



**GROWING AREA WK**  
**Harpwell Sound and Quahog Bay**  
**Towns of Brunswick and Harpswell**  
**Triennial Report for 2008-2010**

**Report Date: 12-23-2011**

**Glenn Nutting**

**APPROVAL**

Division Director:

Kohl Kanwit

A handwritten signature in blue ink, appearing to read "Kohl Kanwit", is written over a light blue rectangular background.

1/30/12

Print name

signature

Date: \_\_\_\_\_



**TABLE OF CONTENTS**

Executive Summary .....5  
Growing Area Description .....5  
Current Classification(s).....5  
Activity during Review Period.....6  
Conditionally Managed Area(s) Activity .....8  
Documentation of Pollution Sources .....8  
    Evaluation of New Pollution Sources .....9  
    Re-Evaluation of Existing Pollution Sources .....9  
Water Quality Review and Discussion .....20  
Upward Classification Changes .....25  
Shoreline Survey Activity during the Review Period (2008-2010).....25  
Aquaculture/Wet Storage Activity.....26  
Recommendation for Future Work .....27  
References.....27  
Appendix A. Annual Review of Management Plan- Orrs Cove, Great Island Boatyard,  
Seasonal Conditional Area No. 18 .....28  
Appendix B. Upward Classification of Quahog Bay .....30  
Appendix C. Key to Water Quality Table Headers .....36

**LIST OF TABLES**

Table 1. Actual and Potential Pollution Sources in Growing Area WK..... 10  
Table 2. Licensed OBDs in Harpswell, Growing Area WK..... 14  
Table 3. Stream Sample Results Collected From April 2009 through November 2010 in  
Growing Area WK ..... 17  
Table 4. Geometric Means and P90 Scores, Growing Area WK .....20  
Table 5. Orrs Cove Marina Seasonal Conditional Area, Open Status (December 1-April  
30) .....22  
Table 6. WK Samples Collected in 2010..... 22

**LIST OF FIGURES**

Figure 1. Growing Area WK-Upper Portion..... 3  
Figure 2. Growing Area WK-Lower Portion..... 4  
Figure 3. Growing Area WK Pollution Source Map-Upper Portion..... 11  
Figure 4. Growing Area WK Pollution Source Map-Lower Portion..... 12  
Figure 5. Stream Sample Sites in Growing Area WK..... 19  
Figure 6. Area WK P90 Scores for Approved and Boundary Stations (expressed as the  
percent of the approved standard), 2008-2010..... 24  
Figure 7. Area WK P90 Scores for Orrs Cove Conditionally Approved Stations  
(expressed as the percent of the approved standard), Open Status, 2008-2010 ..... 25



Figure 1. Growing Area WK-Upper Portion

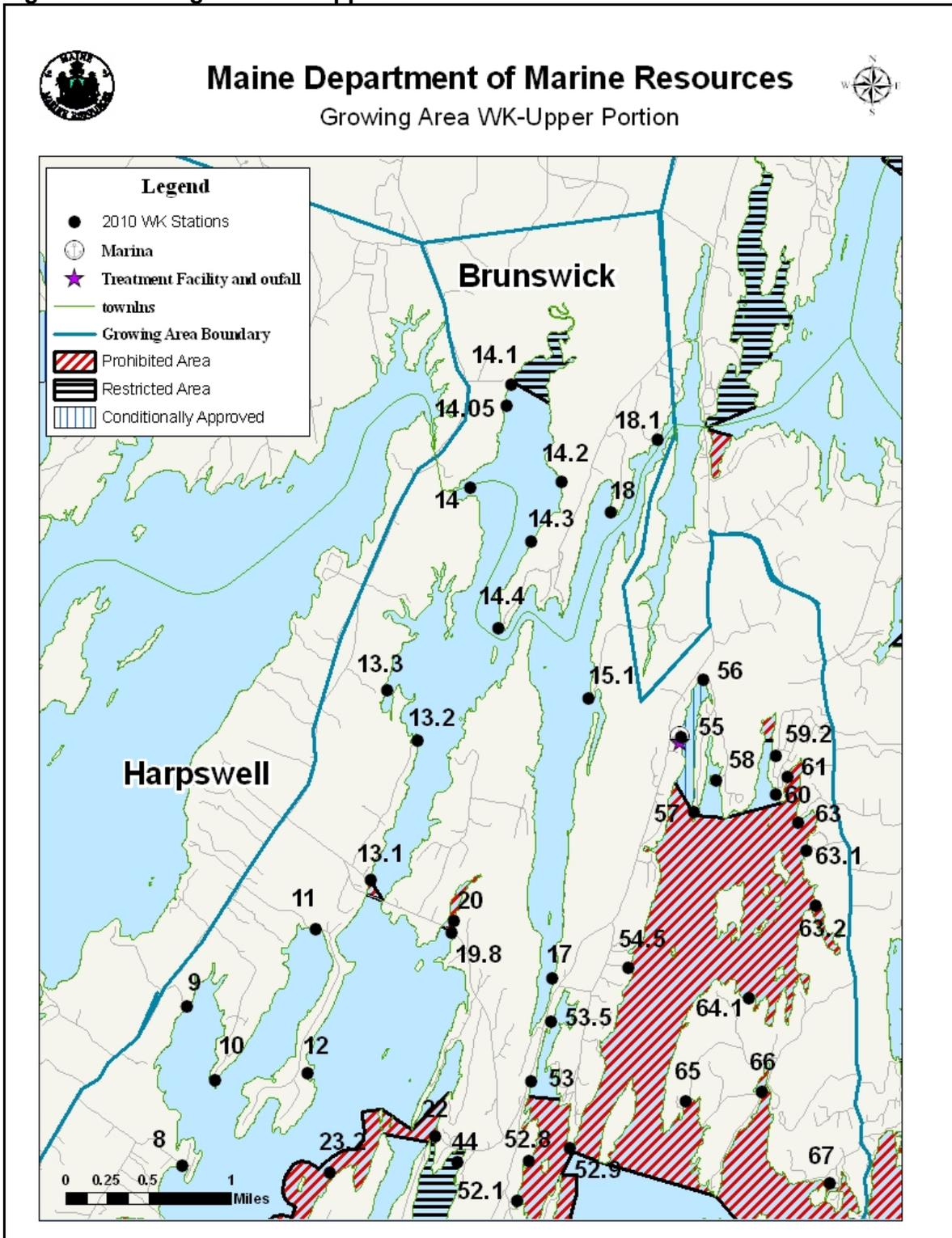
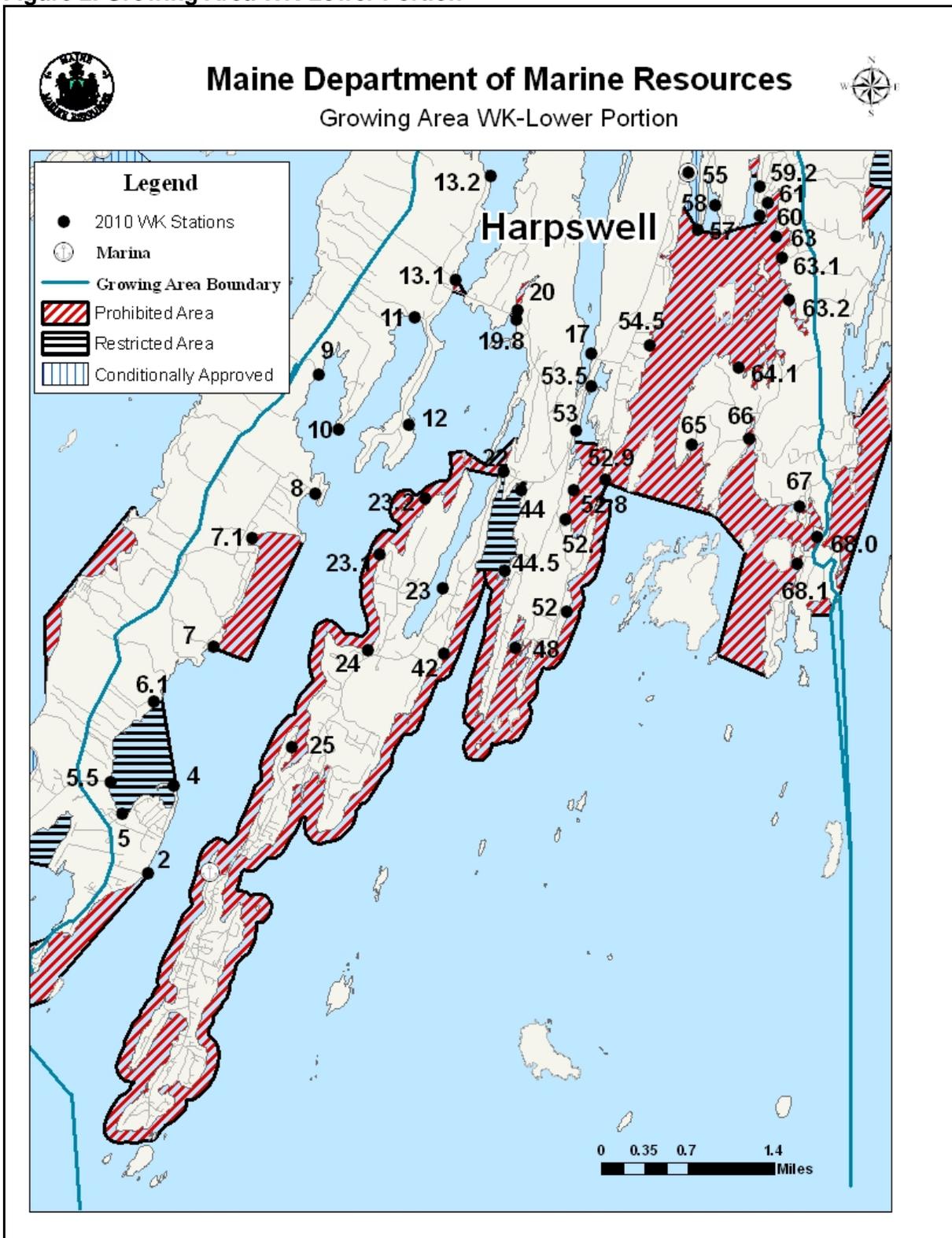




Figure 2. Growing Area WK-Lower Portion





## Executive Summary

This is a triennial report for growing area WK written in compliance with the requirements of the 2009 Model Ordinance and the National Shellfish Sanitation Program. The next sanitary survey report will be written in 2017.

Growing Area WK includes the area between east Potts Cove at the southeastern tip of Harpswell Neck and East Cundy Point. During the review years seven new stations were created in growing area WK. Two prohibited stations were deactivated due to a lack of shellfish resource in the area that they were monitoring. Changes in pollution sources in area WK included the removal of seven over board discharges (OBDs); all were located in the town of Harpswell. Four areas were proposed for an upward classification change in 2009. These areas include Harpswell Cove (Brunswick), Mill Cove (Harpswell), Card Cove (Harpswell) and Brickyard Cove (Harpswell). All of these areas were proposed for an approved classification, based on water quality meeting the approved standard and the remediation of known pollution sources. In 2010, three stations in Quahog Bay were proposed for an upward classification change from prohibited to seasonal conditionally approved due to completion of a shoreline survey and remediation of several pollution sources.

