.

Domestic Waste (IG Systems and OBDs)

There are nine potential and actual domestic waste pollution sources that were identified prior to 2007 (Table 2, Figure 3). These pollution problems were noted in the last sanitary survey report, written after the completion of 2006 review year. All of these pollution sources are located within prohibited areas, and are therefore not a threat to public health.

Table 2. Existing Domestic Pollution Problems in Area WR, Identified before 2007

SLS D	LOT TOWN	Area Name	Description/ Action taken	Dist to Shore (ft)	Impact	Date Surveyed	Area Class
WRB0028.00	Bristol	Johns River	Questionable IGS		PI	01-Oct-03	Prohibited
WRB0029.00	Bristol	Johns River	Holding tank		PI	01-Oct-03	Prohibited
WRB0034.00	Bristol	Johns River	Questionable IGS		PI	01-Oct-03	Prohibited
WRB0020.50	Bristol	Johns River	Break out southwest of cottage	35	PI	01-Oct-03	Prohibited
WRB0025.00	Bristol	Johns River	Wet area surrounding IGS	21	PI	01-Oct-03	Prohibited
WRB0062.00	Bristol	Pemaquid River	Potential Malfunction		AD	01-Nov-03	Prohibited
WRB0064.00	Bristol	Pemaquid River	Holding tank		PI	01-Nov-03	Prohibited
WRB0134.00	Bristol	Pemaquid River	Questionable IGS		PI	01-Dec-03	Prohibited
WRB0188.00	Bristol	Pemaquid River	Questionable IGS	150	PI	01-Jan-04	Prohibited



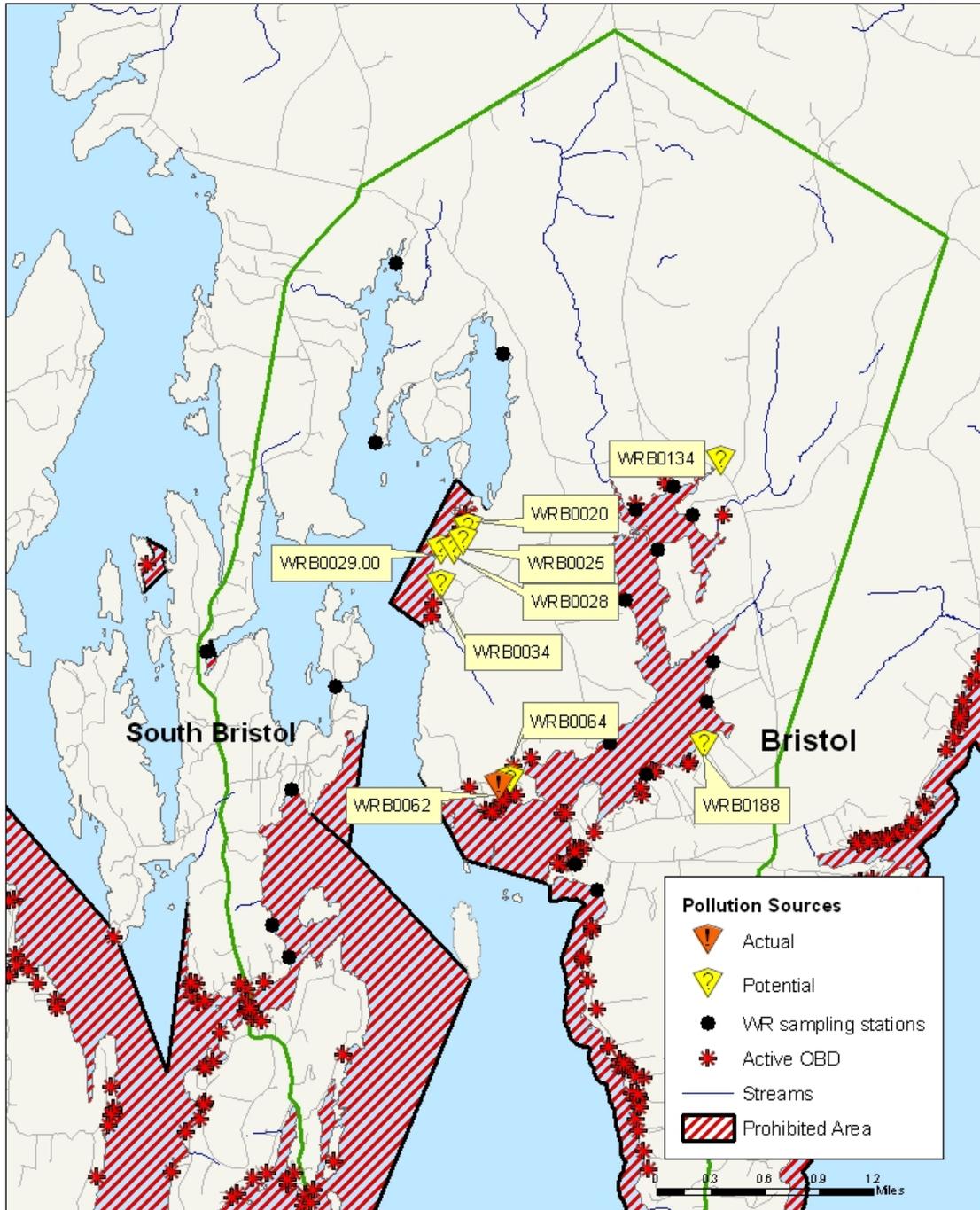
Figure 3. Domestic Pollution Sources in Area WR, Identified before 2007



Maine Department of Marine Resources Growing Area WR - Existing Pollution Sources



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There are 85 active licensed overboard discharges (OBDs) in growing area WR, with the majority of these discharges located in Pemaquid River and lower Johns Bay (Figure 4). 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. 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 WR (Table 3). The size of each closure is determined based on a dilution calculation, based on the permitted flow rate of the OBD, and the depth of the receiving water that each OBD discharges to; the fecal concentration used for this dilution calculation is 1.4×10^5 FC/100 ml. All current closures are of adequate size to protect public health.



