GROWING AREA WZ
Towns of North Haven and Vinalhaven

Sanitary Survey Report

Report Date: 08-10-2012

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APPROVAL

Division Director:

_____ _____ Date: _____
Print name signature

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Figure 1. Growing Area WZ, North Haven, with Active Water Stations

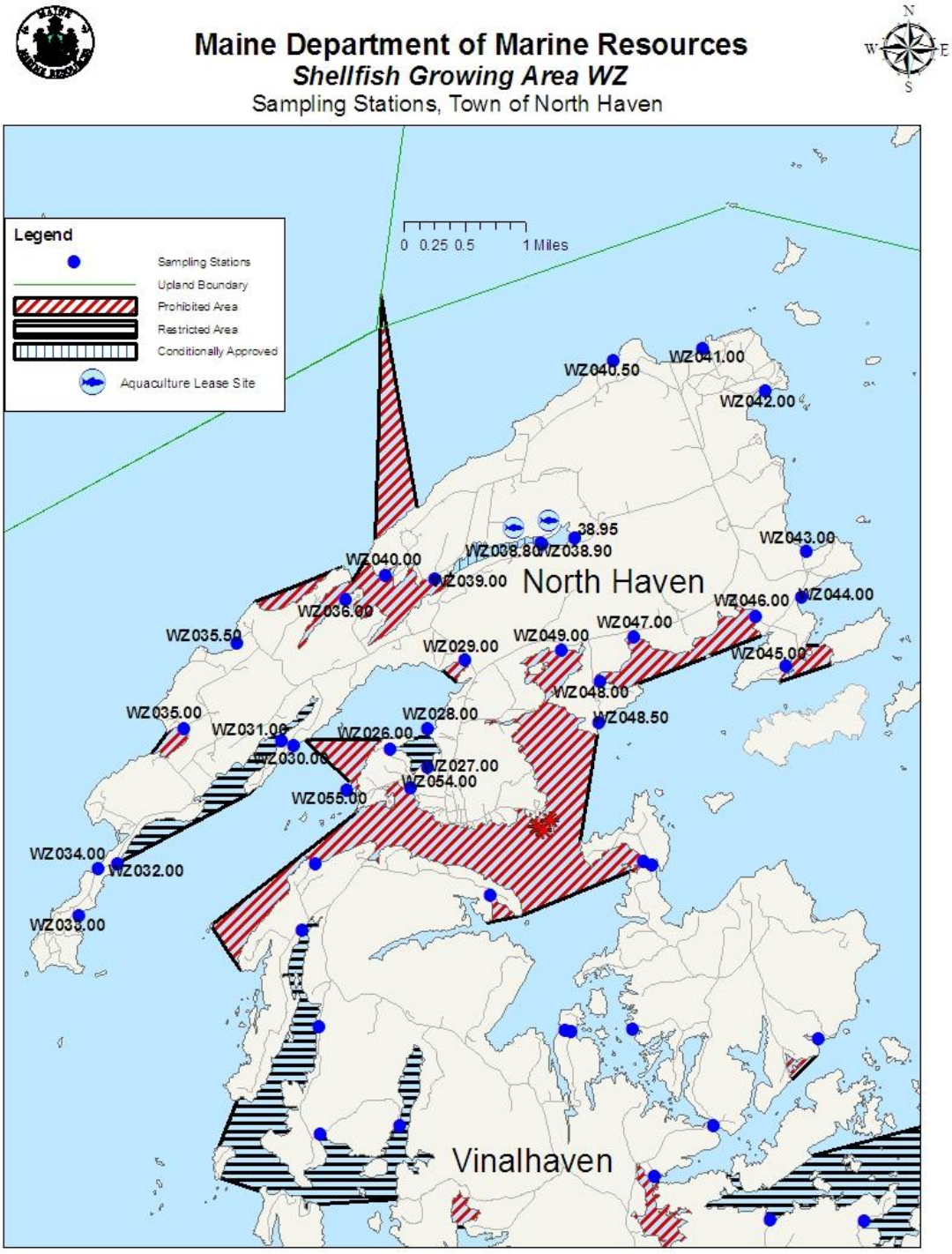
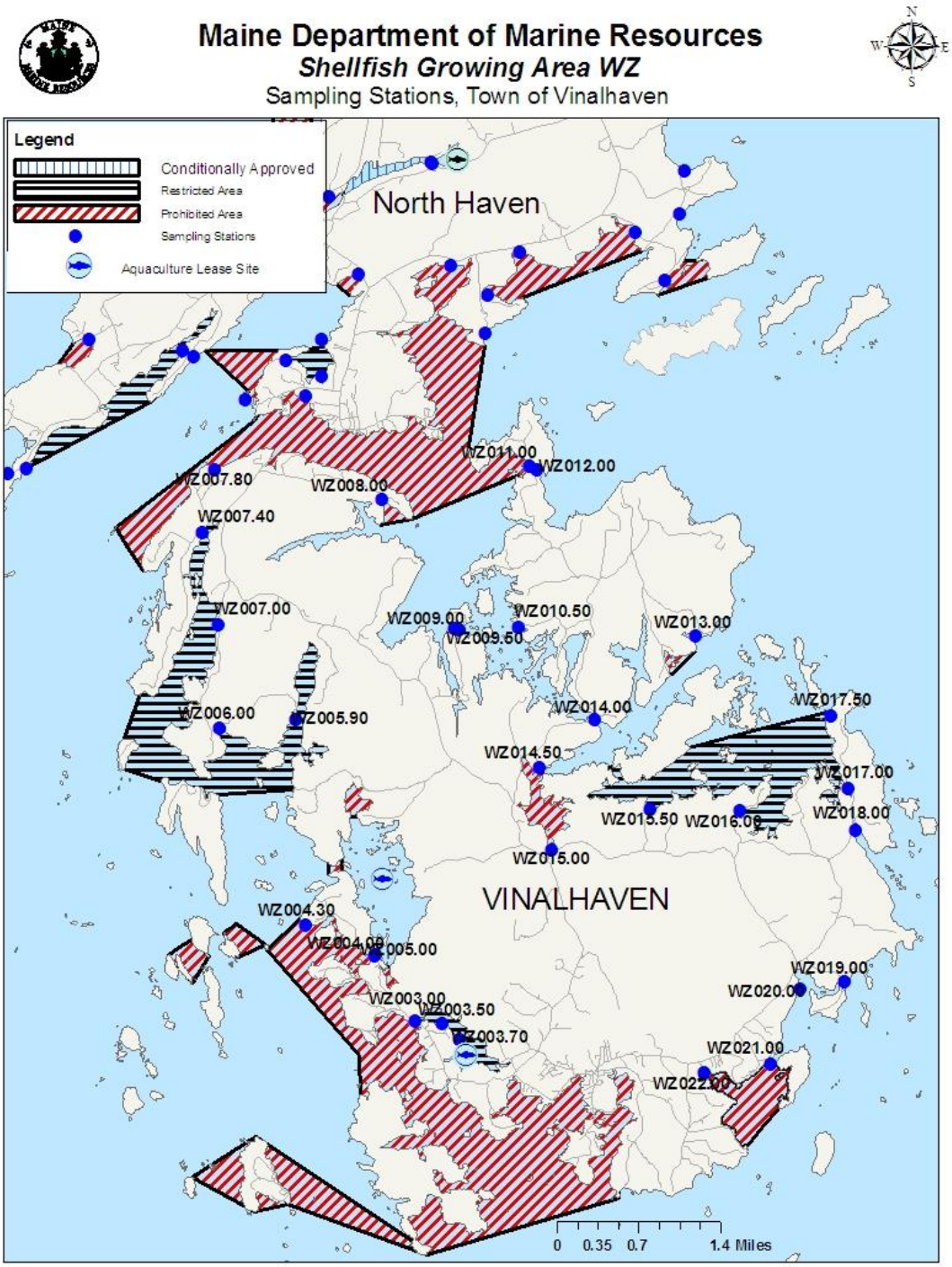


Figure 2. Growing Area WZ, Vinalhaven with Active Sampling Stations



Executive Summary

This is a sanitary survey report for growing area WZ written in compliance with the requirements of the 2007 Model Ordinance and the National Shellfish Sanitation Program. The island of Vinalhaven was surveyed during the fall of 2009 and the island of North Haven was surveyed during the fall of 2010. This report includes a water quality review, as well as an evaluation of all new pollution sources identified during the shoreline survey of the islands. Pollution sources reviewed in this report include domestic waste, including private in-ground systems and over board discharges (OBDs), marinas, recreational areas, agricultural activities, domestic animal and wildlife areas, storm water, and non-point pollution transported by streams. North Haven and Vinalhaven are surrounded by numerous smaller islands that were not surveyed during the 2009 and 2010 surveys. Tables 1and 2 list the smaller islands around North Haven and Vinalhaven, the number of dwellings on each island and the current survey status. Islands that need to have the survey information updated are hi-lighted in yellow. Due to the low occupancy and the seasonal nature of the islands no new closures are recommended around the islands at this time.

Shellfish Growing Area WZ includes the islands of North Haven and Vinalhaven and several smaller islands. This growing area is located in the middle of Penobscot Bay in the area between Rockland, on the mainland and the island of Isle Au Haut to the east. During the review period two active OBDs were removed on North Haven (2008). Vinalhaven had six new stations created during the review period (2007) and North Haven had one new station created (2005).

Seal Bay and the cove south of Zeke Point on Vinalhaven are being proposed for upgrades in classification to Approved. The southwest corner of Pulpit Harbor, North Haven is also being proposed for an upgrade to Approved. The closure on the west shore of Burnt Island (North Haven) will be extended to include a section of the North Haven shore in the prohibited area due to a suspected septic overflow.

The next sanitary survey for shellfish growing area WZ is due in 2022.

Growing Area Description

The islands of North Haven and Vinalhaven are located in the mouth of Penobscot Bay (Figures 1-3). Both islands contain year round populations that more than double during the summer months from June through August. Vinalhaven is the larger of the two islands. According to Vinalhaven's 2004 Comprehensive Plan the year round population is 1,275 individuals. North Haven has a year round population of 380 and a summer population of 2,000 (United States Census Bureau). Both islands have municipal treatment facilities that serve their town centers. There are no large industries on either island. Most residents earn their living lobstering or caretaking the many seasonal dwellings on both islands. There are no marinas on either of the islands but there are areas that contain moorings which are utilized by both cruising and work boats. There are also several coves that are suitable for anchoring.

Matinicus and Ragged Islands are permanently classified as Prohibited for all shellfish harvesting. The Matinicus and Ragged Island closure is an administrative closure due to the islands being too far from shore for staff to easily access and manage on a routine basis.

There is no upland boundary for Shellfish Growing Area WZ because this growing area includes only islands. The growing area boundary lines were drawn to include all of the islands within the study area of Growing Area WZ. Therefore, the boundary lines follow a series of navigational aides around all of the islands that are included in shellfish growing area WZ.

History of Growing Area Classification

The following Classification Changes have occurred in the last five years.

Vinalhaven

Activity in 2006:
On June 5, 2006, Long Cove (station WZ5.9) was reclassified as Prohibited due to water quality not meeting the approved standard.
On June 5, 2006, Seal Bay (station WZ15.5) was reclassified as Prohibited due to water quality not meeting the approved standard.
On June 5, 2006, the section of shore north of Fish Head (station WZ7.8) was reclassified as Prohibited due to water quality not meeting the approved standard.

Activity in 2007:
On May 10, 2007, the entire section of shore from Long Cove to Crockett Cove was reclassified as Restricted due to poor water quality (stations WZ5.9, WZ6, and WZ7).
On May 10, 2007 the Prohibited area in Seal Bay became reclassified as Restricted and was enlarged to include Smith Cove and the shore at Coombs Hill (stations WZ15.5, WZ16, and WZ17). This change was due to deteriorating water quality scores.

Activity in 2008:
No classification changes took place in 2008.

Activity in 2009:
No changes in classification occurred in 2009.

North Haven

Activity in 2006:
On June 6, 2006, the north shore (station WZ40.5) of North Haven was reclassified as Approved.
On June 6, 2006, a portion of the shore at Ames Point (station WZ55) was reclassified as Approved due to the removal of a licensed overboard discharge.
On November 14, 2006, the salt pond (station WZ38.9) on North Haven was reclassified as Approved for shellfish harvest.

Activity in 2007:

On May 10, 2007, the southwest corner of Pulpit Harbor (station WZ36) was downgraded to Restricted due to poor water quality scores.
On May 10, 2007, the cove west of Amesbury Point (station WZ31) was downgraded to Restricted due to poor water quality scores.
On August 21, 2007, the salt pond was reclassified as Restricted due to a mid-season review of the water quality scores revealing that sampling station WZ 38.9 was just over the approved standard.
On December 14, 2007, the salt pond was reclassified as Approved for shellfish harvest. When all of the sampling was completed for 2007, sampling station 38.9 once again had a P90 score that met approved standards.
On December 19, 2007, the cove south of Y-Knot boatyard (stations 26 and 27) was reclassified as Restricted due to water quality scores not meeting the approved standard.

Activity in 2008:
No classification changes in classification occurred in 2008.

Activity in 2009:
No changes in classification occurred in 2009.