No areas in WK required a downgrade in classification during the review years covered by this report. Shoreline surveys were also conducted in the following areas: Middle of Harpswell Neck, the southern portion of Long Cove (Harpswell), Long Reach, Lumbos Hole (Harpswell), Mill Cove, Orrs Cove, Card Cove, High Head (Harpswell) and the islands which fall into the boundaries of the town of Harpswell.

## Growing Area Description

Growing Area WK is located in the towns of Brunswick and Harpswell in the Mid-Coast area of Maine (Figure 1). There is a vast amount of shoreline on three major peninsulas protruding into Casco Bay, as well as numerous islands. Harpswell Neck is the westernmost peninsula. The central peninsula is made up of the western side of Sebascodogan Island, Orrs Island and Bailey Island, with all of them connected to the mainland and each other by bridges. The eastern peninsula is the eastern side of Sebascodogan Island extending south to Cundys Harbor.

Major pollution sources in area WK include OBDs, malfunctions of private, residential in-ground septic systems, and intermittent pollution from wildlife and domestic animals. There are no municipal treatment plants with discharges into the water of growing area WK. There are no farms on the shores of growing area WK. There are a total of 56 sampling stations that monitor water quality in growing area WK. Details on sample locations are presented in Figures 2 and 3.

## Current Classification(s)

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



**Approved**

Brunswick (8 stations), WK 14, 14.05, 14.1, 14.2, 14.3, 14.4, 18 and 18.1  
Harpswell (18 stations), WK 4, 6.1, 7, 8-12, 13.3, 15.1, 17, 19.8, 23, 53, 53.5, 58, 59.2 and 60

**Conditionally Approved**

Orrs Cove, Harpswell (2 stations; seasonal marina area), WK 55 and 56

**Restricted**

Stover Cove, Harpswell (2 stations; poor water quality), WK 5 and 5.5  
Inner Gun Point Cove, Harpswell (2 stations; poor water quality), WK 44 and 44.5

**Prohibited**

Harpswell Sound, Harpswell (10 stations; presence of OBDs and/or poor water quality), WK 2, 7.1, 13.1, 13.2, 20, 22, 23.1, 23.2, 24, 25,  
Card Cove, Harpswell (3 stations; poor water quality), WK 52.1, 52.8 and 52.9  
Gun Point Cove, Harpswell (1 station; poor water quality), WK 42  
Quahog Bay, Harpswell (13 stations; presence of OBDs and/or poor water quality), WK 48, 52, 54.5, 57, 61, 63, 63.1, 63.2, 65, 66, 67, 68 and 68.1

Please visit the DMR website to view legal notices:

[http://www.maine.gov/dmr/rm/public\\_health/closures/closedarea.htm#K](http://www.maine.gov/dmr/rm/public_health/closures/closedarea.htm#K)

**Activity during Review Period**

**2008**

The following legal notice amendments occurred during the 2008 review year:

**No. 17-A, Upper Harpswell Neck and Long Reach (Brunswick to Harpswell)**

**May 19, 2008:** Area No. 17-A, Upper Harpswell Neck and Long Reach (Brunswick to Harpswell) was amended to reclassify a portion of Harpswell Cove (locally known as Skolfield Cove) from approved to restricted.

**No. 17-B, Harpswell Neck (Harpswell)**

**October 8, 2008:** Area 17-B, Harpswell Neck (Harpswell) was amended to reclassify a portion of the upper northwest shore of Harpswell Harbor by Shore Acres Road from approved to prohibited due to the presence of a straight pipe.

**No. 17-C, Bailey Island, Orrs Island, and nearby southwest Sebascodegan Island (Harpswell)**



**November 6, 2008:** Area No. 17-C, Bailey Island, Orrs Island, and nearby southwest Sebascodegan Island (Harpwell) was amended to reclassify Long Cove, Harpswell, from prohibited to approved, and expand the prohibited area in Lumbos Hole due to a licensed overboard discharge.

## **2009**

The following legal notice amendments occurred during the 2009 review year:

### **No. 17-A, Upper Harpswell Neck and Long Reach (Brunswick to Harpswell)**

**December 3, 2009:** Area No. 17-A, Upper Harpswell Neck and Long Reach (Brunswick to Harpswell) was amended to reclassify the lower portion of Harpswell Cove (Brunswick) from restricted to approved, due to the replacement of a malfunctioning septic system, and water quality returning to the approved standard. The upper portion of Harpswell Cove remains classified as restricted.

### **No. 17-B, Harpswell Neck (Harpwell)**

**January 20, 2009:** Area No. 17-B, Harpswell Neck (Harpwell) was amended to reclassify several areas on Harpswell Neck from approved and conditionally approved to prohibited, due to lack of a recent shoreline survey and/or elevated scores during the open status, which fails to meet the requirements of a conditionally approved area.

**September 29, 2009:** Area No. 17-B, Harpswell Neck (Harpwell) was amended to reclassify the area around High Head (Harpwell) from prohibited to approved, due to the completion of a shoreline survey and the removal of two overboard discharges.

**December 29, 2009:** Area No. 17-B, Harpswell Neck (Harpwell) was amended to reclassify Harpswell Harbor from prohibited to restricted, due to water quality meeting the restricted standard and the completion of a water quality review for the area. This amendment also reduces the size of the prohibited area in Harpswell Sound, due to water quality meeting the approved standard.

### **No. 18, Quahog Bay, Hen Cove, Ridley Cove (Harpwell)**

**January 20, 2009:** Area No. 18, Quahog Bay, Hen Cove, Ridley Cove (Harpwell) was amended to reclassify portions of Quahog Bay and Ridley Cove from conditionally approved and approved to prohibited, due to lack of a recent shoreline survey and/or elevated scores during the open status, which fails to meet the requirements of a conditionally approved area.

**January 30, 2009:** Area No. 18, Quahog Bay, Hen Cove, Ridley Cove (Harpwell) was amended to reclassify Orrs Cove, Harpswell as conditionally approved following a recent review of the Conditional Area Management Plan and open status water quality data,

The amendment also reclassifies the lower part of Mill Cove as conditionally approved, due to an updated shoreline survey.



**September 23, 2009:** Area No. 18, Quahog Bay, Hen Cove, Ridley Cove (Harpowell) was amended to reclassify the upper portion of Mill Cove (Harpowell) from prohibited to conditionally approved based on season, due to the completion of a shoreline survey.

## **2010**

The following legal notice amendments occurred during the 2010 review year:

### **No. 17-C, Bailey Island, Orrs Island, and nearby southwest Sebascodogan Island (Harpowell)**

**March 10, 2010:** Area No. 17-C, Bailey Island, Orrs Island, and nearby southwest Sebascodogan Island (Harpowell) was amended to reclassify the upper portion of Card Cove, Harpswell, from prohibited to approved, due to the completion of a shoreline survey and water quality meeting the approved standard. For a complete assessment of Card Cove's recommendation for classification upgrade, please refer to the *2009 Growing Area WK Annual Report*.

### **No. 18, Quahog Bay, Hen Cove, Ridley Cove (Harpowell)**

**March 10, 2010:** Area No. 18, Quahog Bay, Hen Cove, Ridley Cove (Harpowell) was amended to reclassify Mill Cove, Harpswell, from conditionally approved based on season (October 1 to April 30) to approved, due to the completion of a shoreline survey and water quality meeting the approved standard using year round data. For a complete assessment of Mill Cove's recommendation for classification upgrade, please refer to the *2009 Growing Area WK Annual Report*.

**November 3, 2010:** Area No. 18, Quahog Bay, Hen Cove, Ridley Cove (Harpowell) was amended to reclassify the lower portion of Brickyard Cove (Harpowell) from prohibited to approved, due to the completion of a shoreline survey and water quality meeting the approved standard. For a complete assessment of Brickyard Cove's recommendation for classification upgrade, please refer to the *2009 Growing Area WK Annual Report*.

## **Conditionally Managed Area(s) Activity**

There is one conditionally managed area in growing area WK:

Orrs Cove, Harpswell: Marina/Seasonal Conditional Area: (closed status May 1 through Nov 30), Stations WK 55 and 56.

## **Documentation of Pollution Sources**

The following sections include information on pollution sources which do or may impact water quality in growing area WK. Pollution sources that are reviewed in this section

include domestic waste, including both private inground systems and over board discharges (OBDs), marinas and mooring fields, stormwater and pollution from non-point



sources (streams), farms and other agricultural activities, domestic animals and wildlife areas, and recreational areas.

### **Evaluation of New Pollution Sources**

There were no major changes in pollution sources in the WK growing area during the review years, 2008-2010. There were eight OBDs removed in 2008, three removed in 2009 and one removed in 2010.

### **Re-Evaluation of Existing Pollution Sources**

The following sections are a review of existing pollution sources in growing area WK. Pollution problems associated with domestic waste, including OBDs, which were identified prior to the last triennial are re-evaluated in this section. Other pollution sources, including marinas and mooring fields, municipal wastewater treatment facilities, pollution associated with farms and agricultural activities, and farms which were present at the time of the last triennial review, are also reviewed.

Most of the shoreline in growing area WK had updated shoreline surveys completed in 2008, 2009 and 2010. Actual and potential problems identified are presented in Table 1; any remediation or enforcement action taken by the town and DMR to correct the problems and protect public health is noted in bold font in Table 1, along with the description of the problem. Updates to the status of the pollution (actual vs. potential, direct vs. indirect) based on remediation action are also noted in bold in the table. The pollution source maps (Figures 3 and 4) show the locations of the OBDs, wastewater outfalls, and the actual/direct pollution sources (red flags) and actual/indirect – potential/indirect pollution sources (yellow flags).



