



GROWING AREA WK
Brunswick and Harpswell

Sanitary Survey Report

Report Date: 12/22/2015

Final

Teri Dane



Table of Contents

EXECUTIVE SUMMARY	4
GROWING AREA DESCRIPTION	5
Boundary	5
Area	5
HISTORY OF GROWING AREA CLASSIFICATION	12
Current Classification(s).....	12
Pollution Area Activity.....	12
2014	12
2013	12
2012	12
2011	12
2010	13
2009	13
2008	14
POLLUTION SOURCES.....	14
Residential Domestic Waste.....	14
Overboard Discharges	22
Municipal WWTP	23
Industrial Pollution	24
Marinas and Mooring Fields	29
Stormwater	30
Non-Point Pollution Sources	31
Agricultural Activities	31
Domestic Animals and Wildlife Activity	31
Aquaculture/Wet Storage Activity	32
Conservation/Recreation Areas (beaches, trails, etc.)	32
HYDROGRAPHIC AND METEOROLOGICAL ASSESSMENT	32
Tides	32
Rainfall	33
Winds.....	34
Salinity.....	35
River Discharge.....	36
WATER QUALITY REVIEW.....	36
Data Analysis	36
Compliance History.....	38
RECOMMENDATION FOR FUTURE WORK	39



APPENDIX A40
 APPENDIX B.....42
 APPENDIX C.....43
 APPENDIX D45
 KEY TO WATER QUALITY TABLE HEADERS45

LIST OF TABLES

Table 1: Growing Area WK Pollutions Sources – residential15
Table 2: Growing Area WK Active Overboard Discharges (OBDs)23
Table 3: Brunswick Naval Air Station Superfund Site – Environmental Restoration Program26
Table 4: Growing Area WK Marinas30
Table 5: Stream samples collected in 200931
Table 6: List of Active Aquaculture Sites within Growing Area WK.....32
Table 7: Cumulative amount of rainfall in Brunswick per year33
Table 8: 2014 P90 and Geometric Mean analysis for all Approved, Restricted and Prohibited Stations36
Table 9: 2014 End of Year P90 and Geometric Mean analysis for Reed Cove.....37
Table 10: 2014 End of Year P90 and Geometric Mean analysis for Orrs Cove.....38
Table 11: 2014 End of Year P90 and Geometric Mean analysis for Eastern Quahog Bay.38
Table 12: Compliance History for 2014 of stations classified as Approved, Restricted or Prohibited38

LIST OF FIGURES

Figure 1: Overview map of Growing Area WK.....7
Figure 2: Pollution Area 17-A Water quality stations and 2014 NSSP Classification.....8
Figure 3: Pollution Area 17-B Water quality stations and 2014 NSSP Classification.....9
Figure 4: Pollution Area 17-C Water quality stations and 2014 NSSP Classification.....10
Figure 5: Pollution Area 18 Water quality stations and 2014 NSSP Classification.....11
Figure 6: Pollution Area 17-A Pollution sources and last year surveyed.....18
Figure 7: Pollution Area 17-B Pollution sources and last year surveyed.....19
Figure 8: Pollution Area 17-C Pollution sources and last year surveyed.....20
Figure 9: Pollution Area 18 Pollution sources and last year surveyed.....21
Figure 10: Brunswick Naval Air Station Superfund Site25
Figure 11: Total rainfall (inches) per month by year34
Figure 12: Wind Direction Observed34
Figure 13: Average salinity per Water Quality Station35
Figure 14: Average salinity per month for water quality station WK 56.....35



Executive Summary

This is a Sanitary Survey report for shellfish Growing Area WK, towns of Brunswick and Harpswell, written in compliance with the requirements of the 2013 Model Ordinance and the National Shellfish Sanitation Program. This report includes the current water quality assessment and compliance history. The next sanitary survey is due in 2026 and the next Triennial in 2017.

During the last three years, three classifications changes occurred within Growing Area WK. Merriman Cove was downgraded from Approved to Restricted due to water quality no longer meeting approved standards. Harpswell Cove was downgraded from Restricted to Prohibited due a point source pollution found during routine shoreline survey work. Barnes Point was reclassified from Prohibited to Approved due to an updated shoreline survey work and water quality meeting approved standards. In addition to classifications changes, nine overboard discharges were removed over the three-year period.

In 2014, routine shoreline survey work was completed for Growing Area WK. During the survey, eight locations were found to have a malfunctioning septic system and twenty-one locations had questions. There was one outstanding problem from 2009 and all problem forms associated issues were given to the local plumbing inspector in the respected town.

After review of the 2014 P90 analysis, water quality had degraded in three locations. One of which was in Eastern Quahog Bay (Table 8 and 11). It is suggested that the current conditional management plan be reviewed and adjust accordingly.



Growing Area Description

Boundary

Growing area WK lies inside a line from Potts Point, extending southeast along the shellfish management zone line offshore, and also, extending north up Harpswell Neck Road to Middle Bay Road, then east to the intersection of Purinton Road and Coombs Road, then south to the northwest tip of Doughty Cove, then south down the middle of this peninsula to the head of Doughty Cove, then northeast to the intersection of Tondreaus Point Road and Route 24, then north of Route 24 to Cundy Harbor Road, then south down Cundy Harbor Road to West Cundy's Point Road, then south down the eastern peninsula to East Cundy Point, then south along the shellfish management zone line to offshore.

Area

Growing area WK is comprised of the towns of Brunswick and Harpswell, which is located in the mid-coast area of Maine. The shoreline consists of three major peninsulas and several islands that protrude into Casco Bay. Harpswell Neck is the westernmost peninsula and Sebascodogan Island is the easternmost peninsula extending south into Cundy's Harbor. The central peninsula includes Bailey Island, Orr's Island, and the western side of Sebascodogan Island. Figure 1 is an overview of growing area WK with all active water quality stations and classifications.

The larger water bodies between Harpswell Neck and Bailey Island are known as Merriconeag Sound and Harpswell Sound, separated by Ewin Narrows. The Sounds include Harpswell Harbor, also known as Stover Cove, Clark Cove, Merriman Cove, Widgeon Cove, Mill Cove, High Head, Ewin Narrows, Harpswell Cove, Strawberry Creek, Lombos Hole, Long Cove, Reed Cove and Beals Cove. There is also Pinkham Island, Turnip Island and Jaquish Island in the south end of Merriconeag Sound. Stover Cove is part of Harpswell Harbor. In the southwestern corner of the cove is a community spring and many of the nearby yards are very wet from the runoff. Clark Cove is a small cove with a steady freshwater drainage, Spruce Brook, at the head of the cove. Merriman Cove, Widgeon Cove and Mill Cove are heavily developed with year-round homes and have very productive clam flats. High Head is moderately developed with newer homes. There is a small community yacht club on the southeastern shore with 15 moorings for the residents. Strawberry Creek, Lombos Hole, Long Cove and Reed Cove are located on the eastern side of Harpswell Sound. Strawberry Creek is a small, narrow cove with the head of the cove on the north end. The Harpswell Town Office and Transfer Station are located on the eastern shore. Lombos Hole is a short, narrow cove with a very steep eastern bank. Dogs Head Island is just offshore of Lombos Hole and Strawberry Creek. Long Cove is approximately 7,600 feet long with a nearly constant width of 500 feet to 800 feet, and the head of the cove is on the south end. It is protected from the wind by thick woods and high elevations on the west and east. Because of the steep slopes, little residential development has occurred along the shore, which is heavily wooded. Reed Cove has a broad mouth to the northwest. There is a drainage pond on the southeastern side, at the head of the cove. There are several homes on the eastern shore and a campground on the southern end. Beals Cove is a small cove on the western shore of Orrs Island in Harpswell Sound. The mouth of the cove is to the north and the head of the cove, which is a small, low lying wetland, is to the south. The banks are high and steep on the north end with most houses set back 100 feet or more from shore. There is one small, uninhabited island called Rat Island in the middle of the cove. Ewin Narrows, north of the Mountain Road bridge, is classified as Prohibited due to three licensed overboard discharges. Just north of the narrows, there is small marsh area on the western shore of Harpswell Cove called Skolfield Cove. This cove is bordered by hayfields. The head of Harpswell Cove is a large salt marsh with a significant drainage stream, Mare Brook. Included in the drainage is about half of the city of Brunswick and the majority of the Brunswick Naval Air Station. The Air Station has a permit to allow treated storm water to drain into Mare Brook from the runways located on the base.



The larger water bodies between Bailey Island and Cundy's Point are known as Gun Point Cove and Quahog Bay. On the north end of the island masses, there are two reverse coves, Long Reach and Doughty Cove, where the heads of the coves are at the south end and the mouths of the coves are on the north end. Doughty Cove is located in Growing Area WL. Tidal water comes into these coves from Harpswell Sound and the New Meadows River through the Gurnet Strait. Long Reach, bordered on the south by the town of Harpswell and on the north by Brunswick, lies north to south and is approximately 3.5 miles long and 0.33 miles wide at the center, with narrowing at both ends. At the northernmost end of the Reach is an opening called Gurnet Strait, which allows the Long Reach water to pass to and from the New Meadows River. This flow of water channels south through the Reach to another opening called Prince Strait. Prince Strait is located about halfway down the Reach at Doughty Point, allowing water to pass to and from Ewin Narrows. South of Doughty Point, Long Reach becomes a narrow cove with the head of the cove at the southernmost end. The west side of the cove is bold and steep and heavily wooded. The head of Long Reach is a flat marsh. Smuggler's Cove is located on the west side and Dyer's Cove on the east side of the Reach.

The eastern shore of Bailey Island and Orrs Island, including Lowell Cove, is classified as Prohibited. Bailey Island has numerous year-round and seasonal houses which many of them have licensed overboard discharges. Turnip Island and Jaquish Island are undeveloped rock islands off the southern end of Bailey Island. Lowell Cove has been identified as a shellfish area, but there are licensed overboard discharges. Gun Point Cove is a long cove with bold shore that opens to Casco Bay. The inner part of the cove is classified as Restricted due to malfunctioning septic systems, and the outer part of the cove is classified Prohibited due to several overboard discharges. Quahog Bay is a southerly bay on Sebascodegan Island. The shoreline is heavily wooded with numerous small cottages interspersed with large estates and many undeveloped stretches. There is no large fresh water tributary to the area; instead the runoff is channeled into the bay by a number of unnamed brooks and streams. The watershed is 3.5 square miles on Sebascodegan Island. The entire western shore of Quahog Bay has been classified Prohibited due to several overboard discharges. The rest of Quahog Bay was classified Prohibited due to poor water quality. Quahog Bay includes Card Cove, Orrs Cove, Mill Cove, Brickyard Cove, Rich Cove, Pole Island, Snow Island, Ben Island, and Bethel Point. Card Cove is a very productive shellfish area with no overboard discharges. Orrs Cove is a productive shellfish area and classified Conditionally Approved, because of the Great Island Boatyard marina. Mill Cove, just east of Orrs Cove, is also classified Conditionally Approved based on seasonal variation in water quality, possibly due to boats mooring in the cove during the summer. South of Bethel Point is Ridley Cove, which includes Hen Cove, Hen Island, Leavitt Island, Big Hen Island, Bush Island, and Yarmouth Island. East of East Cundy Point is Sandy Cove. Sandy Cove is actually in the New Meadows River, but is part of Growing Area WK. Offshore, in Casco Bay, are Flag Island and Ragged Island, and there are also several other small barren rock islands.

The 2010 census reports that the town of Harpswell has a year-round population of 4,740. There is no daytime increase in population due to commuting. The most common sources of employment are fishing, hunting, forestry, office and administrative support, carpentry and bookkeeping. Harpswell's population dramatically increases in the summer months as reported in the town's comprehensive plan. Combining year-round (50% of residences) and seasonal populations (33% of residences) shows that Harpswell grows to a community of 8,000 during the summer season with a peak population of 10,000 during the summer holiday weekends. The number of summer homes increased slightly in the period of 1990-2000 but the town has not experienced growth in transient lodging. In 2011 and 2012, Harpswell was approved to allocate 66 residential commercial shellfish harvesting licenses. In 2013, 65 residential commercial shellfish licenses were allocated and 60 in 2014.



Maine Department of Marine Resources

Growing Area WK

2014

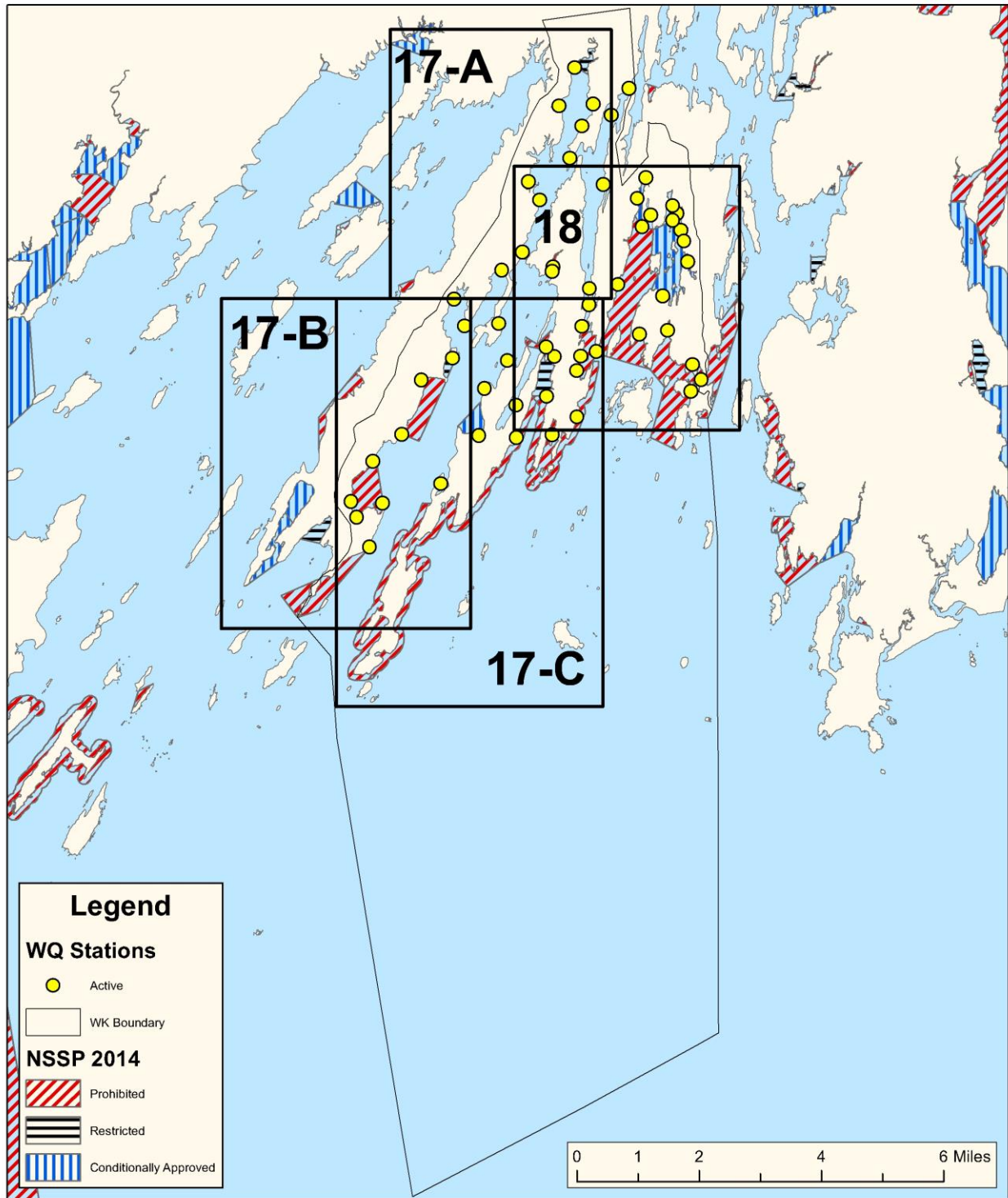


Figure 1: Overview map of Growing Area WK with water quality stations, 2014 NSSP Classification and Pollution Areas