Activity in 2010
On September 28, 2010 an area on Crabtree Point Road was reclassified from Prohibited to Approved due to pollution abatement and water quality meeting approved standards. The area between the Pulpit Harbor bridge and the Salt Pond causeway was also reclassified from Prohibited to Conditionally Approved based on season due to the remediation of known pollution sources and water quality meeting the approved standard in the open status from December 1 – May 31.

During the review period, the following station changes took place:

Sampling station WZ 48.5 was established (2006) to monitor the site of a closure line on North Haven. This station was sampled 5 times in 2006.
On May 24, 2007, five new stations were created to better monitor the water quality in their respective areas. These new stations include: station WZ7.4 sampled at the head of Crockett Cove; station WZ10.5 sampled in Mill River; station WZ14.5 sampled just north of Vinal Cove Station WZ17.5 sampled at the end of Coombs Neck Road, created to monitor the end of the new closure line; and station WZ4.3, located on Barton Island, created to monitor the end of a closure line.

On November 28, 2007, station WZ3.7, located in Old Harbor Pond, was created to monitor water quality at an aquaculture lease site.

Current Classification(s)

Vinalhaven shellfish classifications are described on Area No. 30-D
Vinalhaven stations include stations WZ3 to WZ22

North Haven shellfish classifications are described on Area No. 30-I

North Haven stations include stations WZ26 to WZ55

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

Approved (22 stations):

Area No. 30-D (Vinalhaven):
WZ 5, 9, 9.5,12,13, 14, 18, 19 and 20, station 10.5 has less than 30 samples, this station is in an area currently classified as Approved

Area No. 30-I (North Haven):
WZ 28, 30, 32, 33, 34, 35.50, 38.90, 40.50, 41, 42, 43, 44, and 55

Restricted (9 stations):

Area No. 30-D (Vinalhaven):
Old Harbor Pond; WZ 3.5 due to non-point pollution, station WZ3.7 is also located in Old Harbor Pond, this station has 20 had samples collected
Crockett Cove and Long Cove; WZ 5.9, 6, 7, and 7.4 due to non-point pollution, station 7.4 has had 26 samples collected

Seal Bay; WZ 16, 17 and 17.5, due to variability caused by non-point pollution, station 17.5 had had 26 samples collected

Area No. 30-I (North Haven):
Southern Harbor, Cox Cove; WZ 26, and WZ 27due to variability caused by non-point pollution
Ames Creek, WZ 31 due to variability caused by non-point pollution

Prohibited (20 stations):

Area No. 30-D (Vinalhaven):
Old Harbor Pond causeway; WZ 3, due to licensed OBDs
The Basin Causeway; WZ4, due to former point source in the area and variability in water quality scores
Barton Island; WZ4.3, due to less than 30 samples (26) collected at station site and the need to update survey information
Fish Head; WZ7.8, due to variability caused by non-point pollution
Perry Creek; WZ8, due to variability caused by non-point pollution
Zeke Point; WZ11, due to former OBD and outdated survey
Vinal Cove; WZ 15; due to identified actual pollution sources
Southeast of Penobscot Island; WZ15.5, due to non-point pollution
Roberts Harbor; WZ 21 and WZ22, due to lack of current survey and water quality not meeting the approved standard
Unnamed cove in Winter Harbor, 500 yards northeast of Starboard Rock; due to an active OBD

Area No. 30-I (North Haven):

Southern Harbor across the mouth of Seaview Cemetery Cove; WZ 29 due to non-point pollution
Small closure with no stations, 1000 yards northeast of Crabtree Point, due to an identified actual pollution source
Bartlett Harbor; WZ 35, due to potential malfunction 10 feet from shore
Pulpit Harbor and Mill Stream; WZ 36, due to non-point pollution
Inner Pulpit Harbor; WZ 38.80, due to variability caused by non-point pollution
Pulpit Harbor; WZ39 and 40, due to potential pollution from boats
Between Indian Point and Burnt Island; WZ 45, due to an identified actual pollution source
Kent Cove; WZ 46, 47, 48 and 48.5, due to non-point pollution, station 48.5 currently has 29 samples
Thorofare Closure from Browns Head, Vinalhaven to the Sugar Loaves, continuing to Zeke Point, Vinalhaven north to the Cubby Hole, North Haven; WZ 49 and 54; due to active OBDs, boating traffic and the North Haven treatment plant outfall

The following seven stations have less than 30 data points, and are considered “new” stations: on Vinalhaven: WZ3.7, 4.3, 7.4, 10.5, 14.5, and 17.5; on North Haven: WZ48.5

Please visit the DMR website to view legal notices for Area No. 30-D and Area No. 30-I:

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

Conditionally Managed Area(s)

On September 28, 2010, the area between the Pulpit Harbor Bridge and the Salt Pond causeway was reclassified from Prohibited to Conditionally Approved based on season due to the remediation of known pollution sources and water quality meeting the approved standard in the open status from December 1 – May 31.

Pollution Sources Survey

The following sections include information on pollution sources which do or may impact water quality in growing area WZ. 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. The island of Vinalhaven was surveyed during the fall of 2009 and the island of North Haven was surveyed during the fall of 2010. Pollution sources identified during these surveys were reported to the town manager and Licensed Plumbing Inspector (LPI) responsible for each area. The pollution sources were also reported to Department of Environmental Protection (DEP), and Department of Health and Human Services (DHHS). These additional agencies are provided the survey information to make them aware of the locations where pollution sources were found and also to provide them with a timeline to follow when assessing how long it takes for a pollution source to be addressed and fixed. If a pollution source is not fixed in a timely manner, these agencies may be contacted in an effort to speed up the remediation process.

Several small islands were not revisited during the shoreline survey of the growing area. The majority of these islands are unoccupied. Islands on the west side of Vinalhaven were inspected in 2004. Following the 2004 inspection, closures were made around any of the dwellings that had questionable systems on or near the shore. The islands on tables 1 and 2 that are hi-lighted in yellow are the ones that are most in need of updated survey information. Due to the low occupancy and the seasonal nature of the islands no new closures are recommended around the islands at this time.

Table 1. Status of Small Islands around Vinalhaven

Vinalhaven Islands				
Island Name	# of Dwellings	Closure Around Dwelling? Y/N	Last Surveyed	Comments
Leadbetter Is	5	Y	2004	Two owners, closure around dwellings
Dogfish Is.	5	Y	2004	New septic with septic overflow to shore, closure around dwellings
Crotch Is.	1	Y	2004	New septic 2009, May be able to lift closure after property is revisited
Cedar Is.	2	Y	2004	House and 1 guest camp, closure around dwellings
Hurricane Is	Several	Y		All Closed, never surveyed
Green Is	2 camps	N	2006	The west shore is mostly vacant and is classified as approved - there are two small camps with outhouses >100 feet from shore. The east side is more developed and has not been surveyed. This portion is prohibited.
Laireys Is	2	N	2004	House and guest dwelling
Crane Is.	1	N	2004	Camp with outhouse
Spectacle Is.	0			
Penobscot Is	1 camp	N		Camp on north shore, out house, has not been inspected, remainder of island vacant
Widow Is.	1 camp	N	1999	Seldom used, in ground system
Hen Is.	0			
Hay Is.	0			
Burnt Is.	0			
Bluff Head	0			
Duck	0			
Browns Is.	0			
Stoddard Is.	0			
Smith Is.	0			
Green Is	0			
Narrows Is	0			
Sheep	2	N	2010 discussion with LPI	LPI stated that a tank and LF were installed 1989, 500 feet from shore, it is a big house with a guest house away from shore
White Is. (4)	0			

Vinalhaven Islands				
Island Name	# of Dwellings	Closure Around Dwelling? Y/N	Last Surveyed	Comments
Flat	0			
Ohio	0			
Turnip	0			
Fiddlehead	1			
Raspberry	1	N		Camp with outhouse
Hall	0			
Ram	0			
Brimstone	0			
Little Brimstone	0			
Roberts	0			
Otter	0			
Hay Is.	0			
Carvers	0			
Jennings Is	0			In Mill River
S of Jennings	0			small un-named island
?	0			small un-named island
Inside The Basin	0			small un-named island
Inside The Basin	0			small un-named island

Table 2. Status of Small Islands Around North Haven

North Haven Islands				
Island Name	# of Dwellings	Closure Around Dwelling? Y/N	Last Surveyed	Comments
Stimpsons Is.	2	N	1999	Two in ground systems on northwest shore, remainder of island is in protective trust
Calderwood	0			
Babbidge	0			
Burnt Is.	0			
Sheep	0			
Bald	1	N		Never surveyed
Oak	1	N		Never surveyed
Burnt Is.	1	N		Never surveyed
Dagger	0			
Downfall	0			

North Haven Islands				
Island Name	# of Dwellings	Closure Around Dwelling? Y/N	Last Surveyed	Comments
Hog	0			
Dumplings	0			

Figure 3. Pollution Sources, Town of North Haven

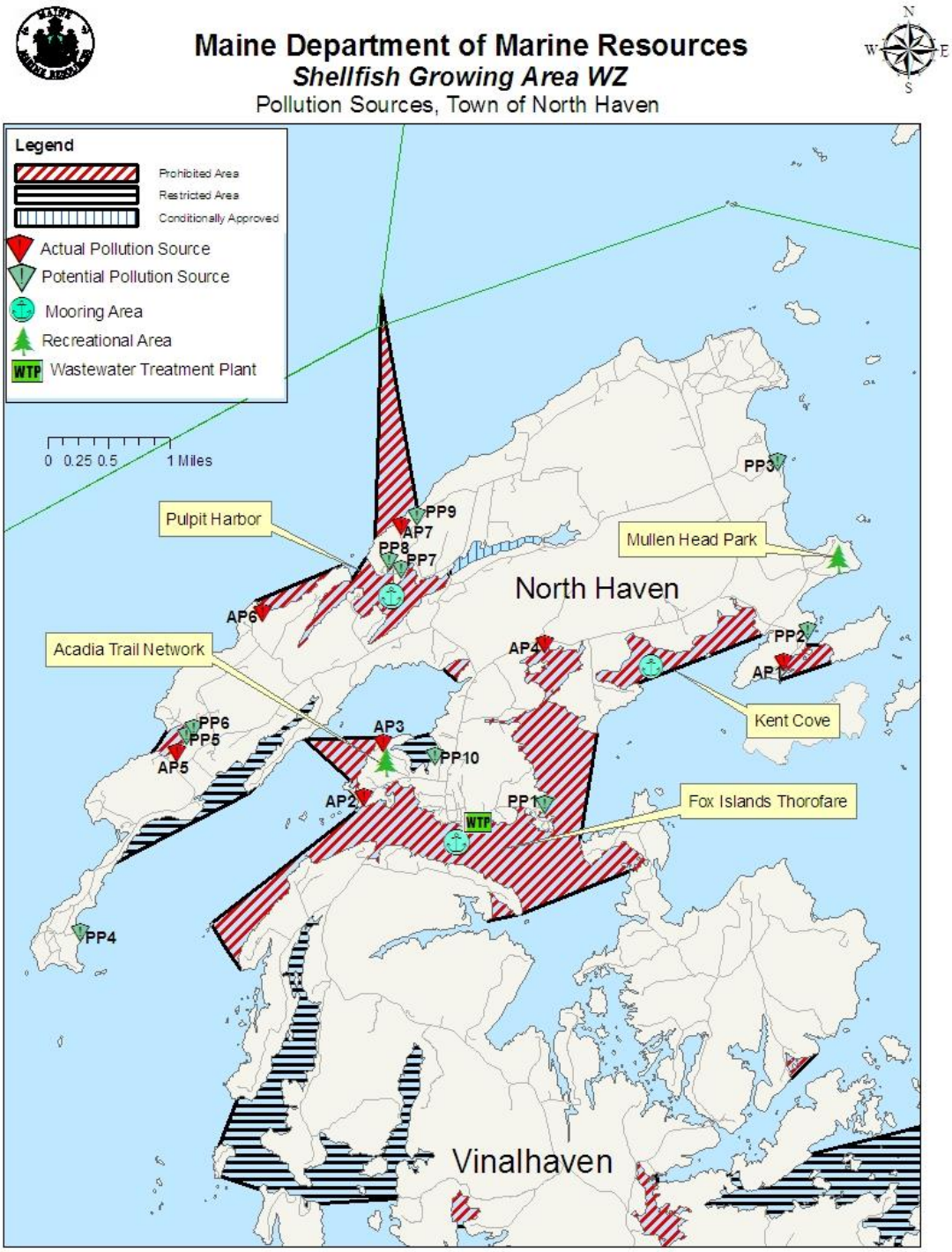
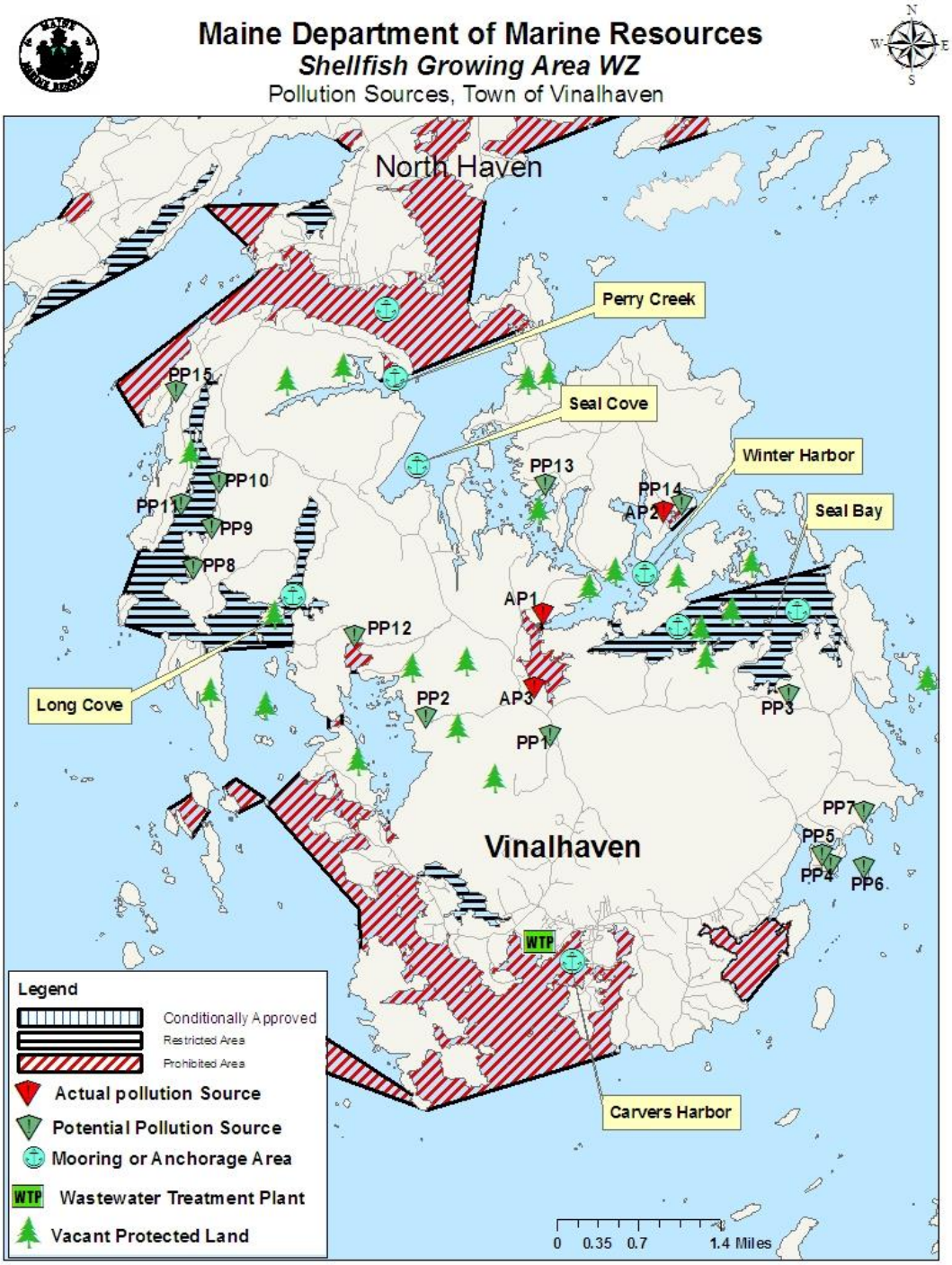