Figure 4. Growing Area WR OBDs



Maine Department of Marine Resources Growing Area WR- Licensed OBDs



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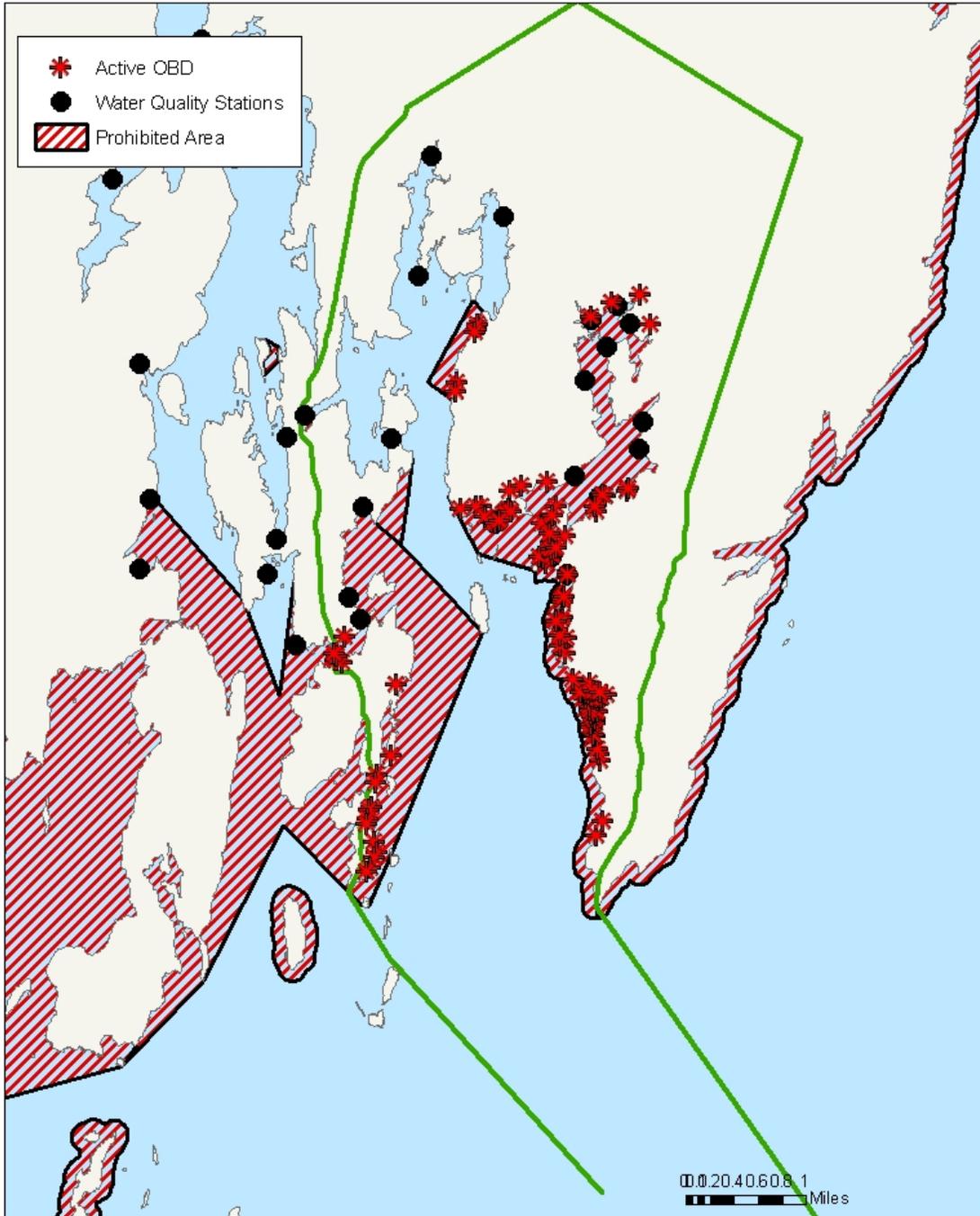




Table 3. Growing Area WR Licensed OBDs

DEP_ID	Town	Receiving Water	Depth Receiving Water	Licensed Flow (GPD)	Type*	Required Closure Acres	Acres Closed
4134	BRISTOL	JOHNS BAY	18	315	S	0.5	Entire Shoreline
3360	BRISTOL	JOHNS BAY	18	300	S	0.5	
7452	BRISTOL	JOHNS BAY	18	300	S	0.5	
5099	BRISTOL	JOHNS BAY	18	300	S	0.5	
7491	BRISTOL	JOHNS BAY	18	300	S	0.5	
6344	BRISTOL	JOHNS BAY	18	300	S	0.5	
6346	BRISTOL	JOHNS BAY	18	300	S	0.5	
6547	BRISTOL	JOHNS BAY	18	300	S	0.5	
6340	BRISTOL	JOHNS BAY	18	300	S	0.5	
6958	BRISTOL	JOHNS BAY	18	360	S	0.6	
6790	BRISTOL	JOHNS BAY	18	300	S	0.5	
7310	BRISTOL	JOHNS BAY	18	300	S	0.5	
6747	BRISTOL	JOHNS BAY	18	300	S	0.5	
6130	BRISTOL	JOHNS BAY	18	300	S	0.5	
7275	BRISTOL	JOHNS BAY	18	300	S	0.5	
2458	BRISTOL	JOHNS BAY	18	300	S	0.5	
4118	BRISTOL	JOHNS BAY	18	315	S	0.5	
3670	BRISTOL	JOHNS BAY	18	300	S	0.5	
1896	BRISTOL	JOHNS BAY	18	500	M	0.9	
4861	BRISTOL	JOHNS BAY	18	315	S	0.5	
1298	BRISTOL	JOHNS BAY	18	300	S	0.5	
4012	BRISTOL	JOHNS BAY	18	300	M	0.5	
3033	BRISTOL	JOHNS BAY	18	300	M	0.5	
2876	BRISTOL	JOHNS BAY	18	300	S	0.5	
2579	BRISTOL	JOHNS BAY	18	300	S	0.5	
2976	BRISTOL	ATL OCN AT JOHNS BAY	20	300	S	0.5	
1925	BRISTOL	ATL OCN AT JOHNS BAY	20	360	M	0.6	
2049	BRISTOL	ATLANTIC OCEAN AT JOHNS BAY	20	300	S	0.5	
2297	BRISTOL	ATLANTIC OCEAN AT JOHNS BAY	20	150	S	0.2	
1765	BRISTOL	JOHNS BAY	20	500	M	0.8	
1803	BRISTOL	JOHNS BAY	20	300	M	0.5	
1807	BRISTOL	JOHNS BAY	20	400	S	0.6	
1604	BRISTOL	JOHNS BAY	20	300	S	0.5	
2468	BRISTOL	JOHNS BAY	20	630	M	1.0	
1807	BRISTOL	JOHNS RIVER	14	400	S	0.9	70