Maine Department of Marine Resources

Growing Area WK

2014

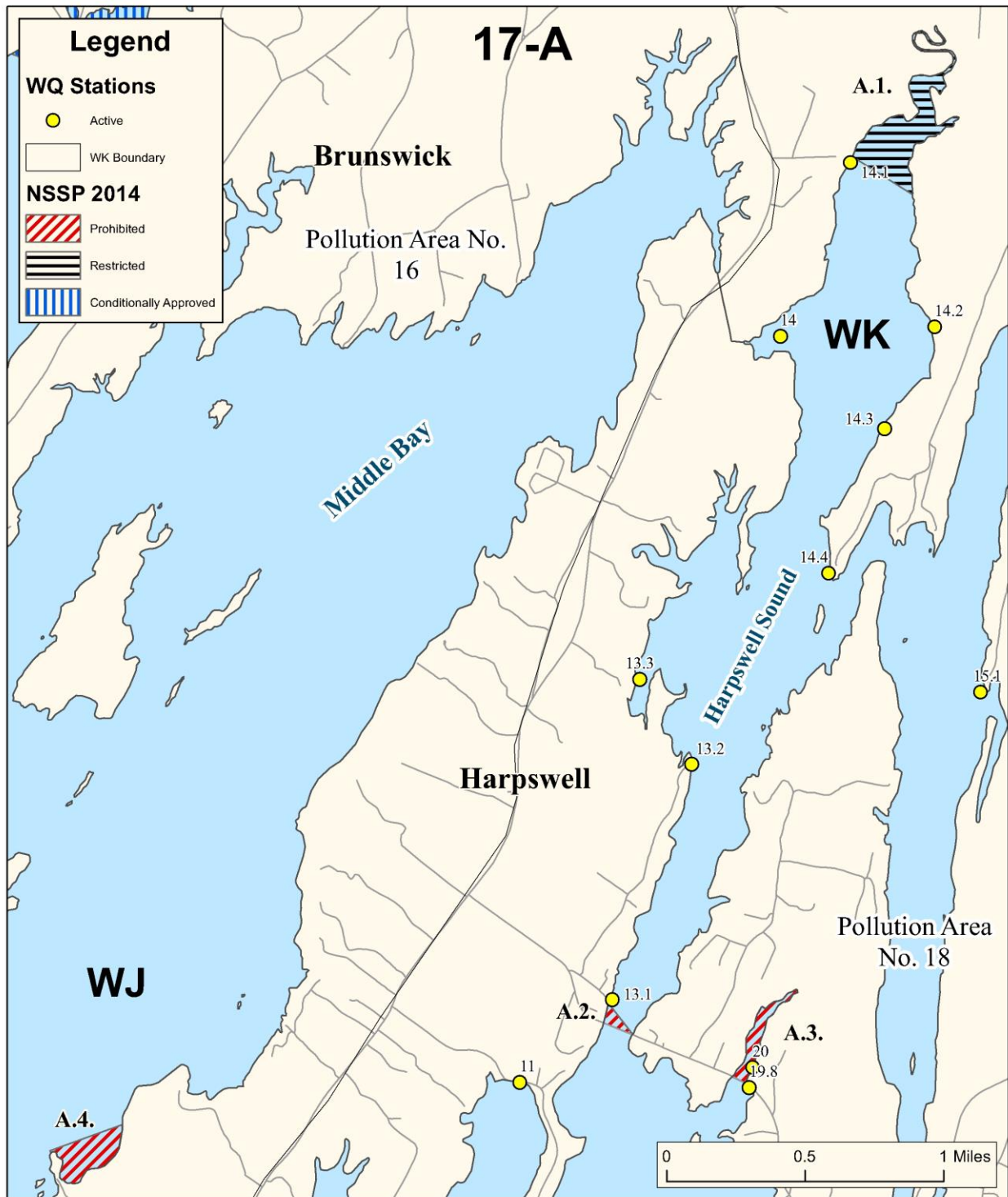


Figure 2: Growing Area WK, Pollution Area 17-A, detailing water quality stations and 2014 NSSP Classification



Maine Department of Marine Resources

Growing Area WK

2014

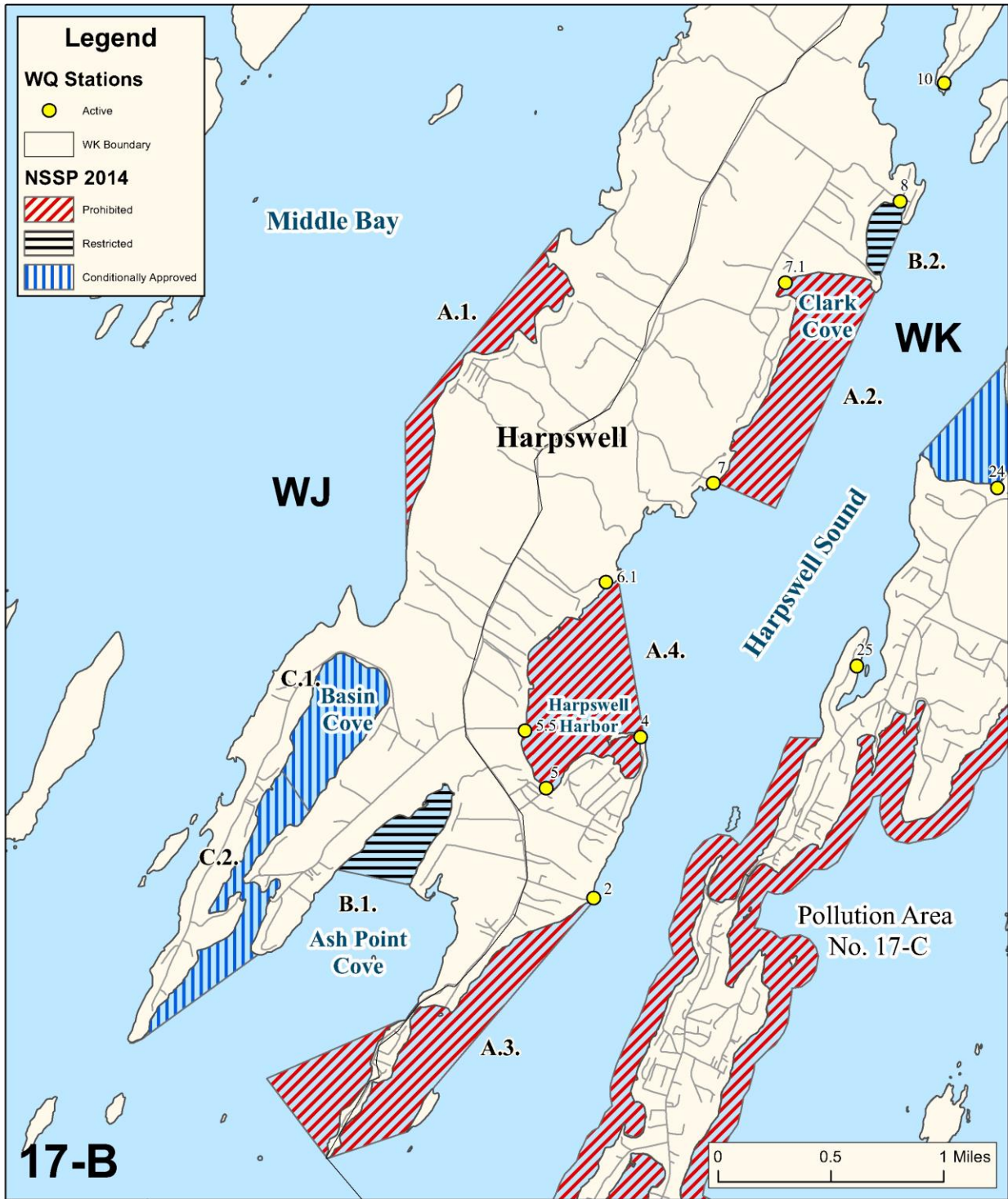


Figure 3: Growing Area WK, Pollution Area 17-B, detailing water quality stations and 2014 NSSP Classification



Maine Department of Marine Resources

Growing Area WK

2014

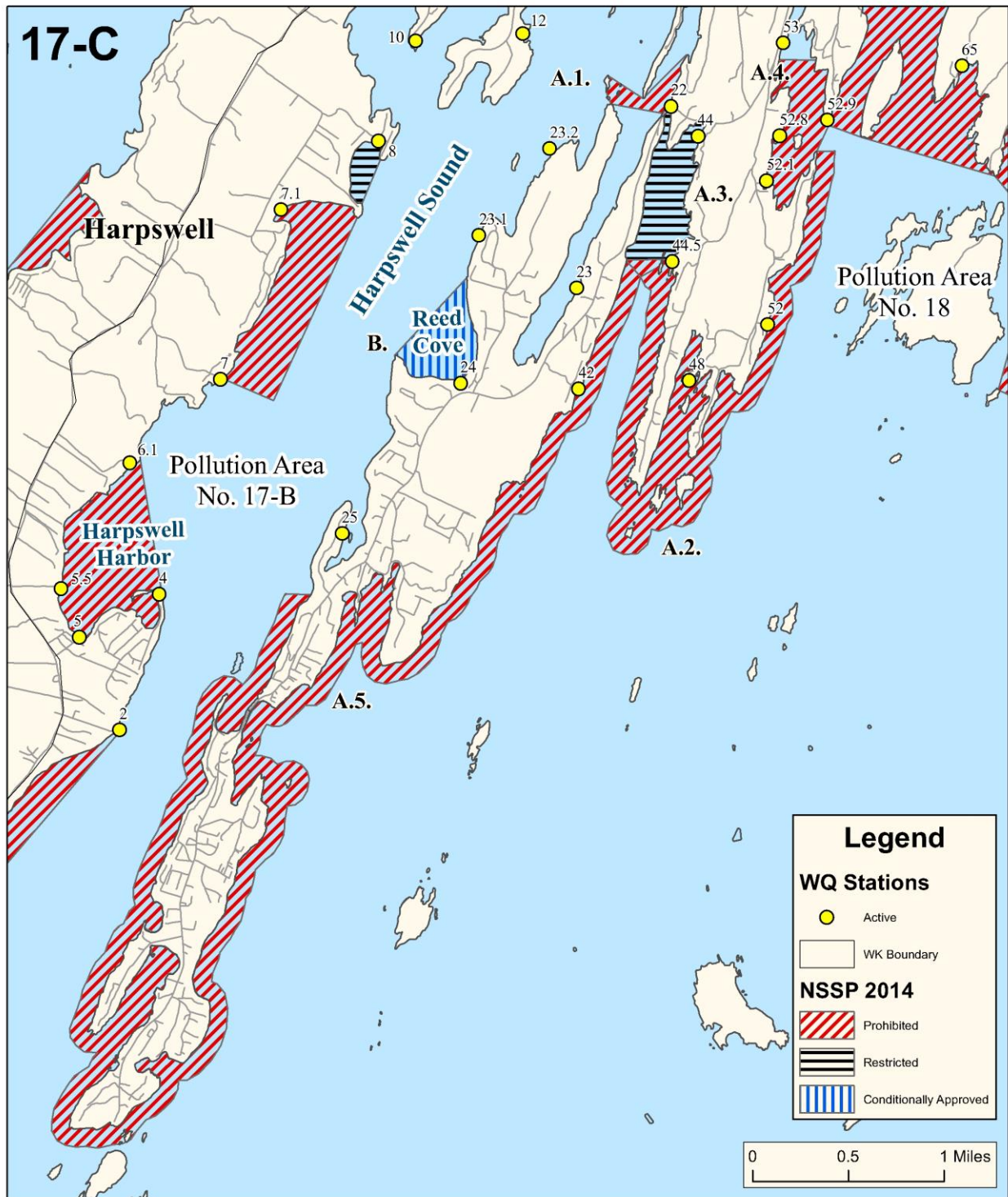


Figure 4: Growing Area WK, Pollution Area 17-C, detailing water quality stations and 2014 NSSP Classification



