



GROWING AREA WU
Towns of Cushing, Warren, Thomaston, South Thomaston and St George

Triennial Report for 2008-2010

Report Date: August 10, 2011

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APPROVAL

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Figure 1. Northern Portion of Growing Area WU, Sampling Stations



Maine Department of Marine Resources
Shellfish Growing Area WU Northern Portion Sampling Stations
 Towns of Cushing, Warren, Thomaston, South Thomaston and St George

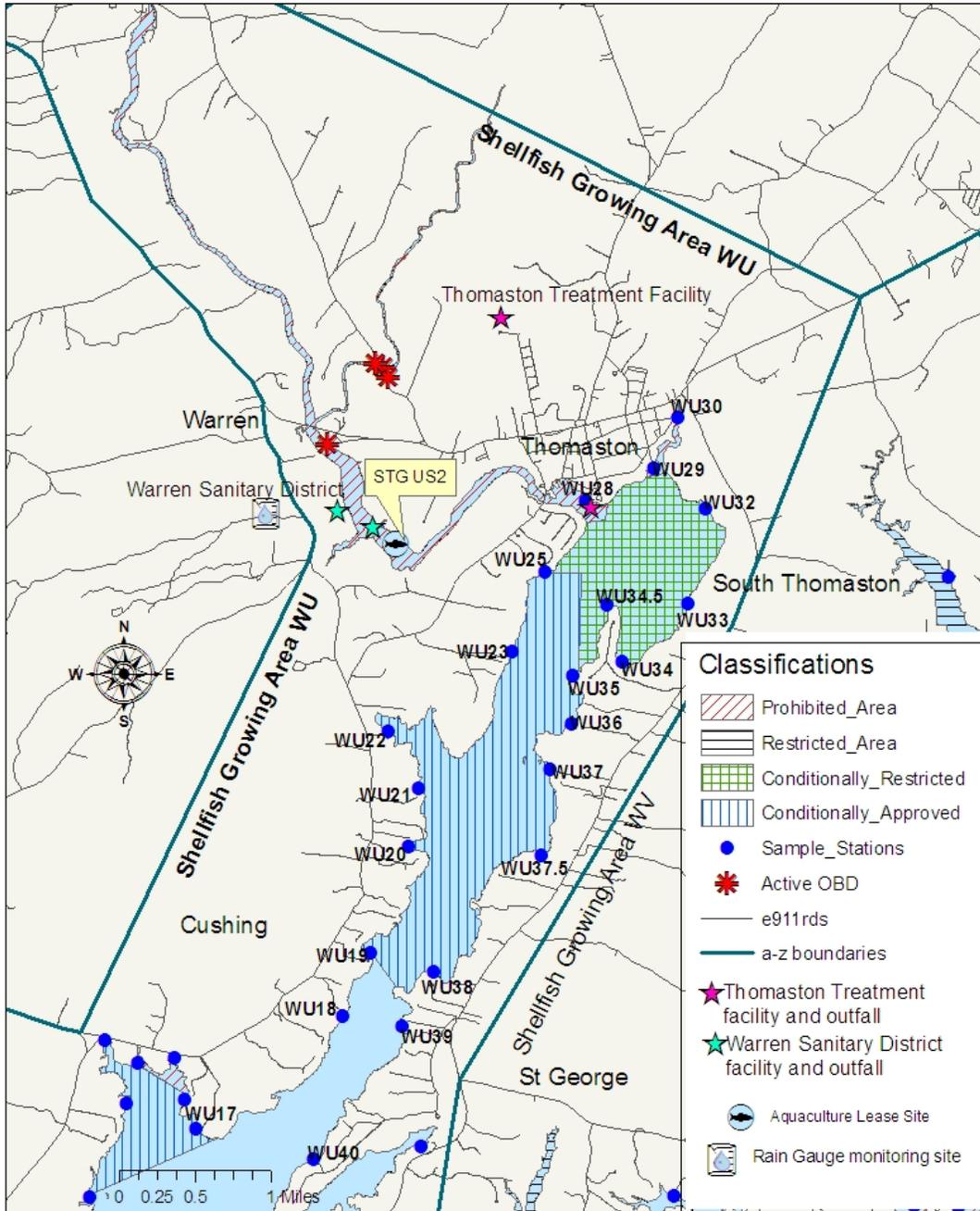
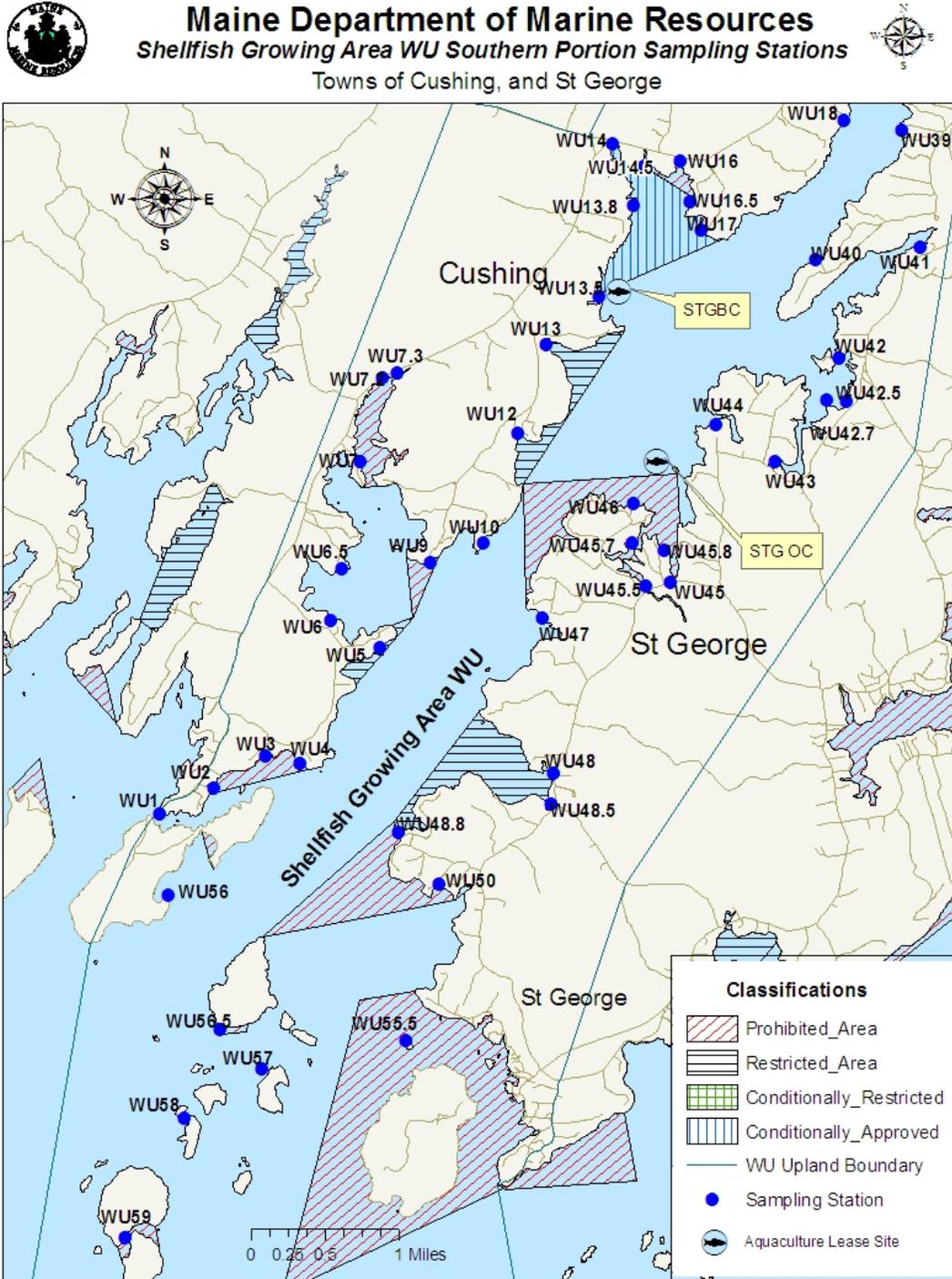




Figure 2. Southern Portion Growing Area WU, Sampling Stations





Executive Summary

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

Shellfish Growing Area WU covers the shores and waters of the St George River in the towns of Cushing, Warren, Thomaston, South Thomaston and St George. Several changes have taken place during the review period (2008-2010) covered by this report.

In May of 2008, a portion of the restricted area in Broad Cove, Cushing, was reclassified from restricted to prohibited, due to the water quality scores no longer meeting the restricted standard at one station. A further review of the data showed that a portion of the cove had a seasonal component to the water quality, the area was reclassified to conditionally approved based on season in November, 2008. Following the re-classification of Broad Cove, three stations were deactivated, (WU 13.9, 15 and 16.3). Two closures were made (October 10, 2008) due to the presence of malfunctioning septic systems. A closure was made in the cove south of Montgomery Point, Cushing, and a closure was made in Maple Juice Cove, near sampling station WU 7. Sampling stations WU 7 and WU 20 were both reclassified as prohibited due to these closures. The closure around Hupper Island, St George was enlarged (December 31, 2008), due to an expired survey. Two stations were created to monitor new classification boundaries, and an additional station (WU7.2) was created to better monitor water quality in the northern portion of Maple Juice Cove, Cushing.

In 2009, the following classification changes were implemented due to pollution abatement: a portion of Pleasant Point Gut Harbor was reclassified as approved for shellfish harvest; Watts Cove, St George was reclassified as approved, and the small closure at Teele Island was repealed. Three stations had P90 scores that no longer met their classification standard at the end of the sampling season. These stations include: WU 17, WU48 and WU48.5. All of these stations were reclassified. Station WU17 was reclassified from approved to conditionally approved based on season. Stations WU48 and WU48.5 were reclassified from approved to restricted. The spring and summer of 2009 were very wet and there were numerous flood closures caused by the wet weather. Thomaston Treatment facility reported over nine inches of rainfall for the month of June and was forced to request permission for an emergency release of wastewater due to a high water level in their storage lagoon and the inability to spray irrigate due to the wet conditions. The conditionally restricted area was closed on June 30, 2009 to allow for the release of treated effluent. The area reopened on August 14th, 2009.

At the end of the 2010 sampling season, a review of the data revealed that stations WU 6 in Maple Juice Cove and WU45 in Otis Cove were no longer meeting the approved standard. Otis Cove was reclassified as prohibited on January 7, 2011. Sampling station WU 6 in Maple Juice Cove was reclassified as conditionally approved on January 19, 2011, based on an open season from November 1- April 30.

The next triennial report is due in 2014; the next sanitary survey report is due in 2019.



Growing Area Description

Shellfish Growing Area WU covers the area from the southeastern tip of Gay Island, Cushing to the western tip of Marshall Point, Port Clyde (Figures 1, and 2). There are also numerous islands in the mouth of the St George River that are included in this growing area. The boundary description of shellfish growing area WU can be found in the Department of Marine Resources central files. The towns of Cushing, Warren, Thomaston, South Thomaston, and St George all have shore frontage in this growing area. The towns of Warren and Thomaston are the only towns in this growing area that have municipal treatment facilities. The Thomaston Treatment Facility and the Warren Sanitary District are both located at the head of the St George River, near significant shellfish resources. There are no major industries along the shore in Shellfish Growing Area WU; Dragon Cement is located approximately 0.5 miles away from the St George River. There are several marine-related businesses along the waterfront in Thomaston. All of these businesses are located along the immediate waterfront which is inside the closure zone for Thomaston Treatment Facility's outfall. The majority of the remaining shore frontage in this growing area is residential.

The resources in Shellfish Growing Area WU are managed by a five town management group which includes harvesters from the towns of Cushing, Warren, Thomaston, South Thomaston and St George. The entire harvestable shore frontage in each of these towns is available to each of the licensed diggers from any of the five towns.

Current Classification(s)

At the end of the 2010 review year, shellfish growing area WU had areas classified as:

Approved 20 stations

WU1, 2, 4, 6.5, 10, 18, 39, 40, 41, 42, 42.5, 42.7, 43, 44, 47, 56, 57, 58, 60, 61;

Conditionally Approved 18 stations

Maple Juice Cove, WU6, conditional on season, closed May 1- October 31

Broad Cove, WU 13.5 (boundary station), 13.8, 14, 14.5 16.5, and 17 (boundary station), conditional on season, area closed June 1 – Sept. 30

Upper St George River, WU 19 (boundary station), 20, 21, 22, 23, 25 (boundary station), 35 (boundary station), 36, 37, 37.5, and 38, 11 stations are conditional on ≥ 1.5 inches of rainfall in a 24 hour period and ≥ 2 inches of rainfall in 48 hours;

Restricted 5 stations

WU 5, 12, 13, 48, and 48.5 due to variability in data and no identified pollution source:

Conditionally Restricted 4 stations

WU 32, 33, 34, and 34.5 conditionally restricted due to operations at Warren and Thomaston Waste Water Treatment Facilities and:

Prohibited 18 stations

WU 3 due to suspect septic system



WU 7, 7.2, and 7.3 due to malfunctioning septic system at station WU7 and scores not meeting the approved standard at stations 7.2 and 7.3
 WU 9 due to point source (farm)
 WU16 due to scores not meeting the approved standard
 WU28 due to the presence of waste water treatment plant outfall
 WU29 and 30, due to non-point pollution
 WU 45 due to suspect septic system
 WU 45.5 due to scores not meeting the approved standard from stream impact
 WU 45.7 due to station not having enough data
 WU 45.8 due to reclassification, station was embedded in new closure area
 WU 48.8 due to point source (OBD)
 WU 50, 55.5, 56.5, 59 due to point source

Please visit the DMR website to view legal notices:

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

Activity during Review Period

Classification changes that occurred during the years 2008-2010 are shown in tables 1- 3.

Table 1 Growing Area WU, Activity 2008

Legal Notice	Station ID	Activity	Old Class	New Class	Date 2008	Reason
27B	WU14.5	class change	R	P	5/30	poor water quality at station WU 16
27B	WU15	class change	R	P	5/30	poor water quality at station WU 16
27B	WU16	class change	R	P	5/30	poor water quality at station WU 16
27B	WU16.3	class change	R	P	5/30	poor water quality at station WU 16
27B	WU16.5	class change	A	R	5/30	poor water quality at station WU 16
	WU20	class change	CA	P	10/10	malfunctioning septic system
27B	WU7	class change	A	P	10/10	malfunctioning septic system
27B	WU13.5	class change	A	CA	11/3	conditional on season
27B	WU13.8	class change	R	CA	11/3	conditional on season
27B	WU13.9	Station deactivated	R	P	11/3	no longer needed
27B	WU14	class change	R	CA	11/3	conditional on season
27B	WU14.5	class change	R	CA	11/3	conditional on season
27B	WU15	Station	P	P	11/3	no longer needed



Legal Notice	Station ID	Activity	Old Class	New Class	Date 2008	Reason
		deactivated				
27B	WU16.3	Station deactivated	P		11/3	no longer needed
27B	WU16.5	class change	R	CA	11/3	conditional on season
	Hupper Is.	Closure enlarged	P and A	P	12/31	Expired survey
27	Little Cove	Conditionally Restricted area enlarged	CA	CR	12/31	Water quality no longer met CA standards at station WU34.5

Table 2 Growing Area WU Activity 2009

Legal Notice	Station ID	Activity	Old Class	New Class	Date	Reason
27B	WU2	class change	P	A	7/16	Pollution Abatement
27B	WU42.5 and WU42.7 (new)	class change	P	A	7/16	Pollution Abatement
27B	WU14.5	Modified closure line	CA	CA	7/16	Placed closure line at sample station
27B	WU59	class change	P	A	7/16	Pollution Abatement
27	WU20	class change	P	CA	7/17	Pollution Abatement
27B	WU48	class change	A	R	1/12/10	Poor water quality
27B	WU48.5	class change	A	R	1/12/10	Poor water quality

Table 3 growing Area WU Activity 2010

Legal Notice	Station ID	Activity	Old Class	New Class	Date	Reason
27B	WU48	class change	A	R	1/12/10	Poor water quality
27B	WU48.5	class change	A	R	1/12/10	Poor water quality
27B	WU17	class change	A	CA	8/30/10	Based on Season
27	Little Cove	class change	CR	CA	1/19/2011	Based on season and rainfall ≥ 1.5 inches in 24 hours and 2" in 48 hours

Conditionally Managed Area(s)

There are now five conditional areas in shellfish growing area WU:

- 1) Upper St. George River Conditionally Restricted Area, Area No. 27: this area is conditional on the operations at Thomaston Treatment Facility and the Warren Sanitary



District. The conditionally restricted area is required to be closed during Thomaston Treatment Facility's discharge period, from January 1 through March 31. Sampling stations that monitor this conditional area include WU32, 33, 34, and 34.5. The upper St George River conditionally restricted management plan requires reporting by the operators of the Warren and Thomaston treatment facilities and the local shellfish warden. There have not been any malfunctions at the Warren or Thomaston treatment facilities in over ten years.

- 2) Upper St. George River Conditionally Approved Area, Area No. 27: this area is conditional on rainfall events of ≥ 1.5 inches of rainfall in a 24 hour period and ≥ 2 inches of rainfall in 48 hours. Sampling stations that monitor this area include WU 19, 21, 22, 23, 25, 35, 36, 37, 37.5, and 38. The upper St George River rainfall conditionally approved management plan requires rainfall reporting by the local shellfish warden. In 2010 there were eleven rainfall events of ≥ 1.5 inches of rainfall. On five of these events the rainfall conditional area was already in the closed status due to a previous rainfall event. On all of these occasions, rainfall was carefully monitored and reported and the conditional area was closed and reopened appropriately following the management plan.
- 3) Upper St George River Seasonal Rainfall Conditional Area (locally known as Little Cove), Area No. 27: This is a new (2011) seasonal conditional area; the closed season for this conditional area is July 1- October 31. Sampling stations that monitor this new conditional area include WU 34.5 (conditionally restricted boundary station) and WU 35. The St George River seasonal and rainfall conditionally approved management plan requires rainfall reporting by the local shellfish warden and a data review prior to the area reopening on November 1.
- 4) Broad Cove, Cushing Seasonal Conditionally Approved Area, Area No. 27B: this area is conditional on season, and is closed from June 1 to September 30. Sampling stations that monitor this area include WU 13.5, 13.8, 14, 14.5, 16.5 and 17. This management plan was revised (8/30/10) to reflect the closure line being extended to Bradford Point, Cushing. The management plan for this conditional area requires a data review prior to the area reopening on October 1 each year. The data review was done on 9/29/09. All stations in the seasonal conditional area continued to meet approved standards during the open season.
- 5) Maple Juice Cove, Cushing Seasonal Conditionally Approved Area, Area No. 27B: this is a new (2011) seasonal conditional area; the closed season is May 1- October 31. Sampling station WU 6 monitors the water quality in this area. This area will have a data review done prior to the area reopening on November 1.

Management plans for WU conditional areas can be found in DMR's central files. The upper St George River conditionally restricted and conditionally approved area management plans were last updated in January 2009. This update was done to reflect a change in the line separating the conditionally restricted and conditionally approved areas. Management plan reviews (2010) are in appendices A, B and C.



Documentation of Pollution Sources

The following section includes information on pollution sources which do or may impact water quality in growing area WU. The section includes information on new pollution sources, identified over the past three review years, as well as updated reviews of existing pollution sources in this growing area and 2010 survey results from a survey conducted by staff from The Department of Environmental Protection in the towns of Warren and Thomaston. 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, wildlife areas, and recreational areas. Current pollution sources are shown in Figures 3, 4, 5, and 6.

Evaluation of New Pollution Sources

In the summer of 2010, staff members from the Department of Environmental Protection (DEP) surveyed properties in the upper most portions of the St George River to try to locate the cause of elevated water quality scores in the upper region of the river following rainfall. Properties within the towns of Thomaston, Warren and Cushing were surveyed (Table 4). Large sections of Thomaston and Warren are serviced by municipal treatment facilities and were therefore not inspected. Properties within 500 feet of the shore that are not connected to a municipal treatment facility were visited. In Cushing, only three properties were inspected and no problems were found. In Thomaston, a total of 56 properties were surveyed; 33 of them were along the St George River, nine properties were along the Oyster River and its tributaries and 14 properties were inspected along the Mill River. Two licensed overboard discharges were found, one malfunctioning septic system and one straight pipe system. At 12 sites, they were unable to identify where the leach field was located. In Warren, thirty-nine properties were surveyed. Eleven of these properties were along the main channel of the St George River, seven properties were located along tributaries leading to the river and 21 properties were located along the Oyster River and its tributary. In Warren, one septic malfunction, three potential septic malfunctions and two licensed overboard discharges were identified. The remainder of the properties were found to be either functional or the system was not able to be located (9). The licensed overboard discharge systems are noted in Table 7. Please refer to Figure 3 to view the locations of the properties noted in Warren and Thomaston in Table 4.

One new pollution source was identified in the town of Cushing by DMR staff doing routine inspections. This property was found to have a septic tank covered by rocks with no apparent leach field (NPS7). This property was reported to the licensed plumbing inspector for the town of Cushing (Figure 5).