Figure 4. Pollution Sources Town of Vinalhaven



Domestic Waste

Table 3. Actual Pollution Sources, 2009 Vinalhaven Survey

Actual Pollution Sources, 2009 Vinalhaven Survey						
Site #	Date Surveyed	Actual or Potential	Direct / Indirect	Description	Class	Distance to Shore
AP1	9/18/2009	Actual	Indirect	Outhouse too close to shore, no waste or seep visible	A	15
AP2	9/18/2009	Actual	Indirect	Septic malfunction, grey pooling water visible alongside driveway	P	90
AP3	9/18/2009	OBD Removed	OBD Removed	OBD removed spring 2010	P	
AP4	9/22/2009	Actual	Indirect	Tank is at east corner, leachfield is downhill from tank and is breaking out by large pine tree	P	200

Table 4. Potential Pollution Sources, 2009 Vinalhaven Survey

Potential Pollution Sources, 2009 Vinalhaven Survey						
Site #	Date Surveyed	Actual or Potential	Direct / Indirect	Description	Class	Distance to Shore
PP1	9/22/2009	Potential	Indirect	Property has composting toilet - however two grey water lines were visible, both were uncovered and there was recent dirt work, what are the exposed lines?	P	180
PP2	10/1/2009	Potential	Indirect	Outhouse has no roof, walls or floor but is considerable distance from shore >500' in wooded area	A	>500
PP3	9/22/2009	Potential	Indirect	Septic exits house by power meter and then goes to rocky overgrown area - leach field?		?
PP4	9/25/2009	Potential	Indirect	leach field location??	A	?

Potential Pollution Sources, 2009 Vinalhaven Survey						
Site #	Date Surveyed	Actual or Potential	Direct / Indirect	Description	Class	Distance to Shore
PP5	9/25/2009	Potential	Indirect	Septic location??	A	?
PP6	9/25/2009	Potential	Indirect	Septic or OH??	A	?
PP7	9/24/2009	Potential	Indirect	Tank and leach field north of the house. The pipe goes from tank to rocky septic mound but the end of the pipe doesn't appear to connect into the mound and the pipe and tank area are leaking	A	350
PP8	7/9/2010	potential	indirect	OH with line that goes under driveway to brush mound	R	90
PP9	7/10/2010	potential	indirect	main house has OH with tank and field	R	120
PP10	7/11/2010	potential	indirect	Septic E of house, tank north of field recently pumped, new cover and dirt work	R	28
PP11	7/12/2010	potential	Indirect	House has septic and tank but also has OH right on shore - not used?	R	5
PP12	10/1/2009	Potential	Indirect	Not sure what they have - composting toilet or??	P	80
PP13	9/16/2009	Potential	Indirect	Stone tank with pump and hose to surface - well, greywater or??	A	400
PP14	9/18/2009	Potential	Indirect	Septic Location??	P	200
PP15	10/20/2009	Potential	Indirect	Raised bed right of driveway was quite wet in places	A	85

Table 5. Actual Pollution Sources, 2010 North Haven Survey

Actual Pollution Sources, 2010 North Haven Survey						
Site #	Date surveyed	Actual or Potential	Direct / indirect	Description	Class	Distance to Shore

Actual Pollution Sources, 2010 North Haven Survey						
Site #	Date surveyed	Actual or Potential	Direct / indirect	Description	Class	Distance to Shore
AP1	9/24/2010	A	Indirect	Shingled cape, septic tank on back side of house below vent, wet break out north of tank drains to stream and then overboard.	A	100
AP2	9/8/2010	A	Indirect	Large white cape, septic goes out back side to old tank and then to pooling area SW of old tennis court pad.	P	70
AP3	9/8/2010	A	Direct	Cape, septic goes to tank alongside driveway and then to leach between driveway and tank. Leach is close to shore and was wet.	area was reclassified to prohibited	5
AP4	9/30/2010	A	Indirect	Brown 2 story camp Septic exits house on E side and goes to a pit covered with a round metal lid. There was evidence that the pit/tank had overflowed.	P	50
AP5	9/16/2010	A	Indirect	Shingled two story. Septic exits north end to a tank and then to a wood covered pit aprox 25 ft from shore. Pit area was wet with black smelly ooze.	P	25
AP6	9/16/2010	A	Indirect	Large home built around courtyard. Septic exits house nearby old apple tree and then heads NE to field, area was marked by four metal stakes. Area was wet and smelly.	A	150
AP7	9/22/2010	A	Direct	Large yellow home. Septic exits north end and goes to wooded area. Followed old iron pipe to blown out tank above shore, no leach field.	A	100

Table 6. Potential Pollution Sources, 2010 North Haven Survey

Potential Pollution Sources, 2010 North Haven Survey						
Site #	Date surveyed	Actual or Potential	Direct / indirect	Description	Class	Distance to Shore
PP1	10/19/2010	P	Indirect	Grey clapboard 2 story Septic exits shore side to tank? unsure of leach field location	P	?

Potential Pollution Sources, 2010 North Haven Survey						
Site #	Date surveyed	Actual or Potential	Direct / indirect	Description	Class	Distance to Shore
PP2	9/24/2010	P	Indirect	Old red cape Tank in lawn shore side covered by 2 wood covers - no obvious leach field	A	100
PP3	9/24/2010	P	Indirect	Three small camps share an outhouse 25 ft from shore. Outhouse should be moved away from stream/shore.	A	25
PP4	9/15/2010	P	Direct	Small camp on shore. Septic exits shore side to ground, with no tank. System was inspected by LPI and found to meet code	A	10
PP5	9/16/2010	P	Direct	small camp on shore small septic across rd - is it adequate. LPI determined building is a storage building	P	20
PP6	9/16/2010	P	Direct	small camp on shore small septic across rd - is it adequate	P	20
PP7	9/22/2010	P	Indirect	Old white cape. Raised septic bed south of house, north of bed by old apple tree was very wet	P	100
PP8	9/22/2010	P	Indirect	Old white two story. Septic may go out NE end to rock mound in bushes - very old system, need information/location	P	120
PP9	9/22/2010	P	Indirect	Grey Gambrel Tank and field has possible break out N side on slope by spruce trees - revisit in summer. Soil scientist determined system was ok.	A	200
PP10	9/8/2010	P	Direct	Small white log home. Septic exits west side to small lawn area 10-15 ft from shore. Owner stated the wastewater goes to a Y pipe that allows waste to drain over larger area. Shore below lawn was eroded. LPI feels system is ok.	P	10

Licensed Overboard Discharges

There are four active licensed overboard discharges (OBDs) in North Haven and fourteen on Vinalhaven that discharge their treated effluent into the waters of shellfish growing area WZ (Figures 5 and 6). Four OBDs have been removed over the past three review years.

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 WZ (Table 7). The size of each closure is determined based on a dilution calculation, 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 $1.4X10^5$ FC /100 ml. All current closures are of adequate size to protect public health.