Maine Department of Marine Resources

Growing Area WK

2014

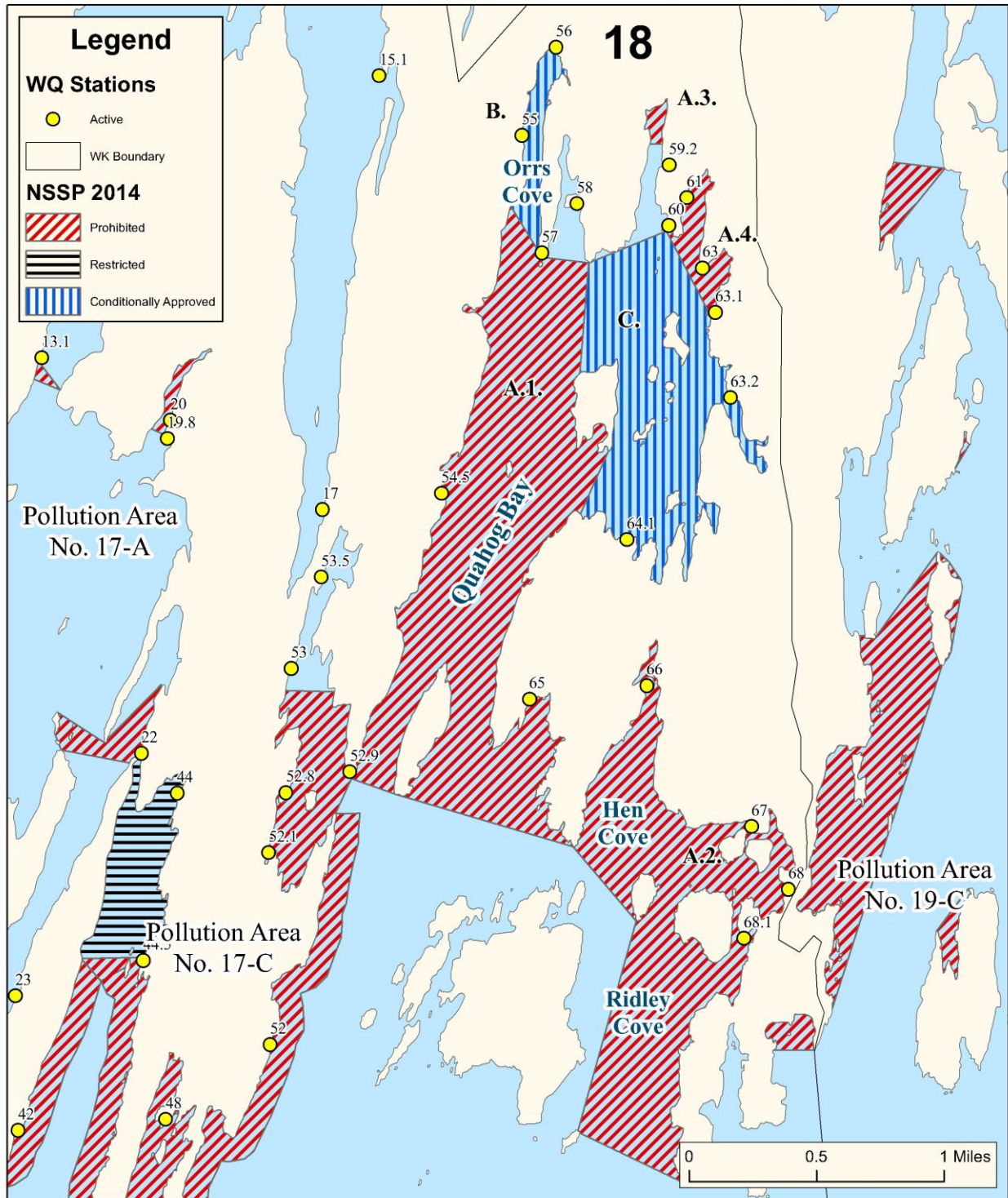


Figure 5: Growing Area WK, Pollution Area 18, detailing water quality stations and 2014 NSSP Classification



History of Growing Area Classification

Current Classification(s)

The following legal notices describe the shellfish classification boundaries in Shellfish Growing Area WK and can be found on the DMR website at: http://www.maine.gov/dmr/rm/public_health/closures/closedarea.htm#

- Area 17-A: Upper Harpswell Neck and Long Reach (Brunswick to Harpswell)
- Area 17-B: Harpswell Neck (Harpswell)
- Area 17-C: Bailey Island, Orrs Island, and nearby southwest Sebascodegan Is (Harpswell)
- Area 18: Quahog Bay, Hen Cove, Ridley Cove (Harpswell)

Pollution Area Activity

2014

Pollution Area 17-B

- March 5: Merriman Cove was reclassified from Approved to Restricted due to water quality no longer meeting approved standards
- June 25: Harpswell Harbor was reclassified from Restricted to Prohibited due to a point source pollution identified during shoreline survey work.

Overboard Discharges Removed: There were three Maine licensed OBDs removed in 2014.

Emergency Closures: There were no emergency closures in 2014 for Growing Area WK.

2013

No classification changes or emergency closures during 2013.

Overboard Discharges Removed: There were three Maine licensed OBDs removed in 2013.

Emergency Closures: There were no emergency closures in 2013 for Growing Area WK.

2012

Pollution Area 17-A

- December 14: Barnes Point Prohibited area is repealed due to an updated shoreline survey and water quality meeting approved standards.

Overboard Discharges Removed: There were three Maine licensed OBDs removed in 2012.

Emergency Closures: There were no emergency closures in 2012 for Growing Area WK.

2011

Pollution Area 17-A

- November 3: Three prohibited areas were created around identified pollution sources (Ewin Narrows, Lookout Point and Barnes Point).

Pollution Area 17-B

- February 11: The east side of Stover Point was placed in a temporary closure due to a vehicle being submerged in the water.
- March 2: The temporary closure for the east side of Stover Point was removed.

Pollution Area 18



- February 11: The eastern portion of Quahog Bay (Harpwell) was reclassified from Prohibited to Conditionally Approved based on season due to an updated shoreline survey and water quality meeting approved standards during the open status during October 1 to May 31.
- March 15: The boundary line between the Prohibited and Conditionally Approved areas was clarified.

Overboard Discharges Removed: There were four Maine licensed OBDs removed in 2011.

Emergency Closures: There was one emergency closure in 2011 for Growing Area WK. See Pollution Area 17-B for details.

2010

Pollution Area 17-A

- March 11: Prince's Point Landing and Gurnet Bridge area were closed due to a vehicle submerged off from Prince's Point Landing.
- April 6: Gurnet area was reopened due to the removal of the potential pollution source (submerged car) and appropriate time period (two weeks) for water quality to return to approved standards.
- May 19: The Prohibited area at Ewin Narrows (Harpwell) was reduced due to the removal of three overboard discharges.

Pollution Area 17-B

- January 22: The Prohibited area in Middle Bay was expanded to the next approved station due to water quality exceeding the approved standard.

Pollution Area 18

- March 10: Mill Cove was reclassified from Conditionally Approved based on season to Approved due to water quality meeting approved standard year round.
- November 3: The lower portion of Brickyard Cove (Harpwell) was reclassified from Prohibited to Approved due to water quality meeting approved standards. Also, the upper portion of Brickyard Cove remained classified as Prohibited due to the high fecal scores from the stream that drains into the head of Brickyard Cove.
- November 16: At the southern edge of Brickyard Cove the Prohibited boundary line was adjusted for clarification to aid enforcement of the closure line.

Overboard Discharges Removed: There were four Maine licensed OBDs removed in 2010.

Emergency Closures: There was one emergency closure in 2010 for Growing Area WK. See Pollution Area 17-A for details.

2009

Pollution Area 17-A

- December 4: The lower portion of Harpswell Cove (Brunswick) was reclassified from Restricted to Approved due to the replacement of a malfunctioning septic system and water quality returning to approved standards.

Pollution Area 17-B

- January 20: Several areas on Harpswell Neck were reclassified from Approved and Conditionally Approved to Prohibited due to the lack of recent shoreline survey and/or elevated scores during the open status, which fails to meet the requirements of a conditionally approved area.
- September 29: The area around High Head (Harpwell) was reclassified from Prohibited to Approved due to the completion of a shoreline survey and the removal of two overboard discharges.
- December 4: Upper Ash Point Cove (Harpwell) was reclassified from Prohibited to Restricted due to water quality meeting the restricted standard and a "Do Not Occupy" order on a house identified with a malfunctioning septic system and confirmation by the Codes Enforcement Officer that the property is no longer occupied.



- December 29: Harpswell Harbor was reclassified from Prohibited to Restricted due to water quality meeting the restricted standard and the completion of water quality review the area. Also, the size of the Prohibited area in Harpswell Sound was reduced due to water quality meeting approved standards.

Pollution Area 18

- January 20: Portions of Quahog Bay and Ridley Cove were reclassified from Conditionally Approved to Prohibited due to the lack of recent shoreline survey and/or elevated scores during the open status which fails to meet the conditionally approved requirements.
- January 30: Orrs Cove (Harpswell) was reclassified to Conditionally Approved after a recent review of the Conditional Area Management Plan and the open status water quality data. Also, the lower part of Mill Cove was reclassified as Conditionally Approved due to an updated shoreline survey.
- September 23: The upper portion of Mill Cove (Harpswell) was reclassified from Prohibited to Conditionally Approved based on season due to the completion of a shoreline survey.

Overboard Discharges Removed: There were three Maine licensed OBDs removed in 2009.

Emergency Closures: There were no emergency closures in 2009 for Growing Area WK.

2008

Pollution Area 17-A

- May 19: A portion of Harpswell Cove (locally known as Skolfield Cove) was reclassified as Restricted.

Pollution Area 17-B

- March 6: The lower west side of Basin Point was reclassified from Prohibited to Approved for shellfish harvesting.
- September 29: The east side of Basin Point was reclassified from Prohibited to Conditionally Approved with a closed season from April 14 to October 31. Also, upper Ash Point Cove was reclassified as Prohibited due a malfunctioning septic system and an illegal greywater discharge. The rest of Ash Point Cove was reclassified from Conditionally Approved to restricted due to elevated scores during the open status and no longer meet conditionally approved requirements.

Overboard Discharges Removed: There were eight Maine licensed OBDs removed in 2008.

Emergency Closures: There were no emergency closures in 2008 for Growing Area WK.

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 in-ground systems and overboard discharges (OBDs), marinas and mooring fields, stormwater and pollution from non-point sources (streams), farms and other agricultural activities, domestic animals and wildlife areas, and recreational areas.

Residential Domestic Waste

Growing area WK consists of 57 two mile segments within the towns of Brunswick and Harpswell. Both Brunswick and Harpswell have dedicated licensed plumbing inspector (LPI). During 2014, all of Growing Area WK was surveyed except 9 two mile segments. Seven of the nine not surveyed are classified as Prohibited due to several overboard discharges (OBDs). Two segments in Ewing Narrow, Harpswell and Long Cover were last surveyed in 2008. They were not surveyed in 2014 due to the lack of access.



Residential septic issues identified during routine or hot spot survey work of an area are reported by DMR staff the town's Licensed Plumbing Inspector (LPI) by documenting the issue and filling out a problem form. The LPI then visits the site and assesses what was documented on the problem form. DMR retains a copy of the form and meets quarterly with the State Plumbing Inspector to go over problem forms that have been remediated. If the LPI agrees that a system is malfunctioning, the town then contacts the home owner and makes them aware that the system needs to be fixed or replaced. Once the system has been documented as fixed, staff members from DMR re-assess the shoreline survey information and water quality data to determine if the area is safe for shellfish harvesting.

During the 2014 survey, eight problem forms were turned in for either a failing septic system or a greywater pipe. One problem form was still outstanding from the 2008 shoreline survey. Twenty-one locations had questions. These were also turned in to the LPI to investigate. In total, there are 30 outstanding problem forms awaiting a response from the LPI (Table 1 and Figures 6-9).

Table 1: Growing Area WK Pollutions Sources – residential

Pollution Area (Figure #)	Map ID	Date Surveyed	Actual or Potential	Direct / Indirect	Description	Class	Distance to Shore (ft)
17-B (7)	WK006-1	6/11/2014	Actual	Indirect	Tank south of weeping willow tree in overgrown area; very wet; smells of septic; problem form submit	P	166
17-B (7)	WK007-109	6/23/2014	Potential	Indirect	Black pipe coming out of shore side of house; goes to culvert under road	P	157
17-B (7)	WK007-122	6/24/2014	Actual	Indirect	E of house. Very wet spot in lawn on lower side of LF. Smells like sewage.	P	325
17-B (7)	WK007-128	6/24/2014	Potential	Indirect	IG N side of house marked with flags. Neighbor said system failed last year. We didn't see problem	P	68
17-B (7)	WK008-120	6/24/2014	Potential	Indirect	Pipes come out of two windows and end on top of rock pile. Same house as WP 34	P	270
17-B (7)	WK009-99	7/1/2014	Potential	Direct	Small pvc pipe comes out of cellar window shore side, does not go underground.	A	127
17-A (6)	WK027-13	7/24/2014	Potential	Indirect	Tank NE side of house. Webber pumped tank and says it needs to be replaced due to water running back	A	486
17-A (6)	WK028-10	7/24/2014	Potential	Indirect	Septic pipe coming out of S side entering into possible tank; LF has trees growing out of it. Not a	A	96
17-C (8)	WK032-29	7/31/2014	Potential	Indirect	Pipe from cabin by road exits, runs above ground and joins with cabin below. Both dump into tank left	CA	217



Pollution Area (Figure #)	Map ID	Date Surveyed	Actual or Potential	Direct / Indirect	Description	Class	Distance to Shore (ft)
17-C (8)	WK043-21	9/4/2014	Potential	Indirect	Pipe going into ground on N corner of house; unclear if there is HT or LF; wet area below	P	128
17-C (8)	WK045-14	8/6/2014	Potential	Direct	Cast iron pipe exits house to ground; round depression at head of small cove <10 ft. from shore	P	63
17-C (8)	WK045-17	8/6/2014	Potential	Indirect	Old trailer - pump box in marshy area behind. Could not locate definitive LF	P	126
17-C (8)	WK045-19	8/6/2014	Potential	Indirect	Mounded area, overgrown; maybe installed and not used	P	276
17-C (8)	WK045-20	8/6/2014	Potential	Indirect	Camper on shore - appears permanent. No visible pipes leaving structure or obvious LF - what is going	P	82
18 (9)	WK048-49	9/11/2014	Potential	Direct	3 tank covers 15' from shore. PVC pipe exits to beach. No flow out of pipe.	P	18
18 (9)	WK048-65	9/11/2014	Potential	Direct	Large PVC goes to open tank ~15 feet from shore; doesn't smell bad and house may not be in use	P	78
18 (9)	WK048-69	9/11/2014	Potential	Indirect	Pipe runs out behind apt. building into large jewelweed field	P	469
18 (9)	WK048-71	9/11/2014	Potential	Indirect	LF S of house near highway; breakout S side of field	P	>500
18 (9)	WK051-123	9/16/2014	Potential	Direct	Same property as wpt. 18. Straight pipe disappears into brush pile at shoreline by metal post.	P	<10
18 (9)	WK051-147	9/15/2014	Potential	Indirect	*See letter from town. White pipe leaves west side of house, above ground for ~20 ft. Runs to treed	A	95
18 (9)	WK056-11	8/5/2014	Potential	Indirect	Old style small mound in woods behind house. Large house, small mound	P	106
18 (9)	WK056-21	8/5/2014	Potential	Indirect	Pipe for clean out sticking out of ground shore side of house. LF between two houses - shared	P	202
18 (9)	WK056-39	8/5/2014	Potential	Indirect	trailer in center of island - pipes to ground under trailer - no obvious system found	P	145
18 (9)	WK056-5	8/5/2014	Potential	Direct	Tank and LF - LF dug up and leveled off on own?	P	45
18 (9)	WK061-1	9/22/2014	Potential	Indirect	Pipe under camp on east side	A	78