DEP_ID	Town	Receiving Water	Depth Receiving Water	Licensed Flow (GPD)	Type*	Required Closure Acres	Acres Closed
6335	BRISTOL	JOHNS RIVER	14	600	S	1.3	
5326	BRISTOL	JOHNS RIVER	14	300	S	0.7	
3790	BRISTOL	JOHNS RIVER	14	300	S	0.7	
7455	BRISTOL	PEMAQUID HARBOR	30	300	S	0.3	Entire Shoreline
4857	BRISTOL	PEMAQUID HARBOR	30	300	S	0.3	
1897	BRISTOL	PEMAQUID HARBOR	30	300	S	0.3	
6839	BRISTOL	PEMAQUID HARBOR	30	300	S	0.3	
6382	BRISTOL	PEMAQUID HARBOR	30	350	S	0.4	
4212	BRISTOL	PEMAQUID HARBOR	30	300	M	0.3	
4093	BRISTOL	PEMAQUID HARBOR	30	500	M	0.5	
6111	BRISTOL	PEMAQUID HARBOR	30	300	S	0.3	
4094	BRISTOL	PEMAQUID HARBOR	30	500	M	0.5	
3144	BRISTOL	PEMAQUID HARBOR	30	300	S	0.3	
3635	BRISTOL	PEMAQUID HARBOR	30	300	S	0.3	
3013	BRISTOL	PEMAQUID HARBOR	30	300	M	0.3	
2384	BRISTOL	PEMAQUID HARBOR	30	300	M	0.3	
1766	BRISTOL	PEMAQUID HARBOR	30	360	M	0.4	
2023	BRISTOL	PEMAQUID HARBOR	30	360	M	0.4	
1759	BRISTOL	PEMAQUID HARBOR	30	300	S	0.3	
2147	BRISTOL	PEMAQUID HARBOR	30	360	M	0.4	
1762	BRISTOL	PEMAQUID HARBOR	30	300	M	0.3	
1704	BRISTOL	PEMAQUID HARBOR	30	540	S	0.6	
1305	BRISTOL	PEMAQUID HARBOR	30	300	M	0.3	
1456	BRISTOL	PEMAQUID HARBOR	30	500	M	0.5	
6304	BRISTOL	PEMAQUID RIVER	4	300	S	2.3	Entire River >400 acres
6153	BRISTOL	PEMAQUID RIVER	15	180	P	0.4	
6042	BRISTOL	PEMAQUID RIVER	4	3500	S	26.9	
3592	BRISTOL	PEMAQUID RIVER	15	300	S	0.6	
3328	BRISTOL	PEMAQUID RIVER	15	300	S	0.6	
3604	BRISTOL	PEMAQUID RIVER	15	300	S	0.6	
2867	BRISTOL	PEMAQUID RIVER	4	300	S	2.3	
1558	BRISTOL	PEMAQUID RIVER	15	300	S	0.6	Entire Shore, >900 Acres
3757	SOUTH BRISTOL	ATL OCEAN AT THE GUT	15	300	M	0.6	
6829	SOUTH BRISTOL	ATLANTICE OCEAN AT THE GUT	15	300	M	0.6	
2056	SOUTH BRISTOL	JOHNS BAY	15	360	M	0.7	
			40			0.3	
2075	SOUTH	JOHNS BAY		330	S		



DEP_ID	Town	Receiving Water	Depth Receiving Water	Licensed Flow (GPD)	Type*	Required Closure Acres	Acres Closed
	BRISTOL						
1755	SOUTH BRISTOL	JOHNS BAY	40	360	S	0.3	
2003	SOUTH BRISTOL	JOHNS BAY	40	300	S	0.2	
1751	SOUTH BRISTOL	JOHNS BAY	40	500	M	0.4	
1877	SOUTH BRISTOL	JOHNS BAY	40	600	S	0.5	
4524	SOUTH BRISTOL	JOHNS BAY	40	450	S	0.3	
1977	SOUTH BRISTOL	JOHNS BAY	40	660	S	0.5	
1653	SOUTH BRISTOL	JOHNS BAY	40	360	S	0.3	
6403	SOUTH BRISTOL	JOHNS BAY	40	300	S	0.2	
7451	SOUTH BRISTOL	JOHNS BAY	40	500	M	0.4	
1901	SOUTH BRISTOL	JOHNS BAY	40	450	S	0.3	
2421	SOUTH BRISTOL	SOUTH BRISTOL GUT	15	300	S	0.6	
6555	SOUTH BRISTOL	SOUTH BRISTOL GUT	15	300	M	0.6	
7453	SOUTH BRISTOL	THE GUT	15	300	S	0.6	
1614	SOUTH BRISTOL	THE GUT	15	300	M	0.6	
3129	SOUTH BRISTOL	JOHNS BAY	40	300	S	0.2	

*S= sand filter; M=mechanical



Municipal WWTP

There are no municipal sewage treatment plants in this growing area.

Industrial Pollution

There are no permitted industrial discharges into growing area WR.

Marinas and Moorings

There are no true marinas in this growing area. Working docks with fuel tanks are located at the south Bristol Co-op and the Pemaquid Co-op (Pemaquid River); these docks service commercial fishing boats and both are located in large prohibited areas. There are numerous moorings located in the area surrounding the Bristol Gut (west of Witch Island), Pemaquid River and McFarlands cove. These moorings are used by both fishing/work boats, smaller pleasure boats and occasionally larger sailboats which are large enough to have on-board heads. It is unknown if any of the boats are used for overnight stays. The highest concentration of large boats has been observed in the Pemaquid River. During peak summer months, up to 25 large boats have been observed moored in the river; the entire river is currently classified as prohibited.