Figure 5. Licensed Overboard Discharges, North Haven

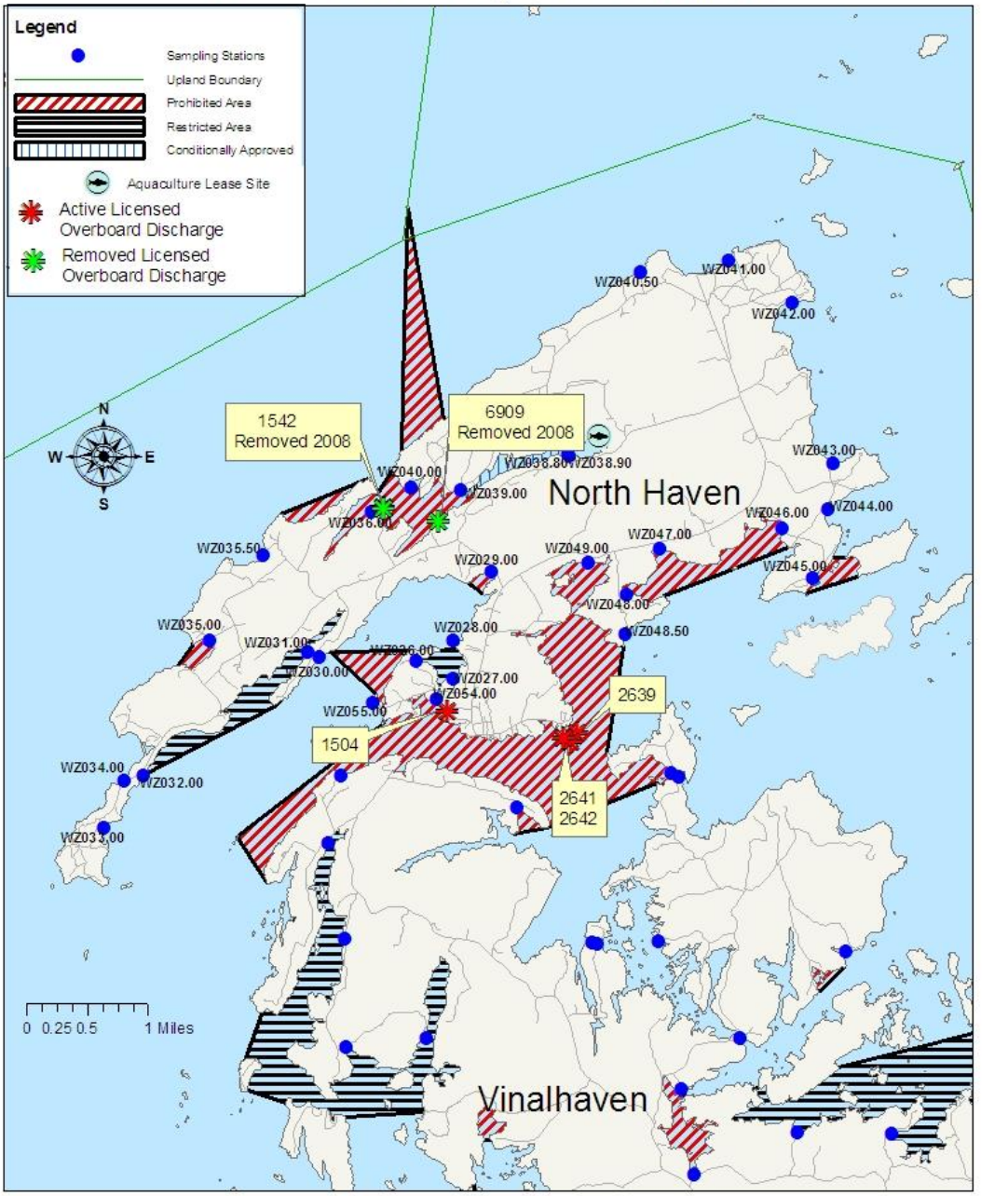


Figure 6. Licensed Overboard Discharges, Vinalhaven

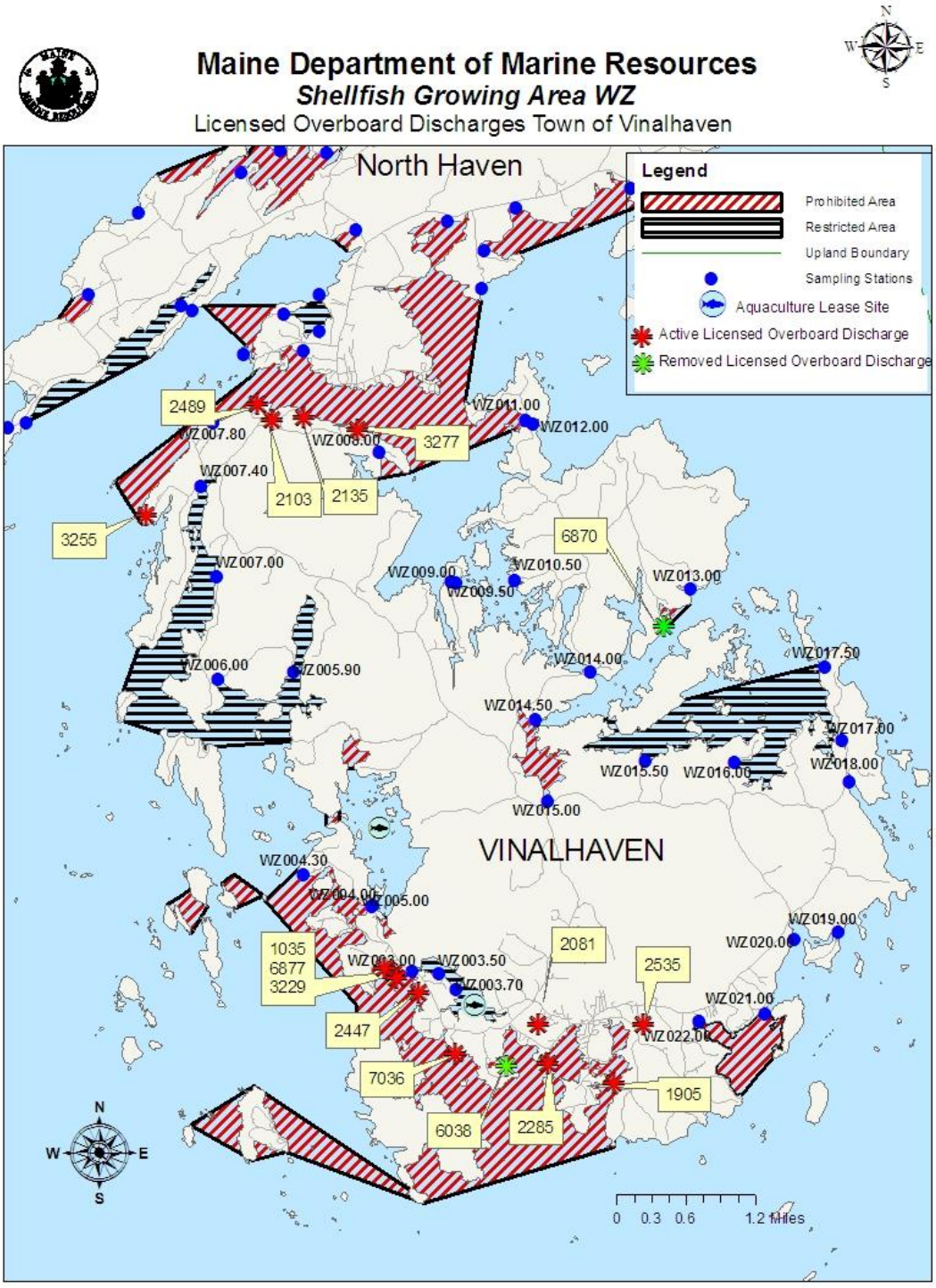


Table 7. Licensed Overboard Discharges and Required Closure Size in Acres

DEP ID	TOWN	FLOW (GPD)	Receiving Water Body	Depth of Receiving Water (ft)	PRIORITY REMOVAL	Required Closure (acres)	Actual Closure (acres)
2641	North Haven	500	Fox Is. Thorofare	9	Y	1.2	>659
2642		500	Fox Is. Thorofare	9	Y	1.2	
2639		300	Fox Is. Thorofare	9	Y	0.7	
1504		500	Fox Is. Thorofare	5	Y	2.2	
3255	Vinalhaven	300	Fox Is. Thorofare	12	N	.5	>75
2489		450	Fox Is. Thorofare	9	Y	1.1	>659
2103		500	Fox Is. Thorofare	6	Y	1.8	
2135		500	Fox Is. Thorofare	18	N	0.6	
3277		500	Fox Is. Thorofare	18	N	0.6	
2535		300	Indian Creek	5	N	1.3	>665
1905		300	Lane Island	5	N	1.3	
2081		300	Carvers Pond	5	N	1.3	
2285		650	Carvers Harbor	8	N	1.8	
7036		300	The Reach	9	Y	0.7	
2447		450	Old Harbor	7	Y	1.4	
1035		300	Old Harbor	7	Y	0.9	
6877		300	Old Harbor	7	N	0.9	
3229		810	Old Harbor	7	Y	2.5	

Municipal WWTP

There are two municipal waste water treatment plants in Growing Area WZ. North Haven (Figure 3) has a small municipal, primary treatment facility that serves a total of 200 sewer connections in the center of town. This plant is designed for a flow of 40,000 gallons per day. The average daily flow is approximately 37,300 gpd and the average wet weather flow is 38,600 gpd (2008 data). The outfall is located in the Thorofare, in approximately 18 feet of water. Assuming an equal mix of effluent with seawater, in order to achieve a 1000:1 viral dilution surrounding the outfall, a closure of 6.6 acres is required; the required bacterial dilution (10,000:1) is 66 acres. There is currently a closure area of approximately 1,000 acres around the outfall.

Vinalhaven has a new UV treatment Facility (Figure 4) that serves 350 dwellings in and around the center of town in Carvers Harbor. The facility became operational in 2003. The facility has a Maine Pollutant Discharge Elimination System (MEPDES) permit and waste discharge license for the discharge of up to 129,000 gallons per day of secondary treated wastewater to the Atlantic Ocean, off Vinalhaven Maine. The outfall for this facility enters Carvers Harbor just south of the Maine State Ferry Terminal, in Grimes Park. The outfall extends 250 feet out into the harbor, with three diffusers located along its length. The depth of the outfall at low tide is 25 feet. The average daily flow is approximately 25,718 gpd and the average wet weather flow is 30,000 gpd (2008 data). Assuming an equal mix of effluent with seawater, in order to achieve a

1000:1 viral dilution surrounding the outfall, a closure of 3.7 acres is required; the required bacterial dilution (10,000:1) is 36.8 acres. There is currently a closure zone of over 1,000 acres around this outfall. The closest open area to the outfall is located west of Greens Island in an area of open ocean.

Industrial Pollution

There are no industrial discharges located on North Haven or Vinalhaven islands.

Marinas and Mooring Fields

There are no marinas on North Haven or Vinalhaven. However, both islands do have areas frequented by cruising boats in the summer months. On North Haven (Figure 3), Pulpit Harbor, portions of the Fox Island Thorofare and Kent Cove are popular sites for cruising boats to anchor. Moorings are available in Pulpit Harbor and the Thorofare. On Vinalhaven (Figure 4), Long Cove, Perry Creek, Seal Cove, Winter Harbor and Seal Bay are all popular anchorages. None of these areas have moorings available for overnight use. All of these areas have limited space available due to the depth of the water and the configuration of the surrounding shore. Pulpit Harbor and the Thorofare have the most space available; both of these areas are classified as prohibited. Carvers Harbor, Vinalhaven has a large mooring area that is used mainly by commercial fishing boats. Cruising boats will occasionally go into Carvers Harbor to purchase groceries or visit the town center but there is limited space available and they are not encouraged to anchor or moor in the harbor. The shellfish classifications for each of these areas are shown in Table 8. Perry Creek, Seal Cove and Winter Harbor have limited space available due to the water depth and the configuration of the coves. It is unlikely that there would be a concentration of over ten cruising boats in any of these coves. At the present time these areas are classified appropriately.

Table 8. Popular Anchorage and Mooring Areas with Current Classifications

Town	Anchorage Area	Shellfish Classification
North Haven	Pulpit Harbor	Prohibited
	Thorofare	Prohibited
	Kent Cove	Prohibited
Vinalhaven	Long Cove	Restricted
	Perry Creek	Approved and Prohibited
	Seal Cove	Approved
	Seal Bay	Restricted
	Winter Harbor	Approved
	Seal Bay	Restricted
	Carvers Harbor	Prohibited

Stormwater

There are no structural stormwater management systems in the towns of North Haven and Vinalhaven. Stormwater in these areas would either percolate through the soil, or flow overland directly into streams, gullies and coastal waters. Any pollution associated with stormwater drainage in areas where no structural facilities exist is monitored by growing area WZ water quality monitoring stations, as well as by collecting samples from selected streams after adverse weather conditions.