Pollution Area (Figure #)	Map ID	Date Surveyed	Actual or Potential	Direct / Indirect	Description	Class	Distance to Shore (ft)
18 (9)	WK061-19	9/22/2014	Potential	Indirect	gray water pipe southeast side of camp	A	92
18 (9)	WK061-25	9/22/2014	Potential	Indirect	Pipe exits camp N side, sink drain	A	38
18 (9)	WK061-26	9/22/2014	Potential	Indirect	pipe exits house by septic tank, runs above ground north into woods	P	78
18 (5)	WK061-4	9/22/2014	Potential	Indirect	Septic pipe exits house S side runs above ground to above ground tank; pipe exits tank and continues	P	115
Not Shown (at mouth of Doughty Cove)		8/20/2009	Actual	Direct	OH right to shore. Toilet paper visible.	A	146



Maine Department of Marine Resources

Growing Area WK

2014

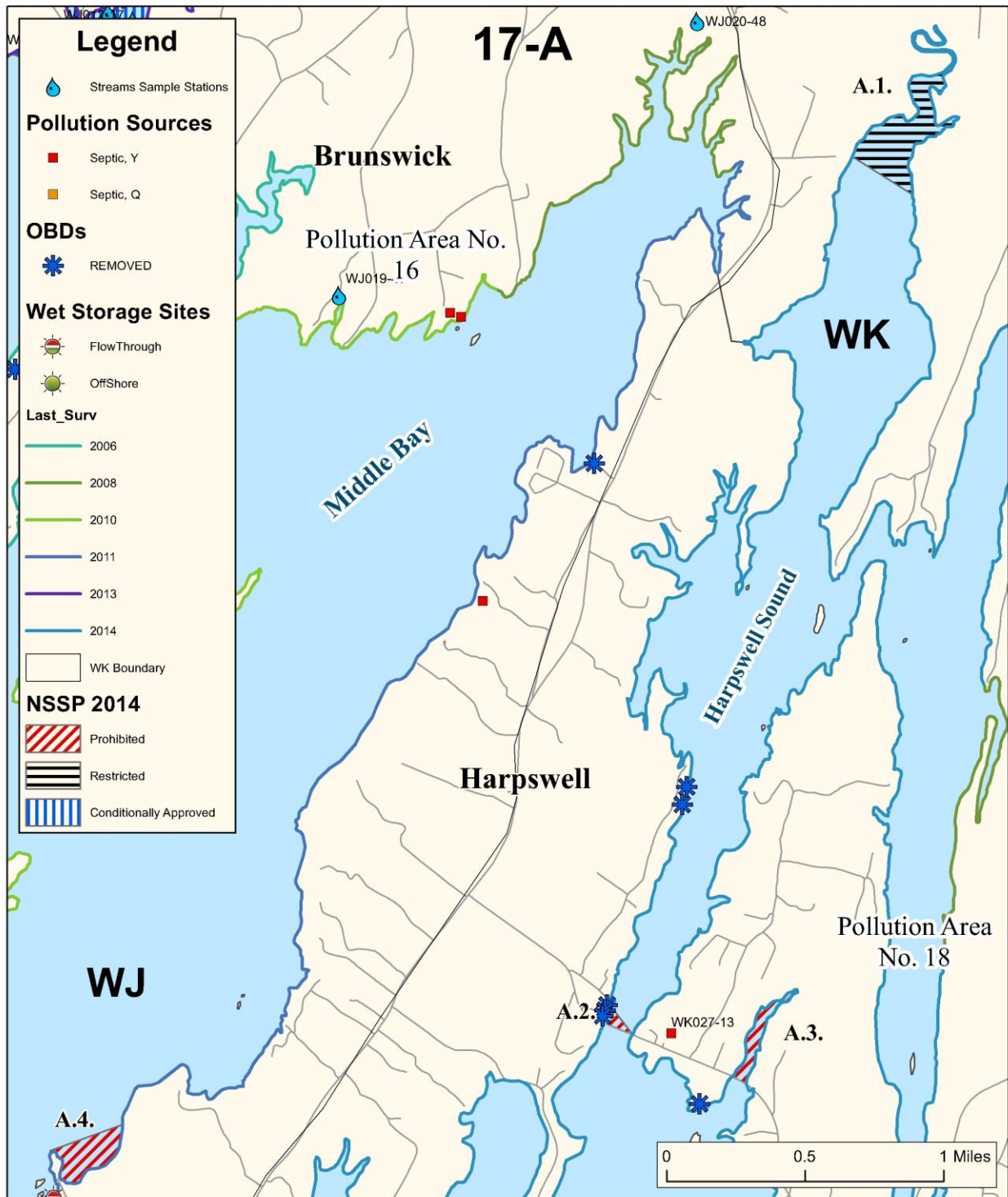


Figure 6: Growing Area WK, Pollution Area 17-A, detailing pollution sources and last year surveyed



Maine Department of Marine Resources

Growing Area WK

2014

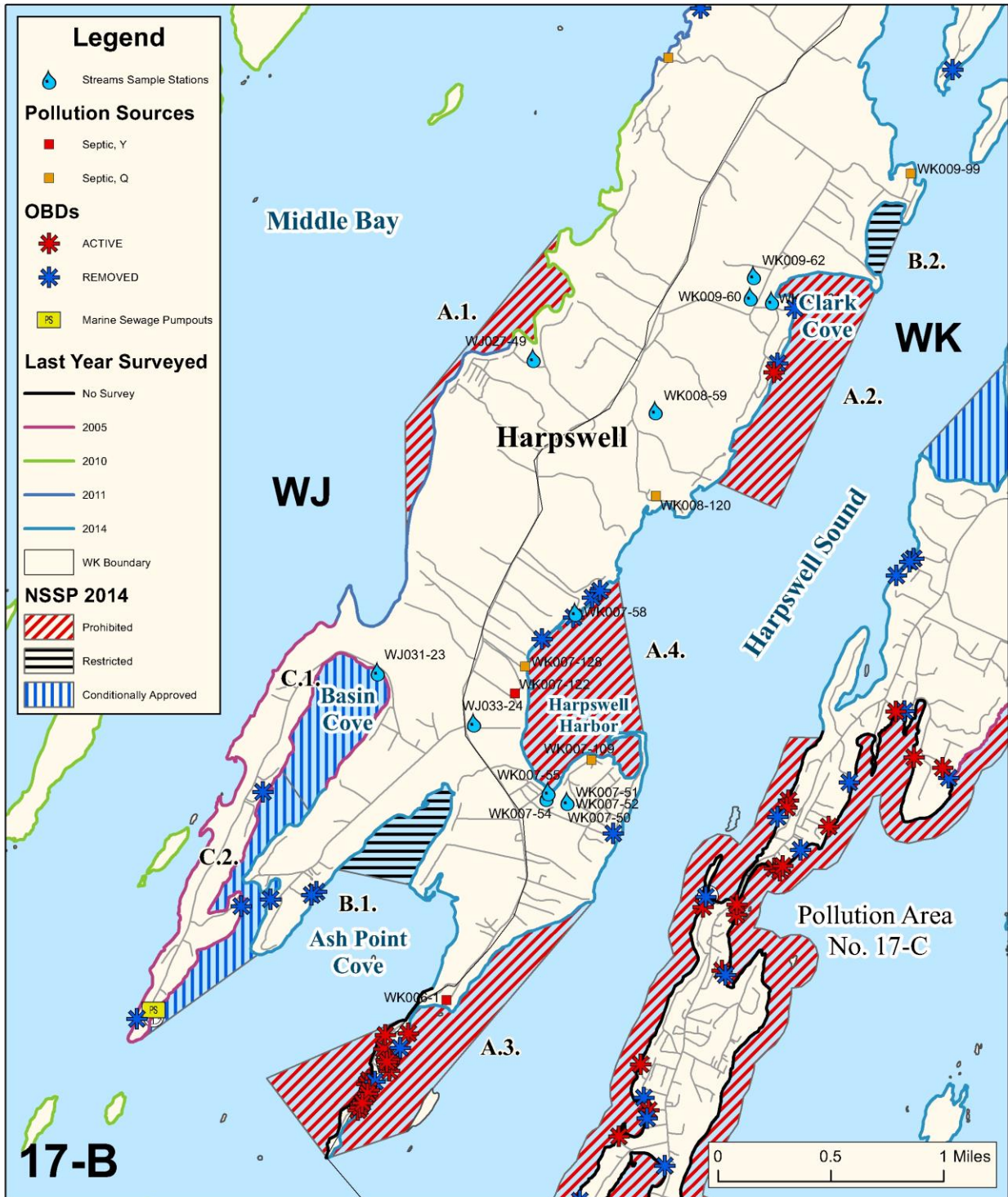


Figure 7: Growing Area WK, Pollution Area 17-B, detailing pollution sources and last year surveyed



Maine Department of Marine Resources

Growing Area WK

2014

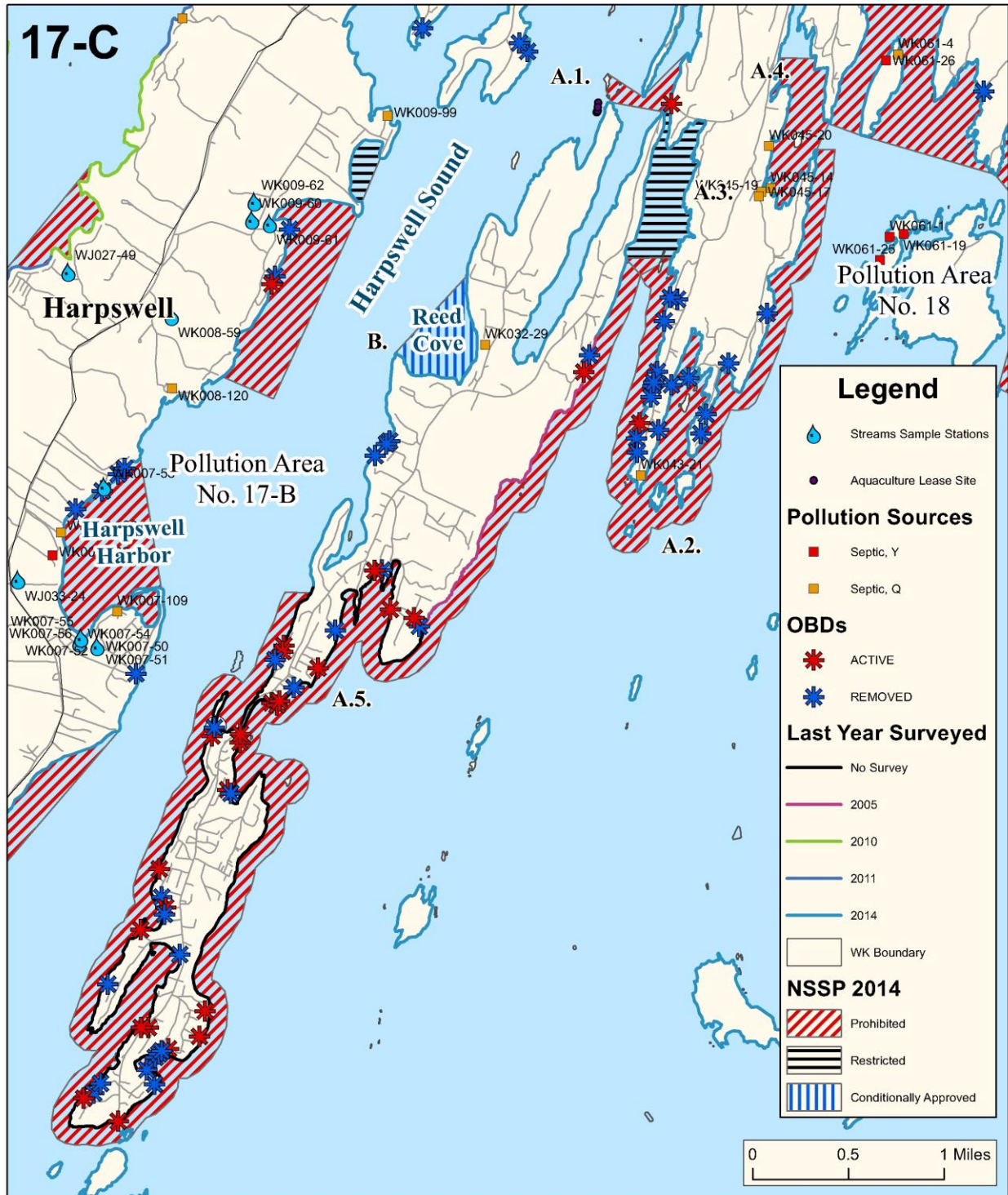


Figure 8: Growing Area WK, Pollution Area 17-C, detailing pollution sources and last year surveyed