Figure 3 Pollution Sources Towns of Warren and Thomaston, Shellfish Growing Area WU



Maine Department of Marine Resources 2010 New Pollution Sources D.E.P Survey



Upper St. George River

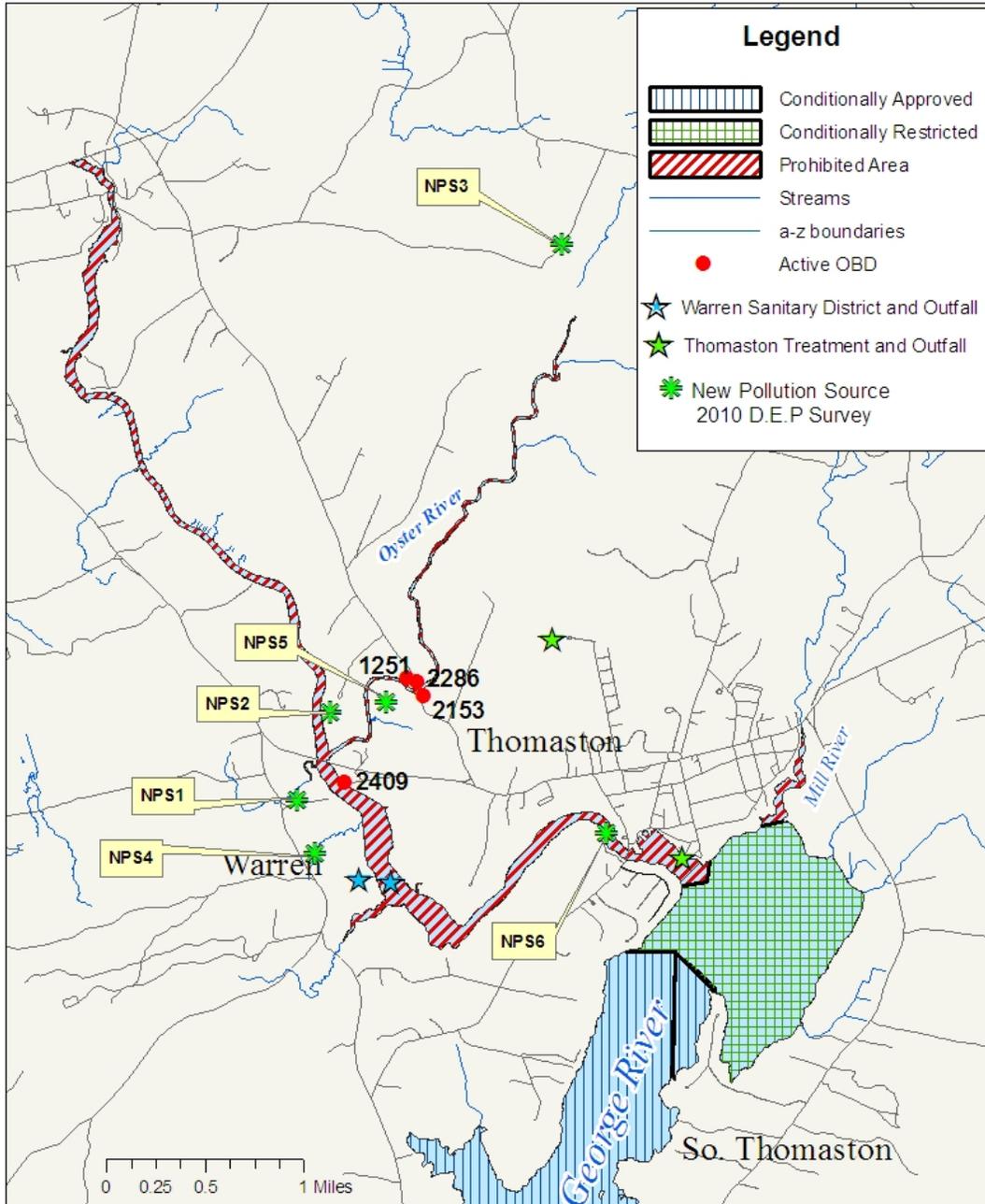




Figure 4. Pollution Sources Upper St George River, Shellfish Growing Area WU

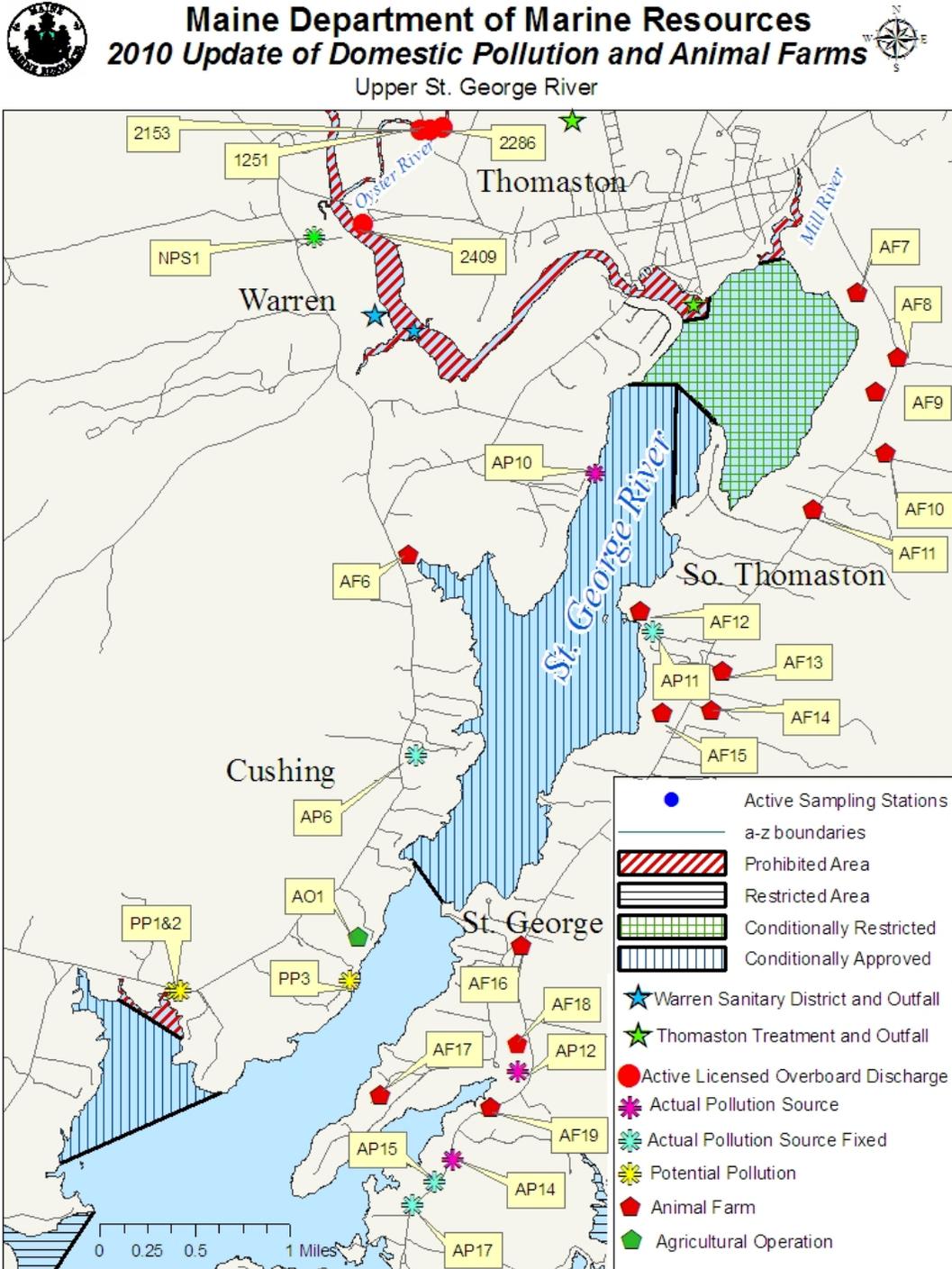




Figure 5 Pollution Sources Lower St George River, Shellfish Growing Area WU

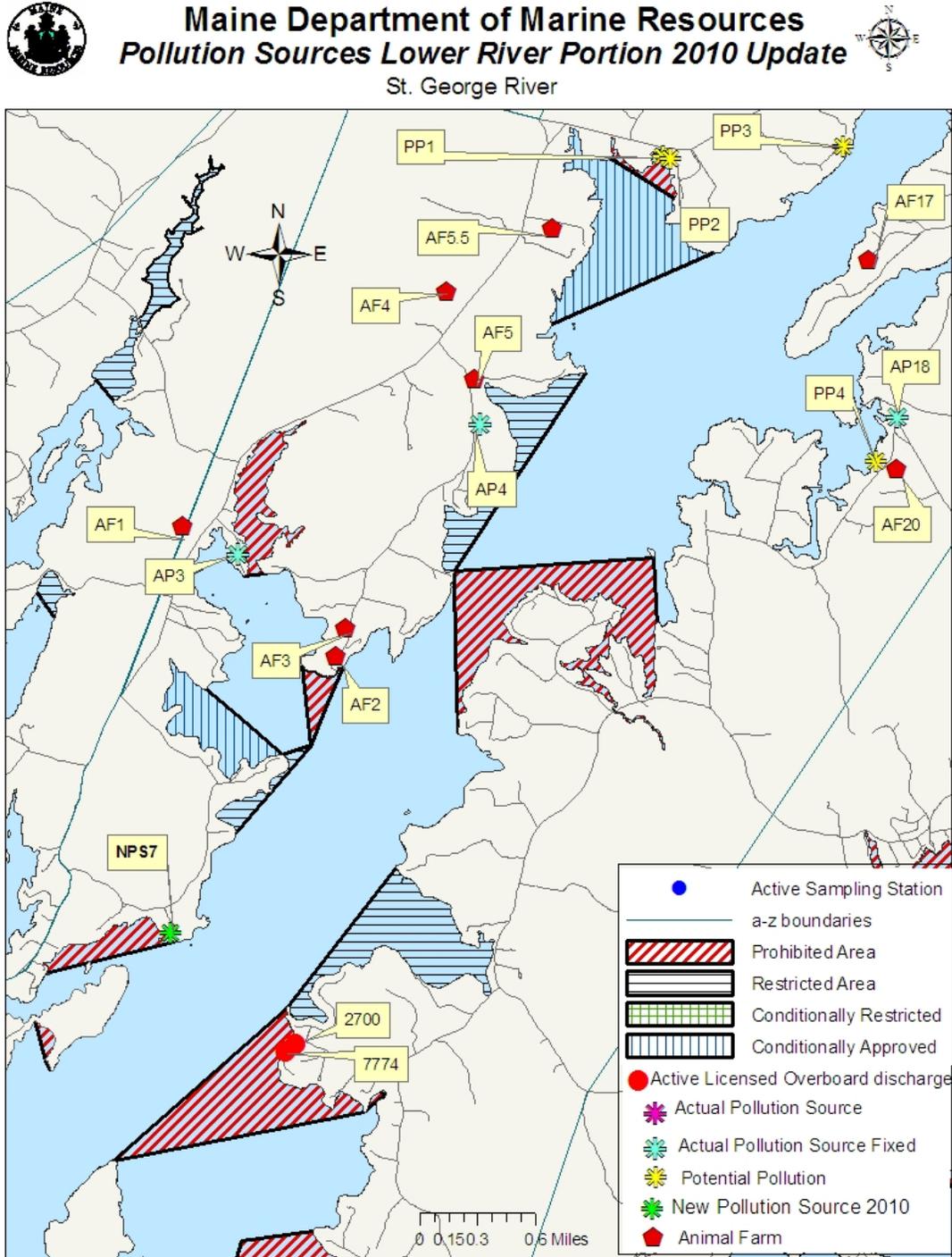
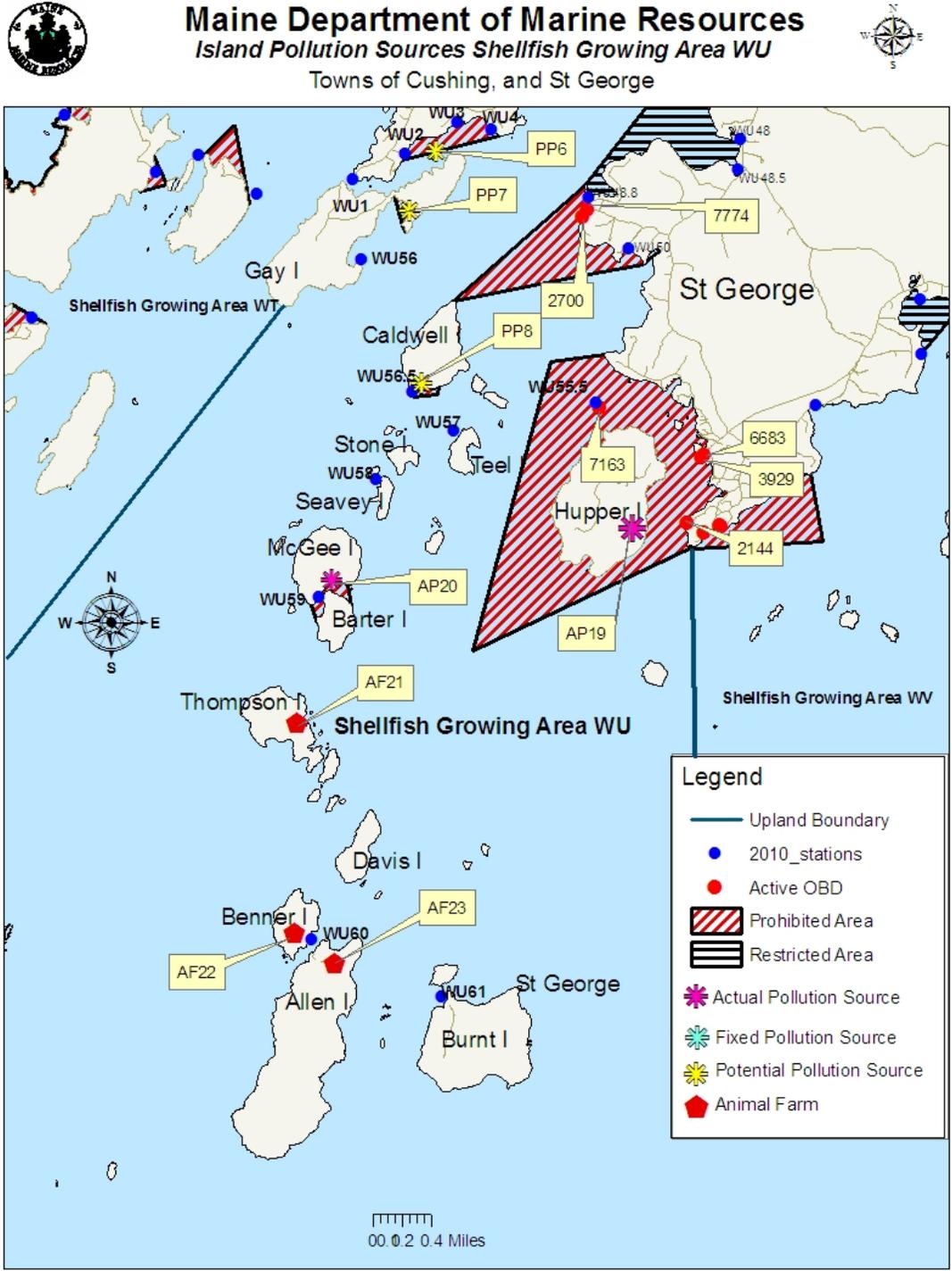




Figure 6. Island Pollution Sources, Shellfish Growing Area WU





Pollution sources identified during the 2010 survey conducted by Department of Environmental Protection staff of the most upper regions of the St George River are shown in Table 4. Relatively few pollution sources were identified during this survey. All of the pollution sources border on areas currently classified as prohibited. Pollution source NPS 7 was identified by DMR staff during a routine water sampling trip in Cushing. This area is also classified as prohibited.

Table 4. New Pollution Sources Shellfish Growing Area WU

Site #	Town	Date Surveyed	Description	Actual or Potential	Direct or Indirect	Classification	Fixed? Y/N
NPS1	Warren	7/21/10	Breakout in leachfield	potential	indirect	Prohibited LPI visited	Y
NPS2	Warren	7/21/10	Breakout in leachfield	potential?	indirect	Prohibited Reported to LP	N
NPS3	Warren	7/22/10	Black residue Possible malfunction	potential	indirect	Prohibited Reported to LPI	N
NPS4	Warren	8/4/10	Grey water discharge	actual	direct	prohibited	N
NPS5	Thomaston	7/26/10	Tank with cesspool - malfunctioning	actual	direct	Prohibited Site eval done Needs \$\$	N
NPS6	Thomaston	8/4/10	Straight pipe to river	actual	direct	prohibited	Y
NPS7	Cushing Seavey Ln	11/30/10	Tank covered by rocks, no leach field	actual	indirect	prohibited	N

Re-Evaluation of Existing Pollution Sources

The following sections are a review of existing pollution sources in growing area WU. Pollution problems associated with domestic waste, including OBDs, which were identified prior to the last triennial review, are evaluated in this section. Other pollution sources, including municipal wastewater treatment facilities, and pollution associated with farms and agricultural activities, are also reviewed. A drive through survey inspection of new and suspect properties and farms on the east side of the river (South Thomaston to St George) was conducted on August 17, 2010. Stream samples were also collected on this date. The western side of the river was inspected on November 30, 2010; animal farms were also visited and stream samples were taken. Table 5 lists pollution sources that were previously identified with the current information for each system highlighted in yellow. Table 6 lists all potential pollution sources in shellfish growing area WU and the action taken relating to each of these systems.

Table 5. Re-evaluation of Existing Pollution Sources, Shellfish Growing Area WU

PS ID	Type of Pollution	Actual/Potential Direct/Indirect	Fixed Yes/No	Action Taken
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PS ID	Type of Pollution	Actual/Potential Direct/Indirect	Fixed Yes/No	Action Taken
AP3	Septic Malfunction	Actual/Direct	Yes	Reported to LPI, the closure in this area was enlarged New septic completed 11/30/09
AP4	Septic Malfunction	Actual/Indirect	No	Reported to LPI, revisited Sept. 2008 and found in working order, revisited 4/12/2010 still in working order
AP6	Straight Pipe to Lawn	Actual/Indirect	Yes	Reported to LPI, system is >500' from shore. A closure was made where stream enters the shore. System replaced 2009
AP10	Inadequate system	Actual/Direct	No	Reported to LPI. Dwelling will be unoccupied until new system can be built.
AP12	Septic Malfunction	Actual/Indirect	Yes	Located >500' from shore, reported to LPI New system has been designed
AP14	Septic or washing machine drain	Actual/Indirect	No	Lint and hair visible below pipe, located >1000' from shore, LPI unable to locate malfunction
AP15	Septic Malfunction	Actual/Indirect	Yes	Wastewater discharged to pond with drainage, >1000' from shore; New system has been designed, New System Installed August 2009
AP17	Septic Malfunction	Actual/Indirect	Yes	Wastewater discharged to wooded wetland 50' from small brook, located >500' from shore. New system has been designed. New System Installed August 2008
AP19	Straight Pipes	Actual/Direct	No	Up to eight straight pipes. Island was not surveyed in 2007 – closure enlarged.
AP20	Holding Tank	Actual/Direct	No	Holding tank directly above shore that has release valve at base.

Table 6. Potential Pollution Sources in Area WU

PP#	Type of Pollution	Potential Direct/Indirect	Action Taken
PP1	Septic System	Potential/Direct	Three dye tests completed, but no dye visible
PP2	Shellfish Business Drain	Potential/Direct	Dye tested, but no dye visible
PP3	cellar or washing machine drain	Potential/Direct	Reported to LPI for follow up
PP4	Old Septic System	Potential/Direct	Dye tested twice, but no dye visible
PP6	Outhouse on island	Potential/Direct	Annual inspections documented in annual review of growing area
PP7	Old small system	Potential/Direct	Precautionary closure made
PP8	Old small system	Potential/Direct	Precautionary closure made



Domestic Waste

There are 10 over board discharges (OBDs) that discharge their treated effluent into the waters of Shellfish Growing Area WU (Figures 4-6). One OBD has been removed over the past three review years (OBD# 1671).

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 water body (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 WU (Table 4). The size of each closure is determined based on a dilution calculation, 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.

Shellfish growing area WU has a total of ten active licensed overboard discharges (Table 7). Four of these discharges are located inside the closure area for the Warren and Thomaston treatment facilities. Two OBDs are located at Howard Point, St George. Four OBDs are inside



the closed area in Port Clyde Harbor. None of these overboard discharges are on the Department of Environmental Protection priority list for removal. The size of the prohibited area surrounding each OBD was reviewed as part of this report; all closures are of adequate size to protect public health.

Table 7. Licensed Overboard Discharges, Shellfish Growing Area WU

OBD #	Town	Flow	Receiving Water	Priority Removal	Required Closure	Actual Closure Acres
1251	Thomaston	300	Oyster River	N	3.07	158
2153	Thomaston	300	Oyster River	N	3.07	158
2286	Thomaston	300	Oyster River	N	3.07	158
2409	Warren	300	Upper St George	N	3.07	158
2700	St George	300	Mouth of St George River	N	1.02	275
7774	St George	300	Mouth of St George River	N	1.02	275
7163	St George	50	Mouth of St George River	N	0.15	345
1671	St George	900	Port Clyde Harbor	Removed	2.76	345
6683	St George	500	Port Clyde Harbor	N	1.71	345
3929	St George	1500	Port Clyde Harbor	N	5.12	345
2144	St George	300	Port Clyde Harbor	N	1.15	345

Municipal Waste Water Treatment Facilities

The towns of Warren and Thomaston have municipal treatment facilities. The location of these facilities and their outfalls is shown in Figure 1. Both facilities have been operating very effectively for a number of years without any malfunctions. Thomaston Pollution Control Department hasn't had a malfunction since 1997, which is prior to the new plant being constructed at its present site. The new facility became operational in December of 1997. Prior to this date the facility was located on the Thomaston waterfront and served the old Maine State Prison along with the residents of Thomaston. There were numerous malfunctions during this period. State prison inmates flushed clothing and debris down the sewer lines causing back-ups and bypasses. Grease from the prison kitchen was flushed down the sewer lines, which also caused back-ups.

The Maine State Prison was relocated in the town of Warren, and the Warren waste treatment facility was enlarged to handle the waste water from the new prison. The new Warren Sanitary District had one minor malfunction event shortly after the new prison facility became operational (April 19th 2002). A manhole became blocked with gravel and construction debris causing water to flow out of the manhole. The line was flushed and samples were collected downstream from the manhole to be tested for fecal coliform bacteria. Staff from both DEP and DMR collected samples. None of the samples revealed the presence of fecal coliform bacteria. The bar grate at this manhole was checked twice a day following this incident and the prison planned to install a Muffin Monster grinder to clear debris from the site. No wastewater reached the river necessitating a shellfish closure. There have been no other incidents involving the prison sewer lines or the Warren Sanitary District.



Thomaston Pollution Control Department

The Thomaston Treatment Facility serves a population of approximately 2,700 citizens. The collection system consists of 13 miles of pipe; 5 pump stations and no combined sewer overflows (CSOs). The municipal sewer collection system delivers the sewerage to the Ship Street pump station by gravity. The Ship Street pump station consists of a mechanical bar screen and an auxiliary manual bar screen, two influent pumps and a flow meter. Effluent from the Ship Street pump station is pumped to the treatment lagoons, with a total capacity of 21 million gallons, and a storage lagoon with a maximum liquid level depth of 20 feet and a capacity of 36 million gallons. Aeration is provided to the treatment lagoons via three blowers, air distribution piping and 98 fine-bubble tubular membrane diffuser assemblies. The lagoons were designed for an average daily influent flow of 427,000 gallons per day (GPD) and an influent biological oxygen demand (BOD) of 885 lbs/day. BOD measures how much oxygen it would take to treat the wastewater to a point that it won't deplete oxygen levels in the river. At an influent rate of 427,000 GPD, the 36 million gallon storage lagoon provides for 84 days of storage. During the months of January, February and March, the effluent from the lagoons is disinfected with sodium hypochlorite and flows by gravity through 7,100 linear feet of pipe to the St George River where it is discharged via the outfall pipe at the former Thomaston Treatment Facility. During the period from April 15 through October 31 of each year, Thomaston is authorized to dispose of wastewater by spray irrigation on approximately 52 acres of a 300 acre site consisting of 5 spray irrigation fields of approximately 10 acres each. The effluent is land applied by a spray irrigation system consisting of two 75 horsepower pumps, approximately 26,000 linear feet of distribution piping, and 130 + spray nozzles. Each spray nozzle is capable of delivering a 150 foot diameter spray pattern. The effluent is applied to one field at a time with each field being used one day each week. The waste water is applied at a maximum rate of 3 inches per week per site. The spray irrigation fields are six hundred feet from the shores of the banks of the Oyster River (northwest of Thomaston waterfront) and more than 3.5 miles from the conditionally restricted area in the upper portion of the river. When the facility is not permitted to use spray irrigation, wastewater is stored in the lagoons.

A dilution calculation for the Thomaston Treatment Facility was done based on a flow rate of 350,000 gallons per day (average wet weather flow), with a bacteria concentration of 230 fecal coliform colonies/100ml (the most elevated fecal score received at the facility during effluent testing in 2004 and 2005), and an average depth of receiving water of six feet. The calculation determined that the required closure size for fecal coliform to be diluted down to an approved concentration of 14 FCU /100ml is 2.9 acres. The required closure size for viral dilution during the discharge period is 179 acres. There is currently a closure zone of 535 acres surrounding the plant's outfall during the discharge period.

Warren Sanitary District

The Warren Sanitary District serves approximately 950 residents (250 connections) within the village of Warren. Approximately 72% of the total sanitary wastewater influent flows to the facility originate at the State of Maine Department of Corrections Minimum and Maximum Security Prison Facility and the Maine Correctional Institute. The Warren Sanitary District provides secondary treatment of sanitary wastewater via a four-cell, partial mix, aerated lagoon system (Table 8).



