



GROWING AREA WG

Towns of Biddeford, Saco, Old Orchard Beach, and Scarborough

Sanitary Survey Report 2016

2005-2016

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Executive Summary

This is a Sanitary Survey report for growing area WG written in compliance with the requirements of the 2015 Model Ordinance and the National Shellfish Sanitation Program. Growing area WG encompasses the area from East Point, Biddeford to Prouts Neck, Scarborough. The shoreline in this area consists of sandy beaches, tidal marshes and rivers, and one large freshwater input being the Saco River. The tidal areas of Biddeford Pool and the Scarborough River provide habitat for softshell clams. The Saco Bay area provides habitat for surf clams.

The coastline in growing area WG is highly developed and very populated, especially during the summer months. Growing area WG was surveyed in 2013 and 2014. Two questions were found; one within a Prohibited area at the mouth of the Saco River and the other in Biddeford Pool. The Biddeford Pool question was not an issue.

There are five known licensed overboard discharges (OBDs) and nine known treated discharges into growing area WG. All known sewage discharges are within Prohibited areas.

Water quality station WG 32 no longer meets the approved standard and requires a downgrade in Jones Creek, Scarborough.

The next sanitary survey is due in 2028 and the next Triennial in 2019.

Description of Growing Area

The area includes Biddeford Pool, which is an embayment that drains out at low tide, and a number of expansive sandy beaches, including Hills Beach in Biddeford, Ferry Beach in Saco, Old Orchard Beach in the town of Old Orchard, Grand Beach and Western Beach in Scarborough. The area also covers the Scarborough Marsh including the Scarborough River and its tributaries, Nonesuch River, Mill Brook, Cascade Brook and Libby River. The beaches are very popular with tourists and there is a significant increase in seasonal habitation and shore use during the summer months. The Scarborough River is the largest salt marsh in the state, comprised of a tidal marsh, salt creeks, a freshwater marsh and uplands.

The major sources of pollution in area WG include the Biddeford Pool Waste Water Treatment Plant (WWTP), Biddeford Waste Water Treatment Plant, Saco Waste Water Treatment Plant, and Old Orchard Beach Waste Water Treatment Plant. Other sources of pollution include boat moorings in Biddeford Pool (less than 10 with heads are moored at this area) and in the Scarborough River (monitored by station WG 38), non-point pollution in the tributaries of the Scarborough River, and residential overboard discharges (OBDs).



Figure 1. Growing Area WG overview map with pollution areas.

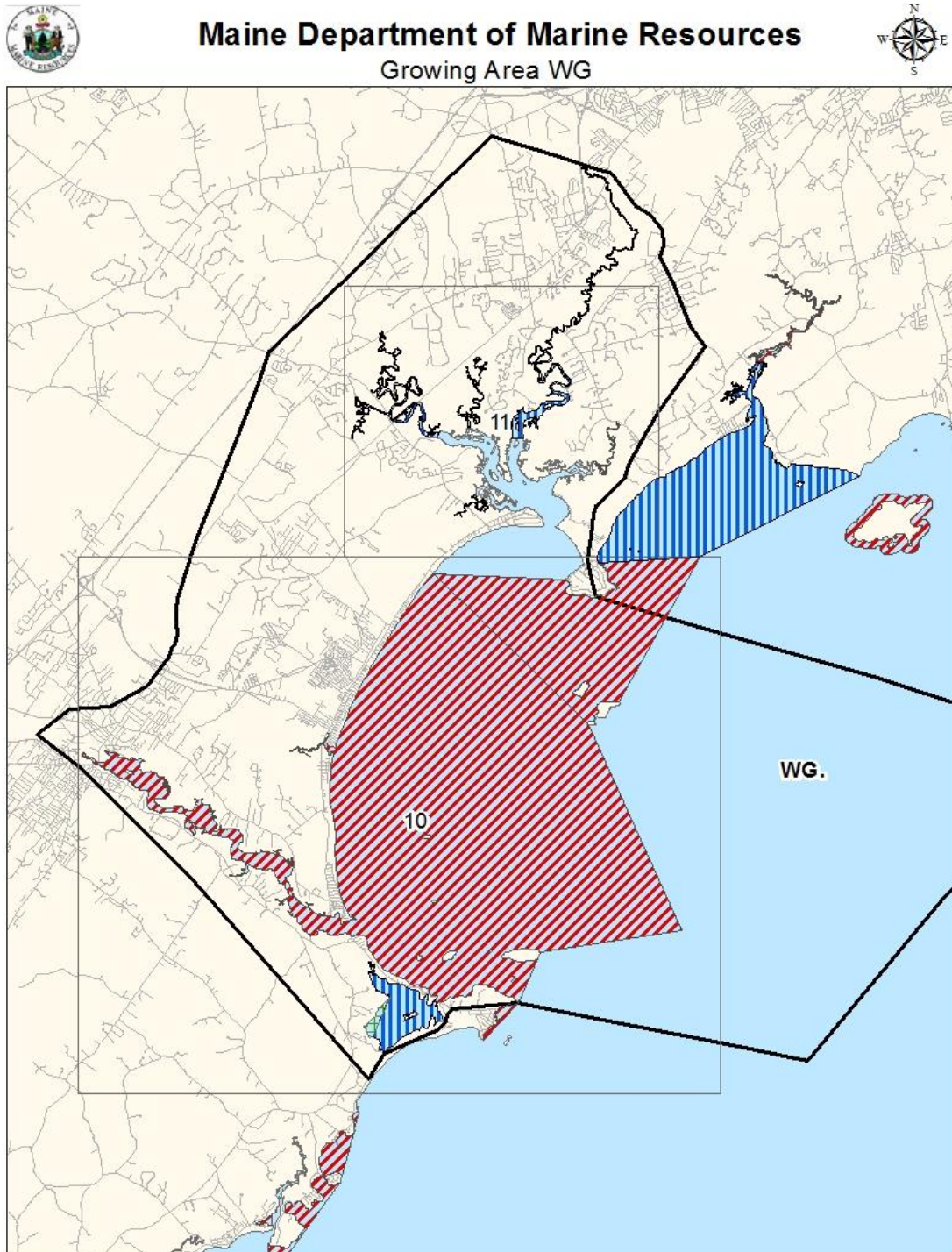




Figure 2. Southern half of Growing Area WG with water quality stations.