Stormwater

There are no structural municipal stormwater collection systems in the growing area WR.

Non-Point Pollution Sources (streams, etc)

Streams are a source of fresh water to the Johns Bay watershed, and may carry stormwater, snowmelt and groundwater into the coastal estuaries. Waste, including that containing fecal matter, which is deposited on land, may be carried by streams to shellfish growing areas, contributing to elevated fecal counts in waters that are filtered by shellfish.

In 2009, four streams were evaluated (Table 4 and Figure 5). Stream S1WR11 is a small stream that drains towards station WR 11. This stream drains an area with an identified septic system malfunction. In 2009, no elevated fecal scores were observed. Streams S1WR 25 flows into the head of the Pemaquid River; sample station S1 WR 26 is located at the mouth of the fresh water portion of the Pemaquid River, before the river drains into the estuary. While the Pemaquid River is currently classified as prohibited, due to the presence of OBDs, other identified pollution sources, and water quality surpassing the approved standards, the area located between stations WR 27.3 and 29 should be evaluated for a seasonal conditional classification in the future review years. This area lacks the presence of OBDs and other identified pollution sources, however, fecal pollution associated with fresh water sources must be considered prior to any reclassification changes being implemented.

Stream sample station S1 WR 24 monitors the mouth of a small, intermittent stream draining into the middle portion of the Pemaquid River; flow rates of this stream are limited to rainfall events. In 2009, this stream showed no scores above the approved variability standard. This



stream should be monitored after rainfall events in the coming review years. The water quality monitoring station (WR 24) located at the mouth of this stream, currently exceeds the approved standard for classification.

There are two streams that drain into the head of the North Branch. These streams flow through undeveloped lots and no access to the mouth of the stream is currently available; therefore no sample collection was completed at these two streams.

Table 4. Growing Area WR Stream Samples

Station	Sample Date	Salinity	Fecal Score	Flow	Flow Conditions
S1WR011.00	9/16/2009	0	<2	15 gpm	Low
S1WR011.00	9/30/2009	0	8	35 gpm	Medium
S1WR011.00	10/14/2009	0	18	200 gpm	Medium
S1WR024.00	9/16/2009	0	24	<5 gpm	Low
S1WR024.00	9/30/2009	-	-	No flow	Medium
S1WR024.00	10/14/2009	0	20	150 gpm	Medium
S1WR025.00	9/16/2009	0	16	-	Low
S1WR025.00	9/30/2009	0	72	-	Medium
S1WR025.00	10/14/2009	0	11	-	Medium
S1WR026.00	9/16/2009	0	46	-	Low
S1WR026.00	9/30/2009	0	25	-	Medium
S1WR026.00	10/14/2009	0	22	-	Medium



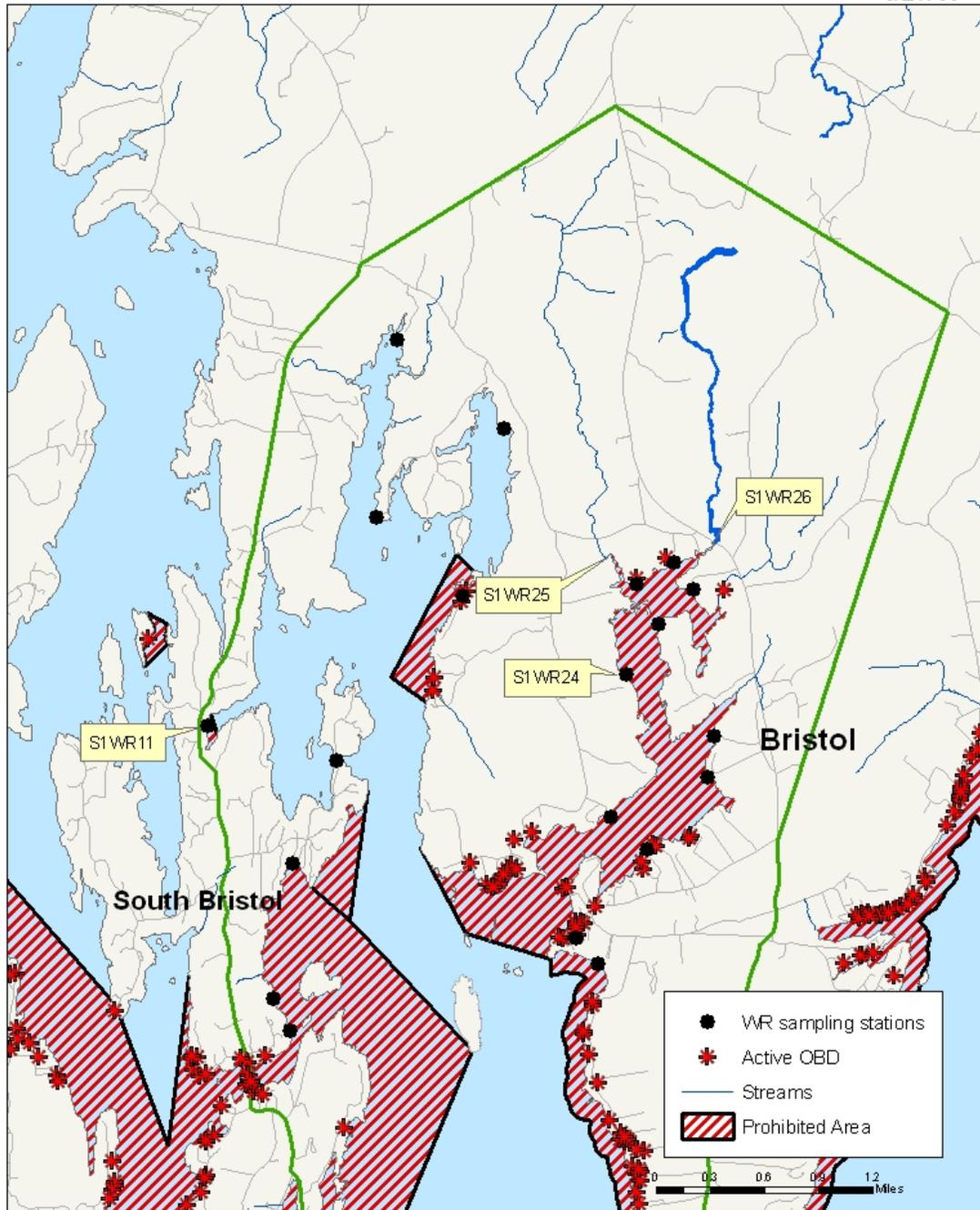
Figure 5. Growing Area WR Stream Sample Locations