Table 8. Warren Sanitary District Lagoon Characteristics

	Cell No. 1	Cell No. 2	Cell No. 3	Cell No. 4
Volume (millions Gallons)	5.59MG	1.58MG	1.58MG	15.0MG
Dimensions (LxWxD)	500'x145'18'	230'x125'x18'	230'x125'x18'	irregular shaped x18'
Lagoon Acreage	1.66 acres	0.66 acres	0.66 acres	4.5 acres

Wastewater is conveyed to the treatment facility via gravity and force main sewer lines and influent flows from the Bolduc Correctional Facility and Warren Village are measured separately prior to entering Lagoon #1, using influent flow meters. Although any of the four available lagoon cells may be removed from service, flows typically follow the sequential pattern: Lagoon #1 to Lagoon #2 to Lagoon #3 to Lagoon #4. Treated effluent from the lagoons flows by gravity to a dissolved air flotation (DAF) unit for algae removal. A polymer is added to the flow prior to entering the DAF unit to assist in coagulation and flocculation. Floc is skimmed from the surface of the DAF unit to a wet well. The contents of the wet well are periodically (daily basis) pumped back to the head works for additional treatment via the lagoon system. Following the DAF unit, the flow is conveyed to a splitter box located in the disinfection building and evenly distributed to up to four channels equipped with an ultraviolet (UV) disinfection system. The UV system is equipped with an alarm system and automatic shut-off designed to cease discharge upon activation of the alarm. Additionally, the District maintains a secondary UV disinfection system to ensure continued operation and discharge upon failure of the primary system. Final effluent is measured using a Parshall flume installed immediately below the UV system channels. Final effluent is conveyed to the St George River for discharge via an 8 inch diameter outfall pipe. The outfall pipe extends out approximately 120 feet into the tidal river and is submerged to a depth of approximately 20 feet below the surface at mean low water. The outfall includes a diffuser port with four 4-inch diameter outfall ports to enhance mixing with the receiving waters. ¹

Warren's license allows both summer (June 1- September 30) and winter (October 1- May 31) discharge periods. The summer average discharge flow limit is 79,500 gallons per day and the winter average flow limit is 244,200 gallons per day. Wet weather flows are typically not greater than average flow rates.

Dilution calculations were done for both discharge periods based on the summer and winter average discharge flow limits. During the summer discharge period, based on a flow limit of 79,500 GPD, using a fecal load of 14,000 FC colonies/100ml, and an average depth of the receiving waters of five feet, the required closure zone for fecal coliform to be diluted down to 14 FC/100ml of water is 48.8 acres. The required acreage for viral dilution is also 48.8 acres. During the winter discharge period, based on a flow limit of 244,200 GPD, using a fecal load of 14,000 FC colonies/100ml, and an average depth at the receiving waters of five feet, the required closure zone for fecal coliform to be diluted down to 14 FC/100ml of water is 149.9 acres. The required viral dilution would also be 149.9 acres. The size of the prohibited area from the route one bridge to the end of the closure lines outside of Thomaston's waterfront is 158 acres. This closure zone is adequate to dilute Warren Sanitary District's discharge during the winter discharge period. When Thomaston Treatment Facility's required dilution closure area is added to Warren's required closure area (winter discharge period) the required prohibited zone



is 329 acres. During Thomaston's discharge period, there are more than 600 acres closed to shellfish harvesting.

Industrial Pollution

There are no major industries along the immediate shore in Shellfish Growing Area WU. Dragon Cement is located nearby the St George River approximately 0.75 miles away. Dragon Cement has no licensed discharges to the St George River. DEP monitors both the ground water and surface water at several sites around the facility for a variety of inorganic substances. The wastewater from this facility is recycled and used in the processing of the cement. Information on DEP's monitoring of Dragon Cement's groundwater and surface water sites can be found in DMR central files.

Marinas

In the town of Thomaston, there is a boatyard that has dock space for approximately 14 forty-foot boats. The boatyard is located, inside the closure zone for both the Thomaston Treatment Facility and the Warren Sanitary District outfalls. The main purpose of the dock space is to "store" the boats while they are being worked on, either until they leave in the springtime or until they are hauled out in the fall. An interview with the manager of the boat yard confirmed that no more than five boats are lived on at any one time. A marina dilution calculation was completed and concluded that a closure of 7.24 acres is necessary to protect public health from potential discharges from docked boats (based on five boats, each having occupancy of two people living aboard); a closure of 20.28 acres is required if all 14 dock spaces are considered in the calculation. The current closure zone in the immediate Thomaston waterfront area is greater than 50 acres, and therefore is adequate in protecting public health from potential pollution associated with this marina.

Jeff's Marine is also located along the Thomaston waterfront. This facility sells and repairs small marine watercraft (10 – 24 feet) that are not lived aboard. Jeff's Marine has dock space for 10 boats.

Stormwater

Stormwater 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, stormwater pollution is caused by the daily activities of people within the watershed. Currently, polluted stormwater is the largest source of water quality problems in the United States.

The primary method to control stormwater discharges is the use of best management practices (BMPs). In addition, most major stormwater discharges are considered point sources and require coverage under an NPDES permit. In 1990, under authority of the Clean Water Act, the U.S. EPA promulgated Phase I of its stormwater 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 stormwater management program, expanding the Phase I program to include all urbanized areas and smaller construction sites.

Although it is a federal program, in the state of Maine, the Phase II Stormwater permit is issued and regulated by the Maine DEP (Chapter 500 and 502). Under the MS4 regulations, 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 stormwater management, and (6) Pollution prevention/good housekeeping. The permit required each city or town to develop a draft Stormwater Management Plan by September 3, 2003 that will establish measurable goals for each of the Minimum Control Measures. The Town must document the implementation of the Plan, and provide annual reports to the Maine DEP. Currently the discharge of stormwater from 28 Maine municipalities is regulated under the Phase II permit requirements, however, no municipalities located within the boundaries of growing area WU fall under these regulations. Additionally, the Maine Stormwater Management Law provides stormwater standards for projects located in organized areas that include one acre or more of disturbed area (Maine DEP 2009).

Stormwater enters the upper St George River by way of stormwater drains along the Thomaston waterfront. When the Thomaston Treatment Facility went on line at its new location, new sewer lines were installed at locations in the center of town and the stormwater lines were separated out from the sewer system making them "clean water drains". After the new facility had been operational for 3 years, it became apparent that wastewater was still entering the river in the vicinity of the Thomaston waterfront. A stormwater study was initiated (2001) to try to locate the source(s) of the elevated scores. Samples were initially collected at all streams and drains entering the waterfront. After it could be determined if a stream or drain was elevated, a combination of fecal A1 method fecal testing and optical brightener testing was conducted to document the presence of fecal coliform bacteria of human origin. Three sample locations were identified that were allowing domestic wastewater to enter the river. The Thomaston Treatment Facility and the town manager for the town of Thomaston were notified. The old sewer lines and clean water drains received additional testing and old sewer lines were televised by a remote camera system to verify the problem. The pollution sources were identified and fixed. Two of these sites continue to be sampled (see stream sample sites S1WU28 and S2WU29, Table 9). The town of Thomaston and Thomaston Treatment Facility has hired mapping specialists to map all of the sewer lines and clean water storm drains around the town of Thomaston. When this project is completed, treatment plant staff and town officials will be able to easily see which properties are connected to the sewer and where runoff flows through the town to the shore.

Non-Point Pollution Sources

Numerous small streams can be found along both shores of the St George River, and many of these streams were sampled as part of this triennial review (Figures 7 and 8). Results obtained from the most frequently sampled streams and from streams thought to have the greatest pollution impact are shown in Table 9; the classification of the water body that each stream drains into is also shown in Table 9. Many of the streams enter the shore near DMR's established water sampling stations. The stream sample site numbers are associated with the proximity of the stream to the closest water sampling station. Runoff conditions are not available



for each sample date because the samples were collected by different staff members and volunteers and the conditions were not always recorded on the data sheet. Salinity values were reported for each sample taken.

Several streams received elevated fecal scores, however most streams received a combination of low and elevated scores (Table 9). The streams with the most elevated scores are highlighted in yellow. Streams S1WU16, S1WU20, S1AWU20, S2WU20, S5WU20, S1WU21, S1WU28, S1WU29 and S1WU30 all received elevated scores. Stream number S1WU16 flows into Broad Cove, Cushing. The portion of the cove this stream flows into is classified as prohibited. There are no known pollution sources associated with this stream, however locals have mentioned that a pond that drains into the stream may contain beavers. The streams associated with sampling station WU20 (S1WU20, S1AWU20, S2WU20, S5WU20) all received elevated scores. These streams were only sampled once in 2010. There are no known pollution sources in the vicinity of these streams; however the scores were all so elevated the area should be revisited to try to determine the source of the elevated scores. Stream site S1WU21 has had elevated scores in the past. This stream is usually sampled a few times every year to check the water quality. During the time period from 2005-2007 stream samples and salt water station samples were collected on the same date to see if the stream was impacting the water quality score at the sample station. On seven of these dates, the sample was collected after the area had been closed due to >1.5 inches of rainfall. On all of these dates the sea water sample scores were considerably lower than the stream sample score which suggests a rapid dilution when the stream water meets and mixes with sea water at the shore. Streams S1WU28, S1WU29 and S1WU30 are all located inside closure areas above the conditionally restricted area. These streams are sampled to check impact from runoff from the town of Thomaston into the waters just above the conditionally restricted and conditionally approved areas. Stream site 29S1 often has raccoon waste on the banks of the stream. Stream site S2WU29 flows out of an old wooden sewer line that flows to the shore from the center of Thomaston. After the new sewer lines were installed in Thomaston, this line was separated out to only allow stormwater runoff to flow to the shore. Stream site S1WU30 is sampled at the large culvert that allows Mill River to flow into the St George River. Stream site S1WU48.5 in Turkey Cove, St George, was collected four times in 2010. These samples were collected to use with stream flow data to determine if the closure size in Turkey Cove could be reduced in size.



Figure 7 Streams Sampled 2010, Northern Portion St George River



Maine Department of Marine Resources
2010 Streams Shellfish Growing Area WU Northern Portion
Towns of Cushing, Warren, Thomaston, South Thomaston and St George

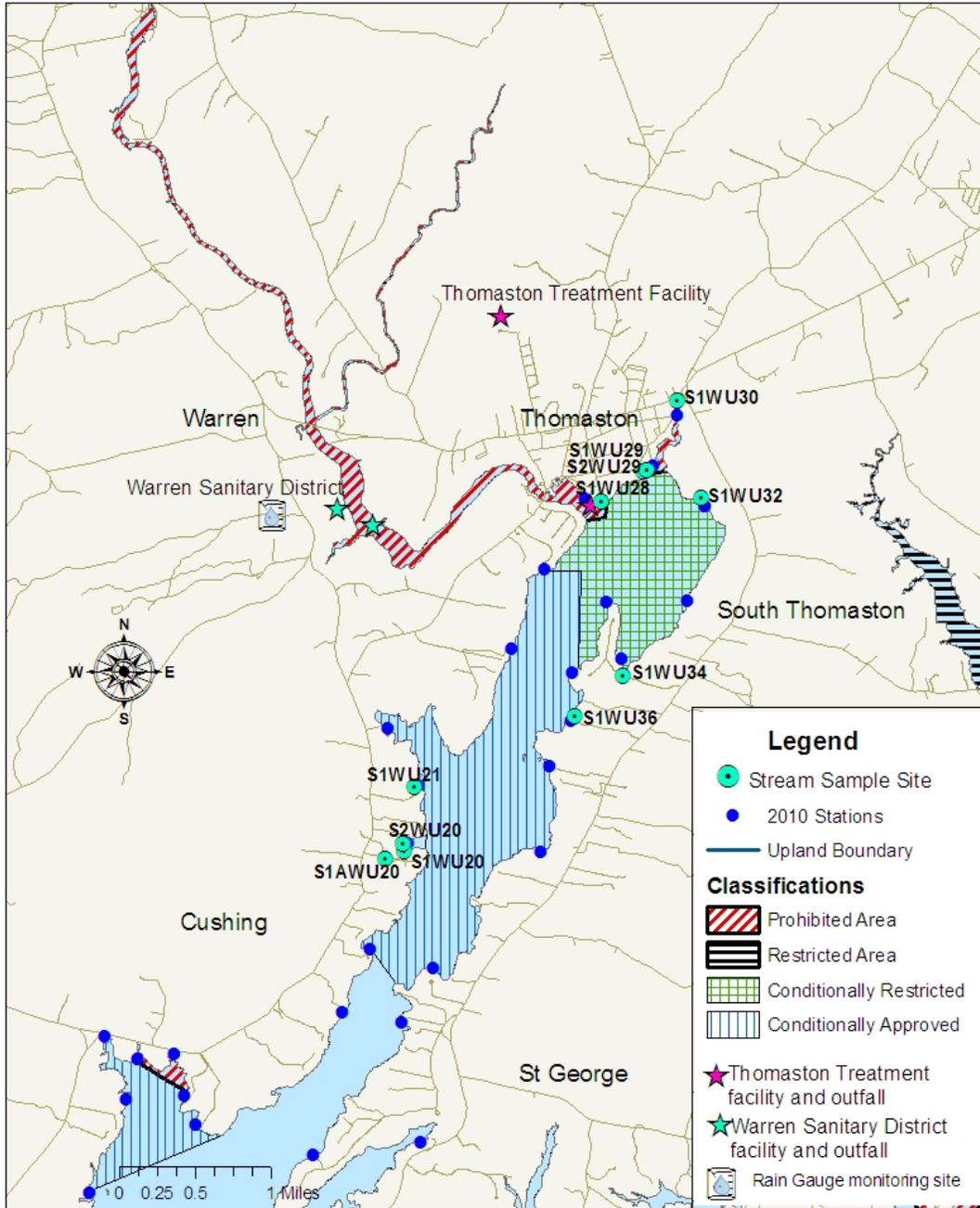




Figure 8 Streams Sampled 2010, Southern Portion of St George River



Maine Department of Marine Resources
2010 Streams Shellfish Growing Area WU Southern Portion
Towns of Cushing, and St George

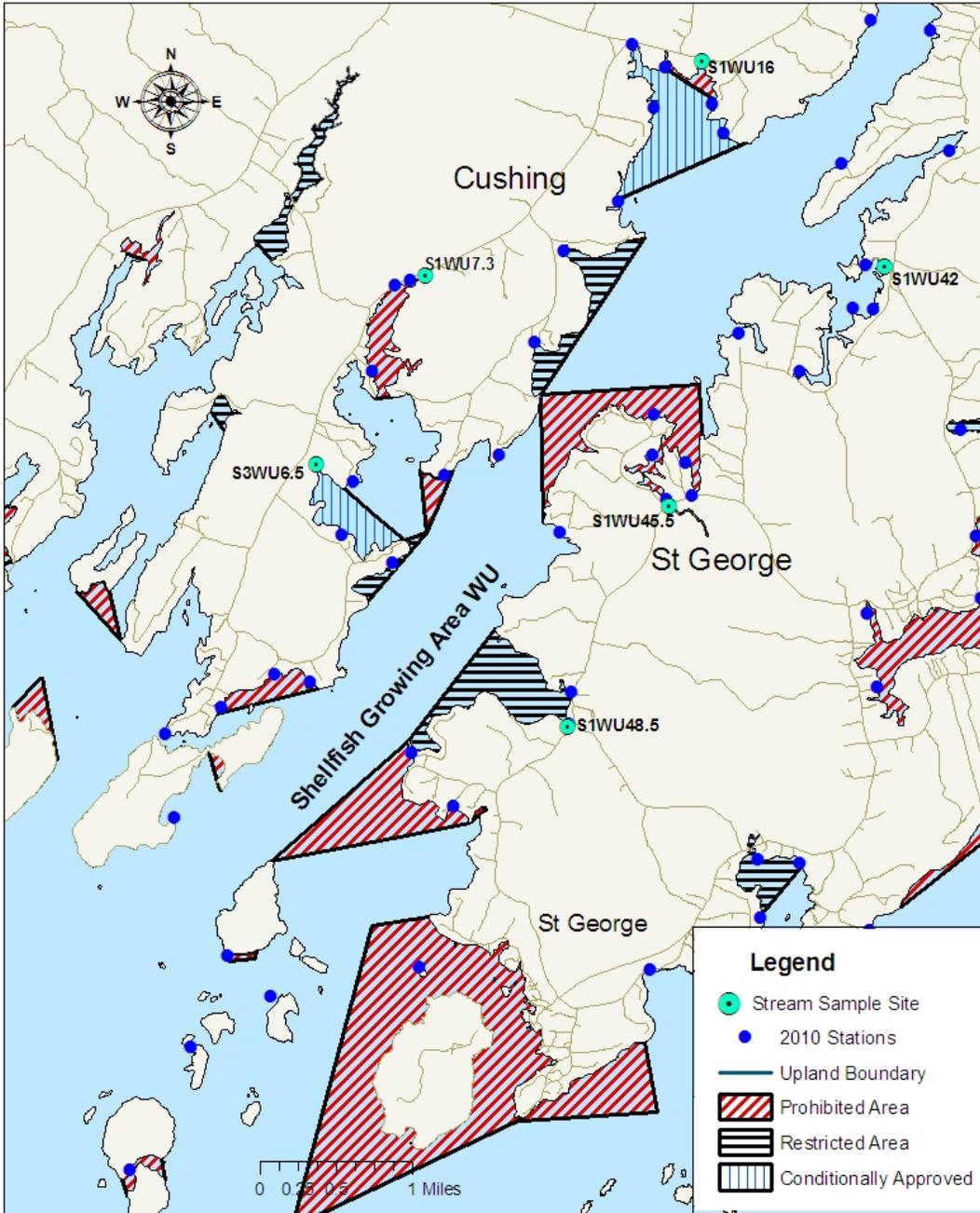




Table 9. Streams Sampled in 2010 in Shellfish Growing Area WU

Stream ID	Date	Time	Salinity	Score	Impact: A=actual P=potential	Impact: D=direct I=indirect	Class	Runoff Conditions
S3WU006.5	11/30/2010	1217	0	<2	P	I		
S1WU007.30	6/2/2010	1257	0	260	P	I		Low
	6/7/2010	1237	0	122	P	I		High
	6/29/2010	1045	0	200	P	I		
	7/14/2010	1253	0	280	P	I		
	8/3/2010	1107	0	18	P	I		
	9/20/2010	1046	0	44	P	I		
S1WU016.00	6/2/2010	1230	0	300	A	D	R	Low
	6/7/2010	1229	0	300	A	D	R	High
	7/14/2010	1241	0	>1600	A	D	R	
	9/20/2010	920	0	86	P	I	R	
	11/30/2010	1311	0	4	P	I	R	
S1WU020.00	7/14/2010	1223	0	1180	A		CA	
S1AWU020.00	7/14/2010	1230	0	>1600	A		CA	
S2WU020.00	7/14/2010	1228	0	920	A		CA	
S5WU020.00	7/14/2010	1210	0	>1600	A		CA	
S1WU021.00	6/29/2010	1132	0	1380	A	D	CA	
	7/14/2010	1202	0	>1600	A	D	CA	
	9/28/2010	1333	0	680	A	D	CA	
S1WU028.00	7/14/2010	1010	0	840	A	D	P	
	8/17/2010	1140	0	42	P	I	P	low
S1WU029.00	7/14/2010	1128	0	>1600	A	D	P	
	8/17/2010	1152	0	>1600	A	D	P	low
S2WU029.00	8/17/2010	1156	0	112	P	I	P	low
S1WU030.00	7/14/2010	1115	0	>1600	A		P	
S1WU032.00	8/17/2010	1345	0	102	P	I	R	low
S1WU034.00	8/17/2010	1352	2	92	P	I	R	low
S1WU036.00	8/17/2010	1317	0	122	P	I	CA	low
S1WU042.00	8/17/2010	1255	0	90	P	I	A	low
S1WU045.50	8/17/2010	1246	15	6	P	I	P	low
S1WU048.50	6/2/2010	1120	2	14	P	I	R	Low
	6/7/2010	1150	0	96	P	I	R	High
	8/2/2010	1200	0	28	P	I	R	
	9/20/2010	1210	1	33	P	I	R	Low

Agricultural Activities

Shellfish Growing Area WU has several small animal operations mostly consisting of a few horses, cows or sheep. The locations of these animal operations and the number of animals are shown in Table 10; animal operations that are listed in the table are shown on the pollution sources maps in Figures 4-6. All of the animal operations were visited during the 2005 -2007 shoreline survey of the St George River. At that time, the only farm of immediate concern was AF 20. This area is monitored by stations WU 42.5 and 42.7. When this farm was initially



inspected a large manure pile 20' by 6' was visible above a wooded slope approximately 400 feet from the shore. The manure was not contained in an enclosure and no efforts had been made to remove the manure from the site. A discussion with the property owner, members from the Department of Agriculture, and staff from the Cooperative Extension Service resulted in the majority of the manure being removed to be composted. A small amount was allowed to remain on the property for the owner to use for gardening activities.

On August 17, 2010, we revisited the horse farm in Watts Cove. This property is on the opposite side of the road from Watts Cove approximately 400 feet from the shore. Nine horses share a small pasture area and barn at this site. The manure pile at this site was flagged as a problem in 2007 due to the large size of the manure pile and concerns that rainfall would wash fecal matter to a nearby drainage ditch and from there to the shore. The manure pile was hauled off site (2008) and the owner agreed to keep the pile at a more manageable size. We found that the manure pile was still in the same location (2010) but the size was considerably smaller. There was no flow in the drainage ditch; we were unable to get a sample.

Table 10. Locations of Animal Waste, Growing Area WU

Farm #	Location	Animal Type	Impact: Direct/Indirect Actual/Potential	Approx Dist. To Shore	Comments
AF1	Maple Juice Cove, Cushing	2 Horses	Indirect/potential	500 ft	
AF2	Burton Pt. Cushing	2 Cows, 1 Horse Chickens	Indirect/potential	40 ft	
AF3	Burton Pt. Cushing	1 Horse	Indirect/potential	30 ft	Horse roams freely
AF4	Hathorne Pt. Rd Cushing	6 Sheep	Indirect/potential	>500 ft	
AF5	Hathorne Pt. Rd Cushing	1 Pig, 2 Dogs, 2 Geese	Indirect/potential	150 ft	pig not always in residence
AF5.5	Broad Cove Rd	2 Horses	Indirect/potential	>500 ft	
AF6	Smith Cove, Cushing	1 Horse & occasionally sheep	Indirect/potential	500 ft	No sheep were present at the time of inspection.
AF7	South Thomaston	2 horses	Indirect/potential	700 ft	
AF8	South Thomaston	8-17 cows; number of animals varies	Indirect/potential	1400 ft -east side Rt. 131 180 ft - west side of Rt. 131	Huge grazing area both sides of Rte. 131
AF9	South Thomaston	2 Horses	Indirect/potential	1300 ft	
AF10	South Thomaston	2 Pulling Horses	Indirect/potential	2100 ft	Very large animals Across Rte. 131 (not on shore side of rd.)
AF11	South	6 Horses	Indirect/potential	1800 ft	Alongside of Rt. 131,



Farm #	Location	Animal Type	Impact: Direct/Indirect Actual/Potential	Approx Dist. To Shore	Comments
	Thomaston				1,800 feet from shore.
AF12	South Thomaston Drury Lane	1 Horse	Indirect/potential	100 ft	
AF13	South Thomaston	7 Miniature horses	Indirect/potential	1800 feet	Across Rte. 131 (not on shore side of rd.) Stream sample collected, with score of 43
AF14	South Thomaston	5 Horses	Indirect/potential	>1400 ft	Across Rte. 131 (not on shore side of rd.)
AF15	South Thomaston	4 Horses and manure pile	Indirect/potential	400 ft	Sampled stream nearby – had A1 score of 9.1 Manure pile will be spread on field away from the river.
AF16	Wileys Corner, St George	1 Goat	Indirect/potential	1,200 ft	
AF17	St George, Snows Point	5 Sheep	Indirect/potential	250 ft	
AF18	River Rd., St George	2 Cows	Indirect/potential	>1000 ft	
AF19	Cutler Cove, St George	2 Horses	Indirect/potential	20 ft	From shore on slope above cove – station WU 41 continues to meet approved
AF20	Watts Cove, St George	9 Horses, some miniature	Indirect/potential	400 ft	Property had large manure pile which has been removed
AF21	Thompson Island	>20 sheep	Indirect/Potential		Sheep graze all over island
AF22	Benner Island	>20 sheep	Indirect/Potential		Sheep graze all over island
AF23	Allen Island	>20 sheep	Indirect/Potential		Sheep graze all over island
AO1	Saltwater Farm Lane, Cushing	Pumpkin and Squash Field	Indirect/potential	250 ft	Large growing area slopes to shore. Spreads manure in field in spring. Never seen impact on water quality.