**Table 1. Actual and Potential Pollution Sources in Growing Area WK**

Town	Pollution ID	Actual / Potential	Direct / Indirect	Pollution Description	Survey Date
HARPSWELL	PS 1	A	I	Dry well close to shore; <b>LPI OK, Approved</b>	April 10, 2008
	PS2			Grey water pipe to shore; <b>Remediated, Approved</b>	
	PS 3	P	I	Drain pipe to shore bank vicinity of OBD; <b>Remediated, Prohibited</b>	August 14, 2008
	PS 4	A	I	Septic malfunction; <b>Remediated, Approved</b>	August 15, 2008
	PS 5			Septic malfunction; <b>Remediated, Approved</b>	
	PS 6	P	I	Drain pipe into stream to shore; <b>Remediated, Approved</b>	August 28, 2008
	PS 7	A	D	Septic malfunction, property vacant; <b>LPI monitoring, Prohibited</b>	August 24, 2009
	PS 8			Outhouse; <b>Removed, Prohibited</b>	July 14, 2010
	PS 9			Septic malfunction; <b>Remediated, Prohibited</b>	July 29, 2010
	PS 10			Septic malfunction; <b>Remediated, Prohibited</b>	
	PS 11			Grey water drain to shore; <b>Remediated, Prohibited</b>	
	PS 12			Outhouse; <b>LPI notified-to date no remediation, Prohibited</b>	October 19, 2010
	PS 13			Septic malfunction; <b>LPI notified-to date no remediation, Prohibited</b>	
	PS 14			P	I



Figure 3. Growing Area WK Pollution Source Map-Upper Portion

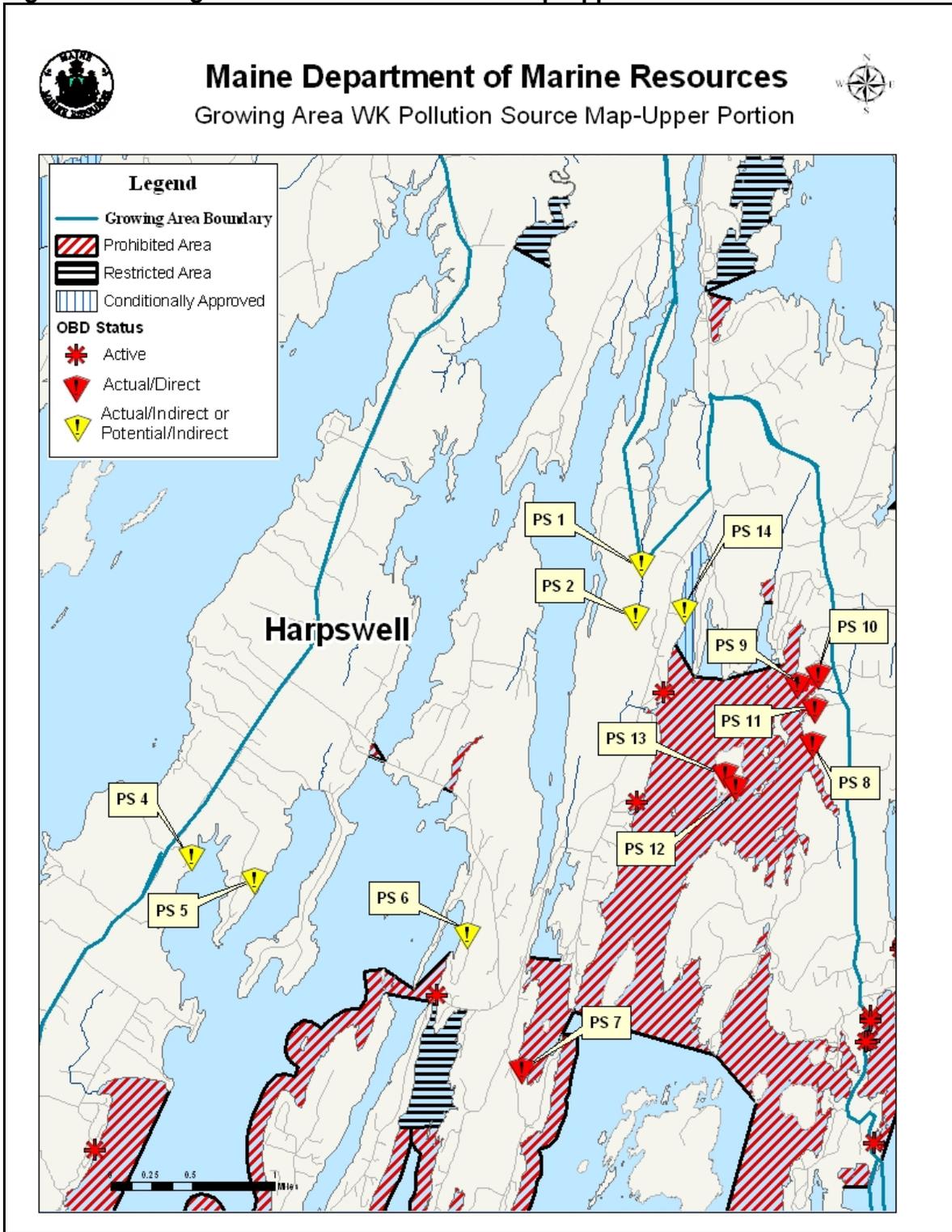
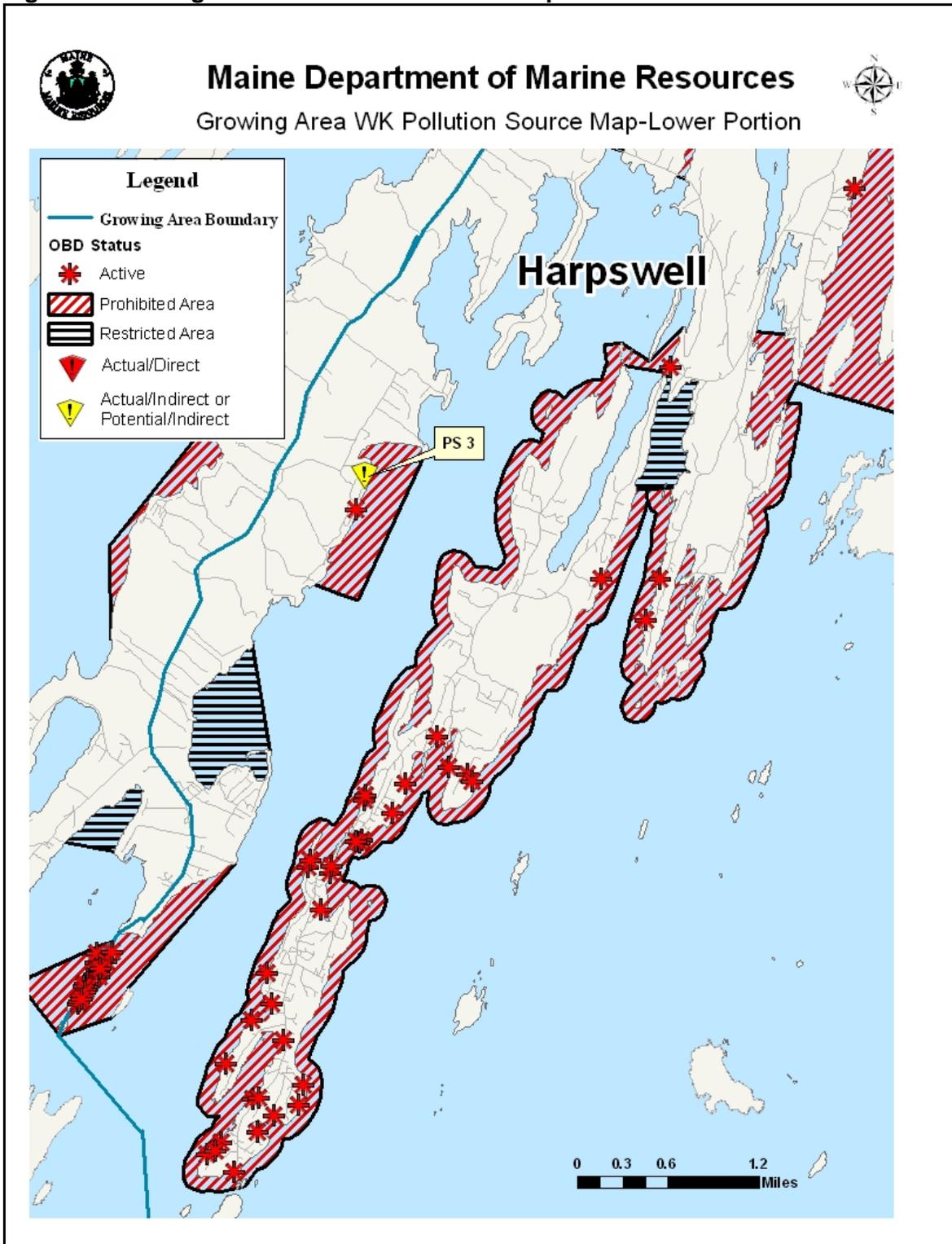




Figure 4. Growing Area WK Pollution Source Map-Lower Portion





### **Domestic Waste**

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

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

OBDs are licensed and inspected by the Maine Department of Environmental Protection. 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. The size of each closure is determined based on a dilution, using the permitted flow rate of the OBD (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  $1.4 \times 10^5$  Fecal Coliforms/100 ml. All current closures are of adequate size to protect public health. There are 52 over board discharges (OBDs) that discharge their treated effluent into the waters of Growing Area WK (Table 2). Twelve OBDs have been removed over the past three review years.



**Table 2. Licensed OBDs in Harpswell, Growing Area WK**

OBD ID	Receiving Waterbody	Flow (gpd)	Acres Needed For Closure	Current Prohibited Acreage
2050	Jaquish Gut	7500	47.00	
7293		300	1.88	
7294		300	1.88	
7295		300	1.88	
		<b>TOTAL</b>	<b>52.64</b>	<b>112</b>
3458	Mackerel Cove	300	1.88	
3632		300	1.88	
4437		300	1.88	
6690		300	1.88	
6759		300	1.88	
		<b>TOTAL</b>	<b>9.4</b>	<b>101</b>
3655	Water Cove	300	1.88	
3853		360	2.26	
7961		1400	8.77	
		<b>TOTAL</b>	<b>12.91</b>	<b>32</b>
1559	Wills Gut	300	1.88	
3665		540	3.38	
		<b>TOTAL</b>	<b>5.26</b>	<b>97</b>
2342	Lowell Cove	300	1.88	
3561		300	1.88	
3587		300	1.88	
3758		300	1.88	
3829		1200	7.52	
7021		300	1.88	
7884		300	1.88	
		<b>TOTAL</b>	<b>18.8</b>	<b>86</b>
1018	Merriconeag Sound	300	1.88	
1692		300	1.88	
1694		250	1.57	
3213		500	3.13	
6083		300	1.88	
2801		300	1.88	
2462		300	1.88	
2482		300	1.88	
2469		300	1.88	
2571		300	1.88	
2871		300	1.88	
2701		300	1.88	
7747		300	1.88	
3995		300	1.88	
2424		300	1.88	
2229	300	1.88		



OBD ID	Receiving Waterbody	Flow (gpd)	Acres Needed For Closure	Current Prohibited Acreage
3411		300	1.88	
1849		300	1.88	
2018		300	1.88	
6106		300	1.88	
2077		1140	7.14	
8093		300	1.88	
		<b>TOTAL</b>	<b>47.56</b>	
3146	Gun Point Cove	300	1.88	
3536		300	1.88	
3560		300	1.88	
4893		300	1.88	
	<b>TOTAL</b>	<b>7.52</b>	<b>500</b>	
3535	Harpwell sound	300	1.88	
4488		300	1.88	
7242		300	1.88	
	<b>TOTAL</b>	<b>5.64</b>	<b>484</b>	
4878	Quahog Bay	300	1.88	
5090		300	1.88	
	<b>TOTAL</b>	<b>3.76</b>	<b>1920</b>	

### ***Municipal WWTP***

There are no wastewater treatment plants in Growing Area WK.