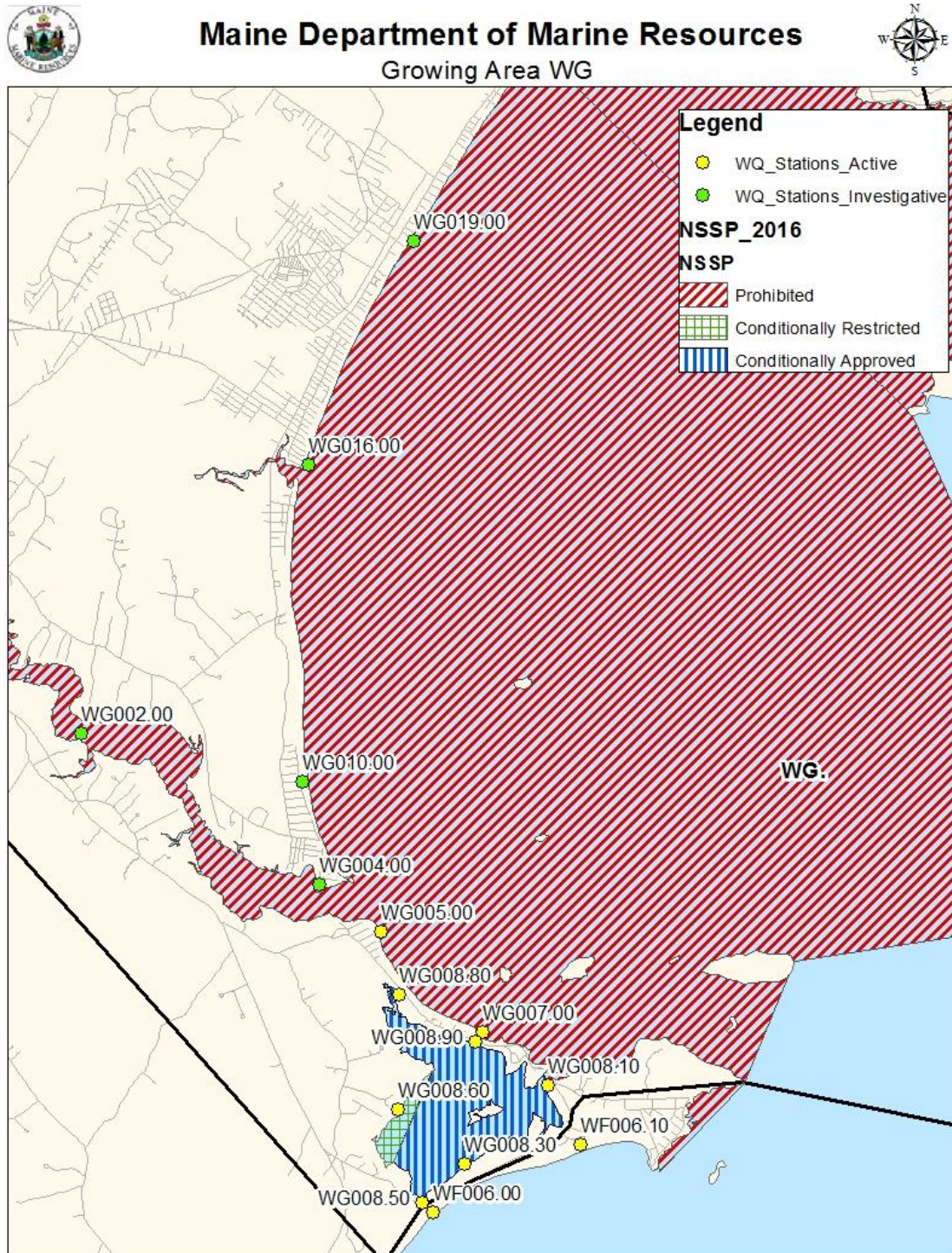
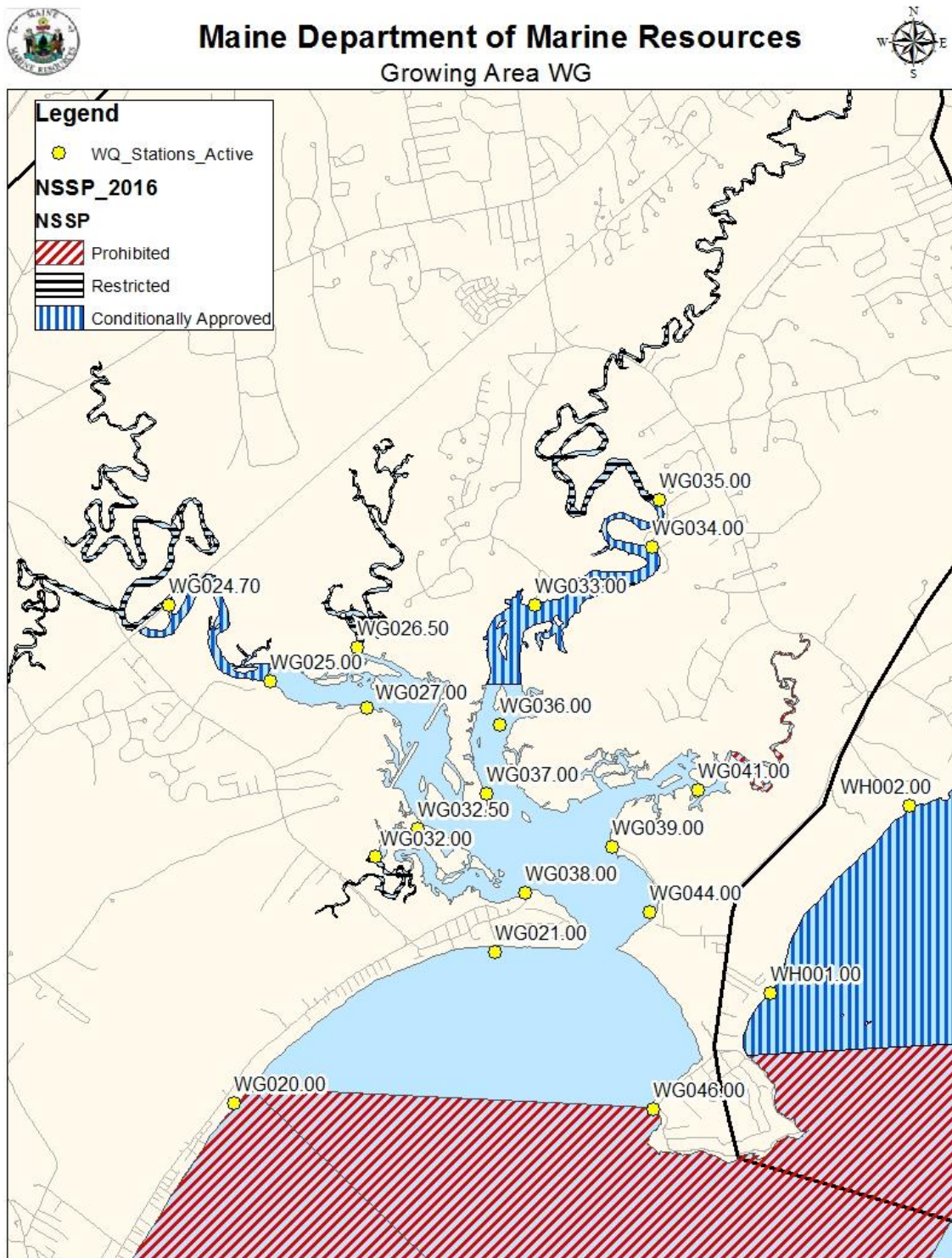




Figure 3. Northern half of Growing Area WG with water quality stations.





History of Growing Area Classification

October 20, 2006: Area No 10. Created Prohibited areas due to the discovery of pollution sources in Biddeford.

October 24, 2006: Area No 11. Created a Prohibited area in the Nonesuch River.

November 14, 2006: Area No 10. Reclassified Hills Beach area as Conditionally Approved.

February 28, 2007: Area No 10. Reclassified Biddeford Pool as Conditionally Approved.

March 6, 2007: Area No 10. Created an additional Prohibited area in Biddeford Pool.

April 23, 2007: Area No 11. Created Prohibited areas in the Scarborough River, Mill Brook, Nonesuch River, and Libby River.

July 20, 2007: Area No 10. Reduced seasonal closure period of Hills Beach.

July 20, 2007: Area No 11. Jones Creek classified as Restricted.

January 6, 2009: Area No 12. Increased the size of the Prohibited area around the Scarborough Sanitary District's outfall (Prout's Neck) due to a review of the Prohibited area size using the NSSP approved dilution calculation.

February 13, 2009: Area No 10. Clarification made to the Prohibited area in Saco Bay.

September 29, 2009: Area No 10. Reclassified Biddeford Pool from CA and P to Approved due to the replacement of malfunctioning septic systems and water quality meeting the approved standard.

April 8, 2010: Area No 11. Reclassified the Restricted area in the Scarborough River and Mill Brook area to Prohibited due to a sewer pipe leak.

November 23, 2010: Area No 11. Reclassified the Prohibited area in the Scarborough River and Mill Brook area to Restricted due to the repair of a sewer pipe leak and the connection of a straight pipe to the sewer system.

March 28, 2011: Area No 11. Reduced the size of the Restricted area in the Nonesuch River due to water quality meeting the approved standard, and clarified the boundary for the Restricted area in Jones Creek.

June 30, 2011: Area No 11. Reclassified a portion of the Nonesuch River from Restricted to Conditionally Approved due to water quality meeting the criteria for a rainfall conditional area.

January 3, 2012: Area No 11. Reclassified the Scarborough River/Mill Brook area from Restricted to Prohibited due to a sewage spill resulting from a break in a forced main.



January 6, 2012: Area No 11. Repealed closure from Jan 3 due to the repair being completed before any sewage leaked into adjacent waters.

August 31, 2012: Area No 11. Reclassified the upper Scarborough River and upper portion of the Nonesuch River from Restricted to Conditionally Approved on rainfall. Also, reclassified portions of Jones Creek and the area at the mouth of Mill Brook from Restricted to Approved due to water quality meeting approved standards.

October 3, 2012: Area No 10. Reclassified Hills Beach from Conditionally Approved to Restricted due to intermittent seasonal pollution.

March 5, 2014: Area No 10. Reclassified a portion of Biddeford Pool from Approved to Restricted due to water quality no longer meeting approved standards.

August 6, 2014: Area No 11. Reclassified a portion of the upper Nonesuch River known as Clay Pits from Restricted to Conditionally Approved based on rainfall due to water quality meeting conditionally approved standards and updated shoreline survey data.

November 18, 2015: Area No 11. Reclassified Jones Creek from Approved to Prohibited due to a sewer main break.

December 8, 2015: Area No 11. Repealed the closure in Jones Creek due to conditions returning to normal and sufficient time had elapsed to reduce pathogens to accepted levels.

March 10, 2016: Area No 10. Reclassified Biddeford Pool from Approved and Restricted to Conditionally Approved and Conditionally Restricted based on performance of the Biddeford Pool Wastewater Treatment Plant. Also, reclassified Hills Beach from Restricted to Prohibited due to point source pollution from wastewater treatment plant outfalls in the Saco River.

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

Current Classification(s)

At the end of the 2016 review year, shellfish growing area WG had areas classified as:

Approved: 11 stations: WG 21, 27, 32, 36, 37, 38, 39, 41, 44, 46

Restricted: 1 station: WG 26.5, 32.5

Prohibited: 3 stations: WG 5, 7, 20

Conditionally Approved: 10 stations: WG 8.1, 8.3, 8.5, 8.8, 8.9, 24.7, 25, 33, 34, 35

Conditionally Restricted: 1 station: WG 8.6

Investigatory: 5 stations: WG 2, 4, 10, 16, 19



Activity during Review Period

Opening and closing dates of rainfall conditional areas can be found in DMR central files.

2008: Horse beach permits are available for Pine Point Beach. Each rider must fill out an application form along with a permit fee to the town clerk's office.