Wildlife Activity

There are no conservation areas designated as wildlife refuges in this portion of shellfish growing area WU. Sea birds including geese, and a variety of ducks and seagulls, can be found at all locations with the greatest concentrations in the conditional areas, around Churches Rocks (sampling station WU 37) and in Broad Cove, Cushing. The birds will frequent these



areas for the majority of the year as long as the area doesn't become iced over. Although their numbers can be large at times, it is difficult to determine the impact they are having on the water quality in the area. The estimated numbers of birds are not always noted when the samples are collected. So far, the data and bird counts have been inconclusive, with no direct correlation established between elevated scores and the number of birds present at the time of sampling.

Conservation/Recreation Areas

There are no parks, or conservation areas in shellfish growing area WU.

Water Quality Review and Discussion

Table 11 lists all active approved restricted and prohibited stations in Growing Area WU, with their respective Geomean and P90 calculations for 2010. Please refer to Appendix D 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 11. 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 samples analyzed by MPN versus 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 MF Count column. This fluctuating standard will cease when all 30 data points have been analyzed by the MF method.

All approved stations, except stations WU 6 and WU45 (highlighted in yellow), met their NSSP classification standard in 2010. A data assessment of Station WU 6 (Maple Juice Cove, Cushing) revealed that this area receives the majority of its elevated scores during the spring and summer months. This area was reclassified (January 19, 2011) as conditionally approved based on season. The open season for this site is November 1- April 30. An analysis for the seasonal conditional area classification for this station is presented later in this report. Station WU 45, also had a failing P90 score; this area was reclassified as prohibited. Station WU45.7 is now meeting approved standards. This station has been receiving extra sampling effort to bring the sample station count up to thirty samples. An analysis for upward classification for this station is presented later in this report.

Table 11. Geomean and P90 Scores Growing Area WU 2000-2010

Station	Class	Count	MFCOUNT	Geo Mean	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU001.00	A	30	27	3.2	0.4	31	10.8	32	173	3/13/2006
WU002.00	A	30	27	3.2	0.41	94	11.2	32	173	3/13/2006
WU003.00	P	30	27	4.2	0.58	540	23.9	32	173	3/13/2006
WU004.00	A	30	27	2.6	0.32	56	6.7	32	173	3/13/2006
WU005.00	R	30	27	3.4	0.53	460	16.5	32	173	3/13/2006
WU006.00	A	30	27	6.7	0.62	160	42.7	32	173	3/13/2006
WU006.50	A	30	27	3.5	0.43	60	12.8	32	173	3/13/2006
WU007.00	P	30	27	5.8	0.7	1700	46.9	32	173	3/13/2006
WU007.20	P	27	27	11.6	0.65	480	80.6	31	163	7/25/2007
WU007.30	P	30	27	11.5	0.57	180	63.2	32	173	3/13/2006



Station	Class	Count	MFCCount	Geo Mean	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU009.00	P	30	27	6.5	0.78	660	66.8	32	173	3/13/2006
WU010.00	A	30	27	3.9	0.55	104	20	32	173	3/13/2006
WU012.00	R	30	27	5.8	0.58	93	33.2	32	173	3/13/2006
WU013.00	R	30	27	5.4	0.7	500	44.3	32	173	3/13/2006
WU016.00	P	30	29	24.6	0.89	1700	343.8	31	166	8/7/2006
WU018.00	A	30	29	4.1	0.45	56	15.9	31	166	8/7/2006
WU028.00	P	30	30	5.5	0.71	1060	45.4	31	163	12/2/2007
WU029.00	P	30	30	13	0.71	920	107.2	31	163	12/6/2007
WU030.00	P	30	30	20.5	0.82	1700	233	31	163	12/6/2007
WU039.00	A	30	27	4	0.46	56	15.8	32	173	2/27/2006
WU040.00	A	30	27	3.8	0.47	52	15.4	32	173	2/27/2006
WU041.00	A	30	28	5.8	0.55	156	30.4	31	169	7/11/2006
WU042.00	A	30	27	3.5	0.35	18	10	32	173	2/27/2006
WU042.50	A	30	27	4.7	0.53	106	23	32	173	2/27/2006
WU042.70	A	28	28	3.5	0.38	28	11.1	31	163	5/23/2007
WU043.00	A	30	27	3.5	0.34	16	9.6	32	173	2/27/2006
WU044.00	A	30	27	4.8	0.53	92	23.3	32	173	2/27/2006
WU045.00	A	30	27	6.1	0.69	1100	47.6	32	173	2/27/2006
WU045.50	P	30	27	7.7	0.62	93	48.1	32	173	2/27/2006
WU045.70	P	30	30	4.1	0.47	116	17	31	163	8/29/2007
WU045.80	A	30	27	4.1	0.48	116	17.3	32	173	2/27/2006
WU046.00	P	30	27	3.1	0.3	16	7.9	32	173	2/27/2006
WU047.00	A	30	27	2.9	0.35	33	8.4	32	173	2/27/2006
WU048.00	R	30	27	6.8	0.61	240	41.6	32	173	2/27/2006
WU048.50	R	30	27	6.3	0.56	106	33.6	32	173	2/27/2006
WU048.80	P	30	27	2.5	0.25	16	5.4	32	173	2/27/2006
WU050.00	P	30	27	5.6	0.73	1100	49.2	32	173	2/27/2006
WU055.50	P	30	26	2	0.06	2.9	2.4	32	176	12/4/2005
WU056.00	A	30	27	1.9	0.05	3	2.3	32	173	4/26/2006
WU056.50	P	30	27	2	0.06	3.6	2.4	32	173	4/26/2006
WU057.00	A	30	27	2.2	0.22	14	4.4	32	173	4/26/2006
WU058.00	A	30	27	2.2	0.27	58	5.1	32	173	4/26/2006
WU059.00	P	30	27	2	0.07	3.6	2.5	32	173	4/26/2006
WU060.00	A	30	27	2	0.13	9.1	3	32	173	4/26/2006
WU061.00	A	30	27	1.9	0.06	3.6	2.4	32	173	4/26/2006

Table 12 lists all conditionally approved stations in the upper St George River rainfall conditional area with their respective Geomean and P90 calculations for 2010. Data for conditionally approved stations reflects only the open status. Two stations in this data grouping did not meet the approved standard (Table 12, stations WU 22 and WU 35). A review of the data collected



during the 2010 sampling season revealed that on June 7, 2010 the majority of the stations in the conditional area received elevated scores. The cumulative recorded rainfall for 48 hours prior to sample collection revealed that the area had received on 2.2 inches of rain. When the data collected on June 7, 2010 is removed (Table 13), all of the stations continue to meet the approved standard. The management plan for the rainfall conditionally approved area was revised. The plan now states that the conditional area will close for harvest following a rainfall event of ≥ 1.5 inches in 24 hours or \geq two inches in 48 hours.

Table 12. Rainfall Conditional Stations with Data Collected June 7, 2010 Included in Data Set

Station	Class	Count	MFCCount	Geo Mean	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU019.00	CA	30	28	2.9	0.34	50	8.2	31	169	7/31/2006
WU020.00	CA	30	22	4.1	0.45	340	16	35	191	5/19/2005
WU021.00	CA	30	28	4.6	0.54	160	23.1	31	169	7/31/2006
WU022.00	CA	30	28	6.1	0.56	180	32.4	31	169	7/31/2006
WU023.00	CA	30	28	4.1	0.52	400	19.3	31	169	7/31/2006
WU025.00	CA	30	28	5.5	0.55	460	28	31	169	7/31/2006
WU035.00	CA	30	29	4.8	0.65	1540	32.9	31	166	8/6/2006
WU036.00	CA	30	27	5	0.55	760	25.8	32	173	4/9/2006
WU037.00	CA	30	28	4.8	0.57	150	26.1	31	169	7/31/2006
WU037.50	CA	30	27	4.2	0.5	220	18.7	32	173	4/9/2006
WU038.00	CA	30	27	4.4	0.65	1380	30.8	32	173	4/9/2006

Table 13. Upper St George River, Rainfall Conditional Area, Open Status 2000-2010

Station	Class	Count	MFCCount	Geo Mean	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU019.00	CA	30	27	2.7	0.25	16	5.8	32	173	4/9/2006
WU020.00	CA	30	21	3.5	0.28	24	8.1	35	195	3/8/2005
WU021.00	CA	30	27	4	0.46	58	15.9	32	173	4/9/2006
WU022.00	CA	30	27	5.3	0.49	58	23	32	173	4/9/2006
WU023.00	CA	30	27	3.5	0.36	48	10.3	32	173	4/9/2006
WU025.00	CA	30	27	4.6	0.41	26	15.9	32	173	4/9/2006
WU035.00	CA	30	28	3.9	0.44	150	14.7	31	169	7/31/2006
WU036.00	CA	30	26	4.3	0.37	54	13.2	32	176	10/4/2005
WU037.00	CA	30	27	4.2	0.49	136	18.4	32	173	4/9/2006
WU037.50	CA	30	26	3.8	0.38	50	12.1	32	176	10/4/2005
WU038.00	CA	30	26	3.9	0.6	1380	23.6	32	176	10/4/2005

Table 14 shows all of the seasonal conditional stations in Broad Cove, Cushing in the open status (October 1 – May 31). All of the stations in this grouping have continued to meet approved standards when in the open status.

Table 14. Broad Cove Seasonal Conditional Area, in Open Status, October 1- May 31

Station	Class	Count	MFCCount	Geo Mean	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
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Station	Class	Count	MFCCount	Geo Mean	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU013.50	CA	30	22	3.6	0.5	300	15.9	35	191	3/3/2003
WU013.80	CA	30	22	3.8	0.56	760	20.5	35	191	3/3/2003
WU014.00	CA	30	21	4.1	0.53	340	19.7	35	195	3/3/2003
WU014.50	CA	30	22	4.3	0.57	300	23.4	35	191	3/3/2003
WU016.50	CA	30	22	3.4	0.49	540	14.7	35	191	12/17/2003
WU017.00	CA	30	18	3.6	0.51	620	16.5	37	208	2/4/2002

Table 15 shows the P90 scores for the stations classified as conditionally restricted based on the operations at the Thomaston and Warren treatment facilities. All of these stations have continued to show deteriorating water quality scores during the past three years. This area was surveyed in 2006 and no actual pollution sources were found. This area is directly below the town center of Thomaston. Runoff from the town during rainfall events could be contributing to the elevated scores. This area is not currently conditional on rainfall. A rainfall and seasonal impact assessment was done (see reclassification proposals) to determine if this area should additionally be managed on season or rainfall or both.

Table 15 Restricted Stations 2007-2010, In Open Status, April 1 – December 31

Station	Class	Count	MFCCount	Geo Mean	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU032.00	CR	30	30	6.9	0.7	1460	55.7	31	163	11/26/2007
WU033.00	CR	30	30	9.6	0.85	1700	119.8	31	163	11/26/2007
WU034.00	CR	30	30	11.6	0.87	1700	152.4	31	163	11/26/2007
WU034.50	CR	30	30	13.9	0.82	1600	158.5	31	163	11/26/2007

All approved and prohibited stations that were active at the beginning of 2010 were sampled at least six times following the systematic random sampling (SRS) schedule (Table 16). At some stations, additional samples were collected under adverse conditions due to flood closures, or to gather rainfall data or to sample the rainfall conditional area to see if the water quality has returned to approved standards.

Table 16. WU Samples Collected in 2010

Station	Class	Adverse		Extra		Random		Total	Comments
		Closed	Open	Closed	Open	Closed	Open		
WU001.00	A						6	6	
WU002.00	A						6	6	
WU003.00	P					6		6	
WU004.00	A						6	6	
WU005.00	R						6	6	
WU006.00	A						6	6	
WU006.50	A						6	6	
WU007.00	P					6		6	
WU007.20	P					6		6	
WU007.30	P					6		6	
WU009.00	P					6		6	
WU010.00	A						6	6	



Station	Class	Adverse		Extra		Random		Total	Comments
		Closed	Open	Closed	Open	Closed	Open		
WU012.00	R						6	6	
WU013.00	R						6	6	
WU013.50	CA					3	6	9	
WU013.80	CA					3	6	9	
WU014.00	CA					3	6	9	
WU014.50	CA					3	6	9	
WU016.00	P					6		6	
WU016.50	CA					3	6	9	
WU017.00	A						4	4	
	CA					1	2	3	Reclassified from A to CA on 8/30/10
WU018.00	A	27					6	33	Flood Station
WU019.00	CA	6	3		1	1	6	17	CA Reopening Sample Site
WU020.00	CA		3			1	6	10	
WU021.00	CA	6	3		1	1	6	17	CA Reopening Sample Site
WU022.00	CA		3			1	6	10	
WU023.00	CA	6	3		1	1	6	17	CA Reopening Sample Site
WU025.00	CA	6	5		1	2	6	20	CA Reopening Sample Site
WU028.00	P	3				9		12	
WU029.00	P	4				9		13	
WU030.00	P	3				9		12	
WU032.00	CR		4				9	13	
WU033.00	CR		4				9	13	
WU034.00	CR		4				9	13	
WU034.50	CR		4				9	13	
WU035.00	CA	6	5		1	2	6	20	CA Reopening Sample Site
WU036.00	CA		3			1	6	10	
WU037.00	CA	6	3		1	1	6	17	CA Reopening Sample Site
WU037.50	CA		3			1	6	10	
WU038.00	CA	6	3			1	6	16	CA Reopening Sample Site
WU039.00	A						6	6	
WU040.00	A	28					6	34	Flood Station
WU041.00	A						6	6	
WU042.00	A						6	6	
WU042.50	A						6	6	
WU042.70	A						6	6	
WU043.00	A						6	6	
WU044.00	A						6	6	
WU045.00	A						6	6	
WU045.50	P					6		6	
WU045.70	P			5		6		11	Accelerated Sampling to get Count to 30 Samples
WU045.80	A						6	6	
WU046.00	P					6		6	



Station	Class	Adverse		Extra		Random		Total	Comments
		Closed	Open	Closed	Open	Closed	Open		
WU047.00	A						6	6	
WU048.00	R						6	6	
WU048.50	R						6	6	
WU048.80	P					6		6	
WU050.00	P					6		6	
WU055.50	P					6		6	
WU056.00	A						6	6	
WU056.50	P					6		6	
WU057.00	A						6	6	
WU058.00	A						6	6	
WU059.00	P					6		6	
WU060.00	A						6	6	
WU061.00	A						6	6	

Figures 9 through 13 show the P90 trends over the past three years, for all approved, conditionally approved, and restricted stations in growing area WU; Figures 11, 12, and 13 show conditional area data collected during the open status only. 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 2010 column on or above 100 percent does not meet the standard for approved classification. Generally, most approved stations (Figures 9 and 10) have shown stable water quality over the past three years. Three stations have shown a significant decline in water quality, and are currently over 50 percent of the approved standard. Station WU 6, located in Maple Juice Cove was surveyed in 2007, and no actual or potential problems were identified. This area has seen an increase in boating activity in recent years and a review of water quality data revealed a seasonal impact during the summer months. This area was reclassified as a seasonal conditional area (on January 19, 2010). Station WU 41, located in Cutler Cove has shown a steady increase in scores over each of the past three years; this station is located below a pasture area for two horses. The horses were relocated to another pasture. The water quality at station WU 45 in Otis Cove (figure 4) no longer meets approved standards. Otis Cove was surveyed in 2007 and no pollution sources were identified at the time of the survey. Otis Cove was reclassified as restricted on January 7, 2011. This area will be revisited in 2011 to try to determine the source of the elevated scores. The water quality at station WU 42.5 (Watts Cove) is elevated but still meets approved standards. This area should also be revisited in 2011 to try to determine the source of the scores.

Figure 9. P90 Trends, Approved Stations, Shellfish Growing Area WU

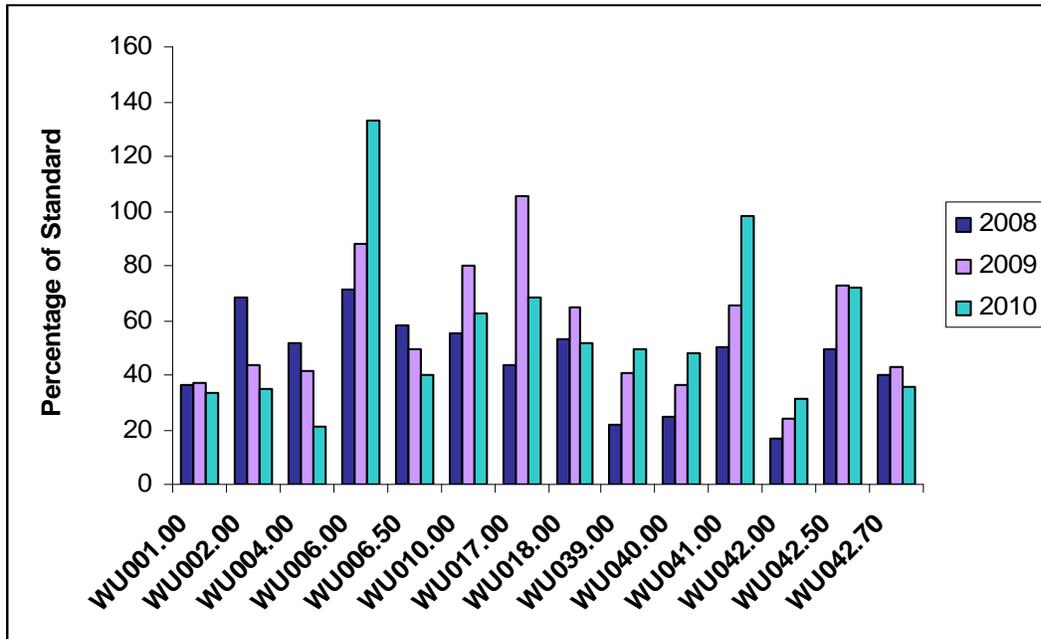


Figure 10. P90 Trends Approved Stations, Shellfish Growing Area WU

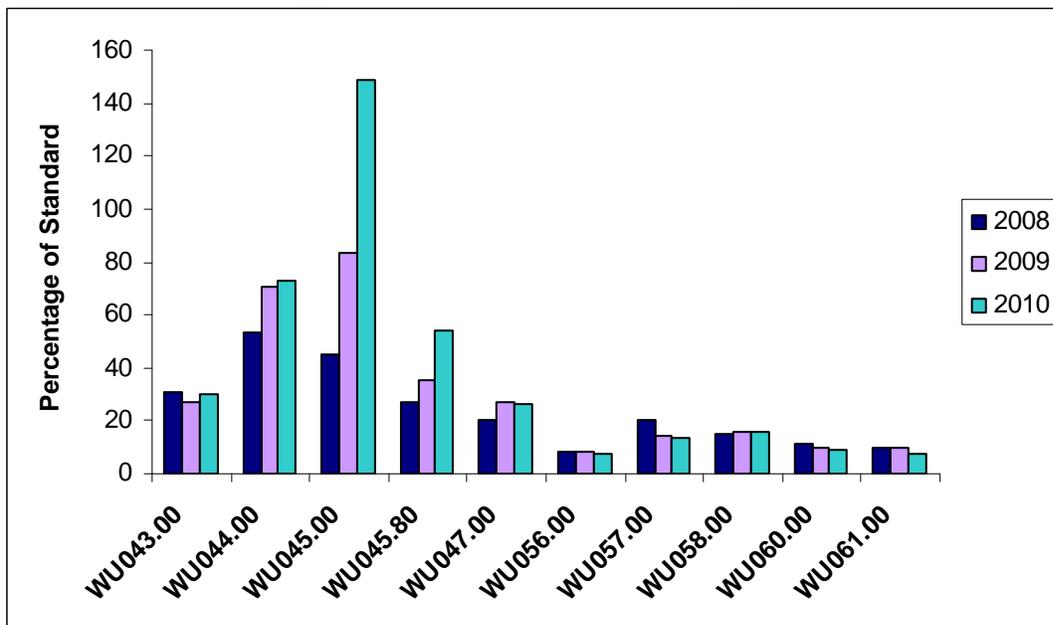


Figure 11 shows the P90 trends over the past three years, for all rainfall conditionally approved, stations in growing area WU; data collected during the open status only. The rainfall conditional area also has several stations with deteriorating water quality. Stations WU 21, 22, 25, 37, and 38 all have water quality scores at or above the 50 percent mark. Stations WU 22 and 38 have shown the greatest increase in scores. All of these sites should be re-evaluated to determine if there are new pollution sources in the immediate area contributing to the elevated scores.



Figure 11. P90 Trends, Rainfall Conditional Area, in Open Status

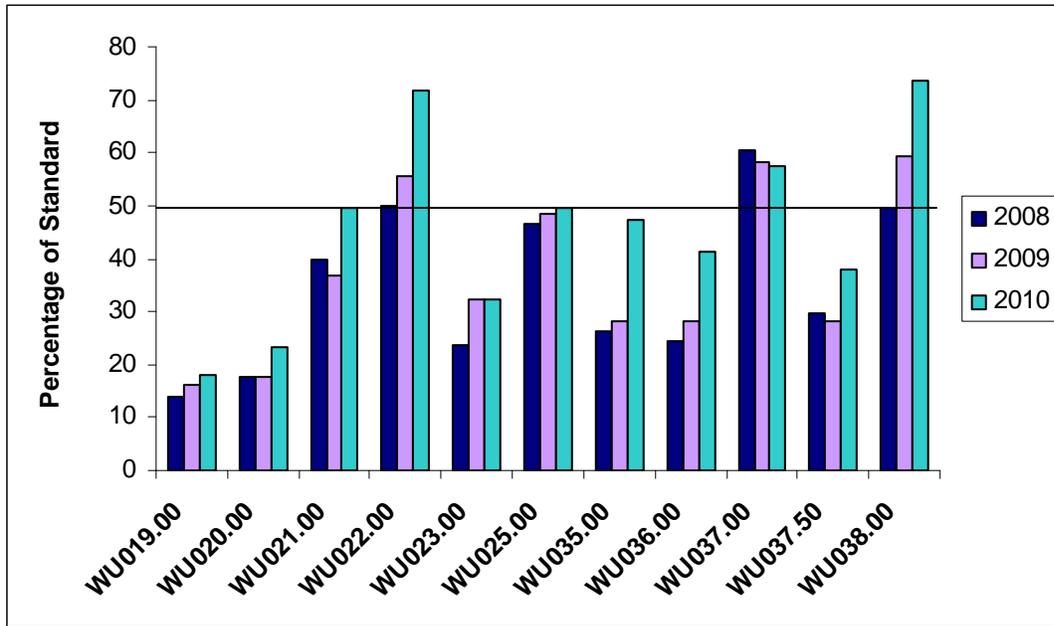


Figure 12 shows P90 trends over the past three years for all conditionally restricted stations in area WU; scores are shown as a percent of the restricted standard, and any station surpassing 100 percent no longer meets its classification standard. All restricted stations in growing area WU have shown deteriorating water quality in both 2009 and 2010. Station WU 34.5 has deteriorated to the point that this area is just below the restricted standard of 163 FC/100ml with a current P90 score of 158.5 FC/100ml.