### ***Industrial Pollution***

There are no industrial discharges in Growing Area WK.

### ***Marinas***

Under the NSSP, any shellfish growing area within the confines of a marina proper or mooring field is presumed to be contaminated for some period of time. Therefore, no growing area within the marina proper can be classified approved. The classifications available for marina areas are conditionally approved, conditionally restricted and prohibited. The microbiological and chemical contamination associated with marinas and marina facilities may result in the contamination of shellfish and sediments in the adjacent areas. The NSSP has developed a set of evaluation criteria to be used in determining if the shellfish growing areas adjacent to marinas and mooring fields are affected by contamination associated with sewage.

The NSSP defines 'marinas' as an area that has 10 or more boats with heads. Each mooring field and marina in the growing area must be evaluated. Marina performance standards must be assessed annually utilizing the DMR developed evaluation form and a review of existing performance standards for those marinas that are in conditionally approved and conditionally restricted areas. The sanitary survey and triennial reviews



require a marina inspection. A marina or mooring field that is in a conditional area must be inspected (and documented) prior to the area closing and opening to assure that the conditions of the management plan are met. Marina closure zone calculations are completed using the information from the inspection to input into a DMR model which was developed using the NSSP volumetric calculations. The marina community in Maine only operates for a portion of the year due to adverse winter weather conditions. The management of marinas in Maine allows for shellfish growing areas to be available to harvesters for at least a portion of the year, to direct market harvest, by utilizing conditional area management plans.

The DEP has been authorized by the U.S. Fish and Wildlife Service to administer the Pump-out Grant Program, part of the recently re-authorized Clean Vessel Act. The purpose of the Clean Vessel Act is to reduce the pollution from recreational vessels by providing a safe and legal method for disposing of human sanitary waste. Improperly disposed waste from malfunctioning or non-existent marine sanitation devices (MSDs) often causes serious water quality problems throughout Maine. Through the Maine Coastal Pump-out Grant Program, DEP hopes to better: define the number of boats with installed MSDs, determine whether the average MSDs are operable and whether they are actually used; determine why they are not used; and eliminate the barriers to proper MSD use. The goals are to provide adequate holding tank pump-out locations along the entire coast, further improving accessibility to pump-out facilities by locating mobile pump-out vessels in strategic locations along the coast, and educating the boating public on the importance of responsible sanitary waste management. There is currently one pump out station in area WK, Great Island Boatyard in Orrs Cove.

From an interview with the marina owner on October 12, 2010, Great Island Boatyard, located on the west side of Orrs Cove, provides moorings for a number of recreational (50% sail and 50% power) and work boats, averaging 32 feet, during the summer months. Services provided by the marina include gasoline, marine hardware and supplies, parking, pump-out barge that is emptied by a septage truck, port-a-potties, snack bar, launching, and electricity and water to the dock. The marina operates from May 1 to October 31, with the peak usage from July to September. They have 50 moorings and 66 slips. Of the 116 boats on moorings and slips, 104 of them, or 90%, have heads. The marina calculation determined that 150 acres is needed to dilute potential pollution from 104 boats with heads. Assuming that only 75% of the boats are being used at any given time, the closed area needs to be 112.5 acres. The conditionally approved area around the marina is 172 acres and is closed when the boats are in the water from May 1 through October 31.

Cleaning of engines or engine areas, or use of the collection and treatment system for uses other than originally intended, is prohibited. Engine washwater that may contain significant amounts of oils or fuels is captured separately and disposed of properly. The marina recycles their washwater.

### ***Stormwater***

There are no stormwater systems in Growing Area WK.



**Non-Point Pollution Sources**

Streams drain into Brickyard Cove, Harpswell Cove, Card Cove and Quahog Bay. Water quality may be intermittently impacted by non-point source pollution, especially after rainfall events when stream flow rates increase. In order to assess the impact to the growing area, stream samples were collected throughout the summer and fall, between April 2008 and November 2010. Results of the stream samples are presented in Table 3; flow conditions were estimated at time of sample collection. On several sampling dates a stream sample was collected on the same day as a growing area sample.

Although there is extreme variability between bacteria scores in stream samples and flow rates, upgrades in classification of the four areas were recommended in 2009 and 2010. Based on both stream and P90 scores, a portion of Brickyard Cove is recommended for an upgrade in classification from prohibited to approved; the upper portion of the cove must remain closed in order to provide an adequate dilution area for stream that drains into the head of the cove. Station WK 60 will serve as the boundary station between the approved area and the Quahog Bay prohibited area (south of Brickyard Cove). The stream flowing into the east side of Quahog Bay, between WK 63 and WK 63.1, was sampled three times from August to November, 2010. The bacterial counts ranged from 114 to 140, therefore the recommended upward classification from prohibited to seasonal conditionally approved does not include a small area in the vicinity of the stream.

**Table 3. Stream Sample Results Collected From April 2009 through November 2010 in Growing Area WK**

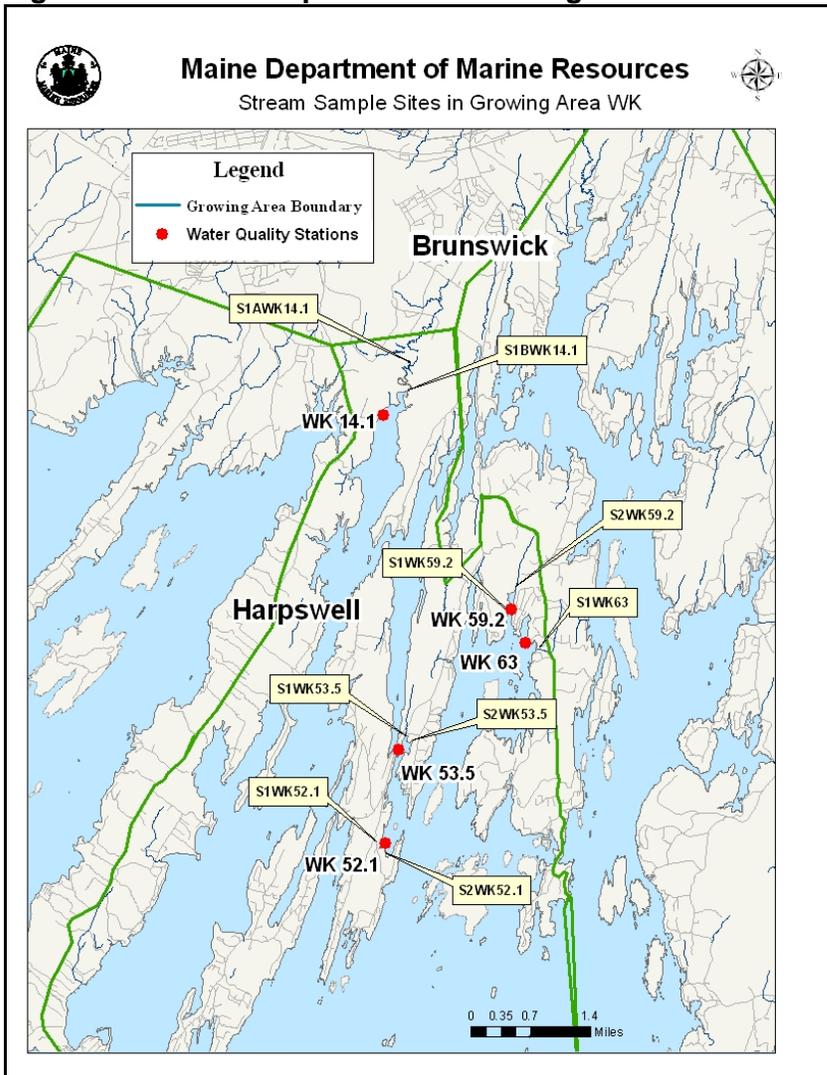
Sample Date	Sample Station	Location	FC/100ml	Stream Flow (gpm)	
4/8/2009	S1WK59.2	Brickyard Cove Harpswell	<2	100	
	S2WK59.2		2	25	
4/27/2009	S2WK59.2		42	No Data	
7/20/2009	S1WK59.2		29		
8/3/2009	S1WK59.2		200		
8/18/2009	S1WK59.2		1220		175
8/24/2009	S1WK52.1		Card Cove Harpswell	1040	No Data
	S2WK52.1			>1600	
9/1/2009	S1WK59.2		Brickyard Cove	13	
9/15/2009				52	
9/30/2009		98			
10/14/2009		22			
11/3/2009		2			
11/17/2009		<2		High	
	S2WK59.2		40		
6/23/2010	S1WK53.5	Card Cove	1480	30	



Sample Date	Sample Station	Location	FC/100ml	Stream Flow (gpm)
	S2WK53.5		200	90
6/29/2010	S1WK52.1		240	10
	S1WK53.5		27	250
	S2WK53.5		138	20
	S1WK53.5		240	No Data
S2WK53.5		1100		
8/4/2010	S1WK53.5		72	Low
	S2WK53.5		72	
8/17/2010	S1WK53.5		50	
	S2WK53.5		180	
8/18/2010	S1WK63	Quahog Bay Harpwell	118	
9/8/2010	S1WK53.5	Brickyard Cove	32	
9/29/2010			16	
	S2WK53.5		360	
	S1WK63	Quahog Bay	140	
10/6/2010	S1AWK14.1	Harpwell Cove	8	
	S1BWK14.1	Brunswick	106	
11/10/2010	S1WK53.5	Card Cove	<2	
	S2WK53.5		8	
	S1WK63	Quahog Bay	114	



Figure 5. Stream Sample Sites in Growing Area WK



***Agricultural Activities***

There are no agricultural activities in growing area WK.

***Domestic Animals and Wildlife Activity***

There are no bird/wildlife sanctuaries/reserves nor domestic animals grazing in growing area WK.

***Conservation/Recreation Areas***

There are no conservation/recreation areas in growing area WK.



## Water Quality Review and Discussion

Table 4 lists all active approved, restricted and prohibited stations in Growing Area WK, with their respective Geomean and P90 calculations for 2010; Table 5 lists the conditionally approved stations in area WK, with their respective geometric mean and P90 calculations in the open status only. Please refer to Appendix C for a key to interpreting the headers on the columns of Table 4. The approved and restricted standards for each station are also displayed in Tables 4 and 5. These standards will fluctuate yearly as a result of the DMR transition from a most probable number (MPN) fecal coliform test method to a membrane filtration (MF) method and are dependent on the number of sample analyzed by MPN 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 MFCNT column. This fluctuating standard will cease when all 30 data points have been analyzed by the MF method. All approved and restricted stations met their NSSP classification standard in 2010. Boundary stations with approved areas must meet the approved classification; in 2010, all boundary stations met the approved standard. Stations with less than 30 data points in their dataset are considered “New” and were not evaluated against the classification standard of the area in which they are located.