Maine Department of Marine Resources Growing Area WR - Streams



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Agricultural Activities, Domestic Animals and Wildlife Activity

There are no farming operations in the vicinity of the shoreline of growing area WR. There are no significant concentrations of animals anywhere in the study area. No pastured large domestic animals (horses) have been observed in the vicinity of the shoreline over the past three review years. Seabirds are occasionally observed in the study area, but never in large enough numbers to indicate migration or overwintering.

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

Pemaquid Beach is located at the mouth of the Pemaquid River, on the southeast edge of Pemaquid Harbor. It has public restroom facilities, including showers, which operate through a licensed OBD. Fort William Henry State Park is a day tourist location at the southeastern edge of Pemaquid Point. It houses a small museum, but does not offer camping or public restroom facilities. A gravel boat launch frequented by many salt water fishing enthusiasts is located just outside Fort William Henry State Park. All of these recreational areas are located within a large prohibited area.

Water Quality Review and Discussion

Table 5 lists all active stations in Growing Area WR, with their respective Geomean and P90 calculations for 2009. Please refer to Appendix A for a key to interpreting the headers on the columns of Table 5. The approved and restricted standards for each station are also displayed in Table 5. These standards will fluctuate yearly as a result of the DMR transition from a most probable number (MPN) fecal coliform test method to a membrane filtration (MF) method and are dependent on the number of sample analyzed by MPN verses MF. The total number of data points used in the calculations is displayed in the Count column and includes both MPN and MF values. The number of data points analyzed by MF is displayed in the MFCNT column. This fluctuating standard will cease when all 30 data points have been analyzed by the MF method. A more detailed explanation of this transition can be found in central files. All approved stations met their NSSP classification standard in 2009.

Table 5. Geomean and P90 Scores, Growing Area WM, 2004-2009

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WR006.00	P	30	21	3	0.42	240	10.8	35	195	3/24/2005
WR007.00	P	30	21	2.6	0.28	43	6.1	35	195	3/24/2005
WR008.00	P	30	21	3	0.38	43	9.4	35	195	3/24/2005
WR010.00	A	30	21	3.6	0.43	93	12.9	35	195	3/24/2005
WR011.00	P	30	21	5.6	0.55	114	29.3	35	195	3/24/2005
WR012.00	A	30	21	4.6	0.56	180	24.2	35	195	5/9/2005
WR013.00	A	30	21	5.3	0.51	78	24.7	35	195	3/24/2005
WR014.00	A	30	21	3.7	0.4	44	12.4	35	195	3/24/2005
WR016.00	P	30	21	2.9	0.25	16	6.3	35	195	3/24/2005



Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WR022.00	P	30	21	3	0.33	43	8.1	35	195	3/24/2005
WR024.00	P	30	21	8.3	0.68	1700	63.6	35	195	7/18/2005
WR025.00	P	30	20	12.1	0.59	98	69.9	36	199	9/27/2004
WR026.00	P	30	21	11.4	0.56	240	60.8	35	195	3/24/2005
WR027.00	P	30	22	13.5	0.64	460	91.6	35	191	3/24/2005
WR027.30	P-New	24	21	7.6	0.64	460	51.9	32	175	4/19/2006
WR028.00	P	30	21	5.4	0.69	460	42.7	35	195	3/24/2005
WR029.00	P	30	21	6.7	0.65	500	46.8	35	195	3/24/2005
WR030.00	P	30	21	4.5	0.47	104	18.3	35	195	3/24/2005
WR034.00	P	30	21	5.9	0.63	1100	39.1	35	195	3/24/2005
WR035.00	P	30	21	3.6	0.35	28	10.5	35	195	3/24/2005

All stations active at the beginning of the year were sampled at least 6 times in 2009, following the systematic random sampling (SRS) schedule. Station WR 13 served as a re-opening sample station after flood events, and was sampled under adverse conditions. Table 5 shows the number of random and adverse samples taken during the 2009 sampling year; Appendix B shows all SRS data collected in 2009 for all active stations in growing area WR.