Figure 12. P90 Trends, Restricted Stations, Percentage of Restricted Standard

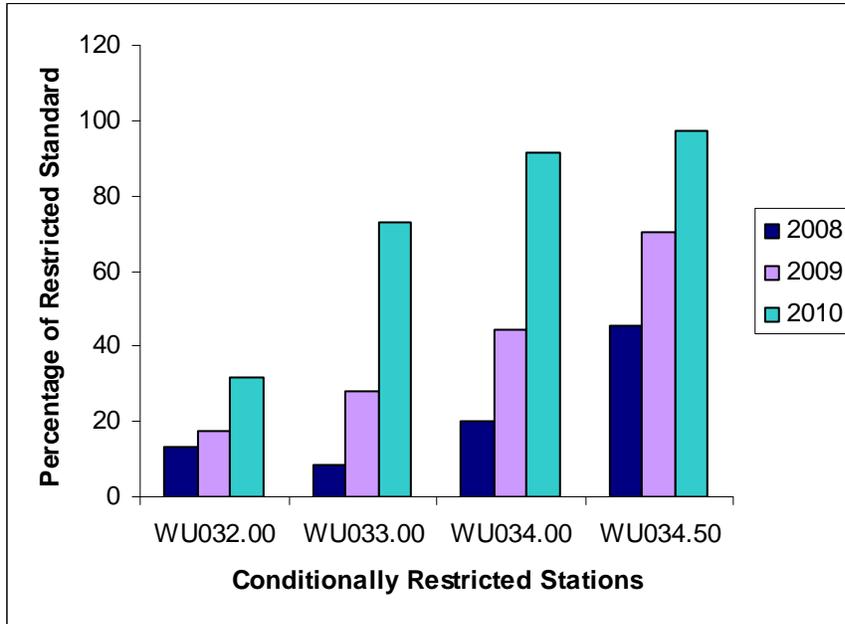
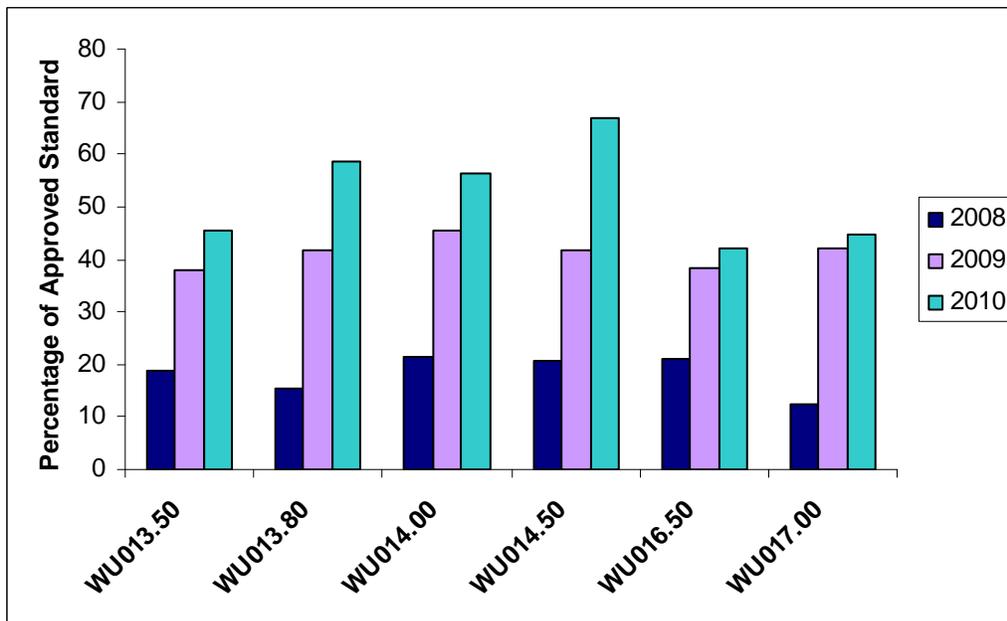


Figure 13. P90 Trends, Broad Cove Seasonal Conditional Area, Open Status October 1 – May 31, Shellfish Growing Area WU



Classification Proposals and Changes

Little Cove Reclassification Implemented March 2, 2011



Little Cove is located on the east side of the upper St George River in the area just south of Hospital Point in the town of South Thomaston. Prior to December 31, 2008, this area had been part of the rainfall conditional area. The area is monitored by water sampling stations WU34.5 and WU35. At the end of the 2008 sampling season, the water quality at station WU34.5 had deteriorated to the point that the area no longer met approved standards during the open period. The water quality at station WU35 has continued to meet approved standards during the period that the rainfall conditional area is open.

Little Cove was reclassified to conditionally restricted on 12/31/08. Following the reclassification, the local shellfish management group submitted a pollution abatement plan to try to locate the source of the pollution. On April 15, 2009 the area was resurveyed to try to find the source of the deteriorating water quality scores. No pollution sources were identified during the inspection of the area. Little Cove borders on the shores of the Four Winds Development. The development has 12 building lots along the shore of Little Cove (8 of the lots are developed). Three of the dwellings utilize individual private septic systems, and five of the dwellings are connected to three large systems that were designed to be shared. All of the septic systems were inspected during the shoreline survey. The manager of the development had the survey process explained to him and was interviewed to determine if any of the systems had experienced any problems in recent years (they had not). The cause of the elevated scores at station WU34.5 remains unknown.

Table 17 shows individual scores collected at station WU 34.5 from 2002 through 2010; cumulative rainfall (in inches) within 3 days and 4 days of collection is also noted in this table. The data are split by month of collection, and are presented in chronological order. Because this area has historically been classified as conditionally approved based on rainfall of ≥ 1.5 inches in a twenty-four hour period (and would continue to be conditional on rainfall if reclassified); only random and extra data collected in the open status was used in the table. All of the elevated scores were limited to the months from July through October. No tidal stage pattern was evident. Data collected during the fall, winter and spring months (November through June) showed clean water scores. It is recommended that Little Cove be reclassified from conditionally restricted to conditionally approved based on season and rainfall events of ≥ 1.5 inches of rain in 24 hours and/or ≥ 2 inches of rain in 48 hours (as per new 2011 management plan), with an open season of November 1 to June 30, and a closed season of July 1 to October 31. The geometric mean and P90 score for station WU 34.5 during this proposed open season is as follows: geomean= 3.4 and P90= 7.06, with an approved standard of 38.

The rainfall amounts highlighted in green show all rainfall amounts of $\geq .50$ inches (cumulative in three days) and the accompanying score.

Table 17. Little Cove, Rainfall and Seasonal Impact

Sum rain3	Sum rain4	Date	Tide	Sal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	06-Jan-02	F	30	2.9											
1.11	1.11	11-Feb-02	HE	28		3.6										
0.2	0.2	11-Mar-02	HE	8			9.1									
0	0	07-Apr-02	E	12				2.9								



Sum rain3	Sum rain4	Date	Tide	Sal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
.01	0.41	05-May-02	E	21					2.9							
0	0.45	09-Jun-02	F	25						3.6						
0	0	14-Jul-02	F	28							9.1					
0.01	0.01	04-Aug-02	E	30								2.9				
0	0.01	08-Sep-02	F	30									3.6			
0	0	03-Nov-02	E	26											3.6	
0	0	08-Dec-02	F	26												2.9
0	0	15-Jan-03	E	21	2.9											
0.54	0.54	03-Feb-03	HE	21		2.9										
0	0	13-Mar-03	LF	11			2.9									
0.41	0.41	13-Apr-03	H	21				2.9								
0	0.04	05-May-03	HF	25					2.9							
0.73	0.74	01-Jun-03	F	20						3.6						
0.25	0.25	13-Jul-03	F	31							7.3					
0.17	0.18	10-Aug-03	HF	30								3.6				
0	0	11-Sep-03	HE	30									3.6			
0.02	0.02	19-Oct-03	E	15										43		
0	0	18-Nov-03	E	27											2.9	
0.08	0.63	14-Dec-03	HF	8												9.1
0	0.28	06-Jan-04	H	25	2.9											
0.48	0.48	04-Feb-04	HE	22		2.9										
0.01	0.01	15-Jun-04	F	20						7.3						
0.74	0.74	08-Aug-04	E	26								2.9				
0	0.01	24-Oct-04	HE	28										3.6		
0.05	0.07	16-Nov-04	HF	30											2.9	
0.07	0.27	11-Jan-05	HF	30	3.2											
0.49	0.49	10-Jul-05	F	23							21					
0.92	0.92	14-Aug-05	E	30								2.9				
0.23	0.23	21-Sep-05	F	30									15			
0	0	04-Oct-05	HE	30										9.1		
1.54	1.54	22-May-06	E	12					5.7							
0.08	0.09	06-Aug-06	HE	25								7.3				
0.09	0.09	10-Sep-06	HF	26									62			
0.73	0.74	01-Oct-06	E	30										4		
0.02	0.02	05-Dec-06	HF	18												4
0	0	28-Feb-07	HE	30		1.9										
0	0	01-Apr-07	F	6				1.9								
0	0.15	22-May-07	HF	18					2							
0	0	10-Jun-07	HE	20						6						
1.28	1.6	08-Jul-07	E	30							2					
0.71	0.73	07-Aug-07	E	30								16				
0	0	23-Sep-07	HE	30									1700			
0.02	0.02	26-Nov-07	HF	25											1.9	



Sum rain3	Sum rain4	Date	Tide	Sal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0.02	02-Dec-07	E	14												2
0.32	0.32	02-Apr-08	HE	10				4								
0.02	0.06	20-May-08	HF	24					1.9							
0.26	0.27	04-Jun-08	HF	26						8						
0	0.01	09-Jul-08	F	30							34					
0	0.02	27-Aug-08	E	26								340				
0.27	0.27	22-Oct-08	F	23										44		
0.07	0.38	12-Nov-08	E	28											1.9	
0.48	0.73	01-Dec-08	F	12												5.5
0	0.72	20-May-09	E	23					2							
0	0	07-Jun-09	E	23						1.9						
0.06	0.07	13-Sep-09	H	26									12			
0.02	0.02	03-May-10	HF	20					6							
0.31	0.31	06-Jul-10	HE	28							7.3					
0.4	0.4	28-Sep-10	H	30									7.3			
0.06	0.89	04-Oct-10	HE	28										40		
0	0.07	03-Nov-10	HE	20											14	
0.11	0.18	06-Dec-10	HE	22												6
Geometric Mean by Month					3	2.8	5.1	2.8	3	4.53	9.4	8.6	21	15	3.4	4.4

Maple Juice Cove Reclassification Implemented January 19, 2011

The southern portion of Maple Juice Cove, in the town of Cushing no longer meets approved standards on a year round basis. This area is monitored by sampling stations WU 5, WU 6 and WU6.5. Stations WU 5 and WU6.5 have water quality scores that meet approved standards on a year round basis; however station WU 6 no longer does (Table 18). This area was reclassified from prohibited to approved on June 5, 2006 following the replacement of a shared septic system at station WU 6. The malfunctioning system was utilized by four seasonal cottages and was located on the edge of a steep bank directly above where station WU 6 is sampled. This area was surveyed in 2007 and no actual pollution sources were identified during the survey of the area. A rainfall and seasonal assessment was done (Table 20) to determine if rainfall or seasonal impacts might be contributing to the elevated water quality scores. The data in Table 20 is sorted by date; rainfall amounts are shown for both three days prior to sample collection (rain day 3) and 3 days prior including the date of sample collection (rain day 4). Rainfall amounts of $\geq .50$ inches are highlighted in green. The months from May through September are highlighted in blue; these are the months that elevated scores are predominantly found.

Data table 20 shows that although some of the elevated scores are associated with rainfall of $\geq .50$ inches of rainfall, many more clean scores have occurred following rainfall than elevated ones. This area appears to be impacted during the months from May through September. This time period is also when seasonal properties and cruising boats are at peak usage. It is



recommend that this area be reclassified as conditionally approved based on an open season from October 1 – May 31. Table 18 shows the revised P90 data calculation for this proposed open period.

Table 18. P90 Scores Stations WU5, WU6, and WU6.5, Maple Juice Cove, Cushing

Station	Class	Count	MFC	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU005.00	R	30	27	3.4	0.53	460	16.5	32	173	3/13/2006
WU006.00	CA	30	27	6.7	0.62	160	42.7	32	173	3/13/2006
WU006.50	A	30	27	3.5	0.43	60	12.8	32	173	3/13/2006

Table 19. Station WS 6 P90 Score during Proposed Open Season, October 1- May 31

Station	Class	Count	MFC	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU006.00	CA	30	16	4.1	0.48	160	17.6	38	216	5/24/2001

Table 20. Rainfall and Seasonal Impact Station WU 6, Maple Juice Cove, Cushing

Rain Day3	Rain Day 4	Date	Tide	Sal	Adv	Strat	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov
0	0	02-Jan-02	F	30	N	R	2.9										
1	1	08-Jan-02	E	30	X	R	2.9										
0.03	0.83	04-Feb-02	F	31	X	R		2.9									
0	0	07-May-02	HE	30	N	R					2.9						
0	0.05	05-Jun-02	E	32	N	R						3.6					
0.15	0.16	10-Jul-02	F	30	N	R							3.6				
0.34	0.34	05-Aug-02	E	30	PB	R								93			
0	0.06	13-Jan-03	E	30	N	R	2.9										
1.27	1.27	03-Mar-03	H	22	P	R			2.9								
0	0	31-Jul-03	F	31	X	R							2.9				
0.51	0.59	04-Aug-03	F	31	X	R								9.1			
0.04	0.04	28-Aug-03	HF	32	X	R								3.6			
0	0.49	23-Sep-03	HE	31	X	R									2.9		
0.35	0.46	05-Jan-04	HE	22	X	R	2.9										
0.94	0.94	23-Feb-04	HF	30	X	R		2.9									
0.05	0.24	09-Mar-04	H	32	X	R			2.9								
0.76	1.14	06-May-04	HF	28	X	R					2.9						
0.4	0.4	28-Jul-04	E	30	P	R							23				
0.11	0.16	19-Aug-04	F	28	X	R								2.9			
0.03	0.03	16-Mar-05	F	30	X	R			2.9								
0.13	0.23	19-May-05	E	25	N	R					2.9						
1.6	1.6	15-Jun-05	L	20	P	R						93					
0.6	0.6	27-Jul-05	F	30	X	R							3.6				
0.77	1.02	16-Aug-05	E	30	N	R								2.9			
2.08	2.08	15-Sep-05	E	30	P	R									7.3		
0.11	0.37	13-Mar-06	E	31	X	R			2.9								
1.3	1.3	11-Jul-06	F	29	N	R							43				
0	0	07-Aug-06	HE	29	B	R								23			

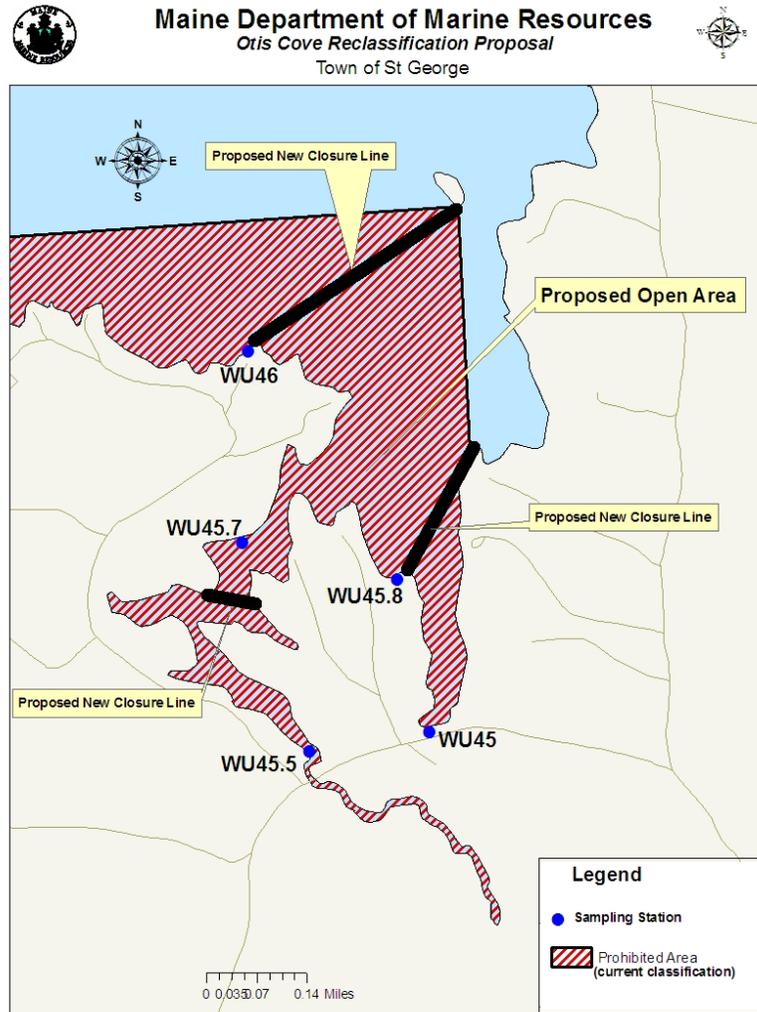


Rain Day3	Rain Day 4	Date	Tide	Sal	Adv	Strat	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov
0.94	0.97	06-Sep-06	HE	30	PN	R									12		
no data	no data	25-Oct-06	F	28	P	R										48	
no data	no data	13-Nov-06	L	22	P	R											20
0.13	0.13	24-Jan-07	F	30	X	R	<2										
0.24	0.29	28-Mar-07	E	23	X	R			<2								
0	0.4	14-May-07	E	29	X	R					20						
0.67	0.68	10-Jul-07	L	32	X	R							44				
0	0.01	28-Aug-07	E	30	X	R								2			
0.95	0.95	29-Oct-07	F	25	X	R										12	
0.37	0.42	15-Jan-08	LF	26	X	R	<2										
1.03	1.68	11-Mar-08	HF	22	P	R			<2								
0	0	13-May-08	E	28	X	R					<2						
no data	no data	08-Jul-08	F	31	X	R							<2				
0	0	26-Aug-08	E	30	X	R								<2			
0	0	21-Oct-08	F	30	X	R										<2	
0	0	24-Mar-09	HE	28	X	R			4								
0.35	0.35	12-May-09	F	28	X	R					<2						
0.58	1.15	01-Jun-09	LE	28	P	R						2					
0	0.02	10-Aug-09	F	28	X	R								22			
0	0	08-Sep-09	H	28	X	R									4		
0.93	1.36	07-Oct-09	HF	28	P	R										31	
0.04	0.08	27-Apr-10	HF	29	X	R				<2							
0	0	26-May-10	H	29	X	R					160						
0.23	1.53	09-Jun-10	E	28	X	R						<2					
0.08	0.08	03-Aug-10	E	30	X	R								18			
0	1.3	20-Sep-10	E	28	X	R									88		
1.49	1.49	22-Nov-10	HE	26	P	R											2



Otis Cove, St George Proposed Reclassification

Figure 14 Otis Cove, St George, Reclassification Proposal



A portion of Otis Cove, in the town of St George is now meeting approved classification standards. The area of discussion is in the southwestern side of Otis Cove. Sampling stations WU 45, 45.5, 45.7, 45.8 and 46 monitor the water quality in Otis Cove. Station WU 45 is located on the eastern section of the cove and WU 45.5 is located at the outfall of a large stream on the western side. Neither of these sections of the cove is being proposed for reclassification. At the end of the 2010 sampling season, a review of the data revealed that station WU45 in Otis Cove was no longer meeting the approved standard. This portion of Otis Cove was reclassified as prohibited on January 7, 2011. The dwelling across the road from station WU 45 was inspected during the 2010 sampling season and no pollution source was found. There are no streams located at the head of the cove at station WU45 but there is a small seep that flows under the road during wet weather conditions. Station WU 45.7 was established in 2007 to monitor the



outer portion of the western section of Otis Cove. There are now thirty samples at this site and the water quality scores are meeting approved standards. Station WU 45.8 is located between the two cove sections that form Otis Cove. Station WU 46 is located on the tip of the point at the southern mouth of Otis Cove. Stations WU45.8 and 46 have continued to meet approved standards for several years. (Table21). The area south of station WU46 contains very little mud flat area and was therefore not surveyed. This area will remain prohibited.

Table 21 2010 P90 Scores, Otis Cove Stations

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU045.00	P	30	27	6.1	0.69	1100	47.6	32	173	2/27/2006
WU045.50	P	30	27	7.7	0.62	93	48.1	32	173	2/27/2006
WU045.70	P	30	30	4.1	0.47	116	17	31	163	8/29/2007
WU045.80	P	30	27	4.1	0.48	116	17.3	32	173	2/27/2006
WU046.00	P	30	27	3.1	0.3	16	7.9	32	173	2/27/2006

To determine the size of the area required to dilute the pollution coming from the stream near WU45.5, a dilution calculation was performed. A flow rate for the stream at station WU45.5 was done using a Gurley Precision Instrument flow meter. The flow rate was determined to be 6,567,236 gallons per day during moderate-high flow conditions. The fecal load of the stream was determined based on the average of the ebb tide stage scores from station WU45.5 samples (Table 22) during the years 2003-2010. The ebb tide stage data was used instead of traditional stream samples because this “stream” flows from deep in a marsh and during high tide the salt water goes a long distance into the marsh making the collection of a fresh water stream sample difficult. Data collected during the months from January through March (Table 23) was excluded from the data set because these months are the coldest months of the year and the data is typically cleaner during this period. Based on the average of the ebb tide data, the fecal concentration was determined to be 27.4 fecal coliform colonies/100 ML. A dilution calculation was then completed using the flow rate, the fecal concentration and an average mid-tide water depth of four feet. Based on these parameters, the dilution calculation determined that the required closure size needed to dilute the water quality to approved standards is 9.86 acres. The proposed closure area around station WU45.5 (Figure 15) would provide an area greater than ten acres which provides a more conservative closure area than required by the dilution calculation.