**Table 4. Geometric Means and P90 Scores, Growing Area WK**

Station	Class	Count	MFCnt	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WK002.00	P-boundary	30	26	2.6	0.31	43	6.6	32	176	3/15/2006
WK004.00	A	30	30	2.4	0.39	148	7.9	31	163	4/11/2007
WK005.00	R	30	30	4.7	0.53	126	23	31	163	3/27/2007
WK005.50	R-new	20	20	2.7	0.52	380	13.3	31	163	9/21/2009
WK006.10	A	30	30	2.5	0.28	36	5.8	31	163	4/11/2007
WK007.00	A	30	30	2.1	0.13	8	3.2	31	163	1/10/2007
WK007.10	P	30	26	5.8	0.61	220	36.2	32	176	3/15/2006
WK008.00	A	30	26	3.4	0.56	180	18.2	32	176	3/15/2006
WK009.00	A	30	27	3.2	0.52	320	15	32	173	3/15/2006
WK010.00	A	30	27	2.8	0.41	280	9.7	32	173	3/15/2006
WK011.00	A	30	28	3.1	0.55	800	16.4	31	169	3/15/2006
WK012.00	A	30	26	2.9	0.33	36	7.7	32	176	3/15/2006
WK013.10	P	30	26	3.3	0.4	42	10.9	32	176	11/3/2005
WK013.20	P	30	26	3	0.42	82	10.4	32	176	3/15/2006
WK013.30	A	30	27	3.1	0.34	38	8.7	32	173	4/12/2006
WK014.00	A	30	27	3.9	0.53	200	19.1	32	173	4/12/2006
WK014.05	A-boundary	1	1	4		4		31	163	10/6/2010
WK014.10	A	30	30	4	0.55	160	21.3	31	163	2/25/2008
WK014.20	A	30	30	3	0.33	20	8.3	31	163	2/25/2008
WK014.30	A	30	30	2.7	0.29	13	6.4	31	163	6/16/2008
WK014.40	A	30	28	2.1	0.16	14	3.5	31	169	7/31/2006



Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WK015.10	A	30	27	2.2	0.18	13	3.8	32	173	4/12/2006
WK017.00	A	30	26	2.6	0.34	90	7.2	32	176	3/15/2006
WK018.00	A	30	28	2.6	0.33	56	7.1	31	169	7/31/2006
WK018.10	A	30	27	2.3	0.25	31	5.1	32	173	6/21/2006
WK019.80	A	30	27	2.9	0.34	42	8.1	32	173	3/15/2006
WK020.00	P	30	27	3.5	0.46	150	13.9	32	173	3/15/2006
WK022.00	P	30	27	2.1	0.09	4	2.8	32	173	4/12/2006
WK023.00	A	30	30	3.9	0.4	40	13	31	163	4/4/2007
WK023.10	P-new	22	22	3	0.58	1120	17.7	31	163	3/18/2009
WK023.20	P-new	22	22	2.5	0.39	120	8.1	31	163	3/18/2009
WK024.00	P	30	26	5.5	0.69	920	43.5	32	176	3/15/2006
WK025.00	P	30	26	3.3	0.42	78	11.5	32	176	3/15/2006
WK042.00	P	30	26	3.4	0.59	1440	20.1	32	176	3/15/2006
WK044.00	R	30	26	2.5	0.32	76	6.7	32	176	2/7/2006
WK044.50	R	30	26	2.5	0.32	33	6.6	32	176	3/15/2006
WK048.00	P	30	26	5.7	0.72	1200	48.9	32	176	3/15/2006
WK052.00	P	30	26	4.5	0.58	420	25.4	32	176	3/15/2006
WK052.10	P	30	30	8.9	0.7	340	71.6	31	163	11/24/2008
WK052.80	P-new	7	7	4.4	0.45	18	17.3	31	163	4/14/2010
WK052.90	P-new	17	17	4.2	0.87	1700	58.4	31	163	9/16/2009
WK053.00	A	30	30	4.7	0.5	52	21.3	31	163	4/15/2008
WK053.50	A-new	9	9	5.3	0.55	54	28.7	31	163	4/14/2010
WK054.50	P-new	12	12	2.1	0.11	4	3	31	163	2/25/2009
WK057.00	P	30	30	2.3	0.35	152	6.7	31	163	9/24/2007
WK058.00	A	30	30	2.5	0.37	116	7.5	31	163	9/24/2007
WK059.20	A	30	30	3.3	0.36	28	9.7	31	163	11/24/2008
WK060.00	A	30	30	2.4	0.29	18	5.8	31	163	6/16/2008
WK061.00	P	30	26	6.4	0.62	118	40.9	32	176	3/15/2006
WK063.00	P	30	26	3.7	0.66	1700	26.9	32	176	3/15/2006
WK063.10	P-new	12	12	5.5	0.42	31	20	31	163	2/25/2009
WK063.20	P-new	12	12	1.9	0	2	1.9	31	163	3/30/2009
WK064.10	P	30	26	3.2	0.47	94	13.2	32	176	3/15/2006
WK065.00	P	30	26	6.1	0.83	1700	72.9	32	176	3/15/2006
WK066.00	P	30	26	4.1	0.49	66	17.7	32	176	3/15/2006
WK067.00	P	30	26	3.2	0.35	42	9.3	32	176	3/15/2006
WK068.00	P	30	26	8	0.86	1100	101.6	32	176	3/15/2006
WK068.10	P	30	26	2.6	0.38	93	8.1	32	176	3/15/2006



**Table 5. Orrs Cove Marina Seasonal Conditional Area, Open Status (December 1- April 30)**

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd Std	Restr Std	Min Date
WK055.00	CA	30	22	3.4	0.44	106	12.7	35	191	4/27/2005
WK056.00	CA	30	22	4.4	0.57	743	24.2	35	191	12/7/2005

All approved, restricted and prohibited stations that were active at the beginning of 2010 were sampled at least 6 times following the systematic random sampling (SRS) schedule (Table 6). Conditional area stations WK 55 and 56 are open five months of the year and were collected five times in the open status as required. At many stations, additional samples were collected under adverse conditions and some stations had additional sampling effort in the open status (extra samples). The classification (noted as Class) noted in Table 6 reflect classification at time of sample collection. The conditionally approved stations in Orrs Cove were sampled monthly in the open status.

**Table 6. WK Samples Collected in 2010**

Station	Class	Adverse		Extra		Random		Total	Comments
		Closed	Open	Closed	Open	Closed	Open		
WK002.00	P	1				6		7	
WK004.00	A		1				6	7	
WK005.00	R		1				6	7	
WK005.50	R		2		10		6	18	
WK006.10	A		1				6	7	
WK007.00	A		1				6	7	
WK007.10	P	1				6		7	
WK008.00	A	15	1				6	22	
WK009.00	A		1				6	7	
WK010.00	A		1				6	7	
WK011.00	A						6	6	
WK012.00	A						6	6	
WK013.10	P					6		6	
WK013.20	P					6		6	
WK013.30	A						6	6	
WK014.00	A						6	6	
WK014.05	A						1	1	
WK014.10	A						6	6	
WK014.20	A						6	6	
WK014.30	A				1		6	7	
WK014.40	A				1		6	7	
WK015.10	A						6	6	
WK017.00	A						6	6	
WK018.00	A	15	1				6	22	
WK018.10	A						7	7	
WK019.80	A						6	6	



Station	Class	Adverse		Extra		Random		Total	Comments
		Closed	Open	Closed	Open	Closed	Open		
WK020.00	P					6		6	
WK022.00	P					6		6	
WK023.00	A						6	6	
WK023.10	P	1		9		6		16	
WK023.20	P	1		9		6		16	
WK024.00	P					6		6	
WK025.00	P					6		6	
WK042.00	P					6		6	
WK044.00	R						6	6	
WK044.50	R						6	6	
WK048.00	P					6		6	
WK052.00	P					6		6	
WK052.10	P	1		9		6		16	
WK052.80	P	1		2		5		8	
WK052.90	P	1		8		6		15	
WK053.00	A	16			5		5	26	Reclassified P to A 3/10/2010
	P	1				1		2	
WK053.50	A		1		3		6	10	
WK054.50	P					6		6	
WK055.00	CA	7				4	5	16	
WK056.00	CA					4	5	9	
WK057.00	P					9		9	
WK058.00	A				1		5	6	Reclassified CA to A 3/10/2010
	CA						2	2	
WK059.20	A				1			1	Reclassified P to A 11/3/2010
	P	1		7		6		14	
WK060.00	P	1		7		6		14	
WK061.00	P					6		6	
WK063.00	P	1				6		7	
WK063.10	P	1				6		7	
WK063.20	P	1				6		7	
WK064.10	P					6		6	
WK065.00	P					6		6	
WK066.00	P					6		6	
WK067.00	P					6		6	
WK068.00	P					6		6	
WK068.10	P					6		6	

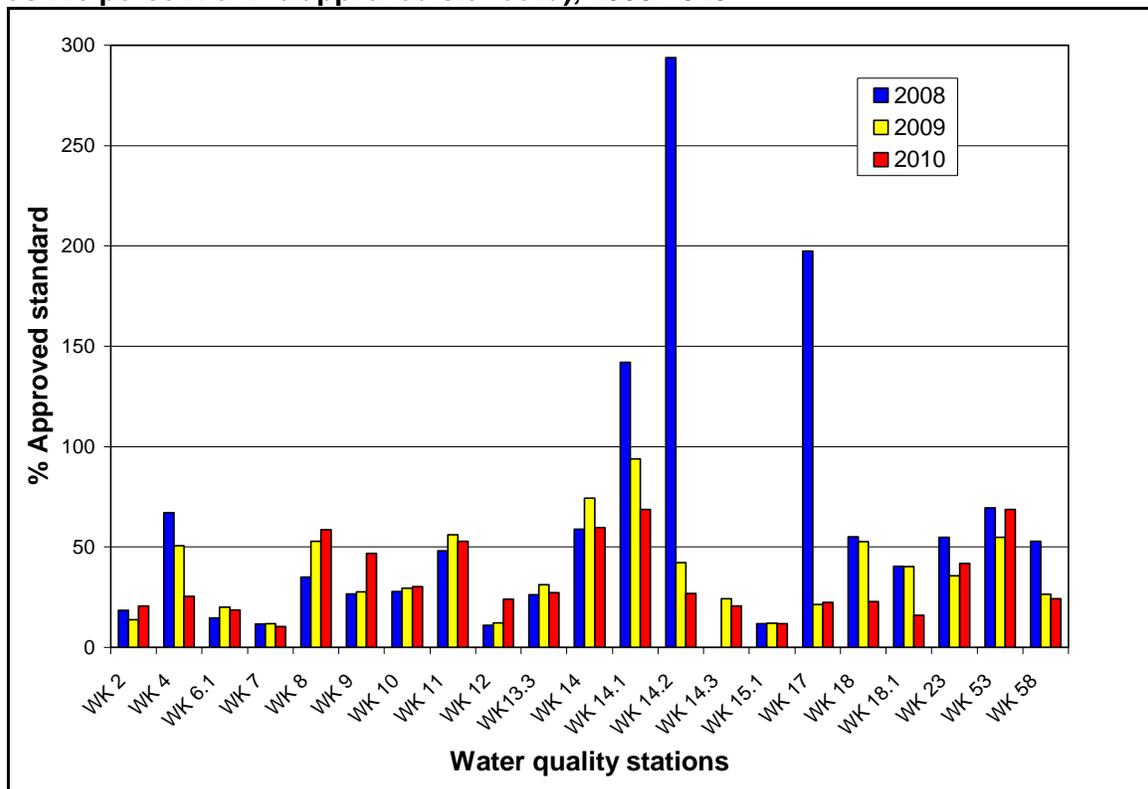
Figures 6 and 7 show the P90 trends over the past three years, for all approved and conditionally approved stations in growing area WK, respectively; Figure 7 shows data collected during the open status only. During the transition from MPN to MF analysis method, the approved standard will decrease every 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 P90 score column on or above 100 percent does not meet the NSSP standard for classification.