2009: DMR terminated the MOU with the City of Biddeford Shellfish Commission for accelerated sampling of stations WG 8.3, 8.5 and 8.6 due to the area being reclassified from Prohibited to Approved. The purpose of the MOU was fulfilled as a result of the reclassification of Biddeford Pool and the accelerated data collection was no longer necessary. Shoreline survey was conducted in the Scarborough River area and Nonesuch River area. The codes enforcement office reported a malfunctioning septic system on Winnocks Neck Road that is 100ft from the Nonesuch River. The homeowner had already pulled a permit to fix or replace the system at the time of the survey. A second actual/direct pollution source was located at the landing on Winnocks Neck Road; an outhouse that is used seasonally and is flooded at high tides.

2010: DMR and DEP surveyed a portion of the Scarborough River starting with Pine Point and working back towards Rt 1. All properties in the vicinity of the river on tax map U021, U022, U023, U027, R088 (except for Ocean View and Seaveys Landing Road), and R069 have been confirmed by the Scarborough Wastewater Treatment Plant (WWTP) to be on public sewer. There are no properties on Eagles Nest or the last property on Bradford that are on public sewer. There was one property on Seavey Landing Rd that neighbors mentioned having a bad septic smell after it rains heavily. At the time of the survey there was no septic smell, however this property has been flagged as questionable and will be revisited after heavy rainfall. No other issues/concerns were found.

2013: Shoreline survey of a large portion of growing area WG.

2014: Shoreline survey of the rest of growing area WG.

Pollution Sources Survey

The following sections include information on pollution sources which may impact water quality in growing area WG. Pollution sources that are reviewed in this section include domestic waste, including both private inground systems and overboard 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.

Domestic Waste (*IG Systems and OBDs*)

There were two domestic pollution source questions found during routine shoreline survey. Table 1 lists the two questions and Figure 2 shows the locations.



There are four known OBDs that discharge their treated effluent into the waters of the Saco River and one known OBD that discharges into Phillips Brook, a tributary to the Scarborough River (Figure 3). The four OBDs discharging to the Saco River (permit number's 1407, 7268, 4514 & 1319) fall within the large Prohibited area in place to accommodate discharge from the Saco and Biddeford Waste Water Treatment Plants. Each of these is permitted for up to 600 gallons of treated effluent, except #1319 (also NDPES ME0023302) which is the treatment facility at the University of New England, permitted for up to 150,000 gallons per day. The Phillips Brook OBD is associated with a restaurant and is permitted for 1400 gpd. This OBD does not discharge directly to marine waters so there is no associated Prohibited closure. Two OBDs have been reported removed over the past three review years.

An OBD is the discharge of wastewater from residential, commercial, and publicly owned facilities to Maine's streams, rivers lakes, and the ocean. Commercial and residential discharges of sanitary waste have been regulated since the mid-1970's when most direct discharges of untreated waste were banned. Between 1974 and 1987 most of the "straight pipes" were connected to publicly-owned treatment works or replaced with standard septic systems. Overboard discharge treatment systems were installed for those facilities that were unable to connect to publicly-owned treatment works or unable to install a septic system because of poor soil conditions or small lot sizes.

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

OBDs are licensed and inspected by the Maine Department of Environmental Protection. At each inspection, DEP looks for tags on each treatment unit identifying the service contractor and the last date of service. If an OBD is not properly maintained, or if the OBD malfunctions, it has the potential to directly discharge untreated wastewater to the shore; therefore, preventative closures are implemented surrounding OBD locations in growing area WG (Table 2). The size of each closure is determined based on a dilution, using the permitted flow rate of the OBD (in gallons per day, GPD), and the depth of the receiving water that each OBD discharges to; the



fecal concentration used for this dilution calculation is 1.4×10^5 FC /100 ml. All current closures are of adequate size to protect public health.

Table 1. Potential or actual pollution source problems associated with domestic waste.

Location ID	Town	Year PS Found	Pollution Source	Pollution Source Type	Problem Flag	Description
WG003-69	Biddeford Pool	2014	CSO	stormwater drainage	Q	Storm drain empties into Biddeford Pool. No sewage smell.
WG005-125	Biddeford	2013	Septic	Cesspool	Q	Cesspool on left side of house when facing the front door. Neighbors complain of the cesspool overflow



Figure 4. Location of domestic waste pollution source questions in growing area WG.

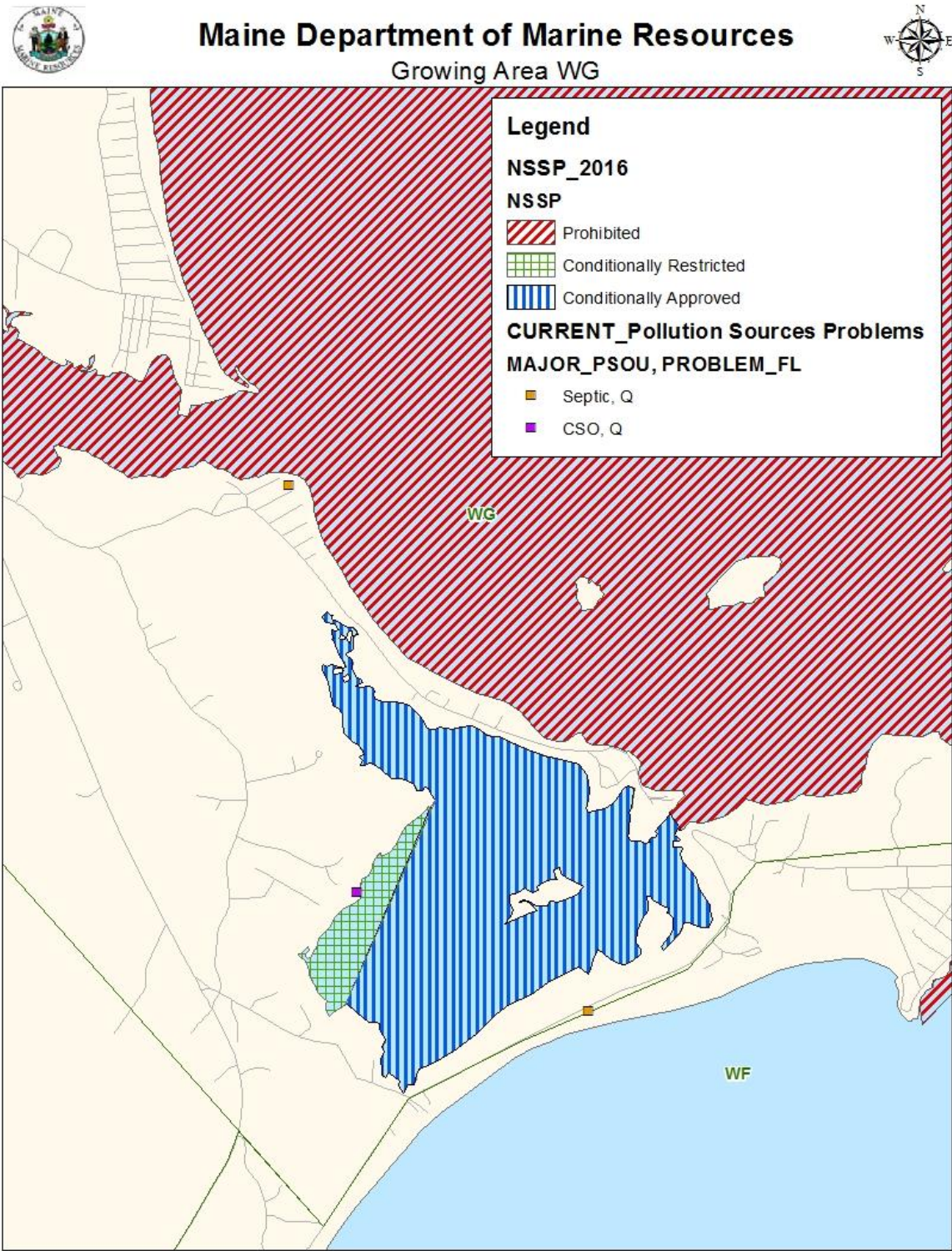




Figure 5. Location of OBDs in growing area WG.