Table 22 Station WU45.5 Ebb Tide Stage Data 2003-2010

Station	Date	Tide	Sal	Score	Rain Day 3	Rain Day 4
WU045.50	23-Nov-03	HE	22	15	0.62	1.39
WU045.50	29-Apr-04	E	0	2.9	0.45	0.94
WU045.50	12-Jul-04	E	2	3.6	0.21	0.81
WU045.50	09-Aug-04	E	10	3.6	0.07	0.07
WU045.50	18-Apr-05	E	0	3.6	0	0
WU045.50	02-Jun-05	E	0	2.9	0.01	0.1
WU045.50	07-Aug-06	E	5	93	0	0
WU045.50	05-Sep-06	E	6	78	0.94	0.94



Station	Date	Tide	Sal	Score	Rain Day 3	Rain Day 4
WU045.50	11-Jul-07	HE	28	11	0.54	0.68
WU045.50	23-Apr-08	E	16	1.9	0.01	0.01
WU045.50	13-May-08	HE	24	1.9	0	0
WU045.50	25-Aug-08	E	22	44	0	0
WU045.50	19-Aug-09	HE	28	40	0	0
WU045.50	15-Sep-09	HE	24	66	0.28	0.29
WU045.50	26-Apr-10	E	28	4	0.04	0.37
WU045.50	08-Jun-10	HE	0	62	1.53	2.42
WU045.50	20-Sep-10	HE	6	33	0	1.3

Table 23. Station WU45.5, Winter Data Excluded From Dilution Calculation

Station	Date	Tide	Sal	Score	Rain Day 3	Rain Day 4
WU045.50	23-Feb-04	HE	16	2.9	0.94	0.94
WU045.50	08-Mar-05	E	20	3.6	0.57	0.57
WU045.50	29-Jan-07	E	18	1.9	0.02	0.02
WU045.50	28-Mar-07	E	0	2	0.24	0.29

A seasonal and rainfall assessment table was done for station WU 45.7 (Table 24) to see if the area receives more elevated scores during a particular season or following rainfall events. During the period from 2007 to 2010 this site has only received one elevated score following over two inches of rainfall (July 14, 2010, cumulative, within three days of sample plus the day of collection). All of the remaining scores were below the variability standard.

Table 24. Station WU 45.7 Rainfall and Seasonal Impact, Otis Cove, St George

Rain day3	Rain day4	Date	Tide	Sal	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
0.14	0.14	29-May-07	HF	28				1.9							
0.54	0.68	11-Jul-07	HE	28						16					
0.1	0.1	25-Jul-07	E	28						1.9					
1.87	1.87	08-Aug-07	E	30							8				
0	0	29-Aug-07	HF	32							5.5				
1.16	1.3	12-Sep-07	H	32								18			
0	0	26-Sep-07	F	32								9.1			
0.1	0.95	30-Oct-07	F	27									10		
0.15	0.15	14-Nov-07	HE	26										1.9	
0.86	0.86	28-Nov-07	H	21										13	
0.46	0.46	12-Dec-07	HF	26											1.9
0.26	1.29	12-Mar-08	F	20		1.9									
0.01	0.01	23-Apr-08	E	22			1.9								
0	0	13-May-08	E	28				1.9							
no data	no data	08-Jul-08	F	32						1.9					
0	0	25-Aug-08	E	28							1.9				



Rain day3	Rain day4	Date	Tide	Sal	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
0	0	21-Oct-08	F	30									1.9		
0.1	0.1	18-Feb-09	F	28	1.9										
0	0	23-Mar-09	HE	22		1.9									
0.35	0.38	11-May-09	H	25				2							
0	0	19-Aug-09	HE	28							27				
0.28	0.29	15-Sep-09	H	30								5.5			
0.47	1.06	06-Oct-09	H	26									12		
0.3	0.4	12-Apr-10	H	20			1.9								
0.04	0.37	26-Apr-10	E	29			1.9								
0.1	0.38	11-May-10	HE	30				1.9							
0	0	25-May-10	H	30				1.9							
1.53	2.42	08-Jun-10	HE	22					16						
0	1.51	30-Jun-10	F	25					15						
2.13	2.36	14-Jul-10	F	30						116					
0	0	02-Aug-10	HF	30							2				
0.12	0.12	17-Aug-10	E	30							6				
0	1.3	20-Sep-10	HE	30								1.9			
0	0.09	03-Nov-10	HE	26										1.9	

A seasonal and rainfall assessment table was also done for station WU45.8 (Table 25). This data table includes data from 2002 to 2010 because this sample station has been active longer than station WU 45.7. During the period from 2002-2010 this station has received three elevated scores occurring at different precipitation levels, ranging from 0.22 to 2.42 (cumulative, within three days of sample plus the day of collection). The elevated scores occurred in the years 2003, 2006 and 2010 and over various months suggesting that they are random and not related to an actual pollution source in the area or a seasonally related impact. There has been one elevated score in the time period from October 2006 to November 2010. This score occurred following 2.42 inches of rainfall on June 8, 2010 (cumulative, within three days of sample plus the day of collection). Again, there is no seasonal correlation to the data set.

Table 25. Station WU 45.8 Rainfall and Seasonal Impact, Otis Cove, St George

Rain day3	Rain day4	Date	Tide	Sal	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov
0.15	0.15	19-Feb-02	F	28		2.9									
0	0	08-May-02	E	30					2.9						
0.05	0.33	04-Jun-02	E	29						2.9					
0.13	0.13	15-Jul-02	F	30							3.6				
		12-Aug-02	F	30								2.9			
0.21	0.21	05-Nov-02	HE	31											2.9
		20-Mar-03	H	30			2.9								
	0.05	11-Jun-03	H	30						9.1					
	0.07	28-Jul-03	H	30							3.6				
	0.22	20-Aug-03	E	32								2.9			
	0.1	02-Oct-03	F	31										2.9	



Rain day3	Rain day4	Date	Tide	Sal	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov
0.62	1.39	23-Nov-03	HE	20											240
0.07	0.07	12-Jan-04	F	30	2.9										
0.94	0.94	23-Feb-04	HE	31		2.9									
0.45	0.94	29-Apr-04	HE	26				2.9							
0.01	0.01	15-Jun-04	HF	30						2.9					
0.21	0.81	12-Jul-04	E	30							2.9				
		09-Aug-04	E	30								3.6			
0.57	0.57	08-Mar-05	E	28			2.9								
		18-Apr-05	E	25				2.9							
	0.1	02-Jun-05	E	22						2.9					
0.2	0.2	26-Jul-05	F	30							3.6				
	0.02	08-Aug-05	HF	30								2.9			
0.02	0.02	05-Oct-05	HF	32										2.9	
	0.03	27-Feb-06	H	30		2.9									
1.3	1.3	11-Jul-06	H	28							3.6				
		07-Aug-06	E	28								23			
		05-Sep-06	E	28									1.9		
0.22	0.22	12-Sep-06	F	30									33		
no data	no data	25-Oct-06	F	18										22	
		29-Jan-07	E	30	1.9										
0.24	0.29	28-Mar-07	E	16			1.9								
1.27	1.27	15-May-07	H	28					2						
0.54	0.68	11-Jul-07	HE	30							2				
		29-Aug-07	HF	32								4			
	0.95	30-Oct-07	F	28										20	
0.1	0.1	19-Mar-08	HE	29			1.9								
		23-Apr-08	HE	26				1.9							
		13-May-08	HE	27					8						
no data	no data	08-Jul-08	HF	31							2				
		25-Aug-08	E	29								1.9			
		21-Oct-08	F	30										4	
		18-Feb-09	F	28		1.9									
		23-Mar-09	HE	24			1.9								
0.35	0.38	11-May-09	H	26					1.9						
		19-Aug-09	HE	30								16			
0.28	0.29	15-Sep-09	HE	30									6		
0.47	1.06	06-Oct-09	H	29										8	
0.04	0.37	26-Apr-10	HE	30				1.9							
	0.38	11-May-10	H	28					1.9						
1.53	2.42	08-Jun-10	HE	22						116					
		02-Aug-10	HF	30								1.9			
	1.3	20-Sep-10	HE	30									2		



Rain day3	Rain day4	Date	Tide	Sal	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov
	0.09	03-Nov-10	H	28											1.9

The Bay, Additional Conditional Management Proposal, Towns of Thomaston and South Thomaston

The area locally known as “The Bay” of the upper St George River currently has water quality scores that have deteriorated to the point that two of the stations in this area are just below the upper limit for the restricted standard (stations WU34 and 34.5, Table 24). This area is now classified as conditionally restricted based on the operations at the Warren and Thomaston treatment facilities. To further assess the water quality in this area, a seasonal and rainfall assessment table was done for each of the stations in the conditionally restricted area (Tables 25-28). Each table shows the months of greatest impact highlighted in blue. The elevated water quality scores that surpass the restricted standard (geometric mean of 88) are highlighted in yellow. All rainfall events of \geq one inch of rain (cumulative, within three days of sample plus the day of collection) are highlighted in green. All of the stations show some impact from rainfall and they all appear to be most impacted during the months of June, July and August. Stations WU 34 and WU 35 show impact during the months from June through October. To further assess the rainfall impact on water quality scores, two tables were done to show the rainfall impact on P90 scores at different levels of rainfall (Tables 28 and 29). The first table (table 28) shows all systematic random samples, extra and adverse data (excluding flood data) between 2000 and 2010 following \geq .50 inches of rainfall. This data table shows a clear impact of rainfall on the P90 scores with all stations except WU 34.5 being above the restricted standard. A second rainfall P90 calculation was done which shows the P90 scores for each of the stations based on samples collected following 0-1.49 inches of rainfall (cumulative, within three days of sample plus the day of collection excluding flood data). In this data table (table 29) all rainfall events of \geq 1.50 inches have been excluded from the data set. In this data table all stations easily meet restricted standards. I recommend that the current conditionally restricted area, locally known as “The Bay” also be managed on rainfall events of \geq 1.5 inches of rainfall in 24 hours.

Table 24 P90 Scores, Upper Bay, Shellfish Growing Area WU

Station	Class	Count	MFCCount	Geo Mean	SDV	MAX	P90	Appd Std	Restr Std	Min Date
WU032.00	CR	30	30	6.9	0.7	1460	55.7	31	163	11/26/2007
WU033.00	CR	30	30	9.6	0.85	1700	119.8	31	163	11/26/2007
WU034.00	CR	30	30	11.6	0.87	1700	152.4	31	163	11/26/2007
WU034.50	CR	30	30	13.9	0.82	1600	158.5	31	163	11/26/2007

Table 25 Season and Rainfall Assessment, Station WU32

Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
15-Jan-03	0	0	E	10	3.6											
03-Feb-03	0.54	0.54	HE	13		3.6										
13-Apr-03	0.41	0.41	H	30				2.9								
05-May-03	0	0.04	HF	12					3.6							
01-Jun-03	0.73	0.74	F	22						3.6						
13-Jul-03	0.25	0.25	F	25							23					



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
10-Aug-03	0.17	0.18	F	26								9.1				
07-Sep-03	0	1.08	HF	31									43			
19-Oct-03	0.02	0.02	E	27										9.1		
05-Nov-03	0.62	0.68	E	22											9.1	
18-Nov-03	0	0	HE	24											9.1	
14-Dec-03	0.08	0.63	F	6												43
06-Jan-04	0	0.28	F	10	9.1											
04-Feb-04	0.48	0.48	HE	3		2.9										
30-Mar-04	0	0.53	F	20			23									
19-May-04	0.18	0.47	F	20					3.6							
15-Jun-04	0.01	0.01	F	2						43						
09-Aug-04	0.74	0.75	H	20								23				
26-Sep-04	0.03	0.03	E	30									3.6			
24-Oct-04	0	0.01	HE	30										2.9		
16-Nov-04	0.05	0.07	F	10											2.9	
13-Dec-04	0.33	0.41	HF	16												2.9
11-Jan-05	0.07	0.27	HF	25	3.6											
12-Apr-05	0.01	0.01	F	0				3.6								
19-Apr-05	0	0	HE	12				43								
08-May-05	1.14	1.14	F	18					43							
05-Jun-05	0.18	0.18	F	0						23						
23-Jun-05	0.12	0.12	HE	8						150						
10-Jul-05	0.49	0.49	F	22							9.1					
14-Aug-05	0.92	0.92	E	28								43				
21-Sep-05	0.23	0.23	HF	20									23			
04-Oct-05	0	0	H	25										9.1		
03-Nov-05	0.03	0.03	HE	10											93	
06-Dec-05	0	0	F	0												15
29-Jan-06	0.14	0.14	H	16	2.9											
15-Feb-06	0	0	F	6		7.3										
09-Apr-06	0.3	0.38	H	25				2.9								
22-May-06	1.54	1.54	E	10					23							
04-Jun-06	1.64	2.65	E	13						93						
18-Jun-06	0	0	F	4						3.6						
09-Jul-06	0	0	F	16							23					
06-Aug-06	0.08	0.09	H	13								43				
10-Sep-06	0.09	0.09	HF	28									6			
01-Oct-06	0.73	0.74	E	30										1.9		
24-Oct-06	0.52	0.52	HF	18										56		
28-Nov-06	0	0	F	28											4	
05-Dec-06	0.02	0.02	F	18												7.3
28-Feb-07	0	0	H	18		4										
01-Apr-07	0	0	F	8				1.9								
22-May-07	0	0.15	F	14					4							



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
10-Jun-07	0	0	HE	22						4						
08-Jul-07	1.28	1.6	E	22							40					
07-Aug-07	0.71	0.73	F	25								14				
23-Sep-07	0	0	HE	30									4			
24-Oct-07	0.01	0.01	HE	26										54		
28-Oct-07	1.27	1.27	E	24										82		
26-Nov-07	0.02	0.02	HF	10											20	
02-Dec-07	0	0.02	E	12												2
23-Jan-08	0	0	H	2	4											
25-Feb-08	0	0.23	HF	15		1.9										
19-Mar-08	0.29	0.32	HF	20			1.9									
02-Apr-08	0.32	0.32	HE	8				1.9								
11-May-08	0	0.02	HF	28					1.9							
20-May-08	0.02	0.06	HF	10					2							
04-Jun-08	0.26	0.27	F	28						1.9						
09-Jul-08	0	0.01	F	28							2					
27-Aug-08	0	0.02	HE	28								1.9				
17-Sep-08	0.02	0.25	H	15									2			
21-Sep-08	0.02	0.02	HF	28									1.9			
22-Oct-08	0.27	0.27	F	29										4		
12-Nov-08	0.07	0.38	HE	16											6	
01-Dec-08	0.48	0.73	F	4												78
24-Mar-09	0	0	H	28			1.9									
29-Apr-09	0.01	0.01	HF	21				1.9								
20-May-09	0	0.72	HE	18					8							
07-Jun-09	0	0	E	20						2						
19-Jul-09	0.45	0.85	H	6							66					
09-Aug-09	0.1	0.11	E	16								66				
12-Aug-09	0.2	0.2	F	18								24				
23-Aug-09	2.75	2.75	H	14								146				
13-Sep-09	0.06	0.07	H	24									4.3			
04-Oct-09	1.53	1.53	H	30										44		
23-Nov-09	0	0.12	F	20											2	
07-Dec-09	0.14	0.14	HF	6												8
27-Jan-10	1.59	1.62	E	2	48											
07-Apr-10	0.27	0.27	F	2				2								
03-May-10	0.02	0.02	F	10					6							
07-Jun-10	2.2	2.2	HE	26						1460						
29-Jun-10	1.52	1.52	HF	26						94						
06-Jul-10	0.31	0.31	HE	24							4					
12-Jul-10	1.1	1.1	HF	22							106					
14-Jul-10	0.69	1.69	HF	30							12					
02-Aug-10	0.01	0.01	H	24								16				
28-Sep-10	0.4	0.4	H	25									22			



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
04-Oct-10	0.06	0.89	H	30										7.3		
03-Nov-10	0	0.07	HE	20											13	
06-Dec-10	0.11	0.18	H	16												48

Table 26 Season and Rainfall Assessment, Station WU 33

Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
05-May-03	0	0.04	HE	22					2.9							
01-Jun-03	0.73	0.74	F	12						15						
13-Jul-03	0.25	0.25	F	30							43					
10-Aug-03	0.17	0.18	HF	30								9.1				
20-Aug-03	0.01	0.01	HE	30								3.6				
07-Sep-03	0	1.08	HF	30									3.6			
19-Oct-03	0.02	0.02	E	20										9.1		
05-Nov-03	0.62	0.68	HE	24											21	
18-Nov-03	0	0	E	13											3.6	
14-Dec-03	0.08	0.63	F	5												23
06-Jan-04	0	0.28	F	10	3.6											
17-Feb-04	0	0	H	22		2.9										
30-Mar-04	0	0.53	F	12			2.9									
19-May-04	0.18	0.47	F	10					23							
15-Jun-04	0.01	0.01	LF	20						3						
09-Aug-04	0.74	0.75	H	21								23				
02-Sep-04	0.18	0.18	H	20									23			
22-Sep-04	0	0.01	F	30									7.3			
26-Sep-04	0.03	0.03	E	30									7.3			
24-Oct-04	0	0.01	HE	29										3.6		
16-Nov-04	0.05	0.07	HF	20											2.9	
06-Dec-04	0.02	0.14	HE	2												93
13-Dec-04	0.33	0.41	H	19												23
11-Jan-05	0.07	0.27	HF	20	9.1											
08-May-05	1.14	1.14	F	10					43							
05-Jun-05	0.18	0.18	F	6						43						
23-Jun-05	0.12	0.12	HE	13						150						
10-Jul-05	0.49	0.49	F	25							43					
14-Aug-05	0.92	0.92	E	30								3.6				
21-Sep-05	0.23	0.23	F	20									9.1			
04-Oct-05	0	0	H	30										9.1		
03-Nov-05	0.03	0.03	HE	18											460	
06-Dec-05	0	0	F	4												23
29-Jan-06	0.14	0.14	H	14	2.9											
15-Feb-06	0	0	F	6		2.9										
09-Apr-06	0.3	0.38	H	12				3.6								
22-May-06	1.54	1.54	E	5					93							



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
18-Jun-06	0	0	HF	12						15						
09-Jul-06	0	0	HF	19							7.3					
06-Aug-06	0.08	0.09	HE	17								3.6				
10-Sep-06	0.09	0.09	HF	28									14			
01-Oct-06	0.73	0.74	E	26										12		
24-Oct-06	0.52	0.52	HF	9										60		
28-Nov-06	0	0	F	18											4	
05-Dec-06	0.02	0.02	F	10												6
28-Feb-07	0	0	H	21		1.9										
01-Apr-07	0	0	F	18				2								
22-May-07	0	0.15	F	24					2							
10-Jun-07	0	0	HE	20						10						
08-Jul-07	1.28	1.6	E	27							5.5					
07-Aug-07	0.71	0.73	F	30								1.9				
23-Sep-07	0	0	HE	28									2			
24-Oct-07	0.01	0.01	HE	20										29		
28-Oct-07	1.27	1.27	E	16										620		
26-Nov-07	0.02	0.02	HF	18											4	
02-Dec-07	0	0.02	E	8												4
23-Jan-08	0	0	H	4	2											
25-Feb-08	0	0.23	HF	8		1.9										
19-Mar-08	0.29	0.32	H	16			1.9									
02-Apr-08	0.32	0.32	HE	3				12								
11-May-08	0	0.02	HF	18					1.9							
20-May-08	0.02	0.06	HF	14					2							
04-Jun-08	0.26	0.27	F	28						1.9						
09-Jul-08	0	0.01	F	29							2					
27-Aug-08	0	0.02	HE	22								6				
17-Sep-08	0.02	0.25	H	20									6			
21-Sep-08	0.02	0.02	HF	27									1.9			
22-Oct-08	0.27	0.27	F	23										8		
12-Nov-08	0.07	0.38	HE	16											12	
01-Dec-08	0.48	0.73	F	10												54
24-Mar-09	0	0	HE	24			1.9									
29-Apr-09	0.01	0.01	HF	14				1.9								
20-May-09	0	0.72	E	16					2							
07-Jun-09	0	0	E	17						2						
19-Jul-09	0.45	0.85	H	6							128					
09-Aug-09	0.1	0.11	E	22								1.9				
12-Aug-09	0.2	0.2	F	22								2				
23-Aug-09	2.75	2.75	H	18								1040				
13-Sep-09	0.06	0.07	H	26									1.9			
04-Oct-09	1.53	1.53	H	24										500		
23-Nov-09	0	0.12	F	15											10	



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
07-Dec-09	0.14	0.14	HF	3												16
27-Jan-10	1.59	1.62	E	2	48											
07-Apr-10	0.27	0.27	F	3				1.9								
03-May-10	0.02	0.02	F	15					1.9							
07-Jun-10	2.2	2.2	H	14						1700						
29-Jun-10	1.52	1.52	HF	26						76						
06-Jul-10	0.31	0.31	HF	24							22					
12-Jul-10	1.1	1.1	H	28							72					
14-Jul-10	0.69	1.69	HF	26							76					
02-Aug-10	0.01	0.01	H	28								1.9				
28-Sep-10	0.4	0.4	H	28									33			
04-Oct-10	0.06	0.89	HE	25										66		
03-Nov-10	0	0.07	HE	20											6	
06-Dec-10	0.11	0.18	HE	8												96

Table 27 Season and Rainfall Assessment, Station WU 34

Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
03-Feb-03	0.54	0.54	HE	12		43										
13-Apr-03	0.41	0.41	H	10				3.6								
05-May-03	0	0.04	HF	20					2.9							
01-Jun-03	0.73	0.74	F	14						9.1						
13-Jul-03	0.25	0.25	F	30							93					
10-Aug-03	0.17	0.18	F	31								23				
07-Sep-03	0	1.08	HF	30									43			
19-Oct-03	0.02	0.02	E	18										43		
05-Nov-03	0.62	0.68	HE	25											9.1	
18-Nov-03	0	0	E	18											3	
14-Dec-03	0.08	0.63	HF	6												23
06-Jan-04	0	0.28	H	10	2.9											
04-Feb-04	0.48	0.48	HE	12		9.1										
30-Mar-04	0	0.53	F	20			2.9									
02-May-04	0.02	0.02	HE	20					2.9							
19-May-04	0.18	0.47	HF	12					15							
15-Jun-04	0.01	0.01	F	20						23						
11-Jul-04	0.34	0.79	E	2							43					
08-Aug-04	0.74	0.74	E	21								9.1				
12-Sep-04	0.01	0.76	F	20									23			
26-Sep-04	0.03	0.03	E	20									9.1			
24-Oct-04	0	0.01	HE	21										3.6		
16-Nov-04	0.05	0.07	HF	21											2.9	
13-Dec-04	0.33	0.41	HF	6												9.1
11-Jan-05	0.07	0.27	HF	12	2.9											
12-Apr-05	0.01	0.01	F	4				2.9								



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
19-Apr-05	0	0	HE	10				2.9								
08-May-05	1.14	1.14	F	0					93							
05-Jun-05	0.18	0.18	F	2						23						
23-Jun-05	0.12	0.12	HE	22						9.1						
10-Jul-05	0.49	0.49	F	23							23					
14-Aug-05	0.92	0.92	E	30								9.1				
21-Sep-05	0.23	0.23	F	29									21			
04-Oct-05	0	0	HE	30										3.6		
03-Nov-05	0.03	0.03	E	21											2.9	
06-Dec-05	0	0	F	5												3.6
29-Jan-06	0.14	0.14	HE	10	3											
15-Feb-06	0	0	F	10		2.9										
09-Apr-06	0.3	0.38	HE	10				2.9								
22-May-06	1.54	1.54	E	5					43							
18-Jun-06	0	0	HF	15						7.3						
09-Jul-06	0	0	F	18							93					
06-Aug-06	0.08	0.09	H	20								3.6				
10-Sep-06	0.09	0.09	HF	22									36			
10-Oct-06	0.02	0.03	HF	25										2		
24-Oct-06	0.52	0.52	H	18										114		
28-Nov-06	0	0	F	10											6	
05-Dec-06	0.02	0.02	HF	10												7.3
28-Feb-07	0	0	H	23		1.9										
01-Apr-07	0	0	F	4				1.9								
22-May-07	0	0.15	F	18					6							
10-Jun-07	0	0	H	22						4						
08-Jul-07	1.28	1.6	E	28							7.3					
07-Aug-07	0.71	0.73	F	30								8				
23-Sep-07	0	0	HE	28									2			
24-Oct-07	0.01	0.01	HE	19										38		
28-Oct-07	1.27	1.27	H	12										700		
26-Nov-07	0.02	0.02	HF	20											2	
02-Dec-07	0	0.02	E	6												11
23-Jan-08	0	0	H	6	4											
25-Feb-08	0	0.23	HF	18		1.9										
19-Mar-08	0.29	0.32	H	25			2									
02-Apr-08	0.32	0.32	HE	2				4								
11-May-08	0	0.02	HF	10					2							
20-May-08	0.02	0.06	HF	18					2							
04-Jun-08	0.26	0.27	HF	24						9						
09-Jul-08	0	0.01	F	31							84					
27-Aug-08	0	0.02	E	22								16				
17-Sep-08	0.02	0.25	HE	25									16			