Figure 7. Stream Sample Sites, North Haven

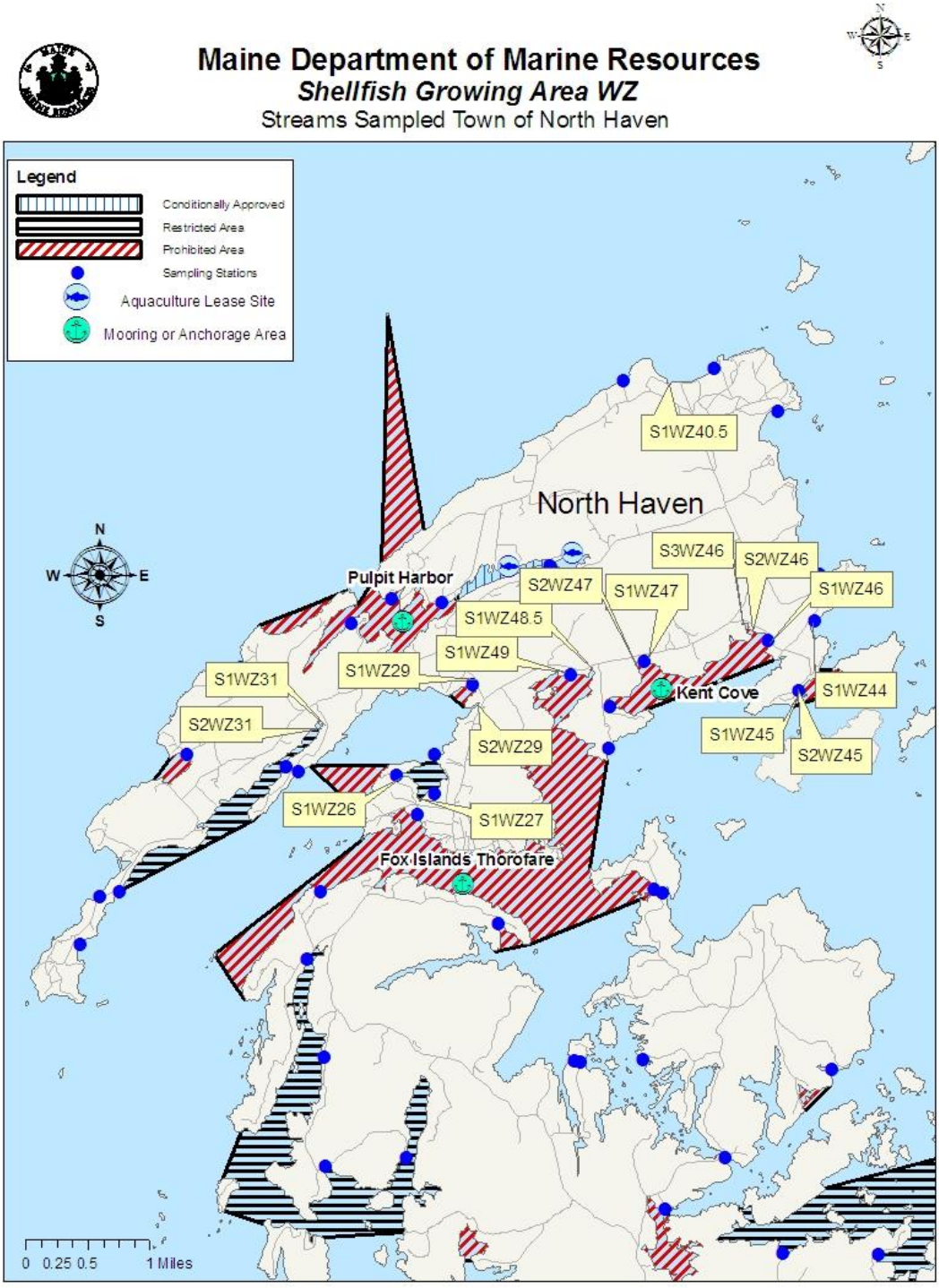
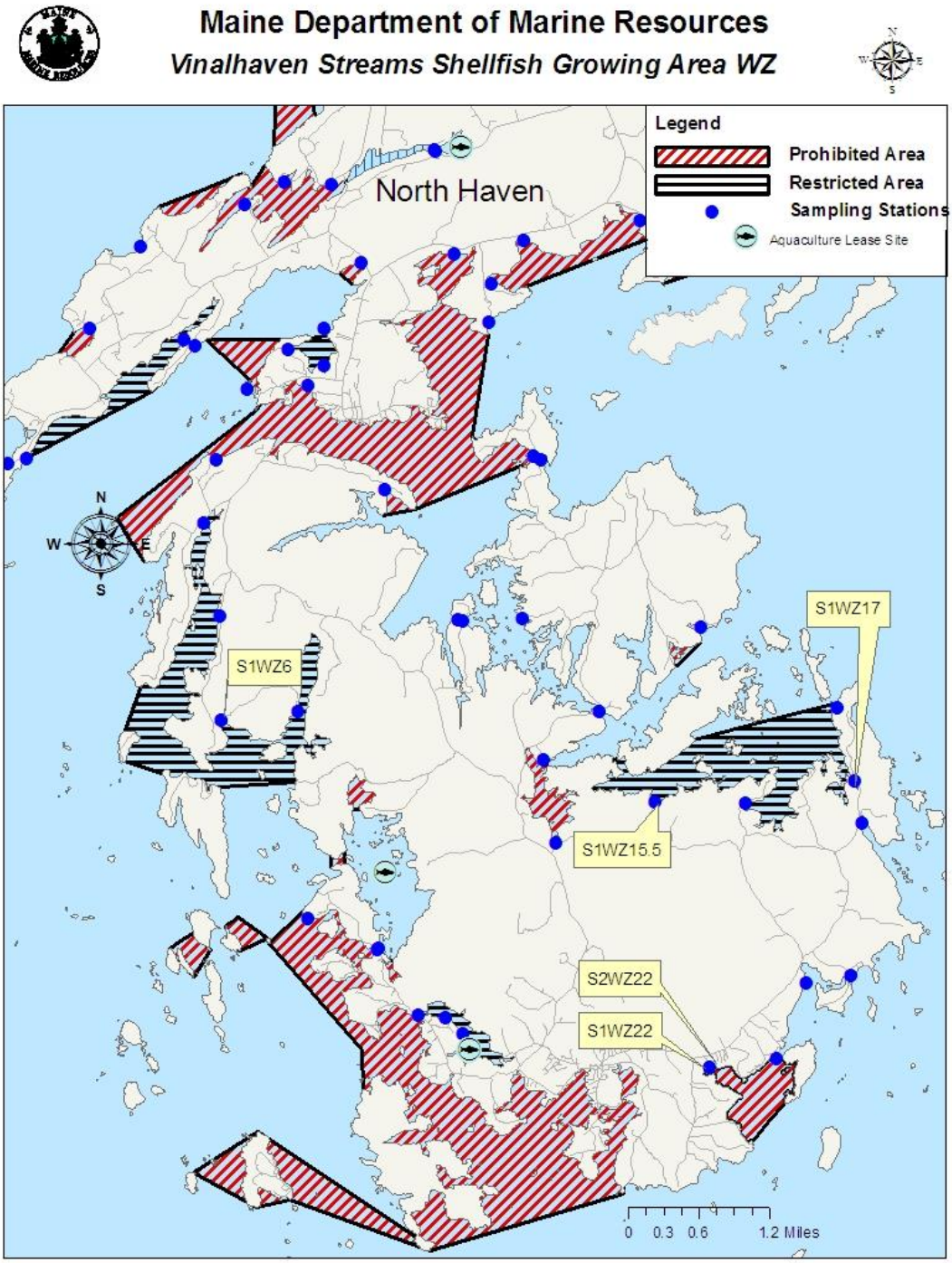


Figure 8. Stream Sample Sites, Vinalhaven



Non-Point Pollution Sources

Streams are a source of fresh water to the watershed, and carry stormwater, snowmelt and groundwater into the coastal estuaries. Waste, including that containing fecal matter, which is deposited on land, may be carried by streams to shellfish growing areas, contributing to elevated fecal counts in waters that are filtered by shellfish. In 2008, fifteen streams were selected for sampling on North Haven and five were sampled on Vinalhaven (Figures 7 and 8). A heavy rainfall of greater than 1 inch of rain fell two days before the stream samples were collected on North Haven in 2008. No stream flow rates were measured. Many of the streams that were sampled in 2008 were sampled again in 2010. Stream sites that received a score of 200 or higher are hi-lighted in yellow (tables 9 and 10). The classification of the water body that the stream flows into is also shown. The majority of the streams flow into areas that are classified as Prohibited or Restricted. Two approved areas received elevated stream scores. Stream site S2WZ29 received one elevated score in 2008 and three relatively clean scores in 2010. This stream flows from a large marsh area that is frequented by wildlife. Stream site S1WZ44 is located in Mullens Head Park. There are no dwellings anywhere near this site. This site is most likely also being impacted by wildlife in the area.

Table 9. Stream Data, Vinalhaven, 2008-2010

Stream ID	Collect Date	Collect Time	Salinity	Fecal Score	Classification
S1WZ006.00	6/14/2010	1122	0	216	R
S1WZ015.50	11/4/2008	1136	0	2	R
	10/19/2009	1241	0	78	R
	6/15/2010	1110	0	200	R
	8/24/2010	1117	0	>1600	R
S1WZ017.00	11/4/2008	1211	0	160	R
	11/19/2008	1100	0	25	R
S1WZ022.00	11/4/2008	1238	0	8	P
S2WZ022.00	11/4/2008	1241	0	18	P

Table 10. Stream Data, North Haven, 2008-2010

Stream ID	Collect Date	Collect Time	Salinity	Fecal Score	Classification
S1WZ026.00	11/17/2008	1050	0	64	R
S1WZ027.00	11/17/2008	1058	0	118	R
	10/6/2010	1046	0	120	
	11/2/2010	1429	0	27	
S1WZ029.00	11/17/2008	1251	0	440	P
	10/6/2010	1106	0	460	
	10/19/2010	1457	0	58	
	11/2/2010	1335	0	24	
S2WZ029.00	11/17/2008	1114	0	200	A
	10/6/2010	1422	0	62	
	11/2/2010	1342	0	52	
	10/19/2010	1508	0	44	

Stream ID	Collect Date	Collect Time	Salinity	Fecal Score	Classification
S1WZ031.00	10/6/2010	1150	0	112	R
S2WZ031.00	10/6/2010	1154	0	124	R
S1WZ040.50	11/17/2008	1404	0	82	A
	10/6/2010	1217	0	78	
S1WZ044.00	11/17/2008	1132	0	136	A
	10/6/2010	1344	0	220	
S1WZ045.00	11/17/2008	1142	0	320	P
S2WZ045.00	11/17/2008	1146	0	420	P
S1WZ046.00	11/17/2008	1152	0	320	P
	10/6/2010	1353	0	>1600	
	10/19/2010	1308	0	560	
	11/2/2010	1306	0	52	
S2WZ046.00	11/17/2008	1157	0	500	P
	10/6/2010	1355	0	380	
	10/19/2010	1431	0	108	
	11/2/2010	1313	0	25	
S3WZ046.00	11/17/2008	1201	0	114	P
S1WZ047.00	11/17/2008	1207	0	54	P
	10/6/2010	1316	0	460	
	10/19/2010	1442	0	76	
	11/2/2010	1320	3	20	
S2WZ047.00	11/17/2008	1211	0	48	P
	11/2/2010	1325	4	42	
S1WZ048.50	11/17/2008	1238	0	46	P
	10/6/2010	1413	0	300	
	10/19/2010	1452	0	86	
	11/2/2010	1330	0	18	
S1WZ049.00	11/17/2008	1245	0	14	P

Agricultural Activities

There are no large scale agricultural facilities on or near the shoreline of growing area WZ. However, there are several small farms that have the potential to impact water quality along the shoreline of this growing area. Animal farms on North Haven and Vinalhaven consist of small family run farms of one to ten animals. Many of these “farm sites” are nothing more than fields used for pasturing animals such as sheep. Often the fields are not owned by the animal owners but permission has been obtained to allow the animals to graze in the field. On both islands, the animal grazing locations and the number and type of animals can change from year to year (Figures 9 and 10).

Figure 9. North Haven Animal Farms, 2010 Survey

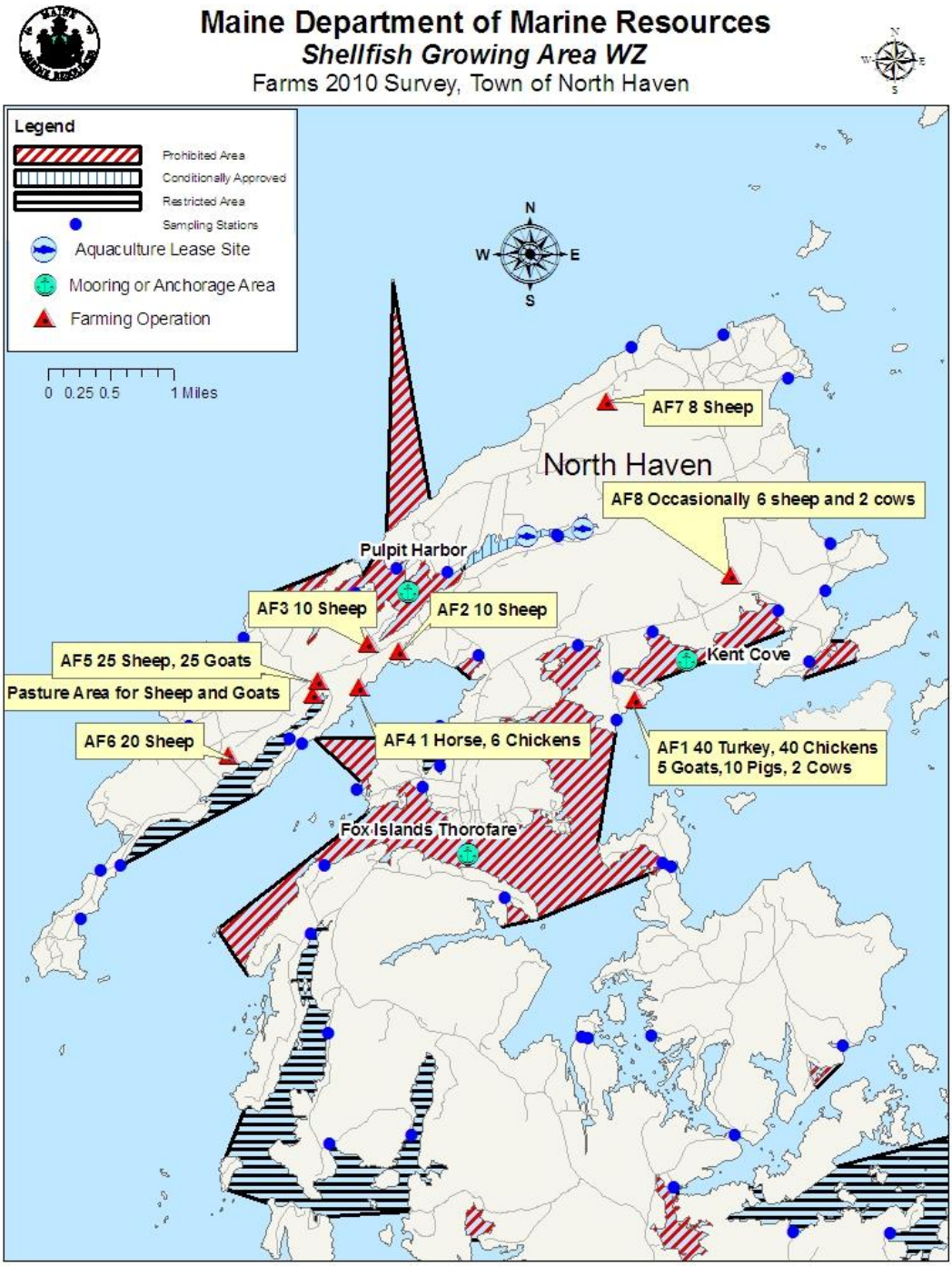
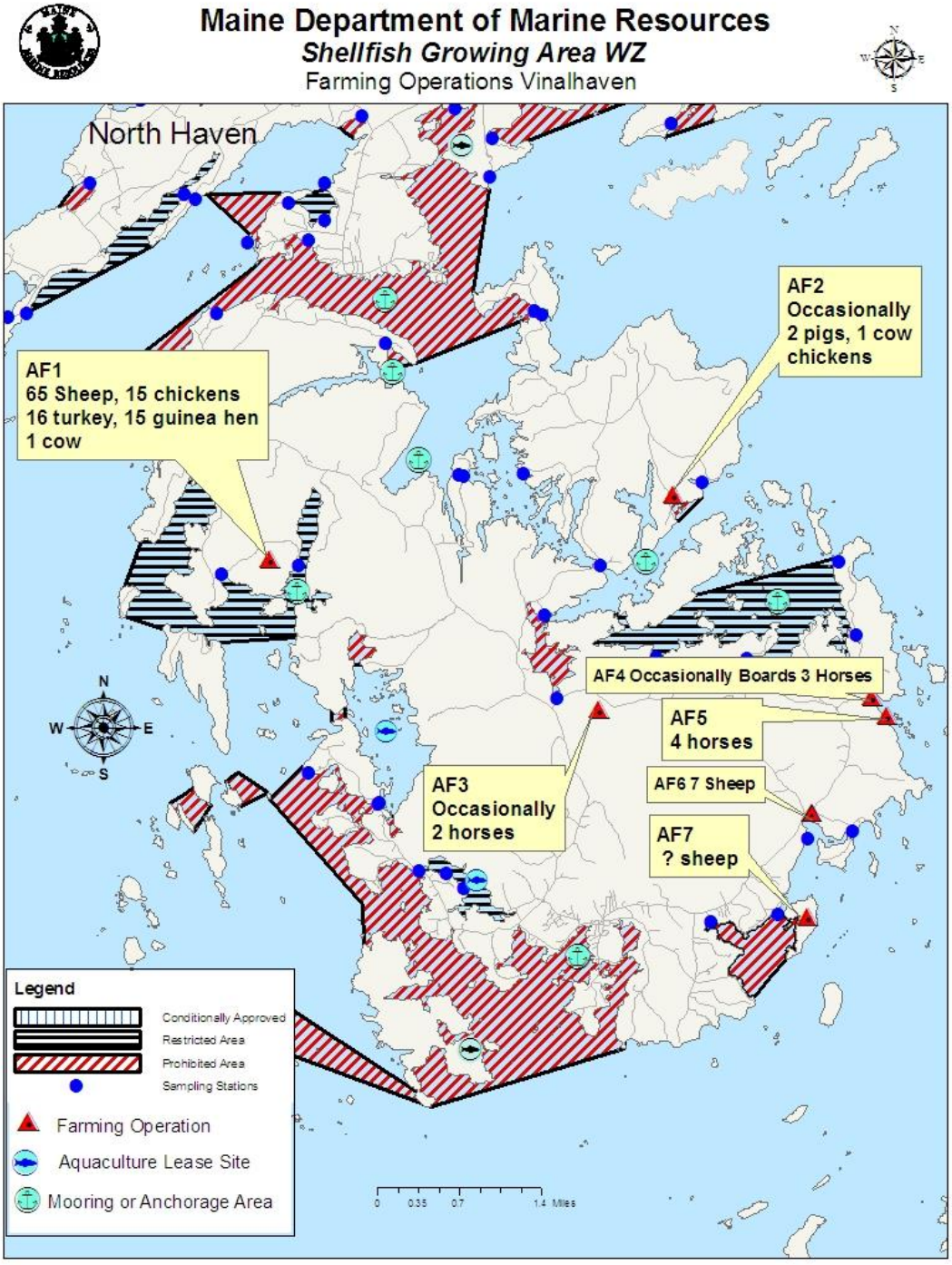