Maine Department of Marine Resources

Growing Area WK

2014

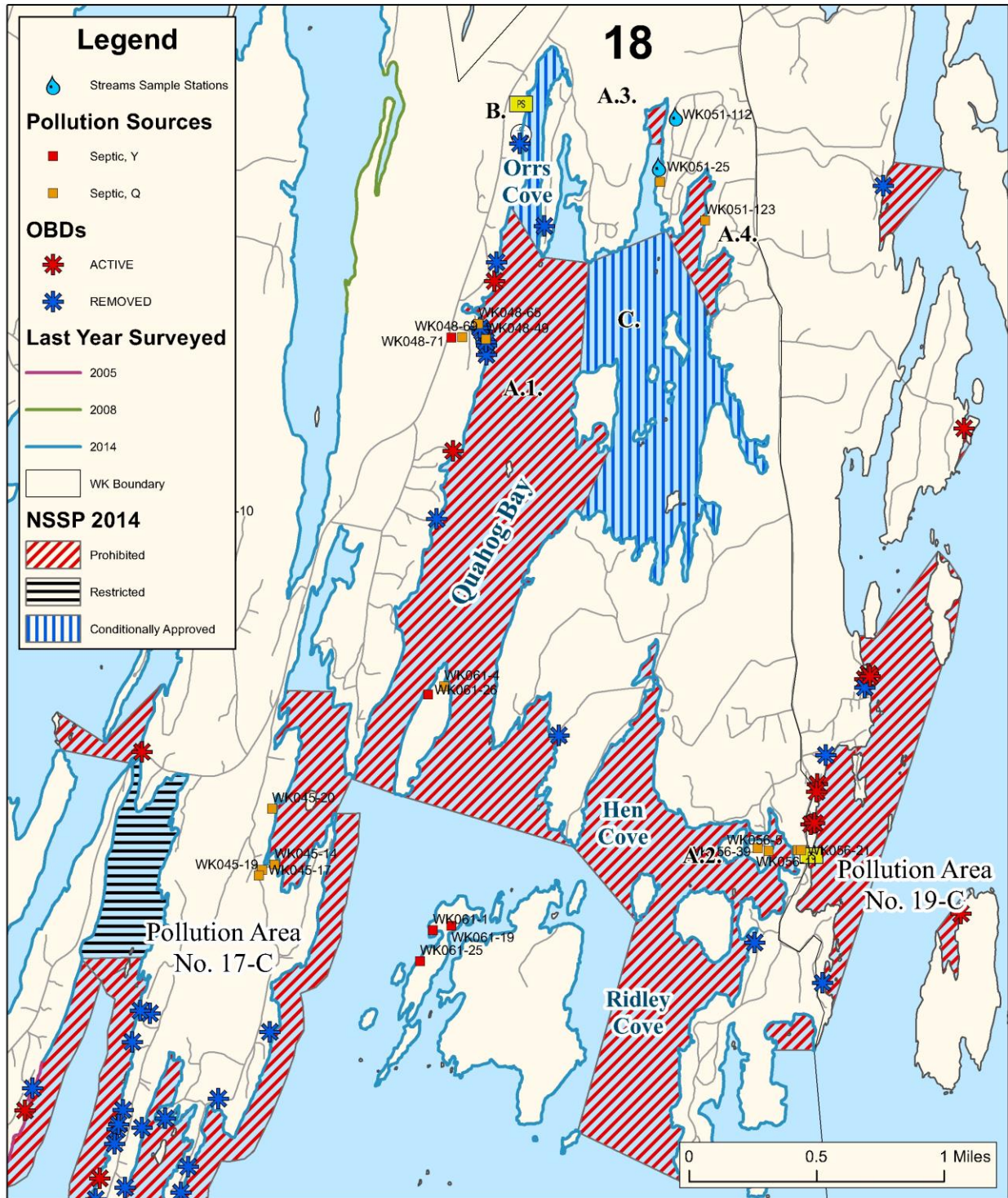


Figure 9: Growing Area WK, Pollution Area 18, detailing pollution sources and last year surveyed



Overboard Discharges

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 located in growing area WK (Table 2). The size of each closure is determined based on a dilution, using on 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.

There are 42 active licensed overboard discharges (OBDs) that discharge their treated effluent into the waters of the Growing Area WK (Figures 7-9). Nine OBDs have been removed over the past three review years (2014-2012). 28 OBDs have been removed since the last sanitary report in 2007.



Table 2: Growing Area WK Active Overboard Discharges (OBDs)

Pollution Area (Figure #)	DEP Permit ID	Town	FLOW (GPD)	Receiving	Impact	Depth of Receiving Water (ft)	Priority Removal	Required Closure (Acres)	Actual Closure (Acres)
17-B (7)	1692	Harpswell	300	Merriconeag Sound	AD	6	N	1.5	162.9
17-B (7)	1694	Harpswell	250	Merriconeag Sound	AD	1	N	7.7	162.9
17-B (7)	1849	Harpswell	300	Merriconeag Sound	AD	6	N	1.5	162.9
17-B (7)	1870	Harpswell	300	Potts Harbor	AD	6	N	1.5	162.9
17-B (7)	2018	Harpswell	300	Merriconeag Sound	AD	6	N	1.5	162.9
17-B (7)	2077	Harpswell	1140	Merriconeag Sound	AD	6	N	5.8	162.9
17-B (7)	2117	Harpswell	300	Potts Harbor	AD	1	N	9.2	79.4
17-B (7)	2424	Harpswell	360	Merriconeag Sound	AD	6	N	1.8	79.4
17-B (7)	2701	Harpswell	300	Merriconeag Sound	AD	9	N	1	162.9
17-B (7)	3411	Harpswell	300	Merriconeag Sound	AD	6	N	1.5	162.9
17-B (7)	3995	Harpswell	300	Merriconeag Sound	AD	1	N	9.2	162.9
17-B (7)	7242	Harpswell	300	Clark Cove	AD	12	N	0.8	190.8
17-B (7)	7747	Harpswell	300	Merriconeag Sound	AD	1	N	9.2	162.9
17-B (7)	8213	Harpswell	360	Merriconeag Sound	AD	6	N	1.8	162.9
17-C (8)	1559	Harpswell	300	Wills Gut	AD	1	N	9.2	787.2
17-C (8)	1991	Harpswell	1800	Delano Bay	AD	12	N	4.6	787.2
17-C (8)	2050	Harpswell	7500	Jaquish Gut	AD	7	N	32.9	787.2
17-C (8)	2342	Harpswell	300	Lowell Cove	AD	6	N	1.5	787.2
17-C (8)	2462	Harpswell	300	Merriconeag Sound	AD	3	N	3.1	787.2
17-C (8)	2469	Harpswell	300	Merriconeag Sound	AD	6	N	1.5	787.2
17-C (8)	2482	Harpswell	300	Merriconeag Sound	AD	7	N	1.3	787.2
17-C (8)	3146	Harpswell	300	Gun Point Cove	AD	14	N	0.7	787.2
17-C (8)	3213	Harpswell	500	Merriconeag Sound	AD	8	N	1.9	787.2
17-C (8)	3458	Harpswell	300	Mackerel Cove	AD	7	N	1.3	787.2
17-C (8)	3560	Harpswell	300	Gun Point Cove	AD	7	N	1.3	360.8
17-C (8)	3632	Harpswell	300	Mackerel Cove	AD	7	N	1.3	787.2
17-C (8)	3655	Harpswell	300	Water Cove	AD	4	N	2.3	787.2
17-C (8)	3665	Harpswell	540	Wills Gut	AD	1	N	16.6	787.2
17-C (8)	3758	Harpswell	300	Lowell Cove	AD	8	N	1.2	787.2
17-C (8)	4313	Harpswell	300	Casco Bay	AD	9	N	0.8	787.2
17-C (8)	4437	Harpswell	300	Mackerel Cove	AD	7	N	1.3	787.2
17-C (8)	4488	Harpswell	300	Lombos Hole	AD	11	N	0.8	28.6
17-C (8)	4501	Harpswell	300	Casco Bay	AD	1	N	9.2	787.2
17-C (8)	6083	Harpswell	300	Merriconeag Sound	AD	8	N	1.2	787.2
17-C (8)	6636	Harpswell	300	Casco Bay	AD	1	N	9.2	787.2
17-C (8)	7021	Harpswell	300	Lowell Cove	AD	1	N	9.2	787.2
17-C (8)	7463	Harpswell	40	Casco Bay	AD	1	N	1.2	787.2
17-C (8)	7859	Harpswell	300	Casco Bay	AD	1	N	9.2	787.2
17-C (8)	7884	Harpswell	300	Lowell Cove	AD	18	N	0.5	787.2
17-C (8)	7961	Harpswell	1400	Water Cove	AD	1	N	43	787.2
18 (9)	4878	Harpswell	300	Quahog Bay	AD	16	N	0.6	660.7
18 (9)	5090	Harpswell	300	Quahog Bay	AD	11	N	0.8	660.7

Municipal WWTP

There are no wastewater treatment facilities or combined sewer overflow points within Growing Area WK.



Industrial Pollution

The only industry in the area is the Brunswick Naval Air Station, which has airport runways and a golf course indirectly draining into Mare Brook at the head of Harpswell Cove. The head of the cove is classified Restricted due to non-point pollution (Figure 2).

The Brunswick Naval Air Station (BNAS) occupies 3,094 acres in the Town of Brunswick. It is located south of the Androscoggin River, between Brunswick and Bath, Maine, south of Route 1, and between Routes 24 and 123. Among the 18 superfund site areas on base (Figure 4), three were used primarily for landfills of the station's household, office, and other wastes. The landfills were used from 1945 to 1979. Other areas were reported to have releases occur or have been used for disposal of various acids, caustics, solvents and building materials including asbestos, and used for fire training purposes. Area surface water is used for recreation, irrigation, and commercial fishing.

Due to past disposal practices, the soil and groundwater on a portion of the base is contaminated with volatile organic compounds (VOCs). Harpswell Cove, a valuable, commercial fishery located downgrade of the site, is subject to potential groundwater contamination. Ingestion of contaminated groundwater may pose health risks; however, it has been determined through investigations that no current drinking water supplies are impacted.

Remediation of the sites at this base has been or is being addressed in three phases: initial removal actions; long-term remedial actions focusing on cleanup of specific areas of contamination; and long-term monitoring, and operation and maintenance. Cleanup actions have been completed on several site areas. Four of the completed site areas have begun long-term monitoring to assess the effectiveness of cleanup actions. Table 3 provides an overview of the various sites which have been or are currently being addressed under the Navy's Environmental Restoration Program at Naval Air Station Brunswick. This Table is meant to provide general information, such as the site description, actions taken, and proposed actions which the Navy is planning to carry out at each site. Sites shaded yellow are the sites that are monitored for their potential impact on Harpswell Cove.

Since the BNAS sites were placed on the National Priorities List (NPL), most of the base's old underground storage tanks have been removed and replaced. Through other environmental programs, the Navy is cleaning up contamination resulting from the former fuel tank farm and taking steps to improve the quality of stormwater discharges on the base. The majority of direct contact threats on the base have been eliminated through cleanup actions completed in 1995. Long-term monitoring on some areas of the base have begun, and data is evaluated yearly. Operation of the groundwater pump and treatment system for the Eastern Plume continues and long-term monitoring is in progress and data is evaluated yearly. The first and second Five Year Review of all sites were performed in 2000 and 2005. It found that all remedies implemented were protective of human health and the environment, but it recommended several modifications to increase remedy effectiveness. These modifications included installing new deep extraction wells, and a confirmation of plume and institutional control boundaries. A phase of the field work to confirm plume boundaries was performed in 2001 and follow-on phases are planned to be completed in 2008.

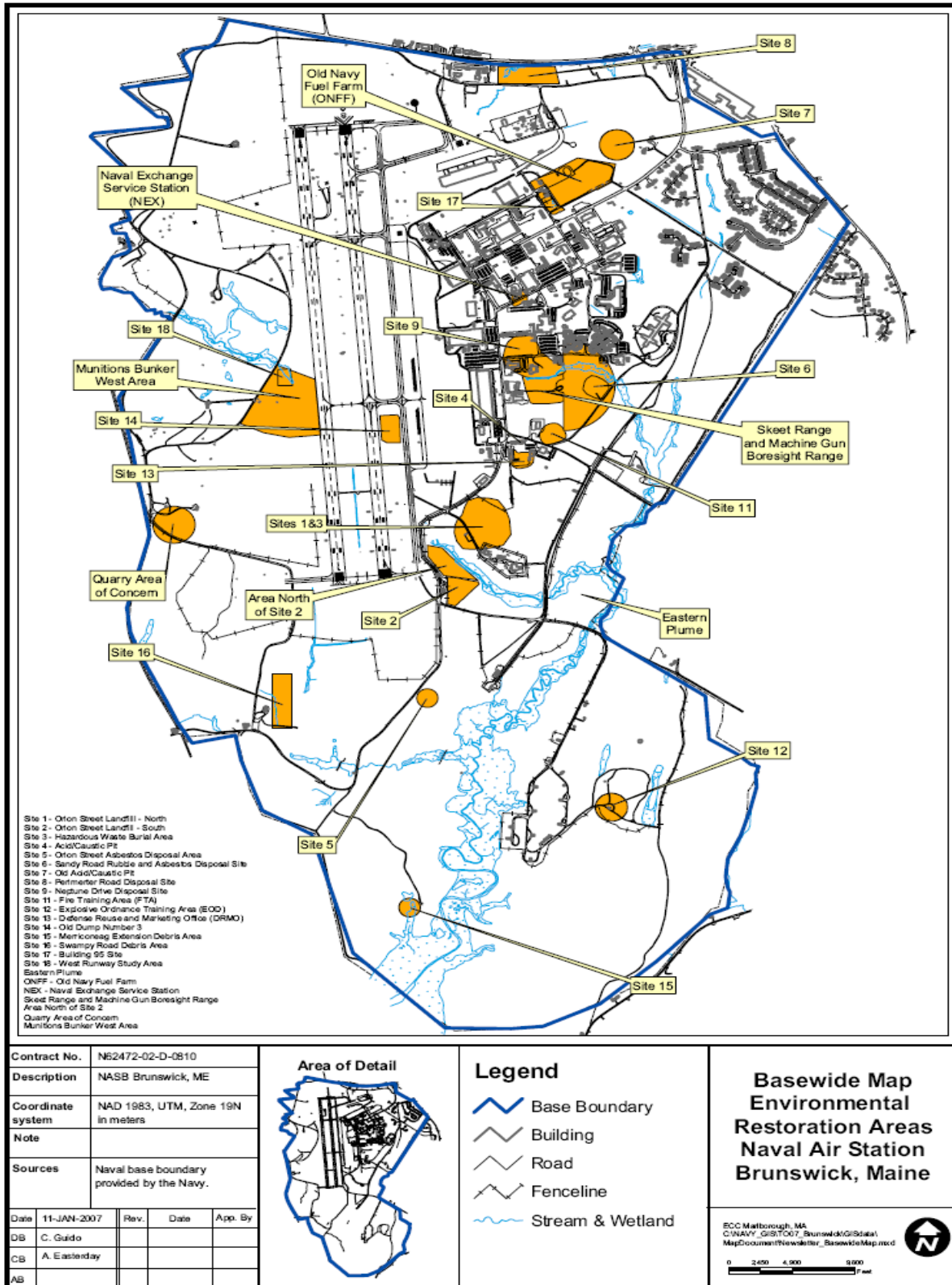


Figure 10: Brunswick Naval Air Station Superfund Site



Table 3: Brunswick Naval Air Station Superfund Site – Environmental Restoration Program
(http://cumulis.epa.gov/supercpad/cursites/dsp_ssppSiteData1.cfm?id=0101073#Status)

Site ID	Site Name	Action	Proposed Action
BASE ENVIRONMENTAL RESTORATION PROGRAM SITES:			
SITES 1 & 3	Orion Street Landfill and Hazardous Waste Burial Area	Remedy included construction of a landfill cap and slurry wall around the wastes. From 1994 through 1997, two extraction wells were installed to maintain the water level within the slurry wall below the waste mass. The Long-Term Monitoring Program monitors groundwater, surface water, leachate seeps, sediment, and landfill gas emissions. As of January 2007, 29 monitoring events were completed.	On-going evaluation of Long Term Monitoring data to gauge success of the remedy and to determine if additional monitoring or modifications to the plan are needed.
SITE 2	Orion Street Landfill South	Metal debris was removed in 1999 and the landfill slope was stabilized. A Long-Term Monitoring Program has been established at Site 2 for environmental monitoring of groundwater, seep, sediments and surface water. As of January 2007, 14 monitoring events completed.	On-going evaluation of Long-Term Monitoring Program data. Navy is in the process of investigating the area immediately north of the Site 2 Landfill to determine if this area should be incorporated into the Installation Restoration Program.
SITE 4	Acid/Caustic Pit	The Navy completed a Remedial Investigation at Site 4 during the 1980s. Quantities of wastes disposed of are unknown. There has been no activity at Site 4 in the past several years.	As per the 1998 Record of Decision, no further action planned for soils at Site 4. Groundwater contamination addressed by the Eastern Plume groundwater remedy.
SITE 5	Orion Street Asbestos Disposal Area	A Remedial Investigation in the early 1990s included geophysical survey, sampling of soils and a site inspection. As per the August 1993 Record of Decision, the asbestos-containing material was excavated from the site and placed into the Sites 1 and 3 landfill.	The results of the Remedial Investigation and a Baseline Risk Assessment conducted at the site indicated that the contaminants of concern were not detected in the environment. Based on confirmatory sampling, no further action is planned for Site 5.
Site 6	Sandy Road Rubble & Asbestos Disposal Area	The results of the Remedial Investigation conducted in the 1990s at Site 6 indicated that the contaminant of concern (asbestos) was not reported in the environment. Under the 1993 Record of Decision, the site remedy included the excavation of the asbestos-containing material and construction debris. This material was disposed of at Sites 1 and 3 landfill beneath the cap.	As per the August 1993 Record of Decision, no further action is planned for Site 6.