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
21-Sep-08	0.02	0.02	F	18									2			
22-Oct-08	0.27	0.27	F	20										48		
12-Nov-08	0.07	0.38	HE	25											9	
01-Dec-08	0.48	0.73	F	6												50
24-Mar-09	0	0	HE	8			2									
29-Apr-09	0.01	0.01	HF	8				2								
20-May-09	0	0.72	E	18					1.9							
07-Jun-09	0	0	HE	24						1.9						
19-Jul-09	0.45	0.85	HE	10							82					
09-Aug-09	0.1	0.11	E	26								1.9				
12-Aug-09	0.2	0.2	F	17								18				
23-Aug-09	2.75	2.75	H	21								980				
13-Sep-09	0.06	0.07	H	24									11			
04-Oct-09	1.53	1.53	H	12										880		
23-Nov-09	0	0.12	F	10											6	
07-Dec-09	0.14	0.14	H	8												2
27-Jan-10	1.59	1.62	E	2	60											
07-Apr-10	0.27	0.27	F	3				1.9								
03-May-10	0.02	0.02	HF	20					1.9							
07-Jun-10	2.2	2.2	E	12						1700						
29-Jun-10	1.52	1.52	HF	20						240						
06-Jul-10	0.31	0.31	HE	25							2					
12-Jul-10	1.1	1.1	H	26							56					
14-Jul-10	0.69	1.69	H	20							500					
02-Aug-10	0.01	0.01	H	27								52				
28-Sep-10	0.4	0.4	H	30									16			
04-Oct-10	0.06	0.89	HE	25										122		
03-Nov-10	0	0.07	HE	22											6	
06-Dec-10	0.11	0.18	HE	21												6

Table 28. Season and Rainfall Assessment Station WU 34.5

Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
15-Jan-03	0	0	E	21	2.9											
03-Feb-03	0.54	0.54	HE	21		2.9										
13-Mar-03	0	0	LF	11			2.9									
13-Apr-03	0.41	0.41	H	21				2.9								
05-May-03	0	0.04	HF	25					2.9							
01-Jun-03	0.73	0.74	F	20						3.6						
13-Jul-03	0.25	0.25	F	31							7.3					
10-Aug-03	0.17	0.18	HF	30								3.6				
11-Sep-03	0	0	HE	30									3.6			
19-Oct-03	0.02	0.02	E	15										43		
05-Nov-03	0.62	0.68	HE	18											3.6	



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
18-Nov-03	0	0	E	27											2.9	
14-Dec-03	0.08	0.63	HF	8												9.1
06-Jan-04	0	0.28	H	25	2.9											
04-Feb-04	0.48	0.48	HE	22		2.9										
30-Mar-04	0	0.53	F	20			3.6									
19-May-04	0.18	0.47	HF	22					9.1							
15-Jun-04	0.01	0.01	F	20						7.3						
08-Aug-04	0.74	0.74	E	26								2.9				
26-Sep-04	0.03	0.03	E	29									3.6			
24-Oct-04	0	0.01	HE	28										3.6		
16-Nov-04	0.05	0.07	HF	30											2.9	
13-Dec-04	0.33	0.41	HF	12												23
11-Jan-05	0.07	0.27	HF	30	3.2											
12-Apr-05	0.01	0.01	F	6				2.9								
19-Apr-05	0	0	HE	16				2.9								
08-May-05	1.14	1.14	F	20					43							
05-Jun-05	0.18	0.18	F	6						15						
23-Jun-05	0.12	0.12	E	22						43						
10-Jul-05	0.49	0.49	F	23							21					
14-Aug-05	0.92	0.92	E	30								2.9				
21-Sep-05	0.23	0.23	F	30									15			
04-Oct-05	0	0	HE	30										9.1		
03-Nov-05	0.03	0.03	E	30											15	
06-Dec-05	0	0	F	12												3.6
29-Jan-06	0.14	0.14	HE	12	2.9											
15-Feb-06	0	0	HF	15		2.9										
09-Apr-06	0.3	0.38	H	24				2.9								
22-May-06	1.54	1.54	E	12					5.7							
18-Jun-06	0	0	HF	16						240						
09-Jul-06	0	0	HF	24							9.1					
06-Aug-06	0.08	0.09	HE	25								7.3				
10-Sep-06	0.09	0.09	HF	26									62			
01-Oct-06	0.73	0.74	E	30										4		
24-Oct-06	0.52	0.52	H	16										66		
28-Nov-06	0	0	F	21											1.9	
05-Dec-06	0.02	0.02	HF	18												4
28-Feb-07	0	0	HE	30		1.9										
01-Apr-07	0	0	F	6				1.9								
22-May-07	0	0.15	HF	18					2							
10-Jun-07	0	0	HE	20						6						
08-Jul-07	1.28	1.6	E	30							2					
07-Aug-07	0.71	0.73	E	30								16				
23-Sep-07	0	0	HE	30									1700			
24-Oct-07	0.01	0.01	H	26										56		



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
28-Oct-07	1.27	1.27	H	24										144		
26-Nov-07	0.02	0.02	HF	25											1.9	
02-Dec-07	0	0.02	E	14												2
23-Jan-08	0	0	H	20	1.9											
25-Feb-08	0	0.23	H	8		1.9										
19-Mar-08	0.29	0.32	H	25			2									
02-Apr-08	0.32	0.32	HE	10				4								
11-May-08	0	0.02	HF	22					4							
20-May-08	0.02	0.06	HF	24					1.9							
04-Jun-08	0.26	0.27	HF	26						8						
09-Jul-08	0	0.01	F	30							34					
27-Aug-08	0	0.02	E	26								340				
17-Sep-08	0.02	0.25	HE	24									24			
21-Sep-08	0.02	0.02	F	23									96			
22-Oct-08	0.27	0.27	F	23										44		
12-Nov-08	0.07	0.38	E	28											1.9	
01-Dec-08	0.48	0.73	F	12												5.5
24-Mar-09	0	0	HE	24			1.9									
29-Apr-09	0.01	0.01	HF	23				12								
20-May-09	0	0.72	E	23					2							
07-Jun-09	0	0	E	23						1.9						
19-Jul-09	0.45	0.85	HE	17							104					
09-Aug-09	0.1	0.11	E	26								140				
12-Aug-09	0.2	0.2	HF	26								4				
23-Aug-09	2.75	2.75	F	26								200				
13-Sep-09	0.06	0.07	H	26									12			
04-Oct-09	1.53	1.53	H	24										220		
23-Nov-09	0	0.12	F	25											1.9	
07-Dec-09	0.14	0.14	H	8												9.1
27-Jan-10	1.59	1.62	E	12	27											
07-Apr-10	0.27	0.27	F	6				4								
03-May-10	0.02	0.02	HF	20					6							
07-Jun-10	2.2	2.2	E	20						1600						
29-Jun-10	1.52	1.52	HF	15						78						
06-Jul-10	0.31	0.31	HE	28							7.3					
12-Jul-10	1.1	1.1	H	30							68					
14-Jul-10	0.69	1.69	H	30							82					
02-Aug-10	0.01	0.01	H	28								620				
28-Sep-10	0.4	0.4	H	30									7.3			
04-Oct-10	0.06	0.89	HE	28										40		
03-Nov-10	0	0.07	HE	20											14	
06-Dec-10	0.11	0.18	HE	22												6



Table 29. Conditionally Restricted Area, Rainfall Impact at \geq .50 inches of Rainfall (cumulative, within three days of sample plus the day of collection excluding flood data)

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU032.00	CR	30	16	30.4	0.68	1460	232.2	38	216	9/26/2001
WU033.00	CR	30	16	37.1	0.76	1700	351.4	38	216	10/29/2002
WU034.00	CR	30	15	50.7	0.81	1700	557.9	38	221	6/3/2001
WU034.50	CR	30	16	17.3	0.76	1600	166.8	38	216	10/22/2000

Table 30. Conditionally Restricted Area, Rainfall Impact Based on 0-1.49" of Rainfall (cumulative, within three days of sample plus the day of collection excluding flood data)

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU032.00	CR	30	30	6.3	0.58	106	35.7	31	163	4/2/2008
WU033.00	CR	30	30	6.4	0.62	128	40.4	31	163	4/2/2008
WU034.00	CR	30	30	7.9	0.61	122	49.3	31	163	4/2/2008
WU034.50	CR	30	30	12.3	0.7	620	99.1	31	163	4/2/2008

Shoreline Survey Activity

A drive through survey inspection of new and suspect properties and farms on the east side of the river (South Thomaston to St George) was conducted on August 17, 2010. Stream samples were also collected on this date. The western side of the river was inspected on November 30, 2010; animal farms were also visited and stream samples were taken. Table 5 lists pollution sources that were previously identified with the current information for each system highlighted in yellow. Table 6 lists all potential pollution sources in shellfish growing area WU and the action taken relating to each of these systems.

A DEP survey was done of the Upper St George River, the Oyster River and Mill River during the summer of 2010. This survey was done to try to locate pollution sources that could impact the water quality in the upper St George River conditionally restricted and conditionally approved areas. Relatively few pollution sources were identified during this survey. All of the pollution sources border on areas currently classified as prohibited. Table 4 shows all of the potential and actual pollution sources that were identified during this survey and any action that was taken by the town.

Aquaculture/Wet Storage Activity

There are three aquaculture sites on the St George River. Information on each site is shown below.

Site: STG US2

Original Date: 5/17/2003 **Effective Date:** 5/17/2003 **Expiration Date:** 5/16/2013

NOAA Chart: 13301

Description: St. George River Warren Knox County

Acreage: 0.17



Species Cultivated: oyster eastern / american (*Crassostrea virginica*)
Cultivation Technique(s): Suspended

Site: STG BC

Original Date: 1/29/2004 **Effective Date:** 1/29/2004 **Expiration Date:** 1/28/2014

NOAA Chart: 13301

Description: Broad Cove St. George River Cushing Knox County

Acreage: 5

Species Cultivated: oyster eastern / american (*Crassostrea virginica*)

Cultivation Technique(s): Suspended

Site: STG OC

Original Date: 5/14/2004 **Effective Date:** 5/14/2004 **Expiration Date:** 5/13/2014

NOAA Chart: 13301

Description: Otis Cove St. George River Tenants Harbor Knox County

Acreage: 2

Species Cultivated: oyster eastern / american (*Crassostrea virginica*) - clam northern quahog / hard (*Mercenaria mercenaria*) - mussel blue sea (*Mytilus edulis*)

Cultivation Technique(s): Suspended

For more information on the aquaculture sites on the St George River visit the website at:

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

Recommendation for Future Work

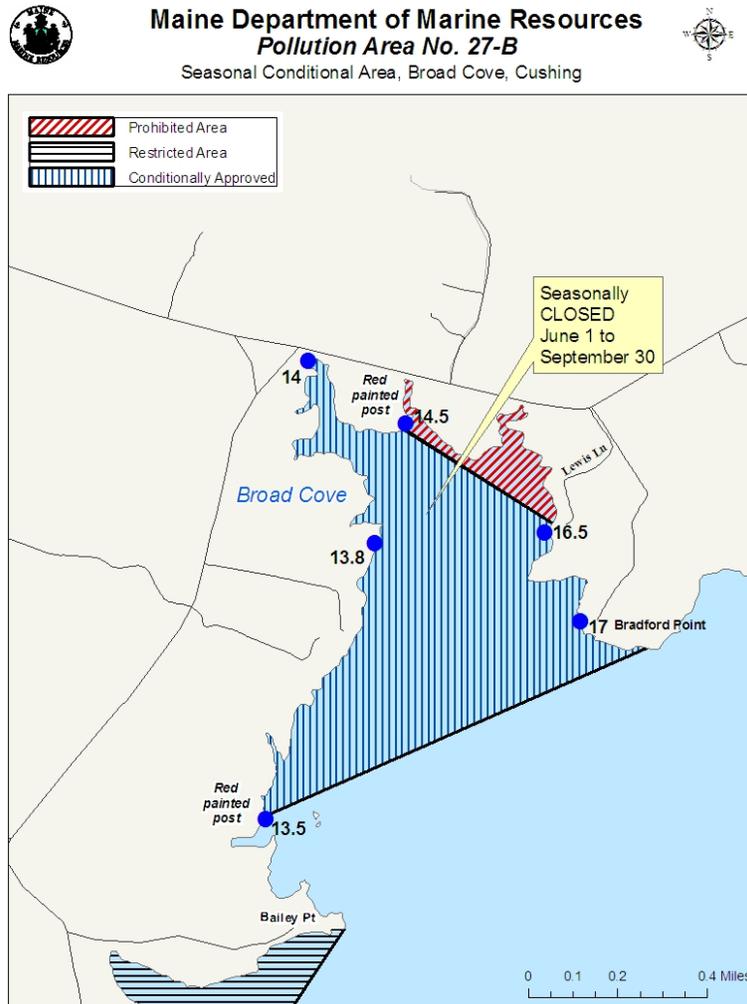
Several sites in shellfish growing area WU showed deteriorating water quality during this review period. These areas include stations WU 6.5, 22, 32, 33, 34, 34.5, 35, 37, 38, 41, 48, and 48.5. Some of these areas have been assessed to see if rainfall or season or both are impacting the water quality. At Turkey Cove (stations WU 48 and 48.5) a dilution calculation of the stream (S1WU48.5) was done to see if the closure size could be reduced in size. A rainfall and seasonal impact assessment was also done for this area. The data showed that most of the elevated scores occurred in 2009 and 2010 suggesting that something had changed in the area in recent years that was impacting the water quality scores. This area will be revisited to determine if there is a new pollution source in the area. The water quality at stations WU22, 35, 37 and 38 is also deteriorating. These areas will also be revisited to check for new pollution sources. In Watts Cove (station WU41) two horses that grazed directly above the sample location have been removed. It is likely that this area's water quality will improve.



Appendix A. Annual Review of Broad Cove, Cushing Conditional Area Management Plan

2010 ANNUAL REVIEW Conditional Area Management Plan Shellfish Growing Area WU Area 27B, Broad Cove, Cushing

Figure 1. Broad Cove, Cushing, Seasonal Conditional Area





Scope

Broad Cove, Cushing is classified as conditionally approved based on season. The open season is from October 1- May 31. This area became a seasonal area on November 3, 2008. A data review of all conditionally approved stations is done prior to the open season each year to assure that the area is still meeting approved standards in the open season. Water quality in this seasonal conditional area is monitored by stations WU 13.5, 13.8, 14, 14.5, 16.5 and 17. Station WU 17 had been classified as approved (2004-2010). On October 21, 2009 this site received a score of 620 fc/100ml following .96 inches of rainfall (cumulative rainfall within three days of sample collection and on day of sample collection). This score brought the P90 score up to 35.8 with an approved standard of 34. The area was watched for additional deteriorating scores and was reclassified as conditionally approved on August 30, 2010 even though all of the remaining scores from 2009 through 2010 were low. Station WU17 once again meets approved standards on a year round basis with a P90 score of 21.2 (Table 1) and an approved standard of 31. This station now serves as a border station between the conditionally approved and approved areas.

Table 1. Station WU17, P90 Score 2006-2010.

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd Std	Restr Std	Min Date
WU017.00	CA	30	30	3.7	0.58	620	21.2	31	163	9/6/2006

Compliance with management plan

In 2010, the area opened as scheduled on October 1st. Prior to opening, a seasonal data check was completed to ensure that all stations were meeting the approved standard in the open status. This data check was completed on September 28, 2010

Adequacy of reporting and cooperation of involved persons

The management plan for this conditional area does not require reporting by non-DMR personnel.

Compliance with approved (or restricted) growing area criteria

The annual review of the water quality for all active stations in this conditional area met approved standards in the open status (Table 2).

Table 2. Broad Cove, Cushing P90 Scores in Open Status Oct.1 - May 31 2000-2010

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd Std	Restr Std	Min Date
WU013.50	CA	30	20	3.4	0.47	300	14	36	199	1/13/2003
WU013.80	CA	30	20	3.3	0.51	760	15.3	36	199	1/13/2003
WU014.00	CA	30	19	3.7	0.5	340	16.8	36	203	1/13/2003
WU014.50	CA	30	20	3.6	0.49	300	15.7	36	199	1/13/2003
WU016.50	CA	30	20	3.3	0.48	540	14.1	36	199	5/7/2002
WU017.00	CA	30	16	3.5	0.51	620	16.1	38	216	11/4/2001

Water sampling compliance history



All conditionally approved stations were sampled a minimum of 6 times in the open status in 2010.

Table 3. 2010 Station Count Table, Broad Cove Conditional Area

Station	Class	Adverse		Extra		Random		Total	Comments
		Closed	Open	Closed	Open	Closed	Open		
WU013.50	CA					3	6	9	
WU013.80	CA					3	6	9	
WU014.00	CA					3	6	9	
WU014.50	CA					3	6	9	
WU016.00	P					6		6	
WU016.50	CA					3	6	9	
WU017.00	A						4	4	
	CA					1	2	3	Reclassified from A to CA on 8/30/10

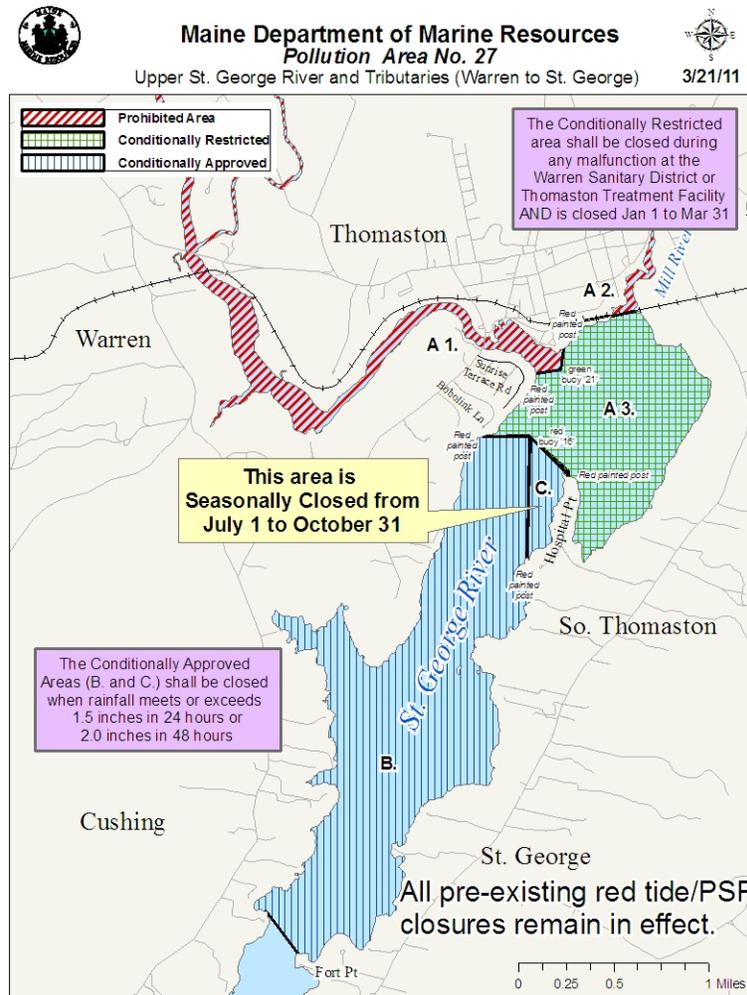
Analysis-Recommendations

No recommendations for changes to the current management plan or conditional area classification status are needed at this time



Appendix B. Annual Review of Upper St George River Conditionally Approved Rainfall Conditional Area Management Plan

Figure 1. Upper St George River Rainfall Conditional Areas



Two portions (sections Band C, Figure 1) of Growing Area WU are conditionally approved, based on rainfall. These areas shall be closed when rainfall meets or exceeds 1.5 inches in a 24 hour period or 2 inches in a 48 hour period. Water quality in the upper St George River rainfall conditional area is monitored by stations WU 19, 20, 21, 22, 23, 25, 35, 36, 37, 37.5 and 38; station WU 34.5, located in the restricted portion of the upper river serves as a boundary station for the conditionally approved/restricted boundary line. All conditionally approved stations must be sampled 6 times per year, in the open status. If the annual cumulative time in the open-status is 5 months or less, the areas are required to be sampled 5 times (monthly).



A portion of the rainfall conditional area is also conditional on season (closed season July 1-October 31). Station WU35 and restricted boundary station WU34.5 are in this small seasonal and rainfall conditional area in the area locally known as Little Cove. The Little Cove seasonal conditional area management plan not yet been in effect for a year.

Compliance with management plan

In 2010, there were 6 rainfall closures for this conditional area (Table 1). On five occasions the rainfall trigger was re-set due to additional rainfall of greater than or equal to 1.5 inches of rainfall occurring after the original event. The 2010 daily rainfall records were reviewed to ensure that all closures were implemented as required by the management plan. All closures were made in compliance with the protocols set by the conditional area management plan. Rainfall closures lasted for a minimum of 14 days from the day the closure is initiated. In instances where the rainfall closure trigger is re-set during an existing rainfall closure, the 14 day minimum closure is also re-set. Prior to re-opening for shellfish harvesting, water samples are collected at stations WU 19, 21, 23, 25, 35, 37, and 38; water quality at these stations must meet the reopening criteria prior to the area re-opening for harvest. In the event that water quality exceeds the re-opening criteria, the area does not re-open and all stations are re-sampled.

Table1. 2010 Conditional Area Rainfall Closures

Date Closed Flood=F Rain>1.5=R	Additional rainfall events ≥1.5 inches in 24 hours	Date area sampled to reopen:	# Days closed	Date Opened	Open from (date- date)	# days open	Comments
					12/17/09 to2/25/10	70 (55)	55 (from 1/1- 2/25)
2/25/10 F 2.15"	2/26/10 1.69"	3/8/10	15	3/12/10	3/12/10 to 3/23/10	11	
3/23/10 2.13"	3/30/10 2.21 3/31/10 1.85"	4/12/10	22	4/14/10	4/14/10- 7/22/10	99	
7/22/10 2.24"F		8/2/10	14	8/5/10	8/5/10- 8/26/10	21	
8/26/10 1.7" R&F	9/4/10 2.25"F	9/15/10	22	9/17/10	9/17/10- 10/15/10	28	Opened one day early
10/15/10 1.65F		10/27/10 (dirty) 11/1/10	18	11/2/10	11/2/10- 11/5/10	3	
11/5/10 1.85"	11/17/10 1.50"	11/29/10	26	12/1/10	12/1/10-	31	
TOTALS			117 days			248 days	



Adequacy of reporting and cooperation of involved persons

In the event that a conditional area closure must be implemented due to rainfall, the management plan for this conditional area requires reporting by Neil Pollis, shellfish warden for the towns of Cushing, Warren, Thomaston, South Thomaston and St George. In 2010, the cooperation between all involved parties was adequate and all necessary notifications were received at appropriate times.