Figure 10. Vinalhaven Animal Farms, 2009 Survey



On North Haven, eight areas were noted as having grazing farm animals in 2010 (Figure 9, Table 11). Farm site AF1 is the largest farm site on the island. The shore in this area is classified as approved. This is a relatively new (two years old) farming operation consisting of 2-4 cows, 5 goats, 10 pigs, 40 turkeys and 40 chickens. There is also a large vegetable garden that provides vegetables for the local grocery store and a local inn. The animals at this site provide cheese and meat for the local grocery store. The manure is stored away from the shore until it can be tilled into the vegetable garden. Farm site AF1 is a well run operation that is well staffed with farm managers and several vegetable gardeners. I was provided a tour of all of the animal grazing areas and we discussed the need to keep animals away from the shore and maintain a buffer between grazing areas and the shore. At farm sites two and three (AF2 and AF3) ten sheep graze in pastures located on either side of Crabtree Point Road. The sheep are held in one pasture until the field has been grazed and then they are moved across the road to the other pasture. Again, this is a large pasture area with a wooded buffer along the shore. No manure pile was visible. The Pulpit Harbor side of Crabtree Point Road is classified as Prohibited the Southern Harbor side of the road is approved. Farm site AF4 is located at a private residence. This site has one horse and six free range chickens. Farm site AF5 had a large manure pile over 600 feet from the shore. This farm raises approximately 25 goats and 25 sheep. The goat meat and cheese is sold at the local grocery store and the sheep are raised for the wool. There is a large pasture area with a wooded buffer along the shore. Occasionally the goats and sheep graze in the neighbor's pasture. This pasture area is approximately 30 acres in size, however approximately 600 feet of it abuts the shore. This area is classified as Restricted. Animal farm site AF6 is another private residence. This farm site raises approximately 20 sheep which graze in another large pasture area that abuts the shore. There is over 30 acres of pasture at this site with over 900 feet of shore frontage. There is a large pond in the middle of the pasture area that is over 400 feet from the shore. The owner was not in residence at the time of the survey. This area is classified as restricted. At animal farm seven (AF7) eight sheep graze in a pasture that is over 500 feet from the shore. This site is on the opposite side of the road from the shore and there is a broad buffer of land between the shore and the pasture area. Animal farm eight (AF8) is again a large pasture area on the opposite side of the road from the shore. At this site, the animals are not always present. When the animals are there, the site usually has up to six sheep and occasionally two cows. There is a stream (S3WZ46) that flows from the general direction of this pasture into Kent Cove. When this site was sampled in 2008 it received a score of 115 FC/100ML. The shore in this area is classified as Prohibited.

In addition to domestic animals, wildlife can also have an adverse impact on water quality. While wildlife, especially wildfowl, can be occasionally observed in small numbers throughout the entire growing area, wildlife has been frequently noted in the area surrounding water quality stations WZ 27, WZ 46 and WZ 47; station WZ 27 is classified as Restricted and WZ 46 and WZ 47 are classified as prohibited. The Cubby Hole (station WZ 49) is a shorebird and wading bird habitat. The Cubby Hole is classified as Prohibited.

Table 11. Animal Farms 2010 North Haven Survey

Farm Site	Animals	Distance to Shore (feet)	Classification
AF1	40 Turkey	280	Approved
	40 Chickens	280	

Farm Site	Animals	Distance to Shore (feet)	Classification
	5 Goats	300	
	10 Pigs	200	
	2 Cows	80	
AF2	10 Sheep	40	Approved
AF3	10 Sheep	200	Restricted
AF4	1 Horse	80	Approved
	6 Chickens	120	
AF5	25 Sheep	250	Restricted
	25 Goats	250	
AF6	20 Sheep	90	Restricted
AF7	8 Sheep	>500	Approved
AF8	6 Sheep	200	Restricted
	2 Cows	200	

Seven animal farms were observed during the 2009 Vinalhaven survey (Figure 10, Table 12). The largest animal operation on Vinalhaven (AF1) is located above Long Cove. This site is a private residence that raises 65 sheep, 1 cow, 16 turkeys, 15 guinea hens, and 15 chickens. The animals graze in a large pasture area that has a three hundred foot buffer of trees between the shore and the pasture area at the closest point. Manure is stored in small open pits away from drainages. The residents are aware of best farm practices and were very concerned about proper farm management and doing whatever is necessary to help the shellfish resources in the area. At farm site AF2 the animals are not always in residence. Occasionally this site will have a cow, 2 pigs and some chickens. The cow grazes on a small lawn alongside of the house and the pigs are kept in a small enclosure 30 feet from the shore. The chickens roam freely on the property. The shore in this area is classified as Prohibited. Animal farm site AF3 is another site that doesn't always have animals in residence. Two horses occasionally graze at this site in a pasture that is on the opposite side of the road from the shore. No animals were in residence at the time of the survey. At AF4, three horses are occasionally boarded. No animals were in residence at the time of the survey. Animal farm site AF5 is located on a steep rise above the shore. Four horses graze in a well buffered pasture area 250 feet from the shore. Site AF5 is located on Narrows Island. I was unable to go on the island. At least five sheep were visible from the mainland grazing freely on the island. The island is directly across from where sampling station WZ21 is sampled. The P90 score at this site currently meets approved standards. The portion of the island facing the mainland is classified as Prohibited; the ocean side of the island is classified as Approved.

Table 12. Animal Farms 2009 Vinalhaven Survey

Farm Site	Animals	Distance to Shore (feet)	Classification
AF1	1 Cow	>500	Restricted
	16 Turkeys		
	15 Guinea Hens		
	65 Sheep		
	15 Chickens		

Farm Site	Animals	Distance to Shore (feet)	Classification
AF2	2 Pigs	30	Prohibited
	1 Cow	100	
	8 Chickens	100	
AF3	2 Horses	>500	Prohibited
AF4	3 Horses	120	Approved
AF5	4 Horses	180	Approved
AF6	7 Sheep	15	Approved
AF7	Unknown Number of Sheep	Graze Entire Island	Approved

Conservation/Recreation Areas (beaches, trails, etc.)
Both islands in shellfish growing area WZ have large tracts of land set aside for public use. On North Haven (Figure 3), Mullens Head Park encompasses all of Mullen Head on the east side of the island. This park is open to the public for daytime use only. No camping is allowed. The park consists of large beach areas and grassy trails. Outhouses are available at several locations around the park. The DMR has two sample sites at Mullen Head Park (WZ 43 and WZ44). Both of these sites have P90 scores that meet approved standards. There are also some smaller public areas that are open for daytime use consisting of trails and public beaches. These sites do not have outhouses available because they do not get the same volume of traffic as the Mullen Head Park.

On Vinalhaven there are numerous large parcels of vacant land that have been set aside for public use (Figure 4). None of the public lands on Vinalhaven have outhouse facilities and camping is not allowed at any of them. All of the town parks and nature preserves are open for daytime use only. Town parks are located in the following areas: Perry Creek, The Basin, Indian Creek, Lanes Island, Seal Bay, Arey Neck, Isle au Haut Mountain, Booths Quarry Road, Middle Mountain, Browns Head Lighthouse, Zekes Point Road and on several islands. The Vinalhaven Land Trust has done a good job of acquiring land for public use. In addition to the areas noted on Figure 4, there are many more parcels that are under easement to either the Maine Coast Heritage Trust, the Vinalhaven Land Trust or a Vinalhaven town easement. These parcels are not noted in Figure 4. No adverse impact has been observed at any of the public land areas on Vinalhaven.

Hydrographic and Meteorological Assessment

No Hydrographic studies have been conducted in this area by the DMR.

Tides
In order to investigate the frequency of elevated scores (those that surpass the variability standard) at various tidal stages, a tidal assessment for all prohibited, restricted and approved stations in growing area WZ was completed (Tables 13 and 14). For this assessment, all SRS data collected between 2003 and 2010 was grouped by tidal stage (ebb vs. flood); geometric means and P90 scores were calculated using this data grouping. The specific tidal intervals that were grouped into the ebbing tide stage are ebb, high ebb, low, and low ebb. Tidal intervals that were grouped in the flood tide stage were flood, high flood, high and low flood. Several

stations showed differences by tidal stage. On Vinalhaven, five stations exceeded the P90 standard on an ebbing tide and no stations exceeded the standard on a flood tide stage. Four of the stations that exceeded the P90 score on an ebb tide stage were stations classified as approved. Stations WZ5, 9.5, 12, and 18 are located in areas of little or no development. None of these sites have large streams nearby. Stations 12 and 18 have small intermittent streams that flow during wet weather and during periods of snow melt. Neither of these streams have been sampled because the majority of the year they are dry. One restricted station (WZ5.9) exceeded the P90 standard on an ebb tide stage. There are two seasonal dwellings in this area and animal farm site AF1 is located on a rise above this site. There is a 300 foot forested buffer between the shore and the farm animals.

On North Haven the only station that exceeded the P90 standard during ebb tide stages is station WZ 44. There are no dwellings anywhere near this site however; there is a small intermittent stream that flows during the wet seasons in the spring and fall. The stream was sampled in 2008 and 2010 and on both occasions the stream received an elevated score.

On a flood tide stage, station WZ 38.9 exceeded the P90 standard. This station received the same number of samples for both the ebb and flood tide stage groupings and the P90 scores for each grouping were similar. This station is sampled on the salt pond side of a causeway. Water flows through the causeway into the salt pond during flood tide stages. The salt pond is a leased aquaculture site for raising oysters. The lessee has mentioned that a family of mink has been seen on both sides of the causeway.