Site ID	Site Name	Action	Proposed Action
SITE 7	Old Acid Caustic Pit	As per the 2002 Record of Decision the Site 7 remedy requires institutional controls with groundwater monitoring. The Long Term Monitoring Program for Site 7 has been on- going since 2005. Long-Term Monitoring data is evaluated twice a year. In June 2007, the Navy installed 3 new monitoring wells to refine the groundwater monitoring well network and the wells were sampled in September 2007.	A Long-Term Monitoring Program is in place at this Site to continually evaluate the groundwater conditions.
SITE 8	Perimeter Road Disposal	The site remedy in the 1993 Record of Decision was to excavate the PAH contaminated soil and dispose of it in the Sites 1 and 3 landfill. Confirmatory soil sampling after the excavation demonstrated that the removal action was successful.	There has been no activity at Site 8 since site restoration in the fall of 1995. No further action planned for Site 8.
SITE 9	Neptune Drive Disposal Area	When the Navy removed the barrack buildings overlying the ash landfill/dump area, it was also decided to remove the source area (ash material). The Navy is currently in the process of removing the demolition debris and contaminated soil from Site 9 north of Neptune Drive. The excavated contaminated material is being transported off site. There is a Long-Term Monitoring Program in place at Site 9 for groundwater. Currently 27 monitoring events have been completed.	The Navy anticipates that the removal action of the landfill/dump north of Neptune Drive will be completed in 2007. A new monitoring well is planned to be installed in the southwest corner of the Site to better define the site boundary and be added to the Long-Term Monitoring Program. An additional investigation is planned to determine if ash material is present south of Neptune Drive and, if so, the extent of contamination. Another investigation is planned south of Neptune Drive for soil, groundwater and pore-water sampling in the vicinity of Bldg. 201.
SITE 11	Fire Training Area	Groundwater and soil within Site 11 were polluted with volatile organic compounds as a result of the former fire training activities. Two removal actions for soil. In 2002, an infiltration gallery was constructed over this site, which recharges treated effluent from the treatment plant back into the subsurface.	No further actions are planned for soils. Groundwater associated with Site 11 is being addressed under the Eastern Plume pump and treat remedy, and Long-Term Monitoring Program, as presented in the 1998 Record of Decision for the Eastern Plume.
SITE 12	Explosive Ordnance Disposal Area	This site is currently under the Navy's Environmental Restoration Program and is concurrently being investigated under the Navy's Military Munitions Response Program (MMRP). A Preliminary Assessment has recently been finalized and plans for a Site Investigation (SI) are underway.	This Site is currently under investigation.



Site ID	Site Name	Action	Proposed Action
SITE 13	Defense Reuse and Marketing Office	The fiberglass replacement tank was removed and replaced with an above-ground tank. The Navy conducted a remedial investigation and a risk assessment to evaluate the potential effects on human health and the environment at Site 13.	No further action are planned for Site 13.
SITE 14	Old Dump Number 3	The Navy conducted a remedial investigation. No unexplained anomalies were detected during the magnetometer survey.	No further actions are planned for Site 14.
SITE 15	Merriconeag Extension Debris Area	Asbestos pipe and scrap metal was removed. During site inspection in 1992, test pits encountered few, or no, debris items. A magnetometer survey in 1999 confirmed that no metal debris remained.	No further actions are planned for Site 15.
SITE 16	Swampy Road Debris Area	A site investigation was conducted in 1992. The Navy used a magnetometer to locate and remove surface debris and disposed of the material off site..	No further actions are planned for Site 16.
SITE 17	Former Building 95	In 1992, a Site Evaluation indicated the presence of pesticides and herbicides in soil. Remedial actions included the removal of over 1,000 cubic feet of impacted soil within the area of concern, and the placement o a geo-textile liner to act as a marker of the excavation.	There is a Long-Term Monitoring Program for groundwater at Site 17. A Remedial Investigation is planned for this site in 2007 to determine the extent of soil and groundwater impact.
SITE 18	West Runway Study Area	In 1993, a Site Evaluation revealed a small number of anomalous areas where innocuous buried debris was found.	No further action are planned for Site 18.
Eastern Plume Operable Unit	Eastern Plume Operable Unit	A groundwater extraction and treatment system is operational and is treating the Eastern. In 1995, the Navy installed five extraction wells and a treatment plant for hydraulic control and treatment of the Eastern Plume groundwater. Since 2000, the treatment plant uses an air stripper and carbon polisher. Water is now discharged to an infiltration gallery. As of January 2007, a total of 29 monitoring wells have been completed.	There is a Long-Term Monitoring Program in place at the Eastern Plume for evaluation of the Plume boundaries and efficiency of the extraction network and treatment system. Activities in 2007 for the Eastern Plume include: (1) installation of an additional extraction well; (2) investigations on the extent of Plume impact on Mere Brook, (3) the development of a groundwater computer model and (4) groundwater investigation at infiltration gallery area.
PETROLUEM, OIL AND LUBRICANT SITES			
UST 001	Old Navy Fuel Farm	Two distinct groundwater plumes containing petroleum hydrocarbons were identified. In 2000, 15,000 tons of impacted soil was removed.	A Long-Term Monitoring Program is in place at this Site to continually evaluate the groundwater conditions.



Site ID	Site Name	Action	Proposed Action
UST 002	Navy Exchange Service Station	Active remediation has consisted of air sparging soil vapor extraction, and a chemical oxidation event. Currently, the bioremediation program treats the dissolved and sorbed phases of petroleum contamination in the subsurface near Building 27 using enhanced biological activity (microbes).	Currently a bioremediation program to treat the petroleum contamination in the source area is being conducted. There is an on-going Long-Term Monitoring Program for groundwater to monitor and evaluate the existing hydrocarbon plume.
MILITARY MUNITIONS RESPONSE PROGRAM (MMRP)			
MMRP	MainBase	A Preliminary Assessment was conducted at AOCs 1, 2 and 3 in 2006. A Preliminary Assessment Addendum on AOC 4 and Site 12 was completed in 2007. Plans for a Site Investigation (SI) are underway.	The Navy is currently in the process of conducting the initial evaluations at these AOCs and Site 12 to determine which require further assessment and/or actions.
MMRP	Topsham Annex	A Preliminary Assessment was conducted in 2006 to evaluate this AOC. Plans for a Site Investigation (SI) are underway.	The Navy is currently in the process of conducting the initial evaluations at this AOC to determine whether further assessment and/or actions are necessary.

Marinas and Mooring Fields

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 by utilizing conditional area management plans.

There is a No Discharge Area (NDA) in Casco Bay administered by DEP. The process for DEP identifying areas and meeting application requirements for requesting the approval of NDAs from the federal EPA was established in Public Law 1999, chapter 655, an Act to Rid Maine’s Waters of Ocean Vessel Sewage. The law was effective August 11, 2000. DEP submitted and had EPA accept an application to designate Casco Bay as a NDA which has been in effect since July 2006. The area included in the no discharge designation includes all contiguous waters north and east of Cape Elizabeth Light in Cape Elizabeth, to a point at Bald Point in Phippsburg. The area also



includes the navigable reaches of the Fore River, Presumpscot River, Royal River, Cousins River, Harraseeket River, and the New Meadows River. All of Growing Area WK is included in this NDA.

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.

There are two marinas located within growing area WK: Great Island Boatyard and Cook's Lobster (Table 4). Great Island Boatyard is located within Orrs Cove and is classified as Conditionally Approved based on an open season of December 1 to April 30. See Appendix A for the annual review of the CAMP. Cook's Lobster is located on Bailey Island and is classified as Prohibited.

Table 4: Growing Area WK Marinas

Pollution Area	Name	Town	Waterbody	Classification
18 (5)	Great Island Boatyard	Harpwell	Orrs Cove	Conditionally Approved
17-B	Cook's Lobster	Harpwell	Bailey Island	Prohibited

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 WK fall under these regulations. Additionally, the Maine Stormwater Management Law provides stormwater standards for projects located in organized areas that include one acre of more of disturbed area (Maine DEP 2009).

Currently, there are no stormwater management plans within 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.

No streams were sampled within the last three year review period (2012-2014), however samples were collected in 2009 (Table 5).

Table 5: Stream samples collected in 2009

Pollution Area	Trip Start Date	Location ID SS	DMR GASSID	Major Pollution Source	FC Score	Adverse/ Investigative
18 (9)	04/08/09	WK051-25	WK051	Stream	<2	Investigative
18 (9)	04/08/09	WK051-112	WK051	Stream	2	Investigative
18 (9)	04/27/09	WK051-112	WK051	Stream	2	Investigative
18 (9)	07/20/09	WK051-25	WK051	Stream	42	Investigative
18 (9)	08/03/09	WK051-25	WK051	Stream	29	Investigative
18 (9)	08/18/09	WK051-25	WK051	Stream	200	Investigative
18 (9)	08/24/09	WK051-25	WK051	Stream	1220	Investigative
18 (9)	09/01/09	WK051-25	WK051	Stream	13	Investigative
18 (9)	09/15/09	WK051-25	WK051	Stream	52	Investigative
18 (9)	09/30/09	WK051-25	WK051	Stream	98	Investigative
18 (9)	10/14/09	WK051-25	WK051	Stream	22	Investigative
18 (9)	11/03/09	WK051-25	WK051	Stream	2	Investigative
18 (9)	11/17/09	WK051-25	WK051	Stream	<2	Investigative
18 (9)	11/18/09	WK051-112	WK051	Stream	40	Investigative

Agricultural Activities

There are no agricultural activities in Growing Area WK.

Domestic Animals and Wildlife Activity

There are no wildlife reserves or bird sanctuaries within Growing Area WK.



Aquaculture/Wet Storage Activity

There are six aquaculture lease sites within Growing Area WK (Table 6). All sites located within approved areas and are raising American oysters (*Crassostrea virginica*). There are no wet storage sites in WK.

Please visit the DMR website to view the details on these lease and LPAs (<http://www.maine.gov/dmr/aquaculture/leaseinventory/index.htm>).

Table 6: List of Active Aquaculture Sites within Growing Area WK

Site ID	Species	Location	Waterbody	City	Expiration Date	Acres
ROGE4 15	American oysters	South of West Dogs Head	Casco Bay	Harpswell	12/31/2015	.01
ROGE1 15	American oysters	South of West Dogs Head	Casco Bay	Harpswell	12/31/2015	.01
LSMI1 15	American oysters	West of Dyer Cove	Long Reach	Harpswell	12/31/2015	.01
LSMI2 15	American oysters	West of Dyer Cove	Long Reach	Harpswell	12/31/2015	.01
ROGE2 15	American oysters	South of West Dogs Head	Casco Bay	Harpswell	12/31/2015	.01
ROGE3 15	American oysters	South of West Dogs Head	Casco Bay	Harpswell	12/31/2015	.01

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

Throughout Harpswell in Growing Area WK, there is over 1,400 acres of land the Land Trust has conserved. Of the 1,400 acres, 355 acres are in preserves owned by the Harpswell Heritage Land Trust and are always open to the public. The rest is in conservation easements on privately-owned land with some public access. There is approximately seven miles of walking trails. There are eleven preserves: Birch Island South, Crow Island, Curtis Farm, Doughty Point, Giant’s Stairs Trail and McIntosh Lot, Johnson Field Preserve at Mackerel Cove, Long Reach, Pott’s Point, Skolfield shores, Stover’s Point and White Island. The preserves offer several different types of areas; from beaches to woodsy trails to tide pool to scenic picnic areas.

Hydrographic and Meteorological Assessment

The NSSP program requires, as part of the sanitary survey, the evaluation of hydrographic and meteorological factors in order to determine the factors that may affect distribution and persistence of pollutants throughout the study area (WK). Climate and weather can affect the distribution of pollutants or can be the cause of pollutant delivery to a growing area. Prevailing winds can determine the distribution of pollutants in a growing area. Rainfall patterns and intensity can affect water quality through pollutant delivery in runoff or cause flooding which can affect the volume and duration of pollutant delivery. Examples of hydrographic factors that must be evaluated are tidal amplitude and type, water circulation patterns, and the amount of fresh water. These factors, along with water depths and stratification caused by density (salinity and temperature) differences, and wastewater and other waste flow rates are used to determine dilution, and time of transport.

Tides

Water circulation in Casco Bay is dominated by tides. The tidal range in Casco Bay is nine feet. Tides are caused by the gravitational effects of the moon and sun on the ocean. Other influences are heavy rainfall, low barometric pressure and strong onshore winds which will increase tides, while the opposite decreases them. Tide levels fluctuate during the month based on the positions of the sun, moon and earth. These fluctuations and the speed and direction of the tidal currents constantly change during a tidal cycle. Tidal currents have the greatest energy when water is pushed in and out of bays and channels during the highest and lowest tide levels. Growing Area



WK is subject to a semi-diurnal tidal cycle which presents two high tides and two low tides per lunar day. The highest magnitude of tidal fluctuation is approximately 10 feet on average and cycling every 12 hours.