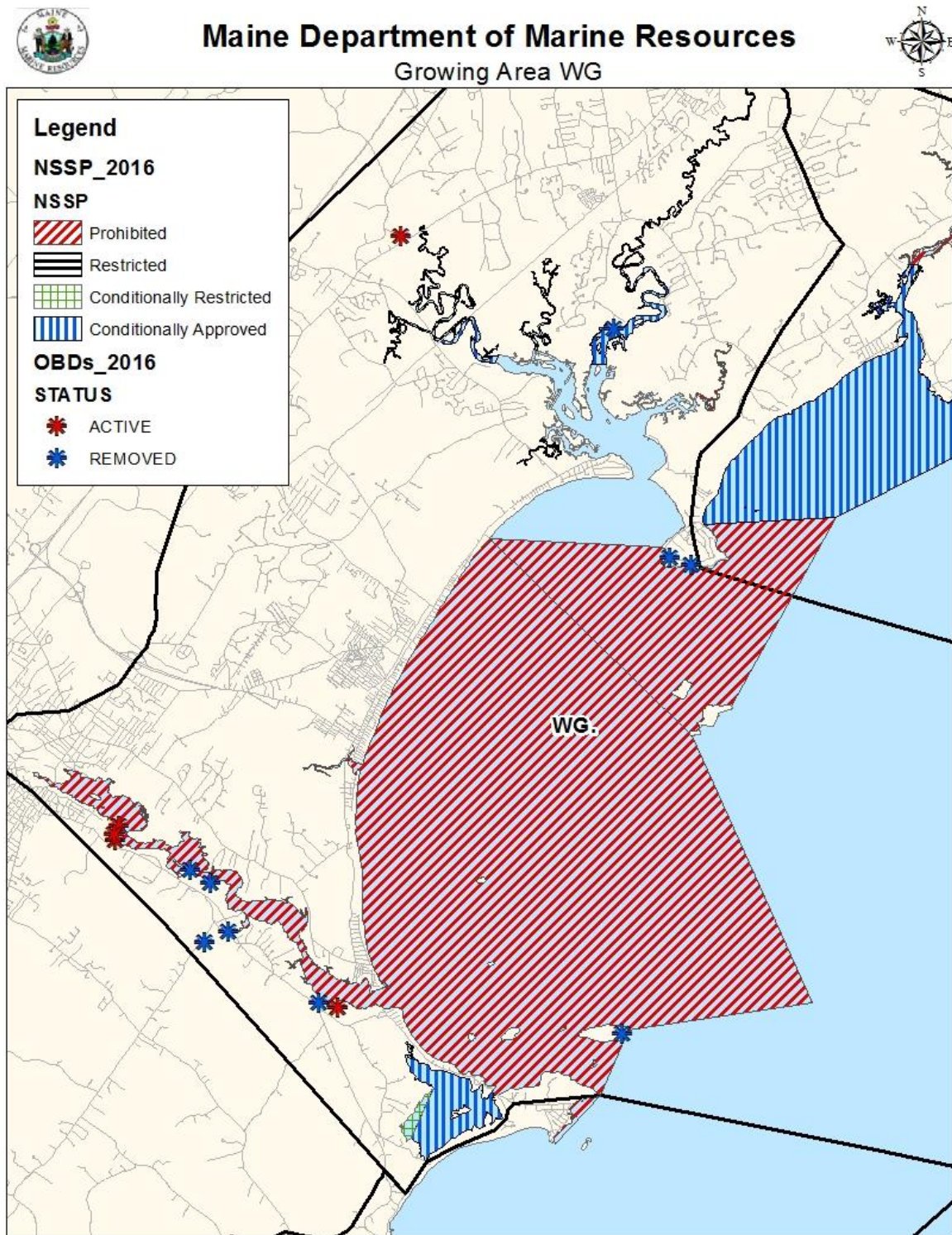




Table 2. List of reported active OBDs in growing area WG.

Pollution Area	DEP Permit ID	TOWN	FLOW	Receiving	Impact	Depth of Receiving Water (ft)	Required Closure	Actual Closure
			(GPD)	Water Body			(acres)	(acres)
11 (B.1)	4335	Scarborough	1400	Phillips Brook	AI	N/A	N/A	N/A
10 (A)	1407	Biddeford	300	Saco River	AD	20	0.5	11,400
10 (A)	7268	Biddeford	300	Saco River	AD	20	0.5	11,400
10 (A)	4514	Biddeford	300	Saco River	AD	20	0.5	11,400
10 (A)	1319	Biddeford	150000	Saco River	AD	20	230.1	11,400

National Pollutant Discharge Elimination System (NPDES)

Table 3. NPDES Permitted Discharges

Pollution Area	Permit ID	TOWN	Receiving Water Body	Required Closure (acres)	Actual Closure (acres)	Type
10	ME0101524	Old Orchard Beach	Atlantic Ocean	1,845	13,700	WWTP
10	ME0101117	Saco	Saco River	10,591*	13,700	WWTP
10	ME0102741	Biddeford Pool	Atlantic Ocean	115	13,700	WWTP
10	ME0102059	Scarborough	Atlantic Ocean	1600	13,700	WWTP
10	ME0100048	Biddeford	Saco River	10,591*	13,700	WWTP
10	ME0110434	Biddeford	Saco River	1,380	13,700	UNE MSRC Wastewater
10	ME0023302	Biddeford	Saco River	355	13,700	OBD
10	ME0001228	Saco	Saco River	N/A	13,700	Stormwater
11	ME0110221	Scarborough	Scarborough River	N/A	13,700	Gray water

*Saco and Biddeford are both included in required closure acreage.

Municipal WWTP

There are five municipal wastewater treatment plants in area WG; Biddeford WWTP and Saco WWTP on the Saco River, Biddeford Pool WWTP at East Point, Old Orchard Beach WWTP, and the Scarborough WWTP at Prout's Neck (Figure 4).

Biddeford Pool WWTP

Located at the southeastern end of the growing area is a small waste water treatment plant with secondary treatment and a separate collection system. The outfall is located 300' offshore in



Wood Island Harbor in three feet of water at low tide. A 1991 FDA/MEDMR Saco River dye study indicated that discharge from the Saco River moves in a southeasterly direction and does not flow back into the direction of the Pool on subsequent tides. It could be expected that discharge from the Biddeford Pool WWTP outfall would follow this same path. With a permitted flow of 30,000 gallons a day, a fecal bacterial load of 1.4×10^5 fecal coliforms/100 ml, discharging to eight feet of water at mid tide indicates that the wastewater dilution calculation requires a 115 acre Prohibited area. The actual Prohibited area is over 12,000 acres in size.

Biddeford & Saco WWTPs

There are two major wastewater treatment plant discharges into the Saco River, the Saco and Biddeford WWTPs. Both plants discharge into the river approximately four miles north of the mouth of the Saco River. The Biddeford Waste Water Treatment Plant has a design flow of 6.5 million gallons per day (mgd) average. The outfall is located 166 feet out into the Saco River with 33:1 acute dilution. The plant disinfects year-round. Biddeford WWTP has a combined sewer system with 11 combined sewer overflow (CSO) outfalls. The Saco Sewage Treatment Plant has a design flow of 4.2 mgd. Flows in excess of 8 mgd are automatically diverted to the CSO swirl concentrator for primary treatment and disinfection. The Saco WWTP disinfects year-round. Both of these plants have combined sewers and are impacted by meteorological and hydrological events such as rain and snow melt. Based on a complete mix calculation, using the design flow for both plants (10.7 mgd) the average river flow would provide a dilution of 278:1. A 10,000:1 dilution is needed to provide adequate public health protection. The FDA approved dilution calculation was used to determine the amount of area needed for the combined discharge from Biddeford and Saco WWTPs at their design capacity assuming a bacterial load of 1.4×10^5 fecal coliforms. This calculation indicates that 10,591 acres is needed to provide adequate dilution. The current Prohibited area is 13,700 acres.

Old Orchard Beach WWTP

OOB WWTP has an average daily flow of 1.5 mgd. Effluent from the Old Orchard Beach outfall is discharged 3,100 feet offshore of Goosefare Brook in 20 feet of water at low tide. Year-round chlorination of the effluent is controlled automatically. The plant has the capacity to bypass and discharge primary treated effluent; however, the treatment plant reports that this has not been done for many years. The wastewater treatment dilution calculation using 1.5 mgd flow with a fecal load of 1.4×10^5 colonies/100 ml discharging into 25 feet of water at mid tide requires 1,845 acres. The current Prohibited area is 13,700 acres.

Scarborough WWTP

The facility is located within growing area WG, but the outfall is located within growing area WH off Prout's Neck. The Scarborough WWTP is a secondary treated wastewater facility approved to discharge up to a monthly average flow of 2.5 million gallons per day. The WWTP dilution calculation using 2.5 mgd with a fecal load of 1.4×10^5 colonies/100 ml discharging into 48 feet of water at low tide requires 1,598.2 acres to be Prohibited. The current Prohibited area around the outfall is appropriate at approximately 13,700 acres.