Table 13. Growing Area WZ, Vinalhaven Tide Stage Impact 2003-2010

		Ebb Tide						Flood Tide					
Station	Class	Count	GM	MAX	P90	Appd_Std	Restr_Std	Count	GM	MAX	P90	Appd_Std	Restr_Std
WZ003.00	P	13	11	200	113	35	196	40	17	240	96.6	39	224
WZ003.50	R	12	10	94	83.3	37	210	41	10	240	78.4	39	222
WZ003.70	R	1	44	44		31	163	19	13	180	119	30	163
WZ004.00	P	12	8.7	158	70.6	36	199	38	4	98	12.6	38	221
WZ004.30	P	5	11	76	104	31	163	21	3	132	13.8	31	163
WZ005.00	A	12	6.4	1200	68.4	36	199	38	4.4	240	18.7	38	221
WZ005.90	R	13	13	1500	222	32	170	36	6.8	460	47	41	236
WZ006.00	R	11	8.6	93	60.4	33	182	39	8.4	93	42.8	39	226
WZ007.00	R	13	5.1	126	35.8	33	179	37	7.3	1100	55	40	230
WZ007.40	R	10	9.5	160	117	31	163	16	5.3	86	23.8	31	163
WZ007.80	P	11	5	260	40.3	33	182	39	5.3	460	29.9	39	226
WZ008.00	P	11	4.3	460	37.1	33	182	39	6.8	460	45.9	39	226
WZ009.00	A	11	3.9	46	15.2	35	192	39	6.7	1100	39.1	39	222
WZ009.50	A	12	5.9	93	44	34	189	38	3.8	93	14.3	39	224
WZ010.50	A	6	3.3	28	13.8	31	163	20	2.5	10	5.1	31	163
WZ011.00	P	14	3.9	38	13.4	36	202	35	4.7	120	24.8	38	219
WZ012.00	A	13	16	240	189	35	196	36	3.4	43	9.1	38	221
WZ013.00	A	11	5.1	38	19.9	38	215	39	3.5	46	9.9	37	212
WZ014.00	A	12	3.1	9.1	5.4	42	244	38	2.7	43	6.2	36	204

Station	Class	Ebb Tide						Flood Tide					
		Count	GM	MAX	P90	Appd_Std	Restr_Std	Count	GM	MAX	P90	Appd_Std	Restr_Std
WZ014.50	P	5	4.5	27	22.5	31	163	21	3.3	13	8.2	31	163
WZ015.00	P	12	7.3	43	28	37	210	32	8.4	280	51.7	36	204
WZ015.50	P	16	14	220	98.4	40	229	34	11	93	65.6	37	209
WZ016.00	R	14	7.1	76	39.4	42	252	36	4.4	240	18.9	36	199
WZ017.00	R	16	6.3	1100	53.3	40	229	34	4.8	93	20.4	36	205
WZ017.50	R	7	3.2	16	11.1	31	163	19	4.1	72	19.2	30	163
WZ018.00	A	16	7.4	460	51.2	40	229	34	5.2	118	20.8	36	205
WZ019.00	A	19	3.9	93	15.9	37	210	31	2.7	22	5.5	38	214
WZ020.00	A	21	4.7	43	17.3	38	217	29	4.3	21	12.5	37	209
WZ021.00	P	21	6.8	93	29.8	39	224	29	4.2	126	16.3	36	205
WZ022.00	P	22	22	750	173	38	221	28	11	332	81.6	36	202

Table 14. Growing Area WZ, North Haven Tide Stage Impact 2003-2010

Station	Class	Ebb Tide						Flood Tide					
		Count	GM	MAX	P90	Appd_Std	Restr_Std	Count	GM	MAX	P90	Appd_Std	Restr_Std
WZ026.00	R	12	3.8	60	19	37	210	37	6.2	160	37.5	38	215
WZ027.00	R	12	14	600	183	37	210	37	7.9	126	43.7	38	215
WZ028.00	A	16	4.4	152	19.7	37	212	33	3.3	43	9.6	38	215
WZ029.00	P	14	7.9	500	101	38	221	35	15	1260	119	37	211
WZ030.00	A	19	5.8	1020	74.3	37	210	30	3.5	44	12.2	38	216
WZ031.00	R	19	6.2	480	45.6	37	210	30	5.8	460	34	38	216
WZ032.00	A	20	3.3	24	8.4	38	214	29	2.9	240	9.4	38	214
WZ033.00	A	19	2.4	7.3	3.8	38	217	30	4.7	240	28.5	37	212
WZ034.00	A	21	2.3	4	3.2	37	211	28	2.9	142	9.2	38	216
WZ035.00	P	23	3	114	9.1	37	212	26	3.5	460	16.9	38	216
WZ035.50	A	24	3.4	42	9.3	38	221	25	2.9	23	6.6	37	208
WZ036.00	P	27	6.1	160	30.6	39	223	22	5.8	1100	52.6	36	203
WZ038.80	CA	32	11	1420	90.6	38	216	33	7.4	93	40	35	196
WZ038.90	A	35	5.9	240	31.1	37	208	35	6.6	160	35.6	35	194
WZ039.00	P	23	4.3	23	11.5	39	224	25	2.9	9.1	6.2	36	203
WZ040.00	P	26	4.3	36	15.2	39	226	23	3.3	28	8.7	36	201
WZ040.50	A	29	3.4	240	11.8	39	228	21	2.8	23	7.7	36	199
WZ041.00	A	30	4.2	210	17.1	40	230	19	3	23	7.9	34	191
WZ042.00	A	32	3.5	260	17.5	39	225	17	3	43	9.1	35	195
WZ043.00	A	30	4.7	740	29.1	40	230	19	2.9	60	8.4	34	191
WZ044.00	A	31	6.3	860	52.4	40	232	18	3.4	56	11.5	34	186
WZ045.00	P	32	12	1200	103	40	234	17	5.3	93	30.2	33	181
WZ046.00	P	31	21	1700	231	40	232	18	6.3	360	36.9	33	180
WZ047.00	P	33	9.3	240	63	39	227	16	4.9	62	20.9	33	182
WZ048.00	P	32	10	240	77	40	229	16	5.1	76	28.1	33	182
WZ048.50	P	15	3.4	68	14.1	31	169	14	3.6	200	21.1	32	170

Station	Class	Ebb Tide						Flood Tide					
		Count	GM	MAX	P90	Appd_Std	Restr_Std	Count	GM	MAX	P90	Appd_Std	Restr_Std
WZ049.00	P	35	11	1200	131	39	223	14	4.6	93	22.1	34	185
WZ054.00	P	15	9.2	240	76.6	37	208	34	6.6	1100	62.3	37	213
WZ055.00	A	15	4.3	940	34.3	37	208	34	3.4	210	11.9	38	217

Rainfall

While emergency closures limit shellfish harvesting during extremely heavy rainfall events, water quality in some shellfish areas may be adversely impacted by polluted run-off that is generated during lesser precipitation events (<2 inches in 24 hours). In order to investigate how water quality is impacted by rainfall events which do not necessitate an emergency flood closure, a rainfall assessment for all stations in growing area WZ was completed. For this assessment, the geomean and P90 scores were recalculated using only data points which were collected after 0.25 or more inches of cumulative rainfall were recorded 72 hours prior to sample collection (sum of rainfall recorded in the AM on day of sample, day before sample and two days before sample was taken) (Table 15). In this calculation, all data (excluding those samples collected during flood closures) collected between 2000 and 2010 were included. In completing this assessment, the data collected under dry (<0.25 inches of rainfall in 72 hours) conditions, and thus not affected by run-off, was omitted from the calculation. While the results of this calculation show that all stations that are classified as Approved retain geometric mean scores of less than 14 when using data collected after rainfall, the P90 scores for three stations increase when looking at this dataset, indicating that these stations are impacted by intermittent pollution that occurs after rain events. Stations that showed an increase in P90 scores include WZ 18, 38.8 and 38.9. Any downward changes in classification for these stations should be supported by additional water quality data following rainfall events.

Table 15 Rainfall Impact of .25 or more inches of rainfall in 72 hours 2000-2010

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WZ003.00	P	27	8	25	0.62	240	159	42	250	5/19/2000
WZ003.50	R	25	12	16	0.76	240	150	39	223	5/29/2003
WZ003.70	R	9	9	13	0.75	140	125	31	163	6/18/2008
WZ004.00	P	25	7	5.2	0.48	158	21.8	43	252	5/19/2000
WZ004.30	P	8	8	5.9	0.68	132	47	31	163	5/16/2007
WZ005.00	A	25	7	4.9	0.43	240	18.2	43	252	5/19/2000
WZ005.90	R	28	9	14	0.8	1500	148	42	246	5/19/2000
WZ006.00	R	27	8	11	0.53	93	54.8	42	250	5/19/2000
WZ007.00	R	26	7	12	0.8	1100	130	43	254	5/19/2000
WZ007.40	R	9	9	11	0.79	140	124	31	163	5/16/2007
WZ007.80	P	38	8	6.5	0.63	460	42.7	44	263	7/19/2000
WZ008.00	P	28	9	9.7	0.67	460	71.3	42	246	5/19/2000
WZ009.00	A	28	9	8.2	0.52	108	38.6	42	246	5/19/2000
WZ009.50	A	27	8	6	0.55	93	30.7	42	250	5/19/2000
WZ010.50	A	7	7	2.9	0.32	10	7.9	31	163	5/16/2007
WZ011.00	P	28	10	6.7	0.58	120	37.9	41	241	5/19/2000
WZ012.00	A	29	10	5.8	0.49	140	25.1	41	243	5/19/2000
WZ013.00	A	27	10	4.3	0.32	20	11.3	41	239	6/19/2001

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WZ014.00	A	29	10	4.3	0.39	43	14	41	243	5/19/2000
WZ014.50	P	9	9	4.2	0.43	27	15.5	31	163	5/16/2007
WZ015.00	P	19	9	14	0.64	280	93	39	224	5/24/2004
WZ015.50	P	27	10	17	0.67	220	126	41	239	6/19/2001
WZ016.00	R	28	10	8.6	0.67	240	62.4	41	241	5/19/2000
WZ017.00	R	28	10	6.7	0.45	93	25.2	41	241	5/19/2000
WZ017.50	R	9	9	5.9	0.64	72	41.3	31	163	5/16/2007
WZ018.00	A	28	10	8.9	0.6	460	52.3	41	241	5/19/2000
WZ019.00	A	27	9	2.9	0.24	23	6.2	42	244	5/19/2000
WZ020.00	A	25	8	7.7	0.45	93	29.6	42	246	5/19/2000
WZ021.00	P	26	9	7.5	0.53	126	36.9	41	242	5/19/2000
WZ022.00	P	26	10	21	0.72	332	183	41	237	5/19/2000
WZ026.00	R	28	11	9.1	0.68	240	69.3	40	236	7/17/2000
WZ027.00	R	29	12	17	0.68	600	129	40	233	7/17/2000
WZ028.00	A	30	12	6.3	0.58	1100	35.8	40	235	7/17/2000
WZ029.00	P	30	12	10	0.77	500	98	40	235	7/17/2000
WZ030.00	A	30	12	4.2	0.51	240	19.4	40	235	7/17/2000
WZ031.00	R	30	12	5.4	0.55	480	27.9	40	235	7/17/2000
WZ032.00	A	31	13	3.4	0.39	240	11	40	232	7/17/2000
WZ033.00	A	31	13	3.1	0.31	93	8	40	232	7/17/2000
WZ034.00	A	31	13	3.5	0.49	240	15.5	40	232	7/17/2000
WZ035.00	P	32	13	3.2	0.42	460	11.3	40	234	7/17/2000
WZ035.50	A	45	13	3.9	0.35	43	11.4	42	251	7/17/2000
WZ036.00	P	32	13	6.7	0.57	160	36.3	40	234	7/17/2000
WZ038.80	CA	43	18	9	0.59	102	53.1	40	232	11/8/2000
WZ038.90	A	52	21	9.5	0.66	240	67.6	40	234	11/1/2000
WZ039.00	P	29	12	4.4	0.32	23	11.4	40	233	7/17/2000
WZ040.00	P	32	13	3.7	0.33	36	10	40	234	7/17/2000
WZ040.50	A	30	12	2.9	0.26	23	6.3	40	235	7/23/2001
WZ041.00	A	32	13	4.6	0.49	210	19.7	40	234	7/17/2000
WZ042.00	A	32	13	3.8	0.5	134	16.7	40	234	7/17/2000
WZ043.00	A	30	14	4.8	0.58	740	27.2	39	225	7/17/2000
WZ044.00	A	31	15	6.2	0.6	240	37.2	39	223	7/17/2000
WZ045.00	P	30	13	9	0.69	1200	70.1	40	230	7/17/2000
WZ046.00	P	30	13	13	0.67	360	98.6	40	230	7/17/2000
WZ047.00	P	33	15	8.1	0.59	240	47.6	39	227	7/17/2000
WZ048.00	P	31	13	17	0.74	460	156	40	232	7/17/2000
WZ048.50	P	16	15	3.9	0.49	68	17.3	31	169	8/15/2006
WZ049.00	P	31	13	9.4	0.79	1200	98.5	40	232	7/17/2000
WZ054.00	P	42	12	11	0.81	1100	126	42	252	9/20/2000
WZ055.00	A	44	11	4.8	0.53	460	23.9	43	257	7/17/2000

Winds

Wind direction can have an impact on the water quality in an area if the wind is found to be predominantly blowing from an area associated with large concentrations of pollutants such as industries or large farming operations bordering on the shore. The Department of Marine Resources started collecting wind direction data in March of 2005. The direction the wind is blowing is noted on the sample collection field sheet at each sample site during the collection of the random run. Using data collected from 2005-2010, the percentage of samples collected at each of the wind directions was placed on a pie chart (Figure 11) to illustrate which wind directions were most frequently noted on the field sheet. The predominant wind direction noted was a calm condition (42.5%) which is little to no wind at all. The next most common wind direction noted is a southwesterly direction (15.6%). There are no large industries or areas of heavy pollution nearby North Haven or Vinalhaven. It is unlikely that wind direction has any impact on pollution loading in this area.