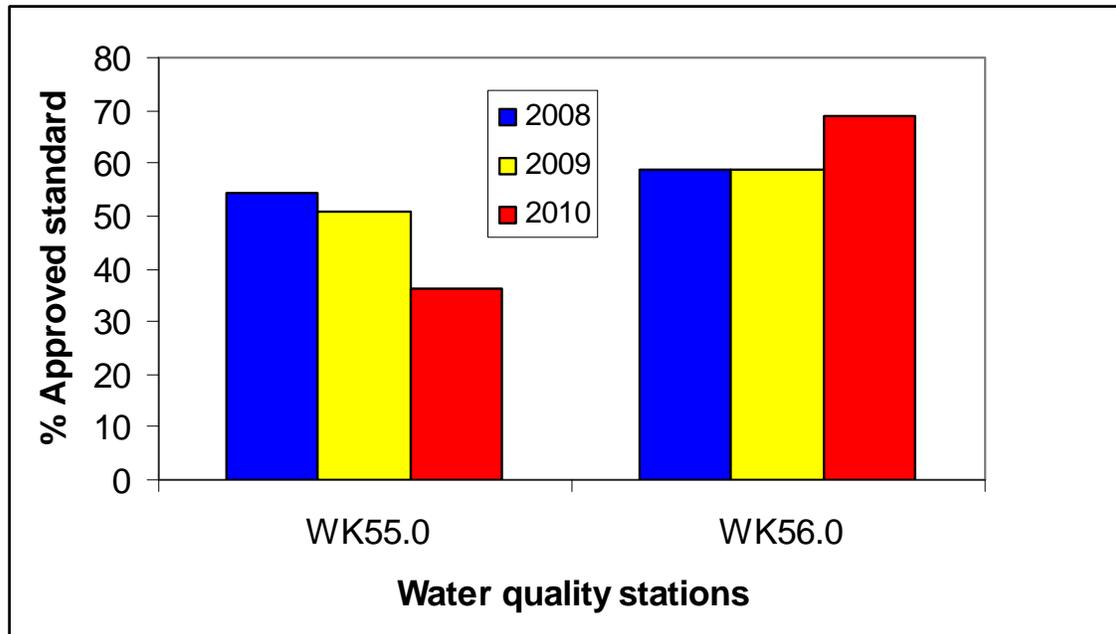
At the end of 2010, all approved stations in WK were well below the approved standard (Figure 6). Most stations have shown declining trends (improving water quality) or no notable changes in water quality scores. Station WK 11 is located at the head of a marshy area; non-point pollution from wildlife, in combination with higher flow rates from the marsh due to higher than average rainfall amounts over the past several review years may be contributing to increasing scores in 2008 and 2009. As a result of significant improvement in the P90 trends for approved stations WK 14.1 and 14.2 (Harpwell Cove), and WK 58 (Mill Cove), these stations were recommended for upward classification in 2009; *Recommendation for Upward Classification* section of the 2009 WK Annual Report. Station WK 17 (Long Reach) score was nearly 200% higher than the approved standard due to pollution sources observed during a shoreline survey. Following remediation the scores in 2009 and 2010 were 21.4 and 22.5 percent, respectively, of the approved standard.

**Figure 6. Area WK P90 Scores for Approved and Boundary Stations (expressed as the percent of the approved standard), 2008-2010**





**Figure 7. Area WK P90 Scores for Orrs Cove Conditionally Approved Stations (expressed as the percent of the approved standard), Open Status, 2008-2010**



### Upward Classification Changes

During the review years, 2008-2010, three areas in Harpswell (Brickyard Cove, Card Cove and Mill Cove) and one area in Brunswick (Harpswell Cove) were recommended for upward classification. For details please visit the DMR website:

[www.maine.gov/dmr/rm/public\\_health/G\\_A\\_reports/annualwk2009.pdf](http://www.maine.gov/dmr/rm/public_health/G_A_reports/annualwk2009.pdf) - 2010-03-09

The recommendation for an upward classification in Quahog Bay (Harpswell) is presented in Appendix B of this report.

### Shoreline Survey Activity during the Review Period (2008-2010)

#### 2008

In 2008, shoreline survey work was completed in the following areas of growing area WK by DMR staff and the town of Harpswell's Marine Warden: middle of Harpswell Neck, the southern portion of Long Cove (Harpswell), Long Reach, Lumbos Hole (Harpswell) and the islands which fall into the boundaries of the town of Harpswell. Follow up work in areas where potential and actual problems were identified was completed by the town of Harpswell CEO.



## 2009

On August 24, 2009, DMR and Harpswell's Marine Warden surveyed 52 properties in Mill Cove and Orrs Cove Area (maps 47 and 48). No actual or potential problems were identified. A follow up survey was conducted in Card Cove, near station WK 52.1. It was noted that a property with a septic system malfunction and a "Do Not Occupy" order was being used; findings were reported to the town CEO/LPI.

On September, 17, 2009, DMR and Harpswell's Marine Warden surveyed 32 properties on High Head (Map 7), Harpswell. This area has been closed due to lack of sanitary survey work. No actual or potential problems were observed.

On September 24, 2009, DMR and Harpswell's Marine Warden surveyed 20 properties in Orrs Cove (Harpswell), Maps 47 and 48. No actual or potential problems were observed.

## 2010

On July 14, 2010, DMR and Harpswell's Marine Warden surveyed 25 properties in the vicinity of Fish House Cove and along eastern shore of Quahog Bay (these portions had never been surveyed). One actual pollution source was found (outhouse too close to shore, Map 56). Problem was reported to Harpswell's LPI. Outhouse was removed on 10/4/10.

On July 29, 2010, DMR and Harpswell's Marine Warden surveyed 21 properties on Harpswell in Quahog Bay (eastern shore), Maps 56 and 55. Two actual problems were found. One property had a side of the leach field blown out and leaking towards a stream which drains into Quahog Bay. Problem was reported to Harpswell's LPI. Remediation was completed in October, 2010. On the second property black water was leaking out of the top of the septic tank (30 ft from shore of Quahog Bay. Problem was reported to Harpswell's LPI. Confirmed fixed and working properly on 8/18/10 by LPI.

On October 19, 2010, one property on Snow Island, one property on Ben Island and six properties on Pole Island in Quahog Bay (Map 46) were surveyed by DMR, Harpswell's Marine Warden and a Cumberland County sheriff deputy. No problems were observed on Ben Island and Pole Island, however, there were two actual problems on Snow Island. Approximately 150 feet from the dock (SE end of the island) an active outhouse with an underground discharge pipe was observed exiting the bank and over the shoreline. The second problem was at the main house located approximately 200 feet uphill from the NW corner of a large cove. A strong sewer odor was noted near the septic system which was located next to the shoreside of the house. Problems were reported to Harpswell's LPI. To date there has been no remediation of either problem.

## Aquaculture/Wet Storage Activity

There are no aquaculture leases nor wet storage sites in growing area WK.



## Recommendation for Future Work

Follow-up surveys on several properties with active septic issues

Intensify stream sampling and flowmeter data collection.

Town requests for DMR to prioritize:

- West side of Orrs Island
- Stovers Cove, Harpswell
- Harpswell Cove
- Strawberry Creek
- Clark cove

Resurvey Gunpoint Cove in 2012 or 2013

Continue monitoring closely Card Cove and Laurel Cove

## References

DMR legal notices

[http://www.maine.gov/dmr/rm/public\\_health/closures/closedarea.htm#K](http://www.maine.gov/dmr/rm/public_health/closures/closedarea.htm#K)

DMR 2009 Annual Report

[www.maine.gov/dmr/rm/public\\_health/G\\_A\\_reports/annualwk2009.pdf](http://www.maine.gov/dmr/rm/public_health/G_A_reports/annualwk2009.pdf) - 2010-03-09

Stream sampling rainfall data

<http://www.wunderground.com/cgi-bin/findweather/hdfForecast?query=04011>

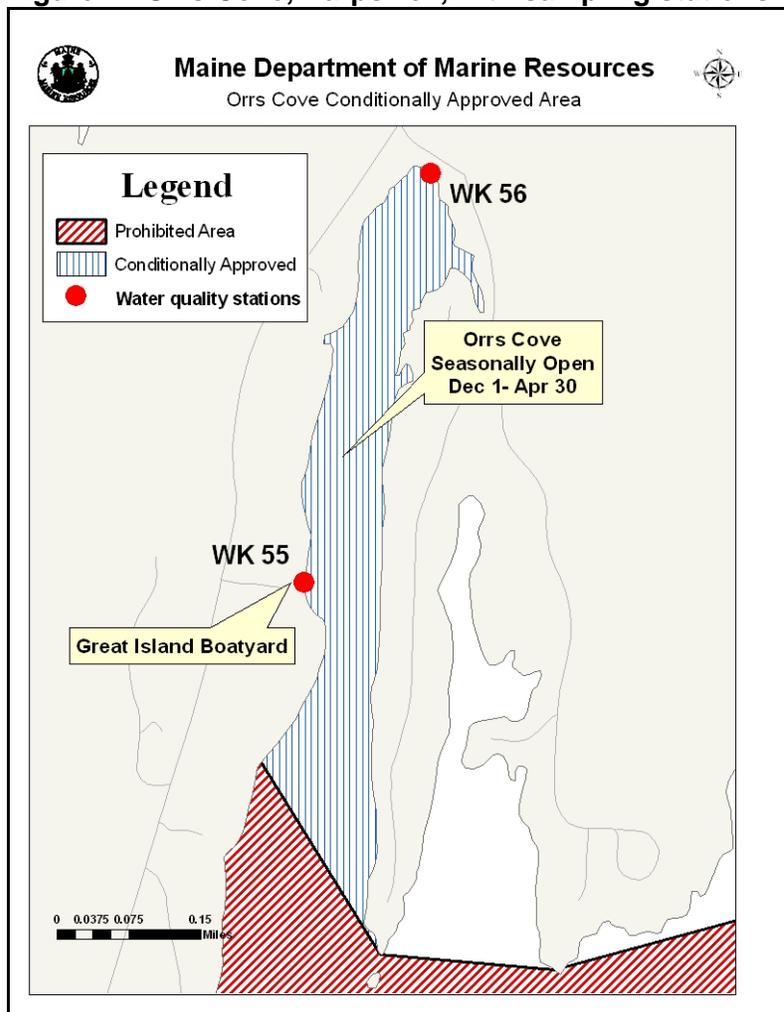


## Appendix A. Annual Review of Management Plan- Orrs Cove, Great Island Boatyard, Seasonal Conditional Area No. 18

### Scope

Orrs Cove is conditionally approved based on the presence or absence of 10 or more boats with heads at the Great Island Boatyard, which may discharge into Orrs Cove. Orrs Cove is monitored by stations WK 55 and 56 and was classified conditionally approved in August 2002, after DMR evaluated the Orrs Cove data, made observations of the marina, and interviewed the marina owner with regard to annual marina usage. The marina owner was re-interviewed in December 2008; all information regarding marina use was updated and a dilution area calculation based on the updated information was completed. Currently, the marina operates between May 1<sup>st</sup> and October 31<sup>st</sup>, with peak season July through September. The current open status for Orrs Cove Conditionally Approved area is from December 1 through April 30; a five month period of time.