UNE Wastewater

The University of New England is located at the base of the Saco River. The Marine Science and Research Center (MSRC) is permitted to discharge 0.72 MGD of treated wastewater into the Saco River. The dilution calculation using 0.72 MGD with a fecal load of 1.4×10^5

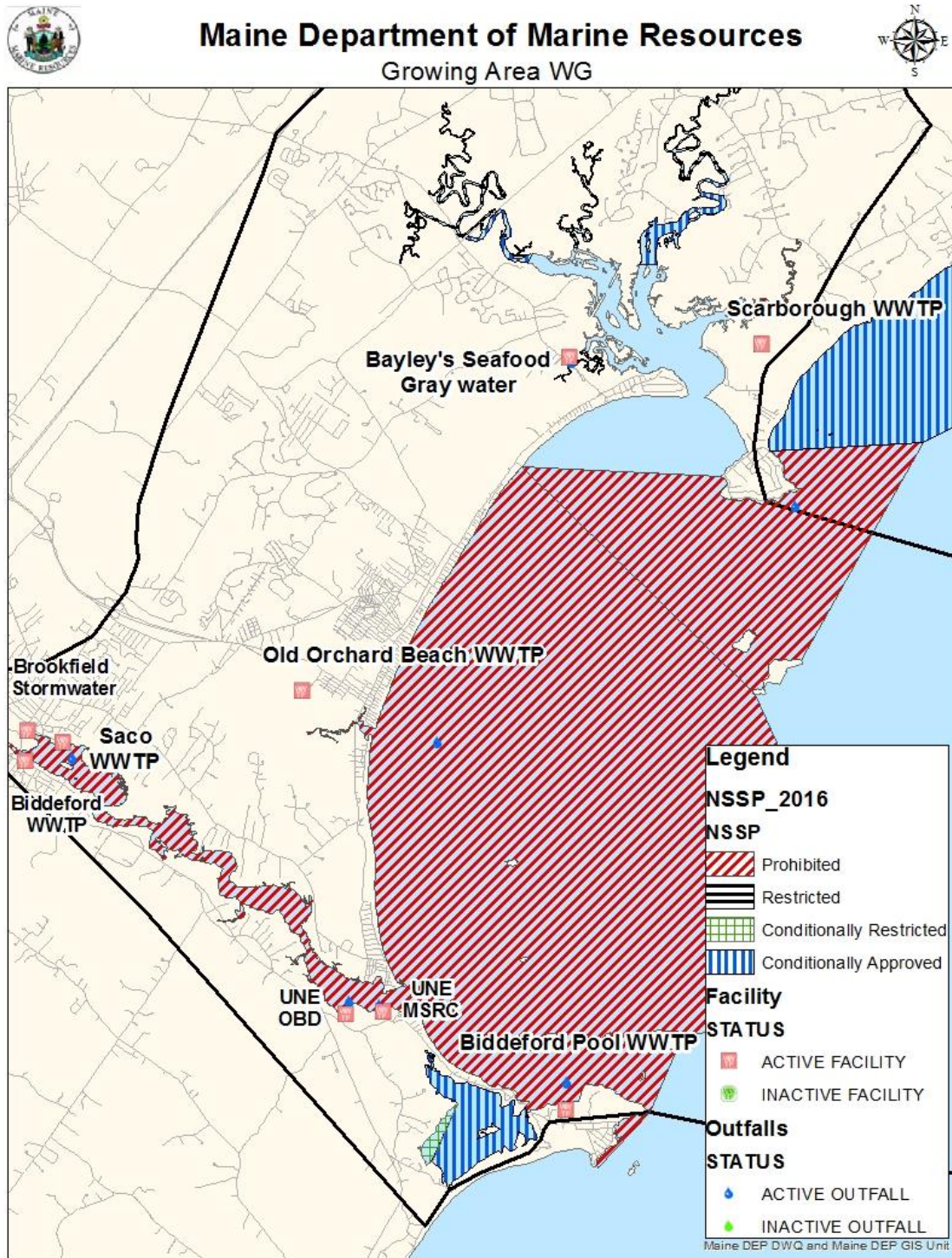


colonies/100 ml discharging into 16 feet of water requires 1,380 acres to be Prohibited. The current Prohibited area around the outfall is appropriate at approximately 13,700 acres.

UNE is also permitted to discharge 150,000 gallons per day of secondary treated sanitary wastewater into the Saco River via an overboard discharge into 13 feet of water. The dilution calculation using 150,000 GPD with a fecal load of 1.4×10^5 colonies/100 ml discharging into 13 feet of water required 355 acres to be Prohibited. The current Prohibited area around the outfall is appropriate at approximately 13,700 acres.



Figure 6. Locations of municipal WWTPs and outfalls within growing area WG.





Industrial Pollution

Growing area WG has no known industrial pollution sources.

Marinas and Mooring Fields

There are several marinas within growing area WG.

Biddeford Pool Yacht Club (BYPC) is a small, 100 family, private club in Biddeford Pool. Fishing boats and small recreational boats are moored by the Biddeford Pool Yacht Club at Station WG 8.1. The Pool drains out at low tide leaving only a small and shallow mooring area, and the fleet consists of day boats with no heads. This area is classified Conditionally Approved based on performance of the Biddeford Pool WWTP.

Marston's Marina is two miles up the Saco River from Saco Bay. It is a 120 slip and 10 mooring marina which offers gas, oil, restrooms and other amenities. They are recognized by the Maine Marine Trade Association and earned their 'Clean Marina Certification' in 2007. This area is Prohibited.

Rumery's Boatyard is located four miles up the Saco River from Saco Bay. They are a boatbuilding facility that also provides launching, hauling and storage. They have limited mooring facilities and marina amenities. This area is Prohibited.

Norwood's Marina is located next to the City of Saco Dock at the mouth of the Saco River. They are not a full-service marina but provide fresh water, shore power, restrooms and a pump out station to their customers. This area is Prohibited.

The city of Saco has the Camp Ellis Fish Pier at the mouth of the Saco River which provides gas, diesel, mooring and slip space. There is a parking lot, boat ramp, pier, and floats. All facilities are open to the public. The parking lot opens on Memorial Day weekend and is a weekend only operation until the middle of June. At that time the lot goes to daily operation and is open 8 a.m. - 8 p.m., 7 days per week. The boat ramp is available for launching vessels. The dock is primarily reserved for and used by the commercial fishermen and lobstermen. This area is Prohibited.

In the Scarborough River, there is a town dock near station WG 38. According to an interview with the town Harbor Master, there are approximately 65 moorings for mostly working fishing boats and center console recreational power craft; only four of the boats on moorings have heads. Peak use time for this marina is from Memorial Day to Labor Day. This area is classified as Approved.

A second mooring area in area WG is located at the Prouts Neck Yacht Club. This establishment has about 70 to 80 mooring sites. The harbormaster reported that in this mooring area there are approximately four boats that have heads. The rest of the boats on these moorings are open console recreation power craft. This area is classified as Approved.



Marina Pollution Areas

Area WG has no Marina Pollution Areas. All existing Marinas in area WG are located within a large Prohibited area or, if in Approved area, have <10 boats with heads on board.

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, it can accumulate debris, chemicals, sediment or other pollutants that could adversely affect water quality.

The primary method to control storm water discharges is the use of best management practices (BMPs). In addition, most major storm water discharges are considered point sources and require coverage under a NPDES permit. In 1990, under authority of the Clean Water Act, the U.S. EPA promulgated Phase I of its storm water management program, requiring permitting through the National Pollution Discharge Elimination System (NPDES). The Phase I program covered three categories of discharges: (1) "medium" and "large" Municipal Separate Storm Sewer Systems (MS4s) generally serving populations over 100,000, (2) construction activity disturbing 5 acres of land or greater, and (3) ten categories of industrial activity. In 1999, US EPA issued Phase II of the storm water management program, expanding the Phase I program to include all urbanized areas and smaller construction sites.

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

There are four municipal storm water systems in this growing area.

Biddeford Pool is impacted by general surface runoff during rain events as well as a private subsurface storm water collection system on Channel Cove Lane, which outfalls to Biddeford Pool. The area directly around this outfall is monitored by station WG 8.6.



The Saco River is impacted by the Biddeford and Saco storm water infrastructure as well as streams and gully runoff to the river below head of tide. The storm water impacts are greater than this, however, as the Saco river watershed is large, and drains over 1700 mi² in Maine and portions of New Hampshire. The large Prohibited area in the lower Saco River, determined via dilution calculation for the two upstream WWTPs in Saco and Biddeford manage the area's potential storm water impacts as well.

The Goosefare Brook and tributaries drain 4,480 acres in Saco and 1792 acres in old Orchard beach discharging to the beach at the border of Ferry beach in Saco and Seven Mile Beach in Old Orchard. While small, this stream runs through areas of high impervious surface and is directly impacted by storm water outfalls in both towns. Goosefare Brook is listed by the Maine Department of Environmental Protection (DEP) on the 303(d) list in impaired waters, has had Total Maximum Daily Loads (TMDL) set for pollutions, and is an area of ongoing remediation efforts by the DEP. The OOB WWTP outfall discharges approximately 3000ft East of the mouth of the brook and the waters of the brook empty to the large Prohibited area put in place due to the OOB WWTP.

The OOB stormwater collection system is fairly extensive and has outfalls both directly on the beach face as well as in several small tributaries of the Goosefare Brook. The potential for stormwater related bacterial pollution is present, but is currently managed for by the large OOB WWTP Prohibited area.

The Scarborough Marsh is a large estuary draining most of the western portion of the town. Scarborough has a storm water collection and drainage system separate from the sanitary sewers. It has miles of pipe and at least 45 storm drain outfalls. There are several thousand catch basins and the town has a truck for cleaning the basins. The basin debris is taken to the landfill. At least 13 of the storm drain outfalls empty directly to the marsh or its tributary streams. Areas where data analysis show a clear relationship with rain events are present in the Scarborough River and Nonesuch River portions of the marsh. Rainfall management was prudent for these areas and rainfall conditional areas were put in place to effectively mitigate pollution risk.

Storm water Pollution Areas

Rainfall Conditional Areas

Pollution Areas

11(B.), Scarborough River and 11(C.), Nonesuch River. These areas will close automatically when rainfall meets or exceeds 1" /24hr period. The areas will remain closed for a period of 14 days, after which they will reopen to harvest. Details are available in the Conditional Area Management Plan (CAMP) and CAMP reviews maintained in the DMR central files.