Table 6. WR Samples Collected in 2009

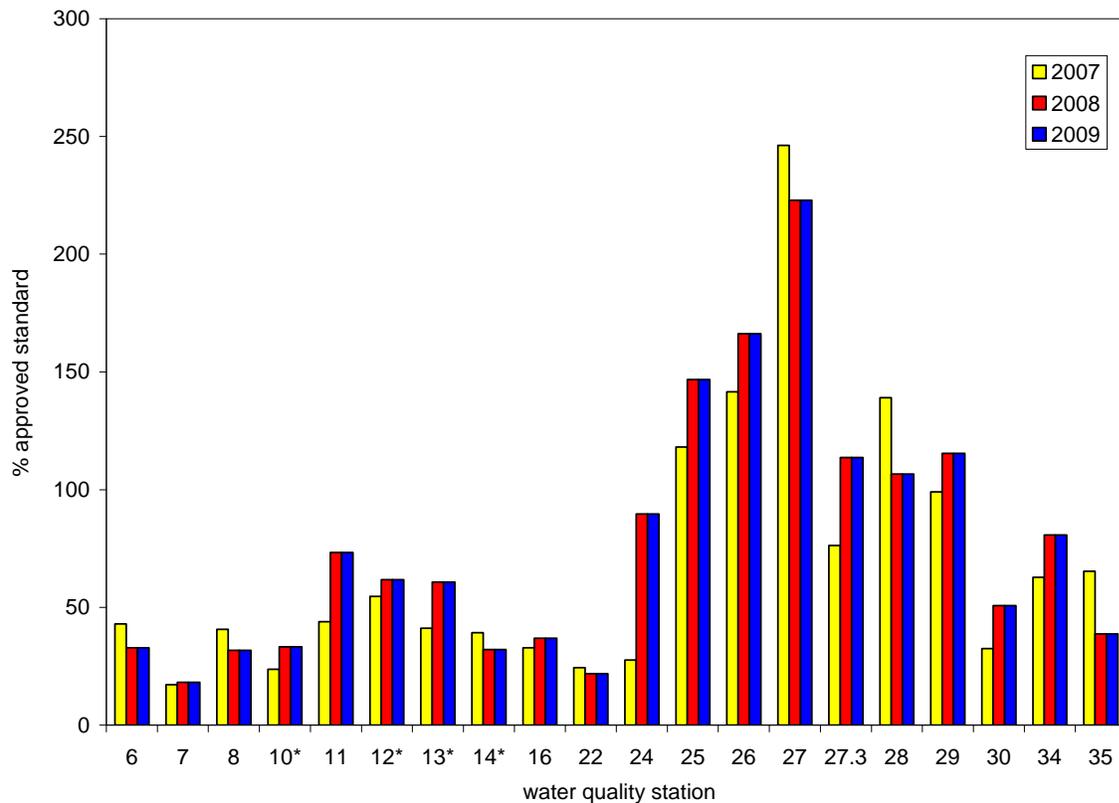
Station	Class	Adverse	Random		Total	Comments
		Closed	Closed	Open		
WR006.00	P		6		6	
WR007.00	P		6		6	
WR008.00	P		6		6	
WR010.00	A			6	6	
WR011.00	P		6		6	
WR012.00	A			6	6	
WR013.00	A	27		6	33	Flood Station
WR014.00	A			6	6	
WR016.00	P		6		6	
WR022.00	P		6		6	
WR024.00	P		6		6	
WR025.00	P		6		6	
WR026.00	P		6		6	
WR027.00	P		6		6	
WR027.30	P		6		6	
WR028.00	P		6		6	
WR029.00	P	1	6		7	
WR030.00	P	1	6		7	
WR034.00	P		6		6	
WR035.00	P		6		6	



Figure 6 shows the P90 trends over the past three years, for all stations in growing area WR. During the transition from MPN to MF analysis method, the approved standard will decrease every year, until all samples have been analyzed by the MF method. In order to show the trend of the P90 value over the years, the calculated P90 scores are expressed as a percentage of the approved standard; any station showing the 2009 column on or above the 100 percent line does not meet the standard for approved classification.

Approved stations WR 10, 12, and 13, as well as multiple stations that are classified as prohibited, have shown an increase in P90 scores between 2007 and 2008, and no change between 2008 and 2009. These upwards trends may be attributed to the above average precipitation that had occurred in summer of 2008 and corresponded to sample collection dates for this growing area; an increase in precipitation events will increase overland run-off conditions, and may contribute to increased transfer of pollutants from the watershed into coastal waters. Additional scores from these three stations should be monitored closely over the 2010 field season, to determine whether the upward trend in P90 scores is likely to continue at the end of the 2010 season.

Figure 6. Area WR P90 Scores for (expressed as the percent of the approved standard), 2007-2009



* = Approved Stations



Recommendations for Upward Classification

No areas are being proposed for an upward classification change.

Shoreline Survey Activity during Review Period (2007-2009)

The following areas in Growing Area WR were surveyed during the review period:

March 31, 2008: 32 properties were surveyed in Bristol and South Bristol, in the Pemaquid river area by the DEP, the local shellfish warden and the local shellfish committee chair. Five potential and two actual problems were noted during the survey. All actual problems were located within a prohibited area.

April 1, 2008: 28 properties were surveyed in South Bristol, East and North Branch areas by the DEP, the local shellfish warden, and the local shellfish committee chair. Three potential problems were noted during the survey.

April 4, 2008: 55 properties were surveyed in South Bristol, Bradstreet, Poorhouse and High Isle Cove areas by DMR, the local shellfish warden, and the local shellfish committee chair. Two potential problems were noted during the survey.

April 5, 2008: 4 properties were surveyed in South Bristol, by the local shellfish committee chair. No potential or actual problems were identified during the survey.

April 7, 2008: 27 properties were surveyed in South Bristol, Johns River area by DEP, the local shellfish warden, and the local shellfish committee chair. No potential or actual problems were identified during the survey.

July 1, 2008: Drive through survey in WR during random sampling run. Mooring field located between stations WR 22 and 30- a total of 45 boats were counted, possible 11 with heads. The remaining boats were lobster boats and day-use, smaller sailboats. In the vicinity of stations WR 34 and 35 are public beaches with many visitors; some dogs were observed on the beach and in the water. Improvements in area WR include a replacement of a malfunctioning septic system in South Bristol, located off Priscilla Point Road (McFarlands Cove area).

August 19, 2008: Drive through survey completed. No problems observed. Improvements in area WR include a replacement of a malfunctioning septic system in South Bristol, located off Priscilla Point Road (McFarlands Cove area).



Aquaculture/Wet Storage Activity

There are three active aquaculture lease sites in area WR (two limited and one experimental). There are no wet storage sites or activities in area WR.

For more information on aquaculture leases, please visit the DMR website:

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

Classification Changes

No classification changes are currently required or recommended.

Summary

At the end of the 2009 review year, all approved stations in growing area WR were meeting their NSSP classification standard; however, three of the four approved stations in this growing area were exhibiting upward trends in water quality scores. Several prohibited stations were meeting the approved standard as well, however must remain classified as prohibited due to their proximity to licensed OBDs or identified pollution sources. Multiple potential pollution sources are located within the boundary of this growing area; these sources that are located in areas classified as approved should be reviewed at a minimum of every three years. One actual pollution source, located in Bradstreet Cove, South Bristol should be reviewed on an annual basis; once this pollution source is remediated, the shellfish flats surrounding it may be evaluated for an upgrade in classification.