Figure 1. Orrs Cove, Harpswell, with sampling stations





**Compliance with management plan**

In 2010, the seasonal conditional area closed on May 1 and reopened on December 1. Prior to reopening, the area was visited on October 12, 2010 to confirm there were fewer than 10 boats with heads remaining in the water, and a review of the water quality showed that the area continued to meet approved standards for the open season.

**Adequacy of reporting and cooperation of involved persons**

An annual data review is required prior to the area’s seasonal reopening on December 1<sup>st</sup>. The area also required site visits prior to the area reopening and closing, to confirm that the number of boats with heads present in the marina is less than 10. In 2010, the observations were completed on April 12 for closing status (six boats present) and October 12 for opening status (six boats present). The seasonal closure is enforced by the DMR Marine Patrol and the local Shellfish Warden. Cooperation between the involved parties has been excellent.

**Compliance with approved growing area criteria**

The annual review of the water quality for all active stations meets approved standards during the open status time period as displayed in Table 1.

**Table 1. Orrs Cove Conditional Area Geomean and P90-Open Status Dec 1 – Apr 30**

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WK055.00	CA	30	22	3.4	0.44	106	12.7	35	191	4/27/2005
WK056.00	CA	30	22	4.4	0.57	743	24.2	35	191	12/7/2005

**Field inspection of critical pollution sources**

The potential for pollution in Orrs Cove comes from boats with heads that are moored at the Great Island Boatyard. Visual observations are made of Orrs Cove at the end of April and in October to ensure that there are fewer than 10 boats with heads in the cove.

**Water sampling compliance history**

In 2010, each station in this conditional area was sampled 5 times in the open status, as required.

**Analysis-Recommendations**

This area is properly classified, and no additional work is recommended for this area.



## Appendix B. Upward Classification of Quahog Bay

Eastern Quahog Bay, monitored by stations WK 63, WK 63.1, WK 63.2 and WK 64.1, is being proposed for an upgrade in classification from prohibited to conditionally approved based on season (OPEN status from October 1 to May 31). Prior to being reclassified from approved to prohibited in May 2006, due to non-point pollution sources negatively impacting water quality, Quahog Bay was last surveyed in 1994. To better assess water quality in this area two new stations (WK 63.1 and WK 63.2) were established in late winter of 2009.

During the summer of 2010, properties along the eastern shore of Quahog Bay were surveyed. Three actual problems were identified (Figure 1) and reported to Harpswell's Codes Enforcement Officer (CEO). Two of the problems were fixed and the third was repaired.

In October 2010, properties on three islands in Quahog Bay (Snow Island, Pole Island, Ben Island) were surveyed. Two actual problems were identified on Snow Island (Figure 1). One was an active outhouse discharging directly onto shore and the other was a malfunctioning septic system within 200 feet of the shore. These were immediately reported to the town CEO. Town inspections have not occurred as of this report date. Table 1 shows all water quality scores for stations WK 63, WK 63.1, WK 63.2 and WK 64.1 from 2000 through 2010; daily rainfall amounts within 4 days of sample collection, as well as the cumulative rainfall amount and tidal stages are also presented in this table. New stations (2009) WK 63.1 and WK 63.2 (n=13) have consistently shown individual water quality scores below the approved variability standard since they were established in 2009. However, since 2000, stations WK 63 and WK 64.1 have occasionally exceeded the approved standard during the summer and fall. The tidal effect was negligible since the high scores occurred during both flood and ebb cycles.

A rainfall assessment was completed for all four stations using data collected after more than 0.5 inch of cumulative rainfall throughout the year (Table 1). Data where the cumulative rainfall within four days of collection exceeded 0.5 inch are highlighted in yellow. The approved standard was exceeded twice in November (2002 and 2006) for station WK 63, and once in November 2005 for station WK 64.1 (elevated scores highlighted in turquoise). One of the elevated scores occurred after more than 2 inches of rain occurring in 24 hours (November 30, 2005); under the current flood protocol this amount of rainfall would constitute an emergency flood closure. The grayed out months are the proposed CLOSED status period. To further assess the impact of rainfall on water quality the P90 scores were recalculated using only data collected after 0.5 inch of rainfall (cumulative four days), during the proposed OPEN status month. The P90 scores met the approved standard at all stations (Table 2). Based on these data eastern Quahog Bay is recommended for an upgrade from prohibited to a conditionally approved OPEN status from October 1 through May 31 (Figure 1).



**Table 1. Stations WK 63, WK 63.1, WK 63.2, WK 64.1, Rainfall and Seasonal Assessment, 2000-2010**

Rain 3 day	Rain 4 day	Station	Date	Tide	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.17	0.17	WK063.00	20-Apr-00	H				2.9								
0.03	0.03	WK063.00	17-May-00	HE					2.9							
0	0.07	WK063.00	28-Jun-00	E						3.6						
0	0	WK063.00	26-Jul-00	E							43					
0.26	0.26	WK063.00	23-Aug-00	LF								2.9				
0.04	0.04	WK063.00	28-Sep-00	H									240			
0.04	0.04	WK063.00	18-Apr-01	E				2.9								
0.14	0.14	WK063.00	16-May-01	E					3.6							
0.84	0.98	WK063.00	13-Jun-01	LE						2.9						
0.54	0.54	WK063.00	18-Jul-01	HF							9.1					
0	0	WK063.00	23-Jul-01	F							1100					
0.03	0.04	WK063.00	15-Aug-01	E								2.9				
0.02	0.02	WK063.00	23-Apr-02	HE				3.6								
0	0	WK063.00	07-May-02	HE					2.9							
0.75	0.75	WK063.00	11-Jun-02	F						2.9						
0.19	0.19	WK063.00	10-Jul-02	HF							3.6					
0	0	WK063.00	13-Aug-02	LF								2.9				
1.33	2.24	WK063.00	18-Sep-02	F									2.9			
2.08	2.08	WK063.00	06-Nov-02	F											93	
0	0	WK063.00	17-Apr-03	HF				2.9								
0.64	0.64	WK063.00	05-Jun-03	L						2.9						
0	0	WK063.00	31-Jul-03	F							9.1					
0.04	0.04	WK063.00	28-Aug-03	F								3.6				
1.74	1.76	WK063.00	04-Sep-03	E									93			
0.04	0.04	WK063.00	19-Nov-03	L											3.6	
0.92	0.92	WK063.00	03-May-04	H					23							
0.2	0.2	WK063.00	07-Jun-04	F						2.9						
0.01	1.2	WK063.00	12-Jul-04	E							43					
0.41	0.53	WK063.00	18-Aug-04	F								3.6				
0	0	WK063.00	13-Sep-04	H												
1.4	1.4	WK063.00	29-Nov-04	HE											3.6	
0.16	0.16	WK063.00	11-May-05	HF					3.6							
0.18	0.18	WK063.00	29-Jun-05	E						23						
0.11	0.11	WK063.00	20-Jul-05	HF							460					
2.53	2.56	WK063.00	31-Aug-05	HE								3.6				
2.22	2.22	WK063.00	30-Nov-05	HE											23	
0	1.59	WK063.00	19-Dec-05	HF												3
0.95	1.57	WK063.00	07-Feb-06	E		2.9										
1.1	1.11	WK063.00	15-Mar-06	H			2.9									
0.01	0.01	WK063.00	12-Apr-06	HF				2.9								
0.26	0.26	WK063.00	20-Jun-06	E						3.6						
0.05	0.05	WK063.00	09-Aug-06	H								43				



WK Triennial Review  
Effective Date 1/30/12

Rain 3 day	Rain 4 day	Station	Date	Tide	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.66	1.66	WK063.00	20-Sep-06	H									1700			
1.98	2.63	WK063.00	15-Nov-06	E											82	
0.87	0.89	WK063.00	16-Jan-07	E	1.9											
0.3	0.3	WK063.00	12-Mar-07	F			2									
1.36	1.57	WK063.00	01-May-07	HF					1.9							
0	0.06	WK063.00	25-Jun-07	E						2						
0	0	WK063.00	20-Aug-07	LF								1.9				
0.34	1.02	WK063.00	22-Oct-07	E										2		
0.02	0.02	WK063.00	26-Mar-08	F			1.9									
0	0	WK063.00	16-Apr-08	HE				2								
0.11	0.11	WK063.00	16-Jun-08	H						1.9						
0.12	0.17	WK063.00	05-Aug-08	F								1.9				
0.03	0.03	WK063.00	15-Oct-08	HF										1.9		
0	0	WK063.00	24-Nov-08	HF											1.9	
0.03	0.43	WK063.00	25-Feb-09	H		1.9										
0	0	WK063.00	13-Apr-09	HF				1.9								
0	0	WK063.00	08-Jun-09	HE						18						
0	0.4	WK063.00	03-Aug-09	HE								2				
0	0	WK063.00	15-Sep-09	E									2			
0.03	0.04	WK063.00	03-Nov-09	HF											1.9	
0	0	WK063.00	09-Feb-10	E		1.9										
0	0	WK063.00	14-Apr-10	H				1.9								
0	0	WK063.00	17-May-10	H					1.9							
0	0	WK063.00	06-Jul-10	E							2					
0.21	0.21	WK063.00	18-Aug-10	E								1.9				
0	0	WK063.00	12-Oct-10	H										26		
1.16	2.07	WK063.00	10-Nov-10	H											2	
0.03	0.43	WK063.10	25-Feb-09	HE		1.9										
0.02	0.02	WK063.10	28-Apr-09	E				18								
0	0.4	WK063.10	03-Aug-09	HE								3.6				
0	0	WK063.10	15-Sep-09	E									14			
0.03	0.04	WK063.10	03-Nov-09	H											1.9	
0	0.45	WK063.10	16-Dec-09	HE												31
0	0	WK063.10	14-Apr-10	H				6								
0	0	WK063.10	17-May-10	H					2							
0	0	WK063.10	06-Jul-10	E							10					
0.21	0.21	WK063.10	18-Aug-10	E								3.6				
0	0	WK063.10	12-Oct-10	H										10		
1.16	2.07	WK063.10	10-Nov-10	HE											1.9	
(blank)	(blank)	WK063.10	07-Dec-10	HE												1.9
0.43	0.49	WK063.20	30-Mar-09	HF			1.9									
0.02	0.02	WK063.20	28-Apr-09	E				1.9								
0	0.4	WK063.20	03-Aug-09	HE								1.9				