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, or wind-borne debris blowing out to sea. Nonpoint source pollution can be contrasted with point source pollution, where discharges occur to a body of water at a single location, such as discharges from a chemical factory, urban runoff from a roadway storm drain or from ships at sea. NPS may derive from many different sources with no specific solution to rectify the problem, making it difficult to regulate. Freshwater streams, drainages and tidal creeks are a major source of non-point discharge into Growing Area WG. A total of 59 samples were taken from freshwater streams during the review period (Table 3, Figures 5&6). Scores > 163 cfu/100ml are highlighted in red.

Table 4. Streams sampled in growing area WG during the three-year review period, 2014-2016.

Location ID	Date	Score
WG002-27	5/16/2016	1.9
WG002-27	7/27/2016	13
WG002-27	9/5/2016	18
WG003-68	9/24/2014	2
WG003-68	10/14/2014	2
WG003-68	4/19/2016	10
WG003-68	6/27/2016	1.9
WG003-68	9/26/2016	2
WG003-68	10/19/2016	1020
WG003-70	9/24/2014	20
WG003-70	4/19/2016	1.9
WG003-71	9/24/2014	84
WG003-71	10/14/2014	40
WG003-71	6/27/2016	38
WG003-71	9/26/2016	>1600
WG003-71	10/19/2016	84
WG003-72	9/24/2014	2
WG003-72	10/14/2014	14
WG003-72	6/27/2016	1.9
WG003-72	9/26/2016	2
WG003-72	10/19/2016	14
WG003-73	9/24/2014	12
WG003-73	10/14/2014	102
WG003-73	4/19/2016	1.9
WG003-73	6/27/2016	11
WG003-74	9/24/2014	2



Location ID	Date	Score
WG003-74	10/14/2014	820
WG003-74	4/19/2016	1.9
WG003-74	6/27/2016	16
WG003-74	10/19/2016	10
WG003-75	9/24/2014	2
WG003-75	10/14/2014	4
WG003-75	4/19/2016	1.9
WG003-75	6/27/2016	4
WG003-75	10/20/2016	138
WG004-105	4/19/2016	9.1
WG004-105	6/27/2016	1.9
WG004-106	6/27/2016	11
WG004-106	10/19/2016	150
WG004-107	4/19/2016	1.9
WG004-107	6/27/2016	20
WG020-21	5/16/2016	46
WG020-21	7/27/2016	480
WG020-21	9/5/2016	66
WG020-21	9/27/2016	35
WG024-1	5/16/2016	46
WG024-1	7/27/2016	56
WG024-1	9/5/2016	80
WG024-1	10/5/2016	60
WG027-1	5/16/2016	26
WG027-1	9/5/2016	118
WG027-1	10/5/2016	260
WG032-1	5/16/2016	5.5
WG032-1	7/27/2016	106
WG032-1	10/5/2016	35
WG048-1	5/16/2016	1.9
WG048-1	7/27/2016	1.9
WG048-1	9/5/2016	56
WG048-1	10/5/2016	40



Figure 7. Stream sampling locations within growing area WG, Biddeford Pool.

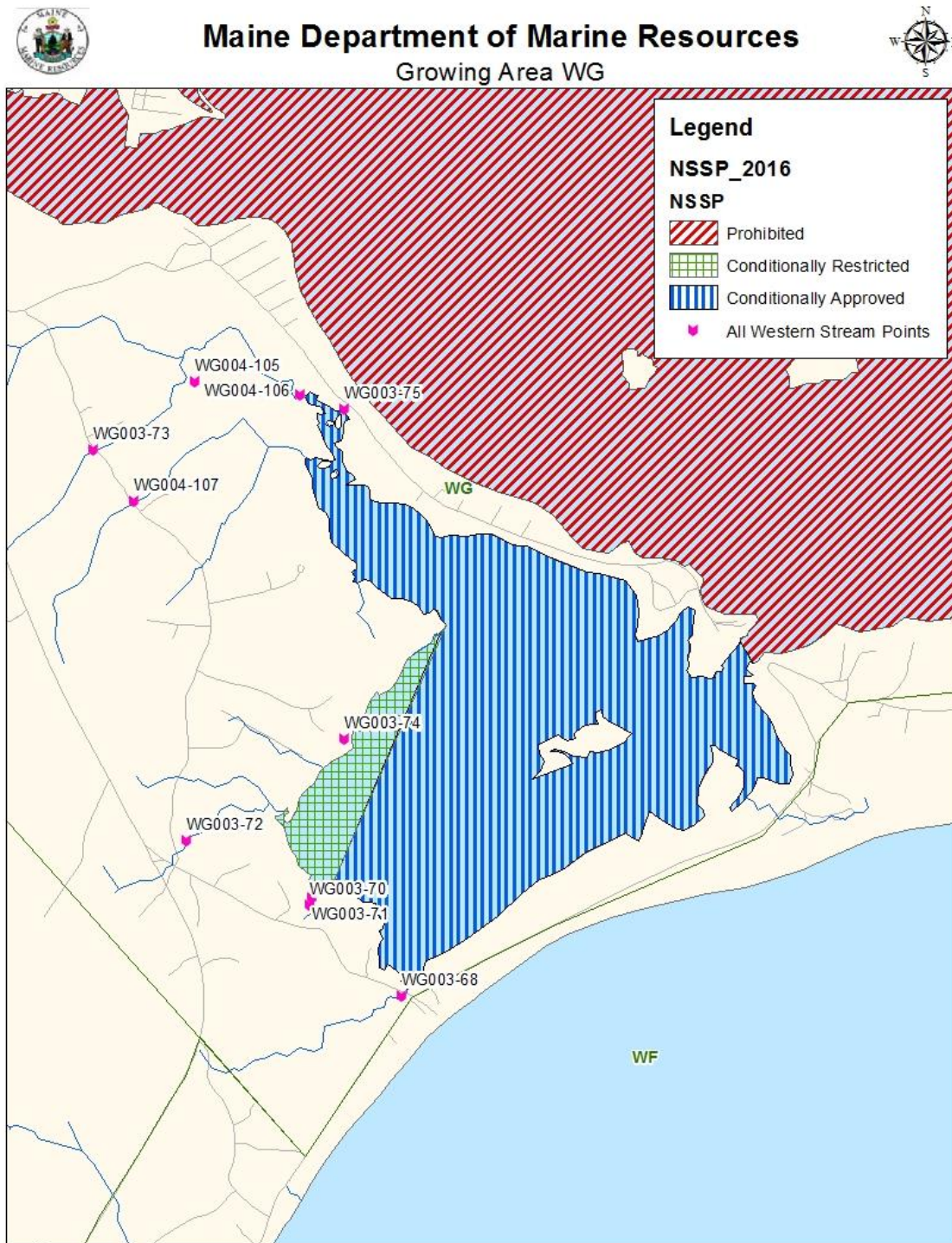
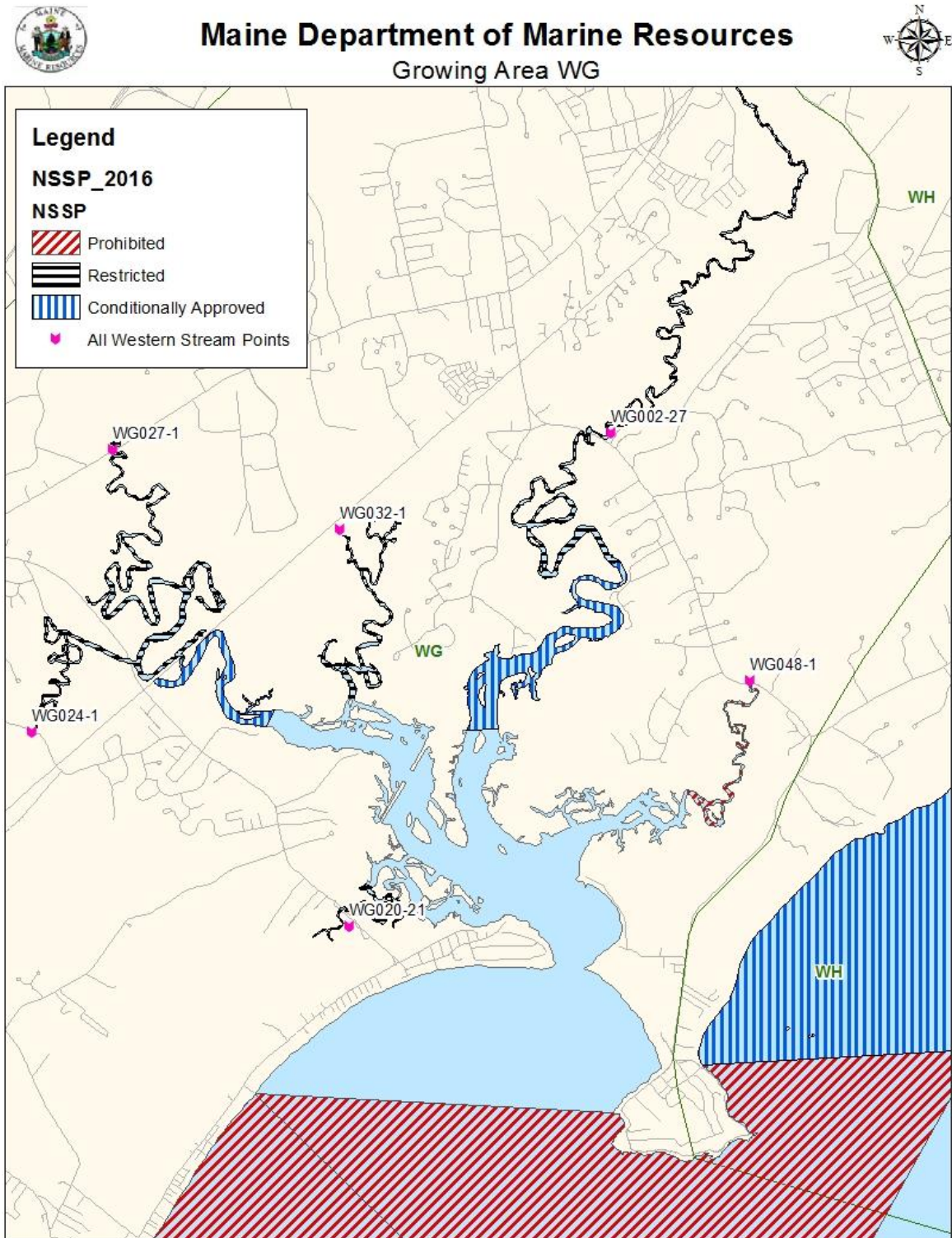