Recommendation for Future Work

The following work is recommended to be completed prior to the next sanitary survey evaluation:

- 1) re-survey all properties in the Pemaquid River area
- 2) evaluate Pemaquid River water quality scores and pollution sources for potential changes in classification. A seasonal conditional area may be appropriate for portions of the river.
- 3) evaluate Bradstreet Cove for an upgrade in classification, pending the correction of a septic system malfunction



References

U.S. Census of Population and Housing, 2000: Maine - Place and County Subdivision.
Accessed online at: <http://factfinder.census.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.

MFCNT = the number of samples evaluated with the MTec method (included in the total Count column)

Geo_Mean = means the antilog (base 10) of the arithmetic mean of the sample result logarithm (base 10).

SDV = standard deviation

Max = maximum score of the 30 data points in the count column

P90 = 90th percentile

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

RESTR_STD = the 90th percentile, at or below which the station would meet restricted criteria.



Appendix B. Growing Area WR 2009 SRS Data

Station	Date	Collector	Tide	Wind	Temp	Salin	Strat	Adv	Status	Class	Col
WR006.00	17-Feb-09	EXT	F	N	2	32	R	X	C	P	<2
WR006.00	31-Mar-09	EXT	F	NE	6	29	R	X	C	P	<2
WR006.00	19-May-09	EXT	HE	CL	12	30	R	X	C	P	16
WR006.00	17-Aug-09	MLP	HF	CL	21	30	R	X	C	P	8
WR006.00	16-Sep-09	AB	H	NW	14	31	R	X	C	P	<2
WR006.00	14-Oct-09	AB	E	N	7	31	R	M	C	P	10
WR007.00	17-Feb-09	EXT	F	N	1	35	R	X	C	P	<2
WR007.00	31-Mar-09	EXT	HF	NE	5	30	R	X	C	P	<2
WR007.00	19-May-09	EXT	HE	NE	12	29	R	X	C	P	<2
WR007.00	17-Aug-09	MLP	HF	CL	21	30	R	B	C	P	<2
WR007.00	16-Sep-09	AB	H	N	12	31	R	M	C	P	<2
WR007.00	14-Oct-09	AB	E	N	7	32	R	M	C	P	<2
WR008.00	17-Feb-09	EXT	F	CL	2	32	R	X	C	P	<2
WR008.00	31-Mar-09	EXT	HF	CL	4	30	R	X	C	P	<2
WR008.00	19-May-09	EXT	HE	CL	12	30	R	X	C	P	<2
WR008.00	17-Aug-09	MLP	HF	CL	21	30	R	X	C	P	2
WR008.00	16-Sep-09	AB	H	CL	13	31	R	X	C	P	6
WR008.00	14-Oct-09	AB	E	N	7	32	R	X	C	P	<2
WR010.00	17-Feb-09	EXT	F	CL	1	32	R	X	O	A	<2
WR010.00	31-Mar-09	EXT	HF	CL	5	26	R	X	O	A	<2
WR010.00	19-May-09	EXT	HE	CL	12	30	R	X	O	A	<2
WR010.00	17-Aug-09	MLP	HF	CL	22	30	R	X	O	A	6
WR010.00	16-Sep-09	AB	H	CL	13	31	R	X	O	A	<2
WR010.00	14-Oct-09	AB	E	N	7	32	R	X	O	A	<2
WR011.00	17-Feb-09	EXT	F	CL	0	28	R	X	C	P	<2
WR011.00	31-Mar-09	EXT	HF	CL	6	22	R	X	C	P	<2
WR011.00	19-May-09	EXT	HE	CL	13	29	R	X	C	P	<2
WR011.00	17-Aug-09	MLP	HF	CL	22	30	R	X	C	P	4
WR011.00	16-Sep-09	AB	H	N	13	30	R	X	C	P	6
WR011.00	14-Oct-09	AB	E	N	8	29	R	X	C	P	5.5
WR012.00	17-Feb-09	EXT	F	N	2	32	R	W	O	A	<2
WR012.00	31-Mar-09	EXT	H	NE	4	30	R	X	O	A	<2
WR012.00	19-May-09	EXT	E	CL	13	29	R	X	O	A	<2
WR012.00	17-Aug-09	MLP	H	CL	22	30	R	X	O	A	7.3
WR012.00	16-Sep-09	AB	HE	CL	13	31	R	X	O	A	<2
WR012.00	14-Oct-09	AB	HE	N	8	32	R	X	O	A	<2



Station	Date	Collector	Tide	Wind	Temp	Salin	Strat	Adv	Status	Class	Col
WR013.00	31-Mar-09	EXT	HF	CL	6	28	R	X	O	A	<2
WR013.00	19-May-09	EXT	E	CL	12	28	R	X	O	A	4
WR013.00	03-Jun-09	EXT	H	CL	16	30	R	X	O	A	2
WR013.00	17-Aug-09	MLP	H	CL	22	30	R	X	O	A	11
WR013.00	16-Sep-09	AB	H	CL	14	30	R	X	O	A	15
WR013.00	14-Oct-09	AB	E	CL	8	30	R	X	O	A	2
WR014.00	31-Mar-09	EXT	H	CL	6	30	R	X	O	A	<2
WR014.00	19-May-09	EXT	E	CL	13	30	R	X	O	A	<2
WR014.00	03-Jun-09	EXT	HF	CL	16	30	R	X	O	A	<2
WR014.00	17-Aug-09	MLP	H	CL	23	30	R	X	O	A	4
WR014.00	16-Sep-09	AB	HE	N	13	31	R	X	O	A	4
WR014.00	14-Oct-09	AB	HE	N	8	31	R	X	O	A	2
WR016.00	17-Feb-09	EXT	F	N	3	32	R	X	C	P	<2
WR016.00	31-Mar-09	EXT	H	NE	4	28	R	X	C	P	2
WR016.00	19-May-09	EXT	E	SW	14	30	R	X	C	P	<2
WR016.00	17-Aug-09	MLP	H	CL	23	30	R	X	C	P	<2
WR016.00	16-Sep-09	AB	E	N	13	31	R	X	C	P	6
WR016.00	14-Oct-09	AB	HE	N	7	32	R	X	C	P	<2
WR022.00	17-Feb-09	EXT	F	CL	2	31	R	X	C	P	<2
WR022.00	31-Mar-09	EXT	H	NE	4	26	R	X	C	P	<2
WR022.00	19-May-09	EXT	E	SW	12	24	R	X	C	P	<2
WR022.00	17-Aug-09	MLP	HE	CL	19	30	R	B	C	P	2
WR022.00	16-Sep-09	AB	HE	N	12	30	R	X	C	P	2
WR022.00	14-Oct-09	AB	HE	NE	7	31	R	X	C	P	<2
WR024.00	17-Feb-09	EXT	F	N	2	22	R	X	C	P	22
WR024.00	31-Mar-09	EXT	H	NE	4	10	R	X	C	P	2
WR024.00	19-May-09	EXT	E	CL	14	21	R	X	C	P	2
WR024.00	17-Aug-09	MLP	HE	CL	23	16	R	X	C	P	240
WR024.00	16-Sep-09	AB	HE	N	13	24	R	X	C	P	56
WR024.00	14-Oct-09	AB	HE	NE	5	28	R	X	C	P	16
WR025.00	31-Mar-09	EXT	HE	CL	5	6	R	X	C	P	<2
WR025.00	19-May-09	EXT	E	CL	14	14	R	W	C	P	15
WR025.00	03-Jun-09	EXT	H	CL	17	17	R	X	C	P	9.1
WR025.00	17-Aug-09	MLP	HE	CL	23	10	R	X	C	P	56
WR025.00	16-Sep-09	AB	HE	N	14	24	R	X	C	P	10
WR025.00	14-Oct-09	AB	H	NE	7	24	R	X	C	P	10