WK Triennial Review  
Effective Date 1/30/12

Rain 3 day	Rain 4 day	Station	Date	Tide	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	WK063.20	15-Sep-09	E									1.9			
0.03	0.04	WK063.20	03-Nov-09	H											1.9	
0	0.45	WK063.20	16-Dec-09	HE												1.9
0	0	WK063.20	09-Feb-10	E		1.9										
0	0	WK063.20	14-Apr-10	HE				1.9								
0	0	WK063.20	17-May-10	H					1.9							
0	0	WK063.20	06-Jul-10	E							1.9					
0.21	0.21	WK063.20	18-Aug-10	E								1.9				
0	0	WK063.20	12-Oct-10	H										2		
1.16	2.07	WK063.20	10-Nov-10	HE											1.9	
0.17	0.17	WK064.10	20-Apr-00	H				2.9								
0.03	0.03	WK064.10	17-May-00	HE					2.9							
0	0.07	WK064.10	28-Jun-00	E						43						
0	0	WK064.10	26-Jul-00	E							23					
0.26	0.26	WK064.10	23-Aug-00	LF								3.6				
0.04	0.04	WK064.10	28-Sep-00	H									3.6			
0.04	0.04	WK064.10	18-Apr-01	HE				2.9								
0.14	0.14	WK064.10	16-May-01	E					2.9							
0.84	0.98	WK064.10	13-Jun-01	E						3.6						
0.54	0.54	WK064.10	18-Jul-01	HF							3.6					
0	0	WK064.10	23-Jul-01	F							15					
0.03	0.04	WK064.10	15-Aug-01	E								2.9				
0.02	0.02	WK064.10	23-Apr-02	E				2.9								
0	0	WK064.10	07-May-02	HE					2.9							
0.75	0.75	WK064.10	11-Jun-02	F						2.9						
0.19	0.19	WK064.10	10-Jul-02	HF							9.1					
0	0	WK064.10	13-Aug-02	LF								3.6				
1.33	2.24	WK064.10	18-Sep-02	F									2.9			
2.08	2.08	WK064.10	06-Nov-02	F											3	
0	0	WK064.10	17-Apr-03	HF				2.9								
0.64	0.64	WK064.10	05-Jun-03	L						240						
0	0	WK064.10	31-Jul-03	F							3.6					
0.04	0.04	WK064.10	28-Aug-03	F								9.1				
1.74	1.76	WK064.10	04-Sep-03	E									1100			
0.04	0.04	WK064.10	19-Nov-03	LE											2.9	
0.92	0.92	WK064.10	03-May-04	H					9.1							
0.2	0.2	WK064.10	07-Jun-04	F						3.6						
0.01	1.2	WK064.10	12-Jul-04	E							2.9					
0.41	0.53	WK064.10	18-Aug-04	F								2.9				
0	0	WK064.10	13-Sep-04	H									2.9			
1.4	1.4	WK064.10	29-Nov-04	HE											2.9	
0.16	0.16	WK064.10	11-May-05	HF					2.9							
0.18	0.18	WK064.10	29-Jun-05	E						9.1						
0.11	0.11	WK064.10	20-Jul-05	HF							43					



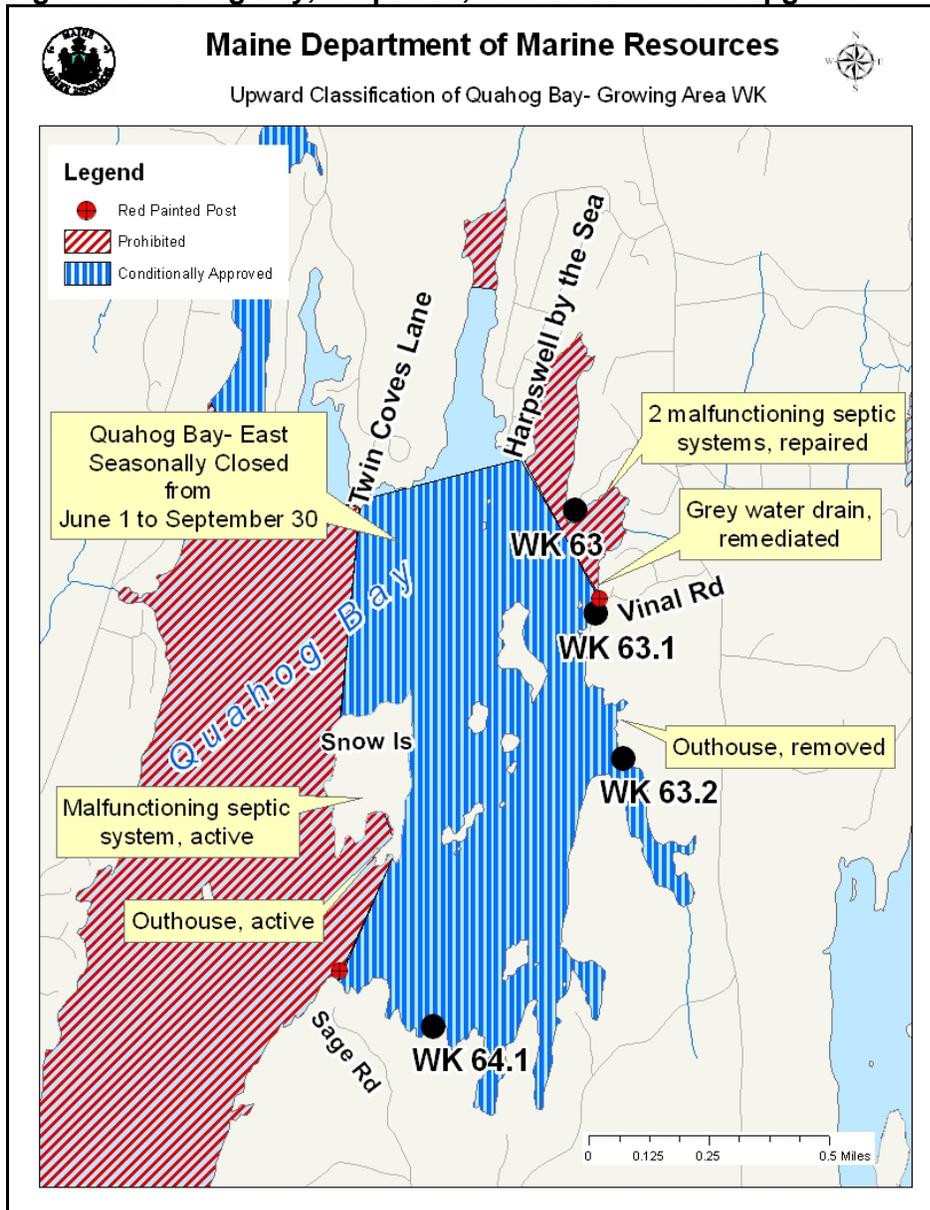
Rain 3 day	Rain 4 day	Station	Date	Tide	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.53	2.56	WK064.10	31-Aug-05	HE								2.9				
2.22	2.22	WK064.10	30-Nov-05	HE											240	
0	1.59	WK064.10	19-Dec-05	HF												2.9
0.95	1.57	WK064.10	07-Feb-06	E		2.9										
1.10	1.11	WK064.10	15-Mar-06	H			2.9									
0.01	0.01	WK064.10	12-Apr-06	H				2.9								
0.26	0.26	WK064.10	20-Jun-06	E						3.6						
0.05	0.05	WK064.10	09-Aug-06	H								2.9				
1.66	1.66	WK064.10	20-Sep-06	H									94			
1.98	2.63	WK064.10	15-Nov-06	E											1.9	
0.87	0.89	WK064.10	16-Jan-07	E	1.9											
0.3	0.3	WK064.10	12-Mar-07	F			4									
1.36	1.57	WK064.10	01-May-07	HF					1.9							
0	0.06	WK064.10	25-Jun-07	E						1.9						
0	0	WK064.10	20-Aug-07	LF								1.9				
0.34	1.02	WK064.10	22-Oct-07	E										1.9		
0	0	WK064.10	16-Apr-08	HE				1.9								
0.11	0.11	WK064.10	16-Jun-08	HE						1.9						
0.12	0.17	WK064.10	05-Aug-08	F								2				
0.03	0.03	WK064.10	15-Oct-08	H										1.9		
0.29	1.22	WK064.10	29-Oct-08	E										1.9		
0	0	WK064.10	24-Nov-08	HF											1.9	
0.03	0.43	WK064.10	25-Feb-09	HE		1.9										
0	0	WK064.10	13-Apr-09	HF				1.9								
0	0	WK064.10	08-Jun-09	HE						1.9						
0	0.4	WK064.10	03-Aug-09	HE								28				
0	0	WK064.10	15-Sep-09	E									36			
0.03	0.04	WK064.10	03-Nov-09	H											1.9	
0	0	WK064.10	09-Feb-10	E		1.9										
0	0	WK064.10	14-Apr-10	HE				1.9								
0	0	WK064.10	17-May-10	H					1.9							
0	0	WK064.10	06-Jul-10	E							6					
0.21	0.21	WK064.10	18-Aug-10	E								1.9				
0	0	WK064.10	12-Oct-10	H										42		



**Table 2. Quahog Bay, Geometric Means and P90 Scores, Data Collected after >0.5 inch of Cumulative Rainfall, October 1- May 31, 2000- 2010**

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WK063.00	P	30	16	3.8	0.48	93	16.2	38	216	5/16/2001
WK063.10	P	8	8	5.1	0.49	31	22.7	31	163	2/25/2009
WK063.20	P	8	8	1.9	0	2	1.9	31	163	3/30/2009
WK064.10	P	30	16	3.1	0.44	240	11.7	38	216	5/16/2001

**Figure 1. Quahog Bay, Harpswell, with Classification Upgrade**





## Appendix C. 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 = 90<sup>th</sup> percentile

APPD\_STD = the 90<sup>th</sup> 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 90<sup>th</sup> percentile, at or below which the station would meet restricted criteria.