Figure 8. Stream sampling locations within growing area WG, Scarborough River area.





Agricultural Activities

There are no known large-scale agriculture activities in Growing Area WG. Pollution from small agriculture operations can be introduced into the growing area as non-point 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. Per the 2013 and 2014 routine shoreline survey, there are no known smaller-scale farms in growing area WG.

Domestic Animals and Wildlife Activity

The salt marshes and mudflats of the growing area provide valuable habitat to a variety of wildlife. Commonly observed bird species include a variety of gulls, sea and inland ducks, cormorants, geese, great blue herons, and others. Mammals living within the growing area include dogs, cats, whitetail deer, muskrat, squirrels, chipmunks, rabbits, moles, mice, bats, weasels, skunks, raccoons, and others.

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

The concern for actual or potential pollution from recreational areas is because many of them allow dogs and some have bathroom facilities. Activities at the recreational areas may contribute to water quality problems by placing added pressure on the watershed. For instance, they may contribute to erosion (trails, building footbridges, etc.) and dog waste not picked up may accumulate and wash off after rainfall.

Growing area WG is heavily used for recreational activity in the summer months. There are several day use beaches including Old Orchard Beach, Hills Beach, Scarborough Beach and others. Many of the beaches are located within the large Prohibited area. Beaches that are not located within the Prohibited area are monitored by water quality stations.

Hydrographic and Meteorological Assessment

Tides

Coastal Maine experiences a mixed, semi-diurnal tide. Currents in the area are predominantly driven by the tides. The mean tidal range for most of Maine is 9 feet to 13 feet. Unlike areas with small diurnal tides, this extreme volume exchange results in significant bacterial dilutions. Weather conditions affect tidal ranges and current speeds, sometimes very strongly. Strong winds may reverse the direction of currents.

Rainfall

Precipitation is typically not evenly distributed throughout the year in Maine. The wettest months are November and April. 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. In growing area WG, after prolonged periods of dry weather, significant rainfall (>1" over 24 hours) can cause pollution from non-point runoff. This is known in the Scarborough and Nonesuch Rivers. These



two rivers are affected by rainfall and are classified as Conditionally Approved and close when it rains over 1" in 24 hours.

Winds

Gulf of Maine winds are generally westerly, but often take on a northerly component in winter and a southerly one in summer. Extreme winds are usually associated with a hurricane or severe nor'easter. 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

River flow in Maine exhibits seasonal variation, with the highest flows occurring in the spring (due to snowmelt and spring rain) and the mid-to late fall (due to fall rain). The Saco River is a large discharge into growing area WG. As discussed in the storm water section, the Saco River watershed drains a very large portion of Maine and some portions of New Hampshire. Though this is a large discharge source, the river is classified as Prohibited due to WWTP outfalls. There are also many small streams that discharge into the growing area and these streams are discussed in the section about nonpoint source pollution.

The Scarborough River system is the largest continuous salt marsh in Maine. It consists of high thatch banks with many drainages and tide pools. The Scarborough River drains into a marsh. It is not a traditional high-flow river system, which is why river discharge is not a major source of pollution in Scarborough.

Aquaculture/Wet Storage Activity

There are aquaculture lease sites and limited purpose aquaculture (LPA) throughout Growing Area WG (Figures 9&10). Kelp and Algae are being grown in Saco Bay inside the Prohibited area. It is currently legal to harvest Kelp for human consumption within an area classified as Prohibited. In the Scarborough River, American and European oysters are being farmed.



Figure 9. Aquaculture within growing area WG, Saco Bay area.

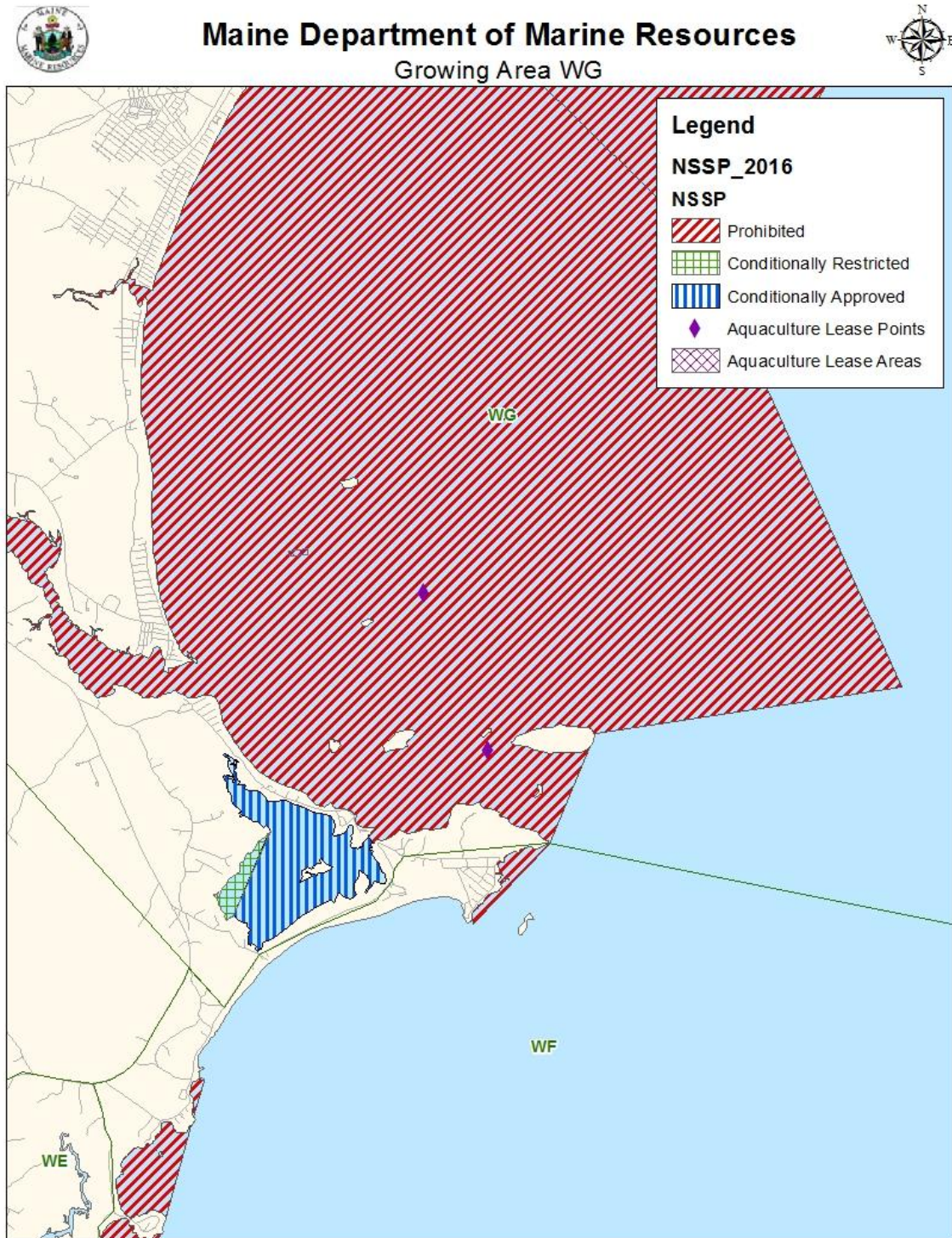
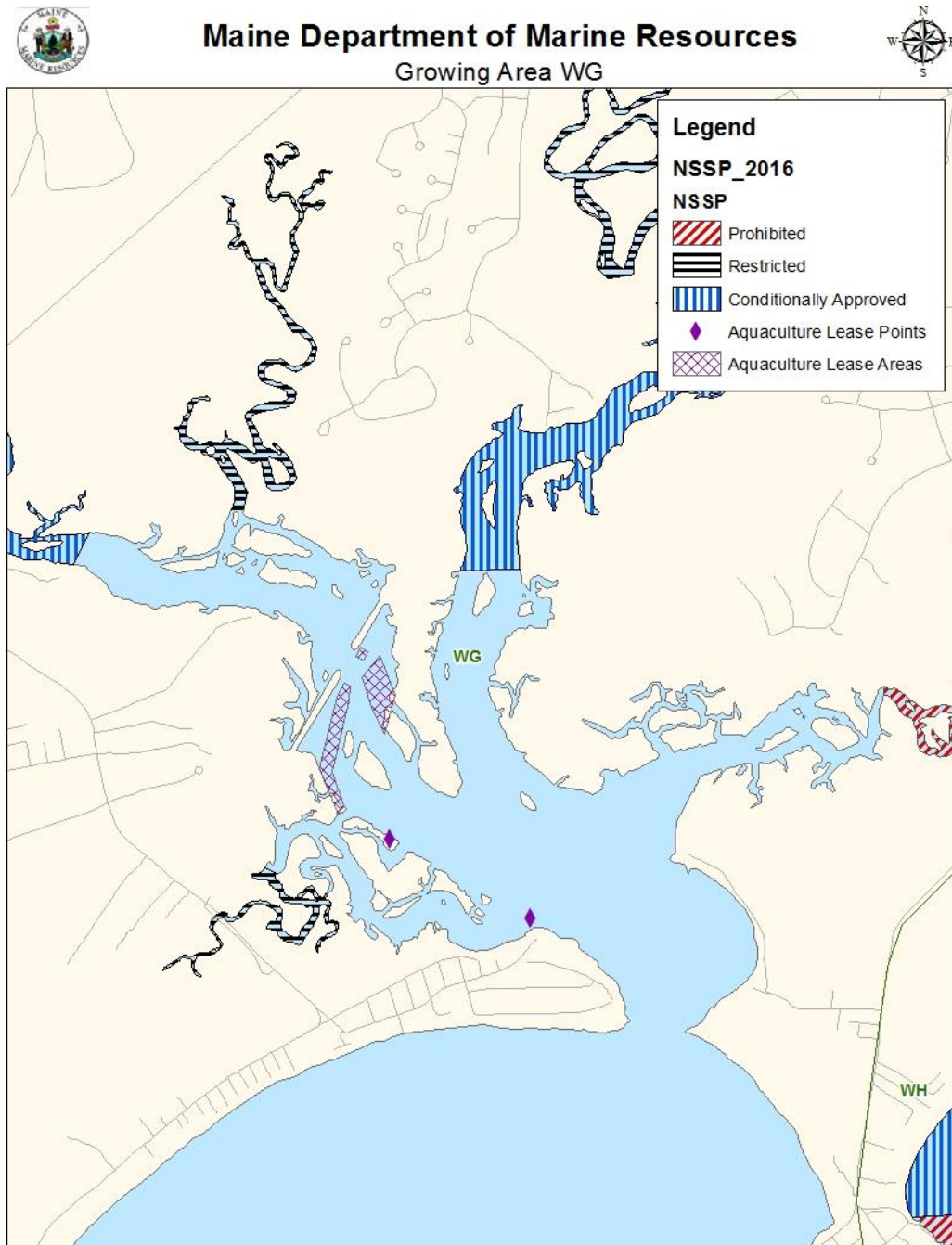