There are very strong tidal currents through Ewin Narrows and Gurnet Strait. Most coves completely drain at low tide providing a complete exchange of water each tide cycle. Water from Long Reach ebbs in two directions: the northern waters flow east to the New Meadows River and the southern waters flow west to Ewin Narrows. On a flooding tide, the opposite is true.

Rainfall

From 2008 to 2014, the average rainfall is 39.41”/year. Rainfall is monitored by automated gauges in Brunswick ([KMEBRUNS5](#)) and Topsham ([KMETOPSH7](#)). The heaviest rainfall year was 2010 with 57.42” (Table 7). The rainiest month are usually May to September and November to December. Occasionally, large rain events occur in October resulting in a Flood Closure (rainfall greater than two inches within a twenty-four hour period of time). Flood closures can occur at any time throughout the year and typically only happen one to three times a year depending upon the year. During the winter most of the precipitation comes as snowfall and affects runoff rates in spring upon melting.

Table 7: Cumulative amount of rainfall in Brunswick per year

Year	Total Rainfall (inches)
2008	30.24
2009	32.25
2010	57.42
2011	44.35
2012	34.32
2013	31.07
2014	46.24
Average	39.41

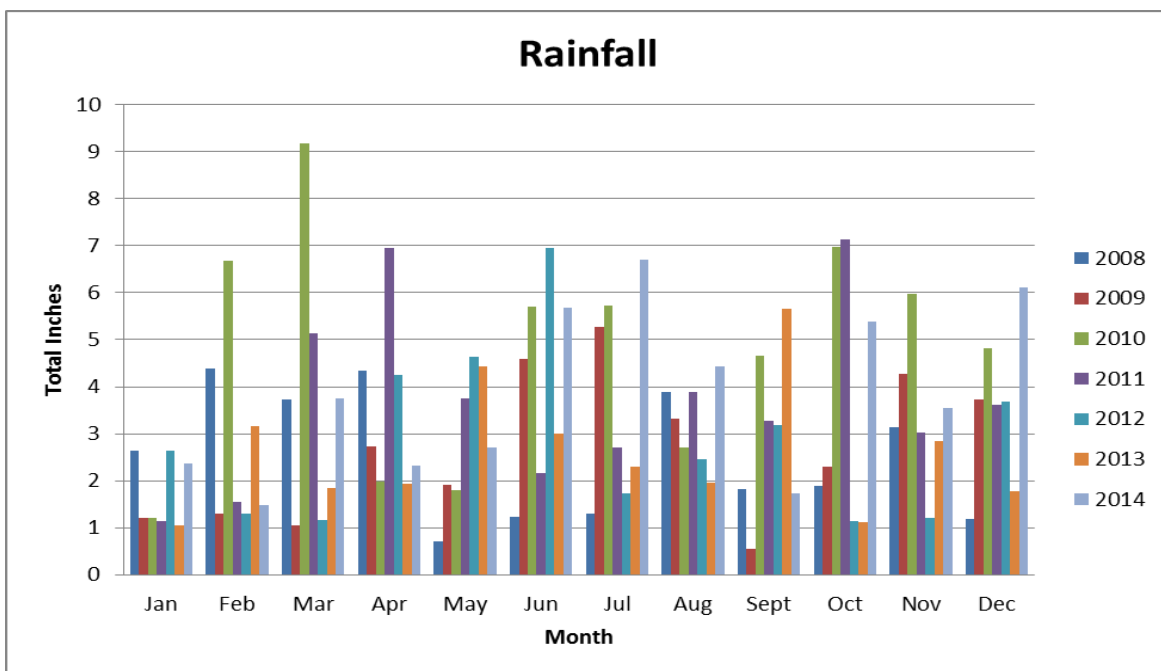




Figure 11: Total rainfall (inches) per month by year

Winds

Wind data specific to each sampling site has been collected since the spring of 2005. Over the last five years of sampling (n = 1770), 41% of the time there was no wind/calm conditions while sampling. If there was wind while sampling, 19% of the time it came from the southwest.

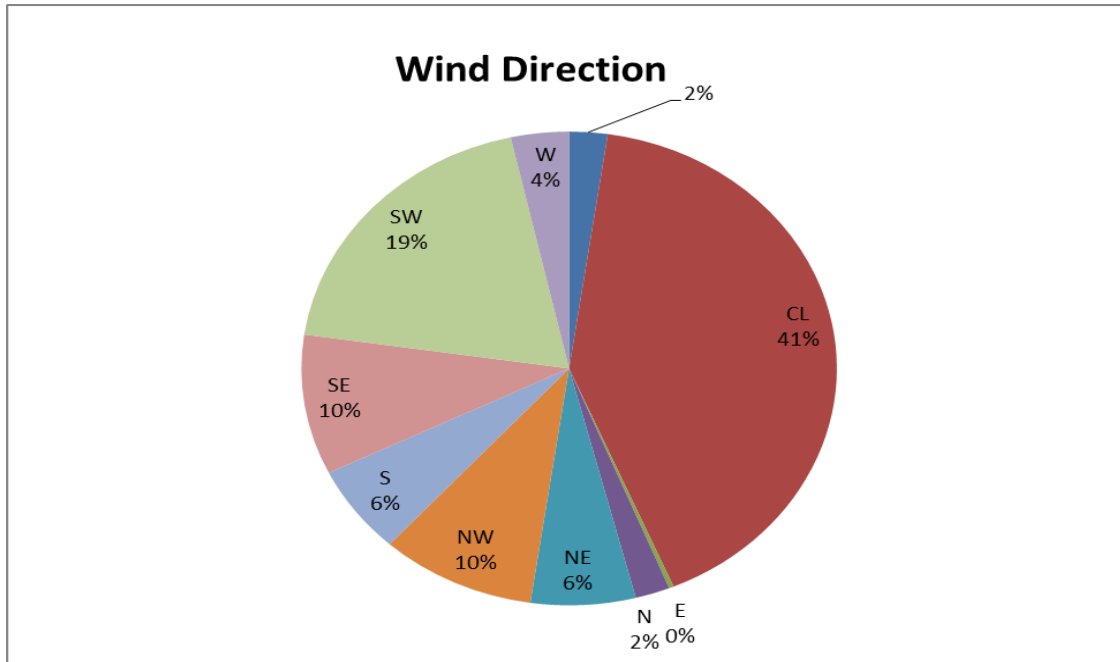


Figure 12: Percent of wind direction observed while sampling over the past 5 years (n = 1770)



Salinity

The average salinity of the samples taken within Growing Area WK is 29 ppt (n =1770). The station with the lowest average (24 ppt) is WK 56 (Figure 13). Station WK 56 is at the head of Orrs Cove. There a stream that drains into Orrs Cove. Salinity for WK 56 is impacted by spring snowmelt and rainfall during the months of March and April (Figure 14). Orrs Cove is classified as Conditionally Approved based on season due to the Great Island Boatyard marina.

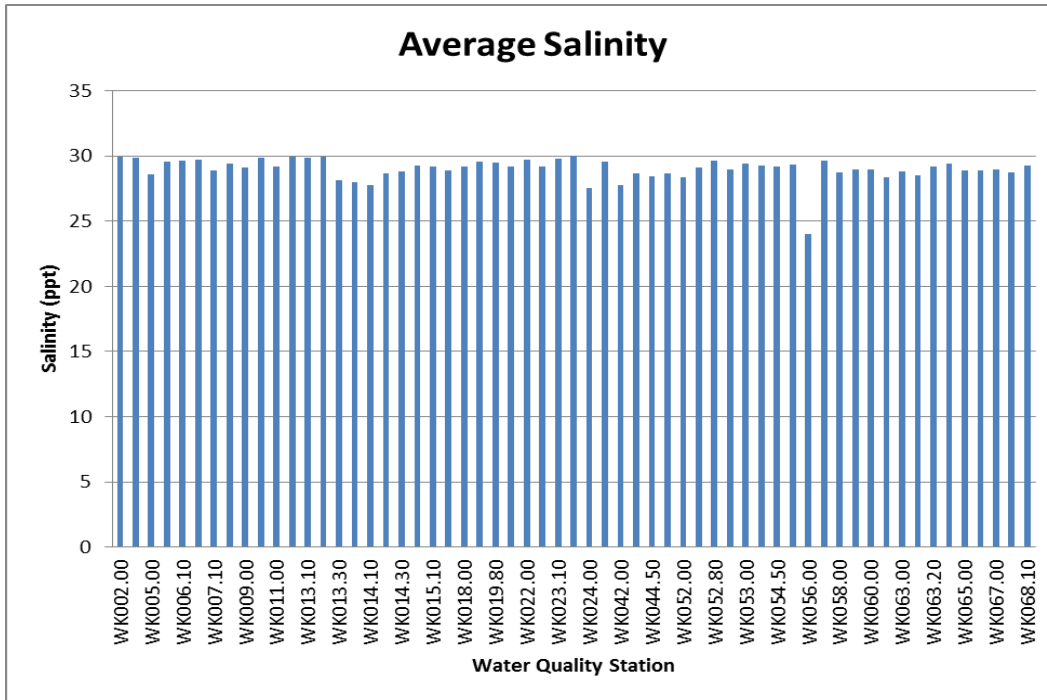


Figure 13: Average salinity per Water Quality Station (n =1770)

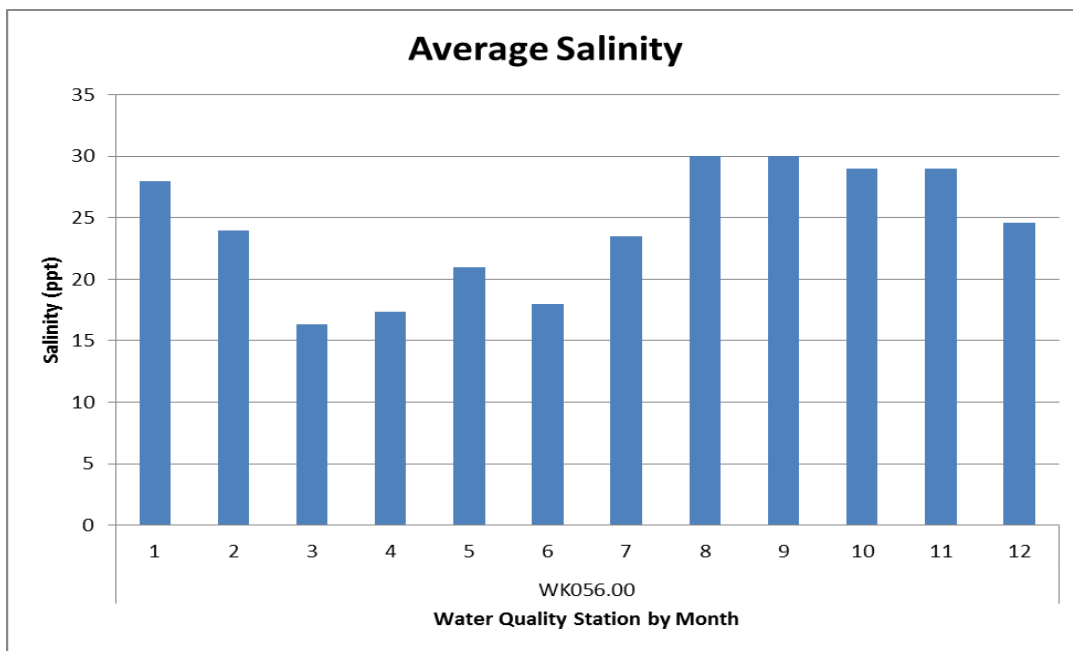


Figure 14: Average salinity per month for water quality station WK 56



River Discharge

There are no rivers in Growing Area WK, therefore are no conditional management plans based upon river discharge/flow. The New Meadows River is located on the eastern side of the Cundy's Harbor peninsula in Growing Area WL. Water quality in the river meets approved standards and is only classified Prohibited in areas where licensed overboard discharges or other localized pollution sources are present. The New Meadows originates in a low-lying marsh area bordered by woods and fields that slope down to the marsh. There is no rapid runoff of fresh water from any particular source. Fresh water volume to the upper lake is minimal and ebbs through the lower lake and then through a sluiceway to the more tidally influenced main channel of the river. It travels approximately three miles before reaching Growing Area WK, where some of it flows into Gurnet Strait on an incoming tide. River volumes increases during spring snow melt and fall rainfalls.

Water Quality Review

There are 59 active water quality stations with Growing Area WK (Figure 1). Table 8 lists 53 active stations that are classified as approved, restricted or prohibited with their respective geomean and P90 calculations for 2014. See Appendix D for explanation of Table 8-11 headers. Of the 53 stations, three approved stations did not meet approved standards ($P90 \geq 31$). There are three conditional areas within Growing Area WK (Tables 9-11). Reed Cove and Orrs Cove met there conditionally approved management criteria (Appendix A-B). One station in Eastern Quahog Bay did not meet the conditionally approved standard (Table 11, Appendix C). Table 12 shows the compliance history for all stations classified as Approved, Restricted or Prohibited. Compliance history for the conditional areas can be found in Appendix A-C.

Data Analysis

Table 8: 2014 End of Year P90 and Geometric Mean analysis for all Approved, Restricted and Prohibited stations. Stations highlighted in red do not meet approved standards (< 31).