Compliance with approved (or restricted) growing area criteria

Table 2 lists all conditionally approved stations in the upper St George River rainfall conditional area with their respective Geomean and P90 calculations for 2010. Data for conditionally approved stations reflects only the open status. Two stations in this data grouping did not meet the approved standard (Table 2, stations WU 22 and WU 35). A review of the data collected during the 2010 sampling season revealed that on June 7, 2010 the majority of the stations in the conditional area received elevated scores. The cumulative recorded rainfall for 48 hours prior to sample collection revealed that the area had received on 2.2 inches of rain. When the data collected on June 7, 2010 is removed (Table 3), all of the stations continue to meet the approved standard. The management plan for the rainfall conditionally approved area was revised. The plan now states that the conditional area will close for harvest following a rainfall event of ≥ 1.5 inches in 24 hours or \geq two inches in 48 hours.

Table 2. Rainfall Conditional Stations with Data Collected June 7, 2010 Included in Data Set

Station	Class	Count	MFCCount	Geo Mean	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU019.00	CA	30	28	2.9	0.34	50	8.2	31	169	7/31/2006
WU020.00	CA	30	22	4.1	0.45	340	16	35	191	5/19/2005
WU021.00	CA	30	28	4.6	0.54	160	23.1	31	169	7/31/2006
WU022.00	CA	30	28	6.1	0.56	180	32.4	31	169	7/31/2006
WU023.00	CA	30	28	4.1	0.52	400	19.3	31	169	7/31/2006
WU025.00	CA	30	28	5.5	0.55	460	28	31	169	7/31/2006
WU035.00	CA	30	29	4.8	0.65	1540	32.9	31	166	8/6/2006
WU036.00	CA	30	27	5	0.55	760	25.8	32	173	4/9/2006
WU037.00	CA	30	28	4.8	0.57	150	26.1	31	169	7/31/2006
WU037.50	CA	30	27	4.2	0.5	220	18.7	32	173	4/9/2006
WU038.00	CA	30	27	4.4	0.65	1380	30.8	32	173	4/9/2006

Table 3. Upper St George River, Rainfall Conditional Area, Open Status 2000-2010

Station	Class	Count	MFCCount	Geo Mean	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU019.00	CA	30	27	2.7	0.25	16	5.8	32	173	4/9/2006
WU020.00	CA	30	21	3.5	0.28	24	8.1	35	195	3/8/2005
WU021.00	CA	30	27	4	0.46	58	15.9	32	173	4/9/2006
WU022.00	CA	30	27	5.3	0.49	58	23	32	173	4/9/2006
WU023.00	CA	30	27	3.5	0.36	48	10.3	32	173	4/9/2006
WU025.00	CA	30	27	4.6	0.41	26	15.9	32	173	4/9/2006
WU035.00	CA	30	28	3.9	0.44	150	14.7	31	169	7/31/2006



Station	Class	Count	MFCCount	Geo Mean	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU036.00	CA	30	26	4.3	0.37	54	13.2	32	176	10/4/2005
WU037.00	CA	30	27	4.2	0.49	136	18.4	32	173	4/9/2006
WU037.50	CA	30	26	3.8	0.38	50	12.1	32	176	10/4/2005
WU038.00	CA	30	26	3.9	0.6	1380	23.6	32	176	10/4/2005

Water sampling compliance history

In 2010, the St George River rainfall conditional area had multiple prolonged closures; the river was closed for 117 days. The 2010 sampling results for this conditional area are presented in Table 4. All stations were sampled a minimum of six times in the open status.

Table 4. Sampling Effort, Rainfall Conditional Areas Stations

Station	Date	Collector	Strategy	Adv	Status	ColScore
WU019.00	27-Jan-10	FP	A	X	O	29
WU019.00	08-Mar-10	FP	A	X	C	<2
WU019.00	12-Apr-10	ESK	A	X	C	2.8
WU019.00	03-May-10	EXT	R	X	O	<2
WU019.00	07-Jun-10	GN	R	X	O	50
WU019.00	29-Jun-10	ESK	A	X	O	18
WU019.00	06-Jul-10	ESK	R	X	O	7.3
WU019.00	02-Aug-10	HG	R	X	C	2
WU019.00	15-Sep-10	GN	A	X	C	2
WU019.00	28-Sep-10	ESK	A	X	O	60
WU019.00	04-Oct-10	EXT	R	X	O	16
WU019.00	27-Oct-10	HG	A	P	C	46
WU019.00	01-Nov-10	FP	A	P	C	4
WU019.00	03-Nov-10	ESK	R	X	O	<2
WU019.00	29-Nov-10	GN	A	X	C	<2
WU019.00	06-Dec-10	EXT	R	X	O	2
WU019.00	20-Dec-10	ESK	E	X	O	2
WU020.00	27-Jan-10	FP	A	X	O	44
WU020.00	03-May-10	EXT	R	X	O	2
WU020.00	07-Jun-10	GN	R	X	O	340
WU020.00	29-Jun-10	ESK	A	X	O	134
WU020.00	06-Jul-10	ESK	R	X	O	4
WU020.00	02-Aug-10	HG	R	X	C	<2
WU020.00	28-Sep-10	ESK	A	X	O	12
WU020.00	04-Oct-10	EXT	R	X	O	24
WU020.00	03-Nov-10	ESK	R	W	O	8
WU020.00	06-Dec-10	EXT	R	X	O	2
WU021.00	27-Jan-10	FP	A	X	O	42
WU021.00	08-Mar-10	FP	A	X	C	2
WU021.00	12-Apr-10	ESK	A	X	C	20



Station	Date	Collector	Strategy	Adv	Status	ColScore
WU021.00	03-May-10	EXT	R	X	O	<2
WU021.00	07-Jun-10	GN	R	X	O	160
WU021.00	29-Jun-10	ESK	A	X	O	56
WU021.00	06-Jul-10	ESK	R	X	O	9.1
WU021.00	02-Aug-10	HG	R	X	C	6
WU021.00	15-Sep-10	GN	A	X	C	<2
WU021.00	28-Sep-10	ESK	A	X	O	12
WU021.00	04-Oct-10	EXT	R	X	O	58
WU021.00	27-Oct-10	HG	A	P	C	104
WU021.00	01-Nov-10	FP	A	P	C	4
WU021.00	03-Nov-10	ESK	R	X	O	2
WU021.00	29-Nov-10	GN	A	X	C	<2
WU021.00	06-Dec-10	EXT	R	X	O	6
WU021.00	20-Dec-10	ESK	E	X	O	<2
WU022.00	27-Jan-10	FP	A	X	O	54
WU022.00	03-May-10	EXT	R	X	O	<2
WU022.00	07-Jun-10	GN	R	X	O	180
WU022.00	29-Jun-10	ESK	A	X	O	25
WU022.00	06-Jul-10	ESK	R	X	O	<2
WU022.00	02-Aug-10	HG	R	X	C	<2
WU022.00	28-Sep-10	ESK	A	X	O	152
WU022.00	04-Oct-10	EXT	R	X	O	58
WU022.00	03-Nov-10	ESK	R	X	O	4
WU022.00	06-Dec-10	EXT	R	X	O	8
WU023.00	27-Jan-10	FP	A	X	O	48
WU023.00	08-Mar-10	FP	A	X	C	<2
WU023.00	12-Apr-10	ESK	A	X	C	2
WU023.00	03-May-10	EXT	R	X	O	2
WU023.00	07-Jun-10	GN	R	X	O	400
WU023.00	29-Jun-10	ESK	A	X	O	116
WU023.00	06-Jul-10	ESK	R	X	O	6
WU023.00	02-Aug-10	HG	R	W	C	<2
WU023.00	15-Sep-10	GN	A	X	C	6
WU023.00	28-Sep-10	ESK	A	X	O	240
WU023.00	04-Oct-10	EXT	R	X	O	18
WU023.00	27-Oct-10	HG	A	PW	C	84
WU023.00	01-Nov-10	FP	A	P	C	4
WU023.00	03-Nov-10	ESK	R	X	O	4
WU023.00	29-Nov-10	GN	A	X	C	<2
WU023.00	06-Dec-10	EXT	R	X	O	2
WU023.00	20-Dec-10	ESK	E	X	O	6



Station	Date	Collector	Strategy	Adv	Status	ColScore
WU025.00	27-Jan-10	FP	A	X	O	56
WU025.00	08-Mar-10	FP	A	X	C	<2
WU025.00	07-Apr-10	HG	R	X	C	10
WU025.00	12-Apr-10	ESK	A	X	C	2
WU025.00	03-May-10	EXT	R	X	O	2
WU025.00	07-Jun-10	GN	R	X	O	460
WU025.00	29-Jun-10	ESK	A	X	O	100
WU025.00	06-Jul-10	ESK	R	X	O	4
WU025.00	12-Jul-10	ESK	A	X	O	29
WU025.00	14-Jul-10	HG	A	X	O	52
WU025.00	02-Aug-10	HG	R	X	C	<2
WU025.00	15-Sep-10	GN	A	X	C	2
WU025.00	28-Sep-10	ESK	A	X	O	2
WU025.00	04-Oct-10	EXT	R	X	O	24
WU025.00	27-Oct-10	HG	A	P	C	880
WU025.00	01-Nov-10	FP	A	P	C	6
WU025.00	03-Nov-10	ESK	R	X	O	4
WU025.00	29-Nov-10	GN	A	X	C	2
WU025.00	06-Dec-10	EXT	R	X	O	<2
WU025.00	20-Dec-10	ESK	E	X	O	10
WU034.50	27-Jan-10	FP	A	X	O	27
WU034.50	07-Apr-10	HG	R	X	O	4
WU034.50	03-May-10	EXT	R	W	O	6
WU034.50	07-Jun-10	GN	R	X	O	1600
WU034.50	29-Jun-10	ESK	A	X	O	78
WU034.50	06-Jul-10	ESK	R	X	O	7.3
WU034.50	12-Jul-10	ESK	A	W	O	68
WU034.50	14-Jul-10	HG	A	X	O	82
WU034.50	02-Aug-10	HG	R	W	O	620
WU034.50	28-Sep-10	ESK	R	X	O	7.3
WU034.50	04-Oct-10	EXT	R	X	O	40
WU034.50	03-Nov-10	ESK	R	X	O	14
WU034.50	06-Dec-10	EXT	R	X	O	6
WU035.00	27-Jan-10	FP	A	X	O	42
WU035.00	08-Mar-10	FP	A	X	C	<2
WU035.00	07-Apr-10	HG	R	X	C	16
WU035.00	12-Apr-10	ESK	A	X	C	10
WU035.00	03-May-10	EXT	R	X	O	<2
WU035.00	07-Jun-10	GN	R	X	O	1540
WU035.00	29-Jun-10	ESK	A	X	O	>1600
WU035.00	06-Jul-10	ESK	R	X	O	2
WU035.00	12-Jul-10	ESK	A	X	O	18



Station	Date	Collector	Strategy	Adv	Status	ColScore
WU035.00	14-Jul-10	HG	A	X	O	40
WU035.00	02-Aug-10	HG	R	X	C	18
WU035.00	15-Sep-10	GN	A	X	C	<2
WU035.00	28-Sep-10	ESK	A	X	O	8
WU035.00	04-Oct-10	EXT	R	X	O	16
WU035.00	27-Oct-10	HG	A	P	C	35
WU035.00	01-Nov-10	FP	A	P	C	16
WU035.00	03-Nov-10	ESK	R	X	O	3.6
WU035.00	29-Nov-10	GN	A	X	C	4
WU035.00	06-Dec-10	EXT	R	X	O	8
WU035.00	20-Dec-10	ESK	E	X	O	150
WU036.00	27-Jan-10	FP	A	X	O	22
WU036.00	03-May-10	EXT	R	X	O	<2
WU036.00	07-Jun-10	GN	R	X	O	760
WU036.00	29-Jun-10	ESK	A	X	O	16
WU036.00	06-Jul-10	ESK	R	X	O	6
WU036.00	02-Aug-10	HG	R	X	C	4
WU036.00	28-Sep-10	ESK	A	X	O	62
WU036.00	04-Oct-10	EXT	R	X	O	54
WU036.00	03-Nov-10	ESK	R	X	O	2
WU036.00	06-Dec-10	EXT	R	X	O	8
WU037.00	27-Jan-10	FP	A	X	O	14
WU037.00	08-Mar-10	FP	A	X	C	2
WU037.00	12-Apr-10	ESK	A	X	C	10
WU037.00	03-May-10	EXT	R	X	O	4
WU037.00	07-Jun-10	GN	R	X	O	150
WU037.00	29-Jun-10	ESK	A	X	O	5.5
WU037.00	06-Jul-10	ESK	R	X	O	90
WU037.00	02-Aug-10	HG	R	X	C	6
WU037.00	15-Sep-10	GN	A	X	C	6
WU037.00	28-Sep-10	ESK	A	X	O	22
WU037.00	04-Oct-10	EXT	R	X	O	136
WU037.00	27-Oct-10	HG	A	P	C	580
WU037.00	01-Nov-10	FP	A	P	C	2
WU037.00	03-Nov-10	ESK	R	X	O	<2
WU037.00	29-Nov-10	GN	A	W	C	<2
WU037.00	06-Dec-10	EXT	R	X	O	16
WU037.00	20-Dec-10	ESK	E	X	O	2
WU037.50	27-Jan-10	FP	A	X	O	8
WU037.50	03-May-10	EXT	R	X	O	<2
WU037.50	07-Jun-10	GN	R	X	O	220



Station	Date	Collector	Strategy	Adv	Status	ColScore
WU037.50	29-Jun-10	ESK	A	X	O	4
WU037.50	06-Jul-10	ESK	R	X	O	2
WU037.50	02-Aug-10	HG	R	X	C	7.3
WU037.50	28-Sep-10	ESK	A	X	O	22
WU037.50	04-Oct-10	EXT	R	X	O	31
WU037.50	03-Nov-10	ESK	R	X	O	<2
WU037.50	06-Dec-10	EXT	R	X	O	6
WU038.00	27-Jan-10	FP	A	X	O	6
WU038.00	08-Mar-10	FP	A	X	C	<2
WU038.00	12-Apr-10	ESK	A	X	C	2
WU038.00	03-May-10	EXT	R	X	O	<2
WU038.00	07-Jun-10	GN	R	X	O	98
WU038.00	29-Jun-10	ESK	A	X	O	13
WU038.00	06-Jul-10	ESK	R	X	O	<2
WU038.00	02-Aug-10	HG	R	X	C	<2
WU038.00	15-Sep-10	GN	A	X	C	<2
WU038.00	28-Sep-10	ESK	A	X	O	<2
WU038.00	04-Oct-10	EXT	R	X	O	30
WU038.00	27-Oct-10	HG	A	P	C	12
WU038.00	01-Nov-10	FP	A	P	C	11
WU038.00	03-Nov-10	ESK	R	X	O	<2
WU038.00	29-Nov-10	GN	A	X	C	4
WU038.00	20-Dec-10	ESK	R	X	O	5.5

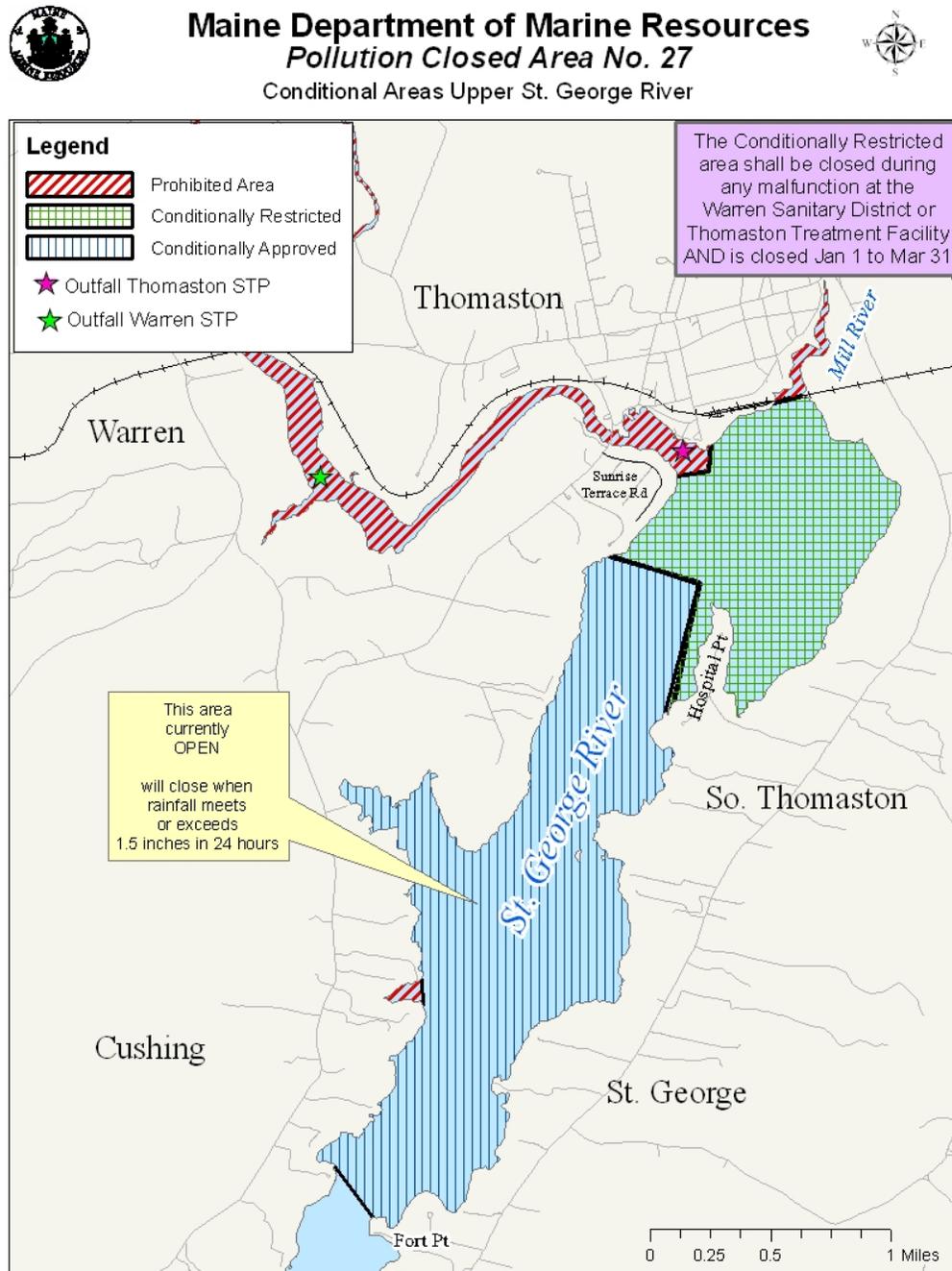
Analysis-Recommendations

No recommendations for changes to the current management plan or conditional area classification status are needed at this time. The new revision to the management plan requiring closure of the conditional area after 2 inches of rainfall in a 48 hour period in addition to closure following 1.5 inches of rainfall twenty-four hour period will be closely monitored.



Appendix C. Annual Review of the Upper St George River Wastewater Treatment Facility, Conditionally Restricted Area Management Plan

Figure 1. Conditionally Restricted Area, St George River





A portion of the St George River is classified as conditionally restricted based on the operations at the Thomaston Treatment Facility and The Warren Sanitary District. This portion of the river is described as:

St George River: south of the railroad trestle that crosses the mouth of the Mill River, and south of a line beginning at a red painted post, located below the bend in Sunrise Terrace Road (Thomaston); then running east to green navigational beacon "21" ; then running northwest to a red painted post located east of the piling ruins which are on the east side of the old maritime museum (now Lyman Morse); AND north of a line beginning at a red painted post located at the bottom of the stairs at the end of Bobolink Lane (Thomaston), then running east to the red nun navigational buoy # 16, then continuing southwest to a red painted post located at the end of Cliff Road at Hospital Point (South Thomaston).

Compliance with management plan

There have been no bypass events at Thomaston Treatment Facility since the new plant went on line in December of 1997. Bypasses are capable of taking place at any of the sealed pump stations, but this would only take place if there was an extreme weather event causing both a power failure and generator failure. There has been only one extreme weather event (October 2005) of >11 inches of rainfall since the new plant went on line. This event caused a pump station to back up into a cellar. No wastewater was released to the river during this event. All bypass events are immediately reported using the Emergency Response Plan reporting mechanism. As a result of the design of the new Thomaston Treatment Facility, bypasses have become a thing of the past. All of the storm water drains were kept separate from the treatment plant lines, so heavy rainfall should have no effect on the pump stations.

There have been no bypass events reported at Warren Sanitary District. It is not possible for wastewater to bypass the plant.

Adequacy of reporting and cooperation of involved persons

The Marine Patrol will enforce the conditional area closure of this area. In the past (prior to 1997) the Thomaston Treatment Facility had a history of numerous malfunctions. All of the emergency closures that were enacted resulting from these malfunctions were handled in a timely and professional manner. There have been no malfunctions resulting in a discharge of wastewater to the river since 1997.

Compliance with approved (or restricted) growing area criteria

The conditionally restricted stations have all shown deteriorating water quality scores in the past year. The water quality at stations WU34 and WU34.5 has deteriorated to the point that these stations are now just under the restricted standard limit of 163 FC/100ml. This area's data was further assessed to see if rainfall or season were impacting the water quality in the area. Following the assessment, it was determined that this area should be conditional on rainfall events that meet or exceed 1.5 inches in a twenty-four hour period.

Table 1. P90 scores for Conditionally Restricted Stations in Open Status.

Station	Class	Count	MFCCount	Geo Mean	SDV	MAX	P90	Appd Std	Restr Std	Min Date
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Station	Class	Count	MFCCount	Geo Mean	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WU032.00	CR	30	30	6.9	0.7	1460	55.7	31	163	11/26/2007
WU033.00	CR	30	30	9.6	0.85	1700	119.8	31	163	11/26/2007
WU034.00	CR	30	30	11.6	0.87	1700	152.4	31	163	11/26/2007
WU034.50	CR	30	30	13.9	0.82	1600	158.5	31	163	11/26/2007

Water sampling compliance history

All of the conditionally restricted stations were sampled each month the area was in the open status (April-December). The restricted stations were also sampled four times under adverse conditions in the open status. These samples were collected to check rainfall impact on the area.

Table 2. Sampling Effort Conditionally Restricted Stations

Station	Class	Adverse		Extra		Random		Total	Comments
		Closed	Open	Closed	Open	Closed	Open		
WU032.00	CR		4				9	13	
WU033.00	CR		4				9	13	
WU034.00	CR		4				9	13	
WU034.50	CR		4				9	13	

Analysis-Recommendations

A rainfall and seasonal impact assessment was done for the stations in the conditionally restricted area. This assessment determined that this area is impacted by rainfall events that meet or exceed 1.5 inches of rainfall in a twenty-four hour period. The assessment also revealed that water quality deteriorates during the summer months (June through September). When data collected following greater than or equal to 1.5 inches of rainfall was removed from the data set, the water quality returned to restricted standards. It has been recommended that this area become conditional on rainfall events that meet or exceed 1.5 inches in a twenty-four hour period.



Appendix D. 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.