Station	Date	Collector	Tide	Wind	Temp	Salin	Strat	Adv	Status	Class	Col
WR026.00	31-Mar-09	EXT	F	CL	5	4	R	X	C	P	<2
WR026.00	19-May-09	EXT	E	CL	14	8	R	X	C	P	6
WR026.00	03-Jun-09	EXT	H	CL	17	22	R	X	C	P	7.3
WR026.00	17-Aug-09	MLP	HE	CL	24	22	R	X	C	P	24
WR026.00	16-Sep-09	AB	E	CL	14	21	R	X	C	P	20
WR026.00	14-Oct-09	AB	H	CL	8	24	R	X	C	P	6
WR027.00	31-Mar-09	EXT	F	CL	5	11	R	X	C	P	<2
WR027.00	19-May-09	EXT	E	CL	13	14	R	X	C	P	16
WR027.00	03-Jun-09	EXT	H	CL	16	17	R	X	C	P	33
WR027.00	17-Aug-09	MLP	HE	CL	22	25	R	X	C	P	29
WR027.00	16-Sep-09	AB	E	CL	13	26	R	X	C	P	10
WR027.00	14-Oct-09	AB	H	CL	7	25	R	X	C	P	11
WR027.30	17-Feb-09	EXT	F	NW	4	24	R	X	C	P	<2
WR027.30	31-Mar-09	EXT	F	N	3	4	R	X	C	P	<2
WR027.30	19-May-09	EXT	E	SW	13	9	R	X	C	P	2
WR027.30	17-Aug-09	MLP	E	S	20	25	R	X	C	P	22
WR027.30	16-Sep-09	AB	E	CL	14	30	R	X	C	P	460
WR027.30	19-Oct-09	LSM	F	N	10	25	R	X	C	P	1.9
WR028.00	17-Feb-09	EXT	F	NW	4	29	R	X	C	P	2
WR028.00	31-Mar-09	EXT	F	N	4	18	R	X	C	P	<2
WR028.00	19-May-09	EXT	E	CL	12	29	R	X	C	P	2
WR028.00	17-Aug-09	MLP	E	CL	21	28	R	X	C	P	2
WR028.00	16-Sep-09	AB	E	CL	13	29	R	X	C	P	14
WR028.00	14-Oct-09	AB	E	N	7	28	R	X	C	P	2
WR029.00	17-Feb-09	EXT	F	NW	3	29	R	X	C	P	<2
WR029.00	31-Mar-09	EXT	F	CL	3	22	R	X	C	P	<2
WR029.00	19-May-09	EXT	E	CL	13	21	R	X	C	P	<2
WR029.00	17-Aug-09	MLP	E	S	22	28	R	X	C	P	20
WR029.00	16-Sep-09	AB	E	CL	13	30	R	X	C	P	<2
WR029.00	14-Oct-09	AB	E	NE	7	32	R	X	C	P	<2
WR030.00	17-Feb-09	EXT	LF	NW	3	29	R	X	C	P	<2
WR030.00	31-Mar-09	EXT	F	N	3	28	R	X	C	P	<2
WR030.00	19-May-09	EXT	E	CL	12	22	R	X	C	P	<2
WR030.00	17-Aug-09	MLP	E	S	21	28	R	X	C	P	4
WR030.00	16-Sep-09	AB	E	N	13	30	R	M	C	P	7.3
WR030.00	14-Oct-09	AB	E	NE	7	29	R	X	C	P	3.6
WR034.00	17-Feb-09	EXT	LF	NW	3	28	R	X	C	P	<2



Station	Date	Collector	Tide	Wind	Temp	Salin	Strat	Adv	Status	Class	Col
WR034.00	31-Mar-09	EXT	F	N	5	22	R	X	C	P	<2
WR034.00	19-May-09	EXT	E	SW	12	28	R	X	C	P	<2
WR034.00	17-Aug-09	MLP	E	S	20	30	R	X	C	P	74
WR034.00	16-Sep-09	AB	E	N	13	30	R	X	C	P	<2
WR034.00	14-Oct-09	AB	E	NW	5	18	R	X	C	P	74
WR035.00	17-Feb-09	EXT	LF	NW	4	32	R	X	C	P	<2
WR035.00	31-Mar-09	EXT	F	N	4	30	R	X	C	P	<2
WR035.00	19-May-09	EXT	E	SW	13	26	R	X	C	P	18
WR035.00	17-Aug-09	MLP	E	S	21	30	R	X	C	P	8
WR035.00	16-Sep-09	AB	E	CL	13	31	R	X	C	P	<2
WR035.00	14-Oct-09	AB	E	NW	8	32	R	X	C	P	<2