Figure 10. Aquaculture within the Scarborough River area.





Water Quality Review

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 26 active water sampling sites in Growing Area WG and five investigative stations which do not currently have enough data to calculate a P90 (Figures 2 and 3). They are collected from near-shore sites on sample runs. Sample sites are established to monitor known or potential pollution sources and on the margins of established pollution areas. It is recognized that access, icing, and safety considerations prevent some stations from being sampled on scheduled dates. Currently all but one station in Growing Area WG met their current NSSP classification standard. Station WG 32 no longer meets the approved standard and requires a downgrade.

Water Quality Discussion and Classification Determination

P90s for all active stations with a minimum of 30 samples were calculated (Tables 4, 5, and 6). P90s that do not meet their classification standards are highlighted in red.

Table 5. P90 scores for Approved, Restricted, and Prohibited stations within growing area WG, 2016.

Station	Class	Count	GM	SDV	MAX	P90	Min_Date
WG005.00	P	30	5.1	0.5	62	22.6	7/1/2012
WG007.00	P	30	5.3	0.54	72	26.3	7/1/2012
WG020.00	P	30	3.6	0.5	180	16.3	6/13/2012
WG021.00	A	30	2.5	0.34	64	6.9	2/29/2012
WG026.50	R	30	3.8	0.45	86	14.9	8/10/2011
WG027.00	A	30	3.8	0.51	100	17.9	6/13/2012
WG032.00	A	30	5.8	0.6	300	34.2	12/5/2011
WG032.50	R	30	3.6	0.42	44	12.7	8/10/2011
WG036.00	A	30	3.1	0.31	25	7.7	9/27/2011
WG037.00	A	30	2.4	0.2	9.1	4.4	9/27/2011
WG038.00	A	30	2.6	0.36	72	7.7	2/29/2012
WG039.00	A	30	2.1	0.13	6	3.2	6/13/2012
WG041.00	A	30	3.1	0.31	22	7.8	9/27/2011
WG044.00	A	30	2.3	0.21	14	4.4	2/29/2012
WG046.00	A	30	2.5	0.31	27	6.3	2/29/2012

Table 6. P90 scores for the WTP conditional area(s) within Biddeford Pool, 2016.



Station	Class	Count	GM	SDV	MAX	P90	Min_Date
WG008.10	CA	30	5.1	0.59	480	29.9	2/25/2013
WG008.30	CA	30	3.7	0.48	72	15.4	3/20/2013
WG008.50	CA	30	3.8	0.47	74	15.4	2/25/2013
WG008.60	CR	30	6	0.73	1700	53.1	2/25/2013
WG008.80	CA	30	4.5	0.43	62	16.3	2/25/2013
WG008.90	CA	30	4.5	0.49	120	19.6	2/25/2013

Table 7. P90 scores for the rainfall conditional areas within the Scarborough River, 2016.

Station	Class	Count	GM	SDV	MAX	P90	Min_Date
WG024.70	CA	30	4.49	0.43	33	15.8	06/13/12
WG025.00	CA	30	3.77	0.44	80	13.8	06/13/12
WG033.00	CA	30	3.74	0.37	36	11.1	07/31/12
WG034.00	CA	30	4.04	0.41	74	13.7	06/13/12
WG035.00	CA	30	5.27	0.52	78	24.4	06/13/12

Table 8. Count table for Approved, Restricted, Prohibited stations, 2016.

Station	Class	Adverse		Extra		Random		Samples Collected	Samples Required	Comments
		C	O	C	O	C	O			
WG005.00	P					5		5	6	Classification changed from R to P in March 2016
	R						1	1		
WG007.00	P					5		5	6	Classification changed from R to P in March 2016
	R						1	1		
WG020.00	P					6		6	6	
WG021.00	A						6	6	6	
WG026.50	R						6	6	6	
WG027.00	A						7	7	6	
WG032.00	A						6	6	6	
WG032.50	R						6	6	6	
WG036.00	A						6	6	6	
WG037.00	A						6	6	6	
WG038.00	A						6	6	6	
WG039.00	A						6	6	6	
WG041.00	A						6	6	6	
WG044.00	A						6	6	6	
WG046.00	A						6	6	6	



Table 9. Count table for the WTP conditional area(s) within Biddeford Pool, 2016.

Station	Class	Adverse		Extra		Random		Samples Collected	Samples Required	Comments
		C	O	C	O	C	O			
WG008.10	A						1	1	12	Classification changed from A to CA in March 2016
	CA						11	11		
WG008.30	A						1	1	12	Classification changed from A to CA in March 2016
	CA						11	11		
WG008.50	A						1	1	12	Classification changed from A to CA in March 2016
	CA						11	11		
WG008.60	CR						11	11	12	Classification changed from R to CR in March 2016
	R						1	1		
WG008.80	A						1	1	12	Classification changed from A to CA in March 2016
	CA						11	11		
WG008.90	A						1	1	12	Classification changed from A to CA in March 2016
	CA						11	11		

Table 10. Count table for the rainfall conditional areas within the Scarborough River, 2016.

Station	Class	Adverse		Extra		Random		Samples Collected	Samples Required	Comments
		C	O	C	O	C	O			
WG024.70	CA	3					6	9	6	
WG025.00	CA	3					6	9	6	
WG033.00	CA	3					6	9	6	
WG034.00	CA	3					6	9	6	
WG035.00	CA	3					6	9	6	



Recommendation for Future Work

It is recommended that Biddeford Pool be re-evaluated to see if the entire pool can be Conditionally Approved on the functionality of the Biddeford Pool WWTP. Also, analyze data for the branches in the Scarborough River area to see if they are impacted by rainfall.

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

Min_Date = the date the 'oldest' water sample was collected out of the 30 samples