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WK002.00	P	30	30	2.7	0.35	43	7.9	31	163	2/10/2010
WK004.00	A	30	30	2.6	0.31	31	6.7	31	163	2/10/2010
WK005.00	P	30	30	8.5	0.76	300	80.9	31	163	2/10/2010
WK005.50	P	30	30	2.6	0.3	27	6.5	31	163	2/8/2011
WK006.10	A	30	30	2.8	0.36	50	8.3	31	163	2/10/2010
WK007.00	A	30	30	2.3	0.19	9.1	4.1	31	163	2/10/2010
WK007.10	P	30	30	5.4	0.73	980	48.3	31	163	2/10/2010
WK008.00	R	30	30	4.3	0.67	380	31.6	31	163	2/10/2010
WK009.00	A	30	30	4.9	0.58	320	28	31	163	2/10/2010
WK010.00	A	30	30	2.6	0.38	64	8	31	163	2/10/2010
WK011.00	A	30	30	3.4	0.52	160	16.1	31	163	2/10/2010
WK012.00	A	30	30	2.6	0.36	36	7.8	31	163	2/10/2010
WK013.10	P	30	30	2.8	0.34	27	7.7	31	163	2/10/2010
WK013.20	A	30	30	2.4	0.25	36	5.1	31	163	2/10/2010
WK013.30	A	30	30	3.2	0.38	33	10	31	163	4/13/2010
WK014.00	A	30	30	3	0.35	27	8.5	31	163	2/9/2010
WK014.10	A	30	30	5	0.54	160	24.9	31	163	2/9/2010
WK014.20	A	30	30	2.9	0.29	22	6.9	31	163	2/9/2010



Station	Class	Count	MFCOUNT	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WK014.30	A	30	30	4	0.48	160	16.9	31	163	3/23/2010
WK014.40	A	30	30	2	0.07	4	2.5	31	163	3/23/2010
WK015.10	A	30	30	2.9	0.42	66	10.3	31	163	2/9/2010
WK017.00	A	30	30	3.3	0.44	60	12.6	31	163	11/4/2009
WK018.00	A	30	30	3	0.35	22	8.6	31	163	2/9/2010
WK018.10	A	30	30	2.3	0.2	16	4.3	31	163	4/12/2010
WK019.80	A	30	30	2.8	0.48	240	11.6	31	163	2/10/2010
WK020.00	P	30	30	2.3	0.27	44	5.2	31	163	2/10/2010
WK022.00	P	30	30	1.9	0	2	1.9	31	163	2/10/2010
WK023.00	A	30	30	4	0.61	1240	24.7	31	163	2/10/2010
WK023.10	A	30	30	2.1	0.19	18	3.9	31	163	3/29/2011
WK023.20	A	30	30	2.2	0.18	9.1	3.7	31	163	3/29/2011
WK025.00	A	30	30	4.2	0.48	40	17.3	31	163	2/10/2010
WK042.00	P	30	30	3.9	0.63	1700	26.1	31	163	2/9/2010
WK044.00	R	30	30	3	0.42	90	10.7	31	163	11/4/2009
WK044.50	R	30	30	3	0.38	36	9.5	31	163	2/9/2010
WK048.00	P	30	30	5.1	0.56	88	27.5	31	163	2/9/2010
WK052.00	P	30	30	7.1	0.89	1700	99.9	31	163	2/9/2010
WK052.10	P	30	30	8.9	0.73	560	78.1	31	163	9/21/2010
WK052.80	P	30	30	3.8	0.57	260	20.6	31	163	11/7/2011
WK052.90	P	30	30	8.8	0.76	940	84.8	31	163	4/13/2011
WK053.00	A	30	30	6.6	0.61	880	40.8	31	163	6/16/2010
WK053.50	A	30	30	5.1	0.58	126	29.2	31	163	11/7/2011
WK054.50	P	30	30	2.4	0.25	18	5	31	163	2/9/2010
WK057.00	P	30	30	1.9	0	2	1.9	31	163	1/12/2009
WK058.00	A	30	30	5.4	0.6	132	32.4	31	163	4/14/2010
WK059.20	A	30	30	4	0.54	620	20.5	31	163	8/18/2010
WK060.00	A	30	30	7.3	0.82	1700	84.4	31	163	7/6/2010
WK061.00	P	30	30	5.9	0.69	240	46.6	31	163	2/9/2010
WK063.00	P	30	30	2.9	0.53	360	14.2	31	163	11/15/2006
WK065.00	P	30	30	6.9	0.73	340	61.4	31	163	2/9/2010
WK066.00	P	30	30	7.2	0.76	820	69.5	31	163	2/9/2010
WK067.00	P	30	30	4.3	0.52	74	20.2	31	163	2/9/2010
WK068.00	P	30	30	7.7	0.73	600	67.1	31	163	2/9/2010
WK068.10	P	30	30	2.6	0.31	32	6.7	31	163	2/9/2010

Table 9: 2014 End of Year P90 and Geometric Mean analysis for Reed Cove – Conditionally Approved area based on season.

Station	Class	Count	MFCOUNT	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WK024.00	CA	30	30	2.9	0.29	16	7.1	31	163	3/18/2009



Table 10: 2014 End of Year P90 and Geometric Mean analysis for Orrs Cove – Conditionally Approved area based on marina season.

Station	Class	Count	MFCOUNT	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WK055.00	CA	30	30	2.5	0.39	126	8.3	31	163	2/25/2009
WK056.00	CA	30	30	3.3	0.49	96	14.1	31	163	3/18/2009
WK057.00	P	30	30	1.9	0	2	1.9	31	163	1/12/2009

Table 11: 2014 End of Year P90 and Geometric Mean analysis for Eastern Quahog Bay – Conditionally Approved area based season. Station highlighted in red does not meet approved standards (< 31).

Station	Class	Count	MFCOUNT	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WK060.00	A	30	30	7.3	0.82	1700	84.4	31	163	7/6/2010
WK063.00	P	30	30	2.9	0.53	360	14.2	31	163	11/15/2006
WK063.10	CA	30	30	3.2	0.52	160	15.4	31	163	5/4/2011
WK063.20	CA	30	30	2.2	0.14	6	3.3	31	163	5/4/2011
WK064.10	CA	30	30	2.7	0.37	48	8.2	31	163	4/13/2009

Compliance History

Table 12: Compliance History for 2014 of stations classified as Approved, Restricted or Prohibited

Station	Class	Adverse		Extra		Random		Total	Comments
		C	O	C	O	C	O		
WK002.00	P					6		6	
WK004.00	A						6	6	
WK005.00	P					4		4	Classification changed from R to P in June 2014
	R						2	2	
WK005.50	P					4		4	Classification changed from R to P in June 2014
	R						2	2	
WK006.10	A						6	6	
WK007.00	A						6	6	
WK007.10	P					6		6	
WK008.00	R						6	6	
WK009.00	A						6	6	
WK010.00	A						6	6	
WK011.00	A						6	6	
WK012.00	A						6	6	
WK013.10	P					6		6	
WK013.20	A						6	6	
WK013.30	A						6	6	
WK014.00	A						6	6	
WK014.10	A						6	6	
WK014.20	A						6	6	
WK014.30	A						6	6	
WK014.40	A						6	6	
WK015.10	A						6	6	
WK017.00	A						5	5	Sample missed due to ice and staff limitations
WK018.00	A						6	6	
WK018.10	A						6	6	



Station	Class	Adverse		Extra		Random		Total	Comments
		C	O	C	O	C	O		
WK019.80	A						6	6	
WK020.00	P					6		6	
WK022.00	P					6		6	
WK023.00	A						6	6	
WK023.10	A						6	6	
WK023.20	A						6	6	
WK024.00	CA					3	6	9	
WK025.00	A						6	6	
WK042.00	P					6		6	
WK044.00	R						5	5	Sample missed due to ice and staff limitations
WK044.50	R						6	6	
WK048.00	P					6		6	
WK052.00	P					6		6	
WK052.10	P					6		6	
WK052.80	P					6		6	
WK052.90	P					6		6	
WK053.00	A						6	6	
WK053.50	A						6	6	
WK054.50	P					6		6	
WK055.00	CA					4	5	9	
WK056.00	CA					4	5	9	
WK057.00	P					8		8	
WK058.00	A						6	6	
WK059.20	A						6	6	
WK060.00	A						6	6	
WK061.00	P					6		6	
WK063.00	P					5		5	Sample missed due to ice and staff limitations
WK063.10	CA					2	6	8	
WK063.20	CA					1	6	7	
WK064.10	CA					2	6	8	
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	

Recommendation for Future Work

After review of the last years P90 analysis and shoreline survey work, it is recommended to adjust the management plan for Eastern Quahog Bay.



Appendix A.

**2014 Annual Review of Conditional Area Management Plan
Orrs Cove - Marina Conditional Area (Pollution Area 17-B)**

Scope:

Orrs Cove is classified as Conditionally Approved based on the presence of 10 or less boats with heads at the marina(s) or town dock. Orrs Cove area is monitored by stations WK55, 56 and 57. Station WK57 serves as the boundary station between the conditionally Approved and Prohibited areas. This area is used for as a commercial fishing wharf, recreational boat mooring field and other seasonal recreational uses.

Compliance with the Conditional Area Management Plan (CAMP):

This area is Conditionally Approved with an open status of December 1st to April 30th based on water quality meeting the approved NSSP standard during this time period and 10 or less boats with heads are present.

Adequacy of reporting and cooperation of involved persons:

The management plan for this conditional area does not require reporting.

Cooperation on behalf of the local shellfish wardens and marina personnel is excellent. Marina personnel provide opening and closing interviews and alert the Department or the local Shellfish Warden of any emergency situations.

Marine Patrol and/or local Shellfish Wardens monitor illegal harvesting activity for this area during the closed period.

Compliance with approved growing area criteria:

Stations WK55, 56 and 57 are in the conditional area and meet the approved NSSP standard during the OPEN period based on geometric mean and P90 values (Table 1).

Table 1: Lower Basin Cove Marina Conditional Area geometric mean and P90 scores

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WK055.00	CA	30	30	2.5	0.39	126	8.3	31	163	2/25/2009
WK056.00	CA	30	30	3.3	0.49	96	14.1	31	163	3/18/2009
WK057.00	P	30	30	1.9	0	2	1.9	31	163	1/12/2009

Field Inspection of Critical Pollution Sources:

Orrs Cove Marina Condition Area is inspected twice a year, two weeks prior to the open and close dates. There were less than 10 boats with heads when inspected in April and November 2014.

Water Sampling Compliance History:

Conditional area sampling was done during both the open and closed periods. The monitoring stations are part of a scheduled sampling run. All stations were collected 5 times in the open status meeting the NSSP Model Ordinance and Conditional Area Management Plan requirements (Table 2).



Table 2: Lower Basin Cove Marina Conditional Area - Water Sampling Compliance History

Station	Class	Adverse		Extra		Random		Total	Comments
		C	O	C	O	C	O		
WK055.00	CA					4	5	9	
WK056.00	CA					4	5	9	
WK057.00	P					8		8	

Summary:

This area meets the Conditionally Approved classification criteria based on water quality during the open period. The OPEN period start date (12/1) and CLOSE date (5/1) continue to be valid. No recommendation for changes to the current management plan or conditional area classification status is needed at this time.



Appendix B.

**2014 Annual Review of Conditional Area Management Plan
Reed Cove – Seasonal Conditional Area (Pollution Area 17-C)**

Scope:

Reed Cove is classified as Conditionally Approved based on the seasonal variation in water quality. This conditional area is monitored by station WK 24.

Compliance with the Conditional Area Management Plan (CAMP):

This area is Conditionally Approved with an open status of October 1st to June 30th based on water quality meeting the approved NSSP standard during this time period.

Adequacy of reporting and cooperation of involved persons:

The management plan for this conditional area requires an annual review of the data to ensure the open season length is appropriate.

Marine Patrol and/or local Shellfish Wardens monitor illegal harvesting activity for this area during the closed period.

Compliance with approved growing area criteria:

Station WK 24 is in the conditional area and meets the approved NSSP standard during the OPEN period based on geometric mean and P90 values (Table 1).

Table 1: Reed Cove Seasonal Conditional Area geometric mean and P90 scores

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WK024.00	CA	30	30	2.9	0.29	16	7.1	31	163	3/18/2009

Field Inspection of Critical Pollution Sources:

Non-point pollution sources have contributed to elevated scores during the closed months (July to September). An analysis of the data shows that water quality meets approved standards from October 1 to June 30.

Water Sampling Compliance History:

Conditional area sampling was done during both the open and closed periods. The monitoring stations are part of a scheduled sampling run. All stations were collected 6 times in the open status meeting the NSSP Model Ordinance and Conditional Area Management Plan (Table 2).

Table 2: Reed Cove Seasonal Conditional Area - Water Sampling Compliance History

Station	Class	Adverse		Extra		Random		Total	Comments
		C	O	C	O	C	O		
WK024.00	CA					3	6	9	

Summary:

This area meets the Conditionally Approved classification criteria based on water quality during the open period. The OPEN period start date (10/1) and CLOSE date (7/1) continue to be valid.



Appendix C.

**2014 Annual Review of Conditional Area Management Plan
Eastern Quahog Bay – Seasonal Conditional Area (Pollution Area 18)**

Scope:

Eastern Quahog Bay is classified as Conditionally Approved based on the seasonal variation in water quality. This conditional area is monitored by stations WK 60, 63, 63.1, 63.2 and 64.1.

Compliance with the Conditional Area Management Plan (CAMP):

This area is Conditionally Approved with an open status of October 1st to May 31st based on water quality meeting the approved NSSP standard during this time period.

Adequacy of reporting and cooperation of involved persons:

The management plan for this conditional area requires an annual review of the data to ensure the open season length is still applicable.

Marine Patrol and/or local Shellfish Wardens monitor illegal harvesting activity for this area during the closed period.

Compliance with approved growing area criteria:

Stations WK 60, 63, 63.1, 63.2 and 64.1 are in the conditional area and all but one station (WK60), meet the approved NSSP standard during the OPEN period based on geometric mean and P90 values (Table 1).

Table 1: Eastern Quahog Bay Seasonal Conditional Area geometric mean and P90 scores

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WK060.00	A	30	30	7.3	0.82	1700	84.4	31	163	7/6/2010
WK063.00	P	30	30	2.9	0.53	360	14.2	31	163	11/15/2006
WK063.10	CA	30	30	3.2	0.52	160	15.4	31	163	5/4/2011
WK063.20	CA	30	30	2.2	0.14	6	3.3	31	163	5/4/2011
WK064.10	CA	30	30	2.7	0.37	48	8.2	31	163	4/13/2009

Field Inspection of Critical Pollution Sources:

Non-point pollution sources have contributed to elevated scores during the closed months (June to September). An analysis of the data shows that water quality meets approved standards from October 1 to May 31.

Water Sampling Compliance History:

Conditional area sampling was done during both the open and closed periods. The monitoring stations are part of a scheduled sampling run. All stations, except one, were collected 6 times in the open status meeting the NSSP Model Ordinance and Conditional Area Management Plan (Table 2).



Table 2: Eastern Quahog Bay Seasonal Conditional Area - Water Sampling Compliance History

Station	Class	Adverse		Extra		Random		Total	Comments
		C	O	C	O	C	O		
WK060.00	A						6	6	
WK063.00	P					5		5	Sample missed due to ice and staff limitations
WK063.10	CA					2	6	8	
WK063.20	CA					1	6	7	
WK064.10	CA					2	6	8	

Summary:

One station in this area no longer meets the approved classification criteria based on water quality. The Conditionally Approved stations in this area continue to meet Conditionally Approved classification criteria based on water quality during the open period. OPEN period start date (10/1) and CLOSE date (6/1) continue to be valid.

After reviewing the water quality data, it is recommended to amend the Conditional Area Management Plan from seasonal to rainfall and reduce the size of the conditional area.



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.