Figure 11. Percentage of Samples Collected at Various Wind Directions 2005-2010

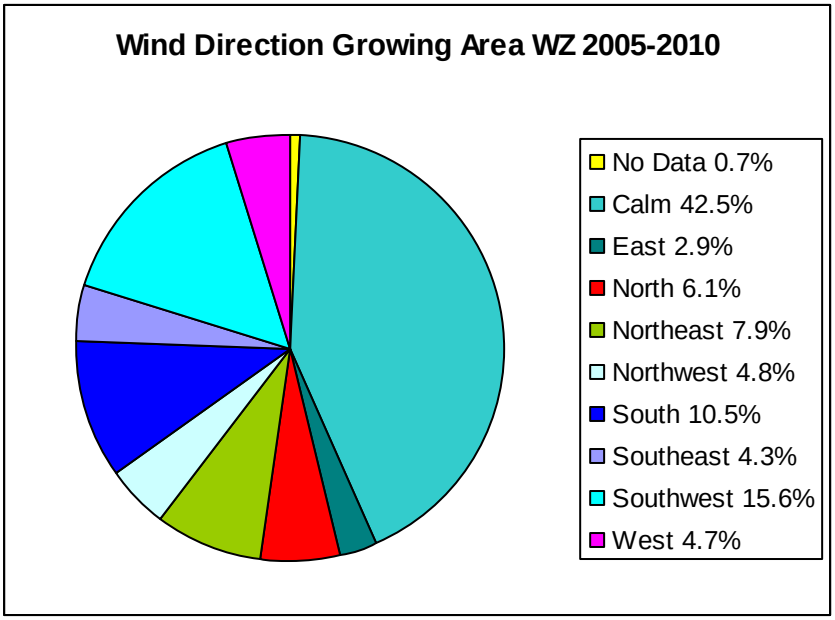
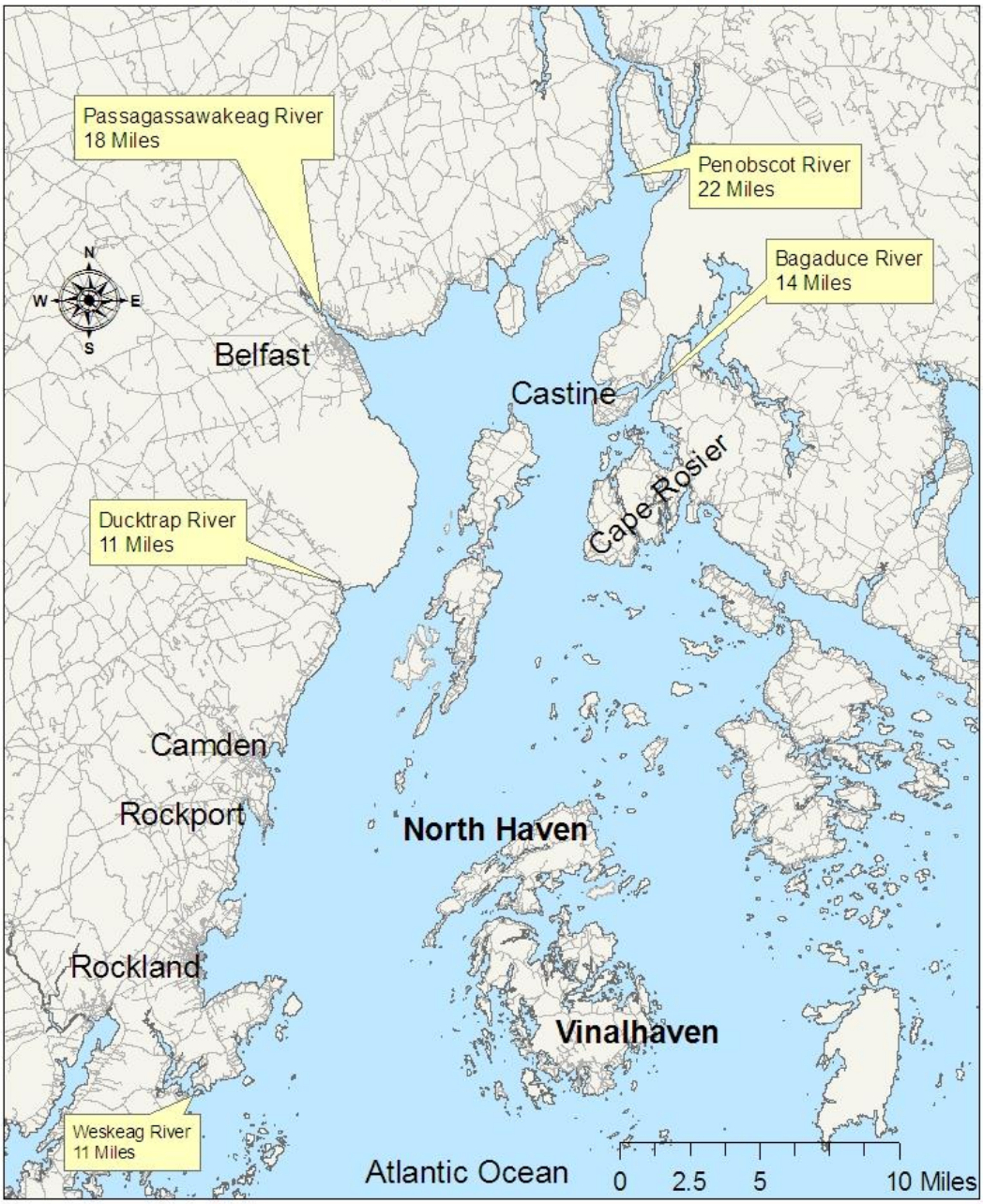


Figure 12. River Systems nearby Growing Area WZ



River Discharge
The islands of North Haven and Vinalhaven are located in the middle of Penobscot Bay. There are no river systems nearby the islands however river systems are located along the mainland shores which discharge into Penobscot Bay. Figure 12 shows the river systems that discharge into Penobscot Bay and the distance in miles (measured in a straight line to the closest point of land) from the mouth of each river to the islands of North Haven and Vinalhaven. Due to the broad expanse of open ocean surrounding the islands and the distance between the islands and the river systems, it is unlikely that river discharge has a pollutant impact on the water quality in growing area WZ.

Water Quality Review

At the end of the 2010 sampling season all stations in growing area WZ had P90 scores that were meeting their classification standard. Station WZ 38.8 is a new seasonal conditional area. Table 17 shows the P90 score for this station during the open season (December 1- May 31).

Table 16. Growing Area WZ Geomean and P90 Scores

Rain_P90										
Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WZ003.00	P	30	28	11.2	0.67	200	82.3	31	169	8/8/2006
WZ003.50	R	30	27	8.6	0.74	180	77.7	32	173	7/26/2006
WZ003.70	R	20	20	13.4	0.74	180	123.3	31	163	5/20/2008
WZ004.00	P	30	27	4.4	0.55	158	22.6	32	173	6/27/2006
WZ004.30	P	26	26	3.9	0.58	132	22.5	31	163	5/16/2007
WZ005.00	A	30	27	3.9	0.43	108	14.1	32	173	6/27/2006
WZ005.90	R	30	26	7.5	0.76	1500	72.5	32	176	6/27/2006
WZ006.00	R	30	27	6.2	0.61	93	38.2	32	173	6/27/2006
WZ007.00	R	30	27	6.9	0.71	1100	57.2	32	173	6/27/2006
WZ007.40	R	26	26	6.6	0.64	160	45.3	31	163	5/16/2007
WZ007.80	P	30	27	3.7	0.56	260	19.5	32	173	6/27/2006
WZ008.00	P	30	27	4.6	0.66	460	33.2	32	173	6/27/2006
WZ009.00	A	30	27	5.4	0.54	108	27.2	32	173	6/27/2006
WZ009.50	A	30	27	3.1	0.43	70	11.2	32	173	6/27/2006
WZ010.50	A	26	26	2.6	0.3	28	6.5	31	163	5/16/2007
WZ011.00	P	30	27	4.5	0.59	120	26.6	32	173	6/27/2006
WZ012.00	A	30	27	4.4	0.58	200	25	32	173	6/27/2006
WZ013.00	A	30	28	4	0.46	46	15.8	31	169	7/26/2006
WZ014.00	A	30	28	2.3	0.19	11	4	31	169	7/26/2006
WZ014.50	P	26	26	3.5	0.34	27	10	31	163	5/16/2007
WZ015.00	P	30	27	7.4	0.6	280	44.9	32	173	6/27/2006
WZ015.50	P	30	27	9.7	0.68	220	72.6	32	173	6/27/2006
WZ016.00	R	30	28	3.9	0.47	88	16.1	31	169	8/8/2006
WZ017.00	R	30	28	3.8	0.58	1100	21.8	31	169	7/26/2006

Rain_P90										
Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WZ017.50	R	26	26	3.8	0.48	72	16.4	31	163	5/16/2007
WZ018.00	A	30	28	4.5	0.46	118	18.1	31	169	7/26/2006
WZ019.00	A	30	28	2.5	0.29	22	5.8	31	169	6/27/2006
WZ020.00	A	30	28	3.4	0.34	20	9.3	31	169	7/26/2006
WZ021.00	P	30	28	4.5	0.49	126	19.4	31	169	7/26/2006
WZ022.00	P	30	29	10.8	0.71	750	87.9	31	166	8/8/2006
WZ026.00	R	30	27	4	0.57	160	22.2	32	173	7/26/2006
WZ027.00	R	30	27	7	0.69	600	54.8	32	173	7/26/2006
WZ028.00	A	30	27	3.7	0.49	152	16.4	32	173	6/27/2006
WZ029.00	P	30	27	13.5	0.79	1260	142.7	32	173	6/27/2006
WZ030.00	A	30	27	3.9	0.69	1020	30.3	32	173	6/27/2006
WZ031.00	R	30	27	5	0.61	480	30.4	32	173	6/27/2006
WZ032.00	A	30	27	2.7	0.28	24	6.2	32	173	6/27/2006
WZ033.00	A	30	27	2.5	0.35	132	7.3	32	173	6/27/2006
WZ034.00	A	30	27	2.3	0.34	142	6.5	32	173	6/27/2006
WZ035.00	P	30	27	2.6	0.35	114	7.5	32	173	6/27/2006
WZ035.50	A	30	27	3.1	0.35	42	8.9	32	173	6/27/2006
WZ036.00	P	30	27	4.4	0.55	160	22.8	32	173	6/27/2006
WZ038.80	CA	30	30	6.3	0.7	1420	50.4	31	163	11/26/2007
WZ038.90	A	30	30	5.4	0.55	160	27.9	31	163	3/12/2008
WZ039.00	P	30	27	3.1	0.29	18	7.4	32	173	6/27/2006
WZ040.00	P	30	27	3.6	0.41	36	12.4	32	173	6/27/2006
WZ040.50	A	30	27	2.6	0.29	23	6.3	32	173	6/27/2006
WZ041.00	A	30	27	3.7	0.51	210	16.8	32	173	6/27/2006
WZ042.00	A	30	27	2.9	0.51	260	13.7	32	173	6/27/2006
WZ043.00	A	30	27	3.6	0.62	740	23	32	173	6/27/2006
WZ044.00	A	30	27	4.3	0.65	860	30	32	173	6/27/2006
WZ045.00	P	30	27	8.2	0.69	780	64.2	32	173	6/27/2006
WZ046.00	P	30	28	12.1	0.78	1700	122.1	31	169	8/9/2006
WZ047.00	P	30	28	6.1	0.56	128	32.7	31	169	8/9/2006
WZ048.00	P	30	27	6.3	0.64	150	42.5	32	173	6/27/2006
WZ048.50	P	29	27	3.5	0.52	200	16.4	31	170	8/9/2006
WZ049.00	P	30	28	5.9	0.69	1060	46.3	31	169	8/9/2006
WZ054.00	P	30	28	5	0.64	680	34.2	31	169	8/9/2006
WZ055.00	A	30	27	3.1	0.54	940	15.3	32	173	6/27/2006

Table 17, Seasonal Conditional Area, Geomean and P90 Scores during Open Season December 1- May 31

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WZ038.80	CA	30	17	3.8	0.44	72	14.2	37	212	2/7/2001

Sampling Effort

Table 18 shows the sampling effort for shellfish growing area WZ in 2010. All of the stations were sampled a minimum of six times following the systematic random sampling strategy (SRS) over the course of the sampling season. Several new stations are noted in this table with an explanation for why they were created in the comments column. The classification of the water body that each of these new stations is located in is shown in the “Class” column. The majority of these stations will have received thirty samples by the end of the 2011 sampling season.

Table 18. 2010 Sampling Effort, Shellfish Growing Area WZ

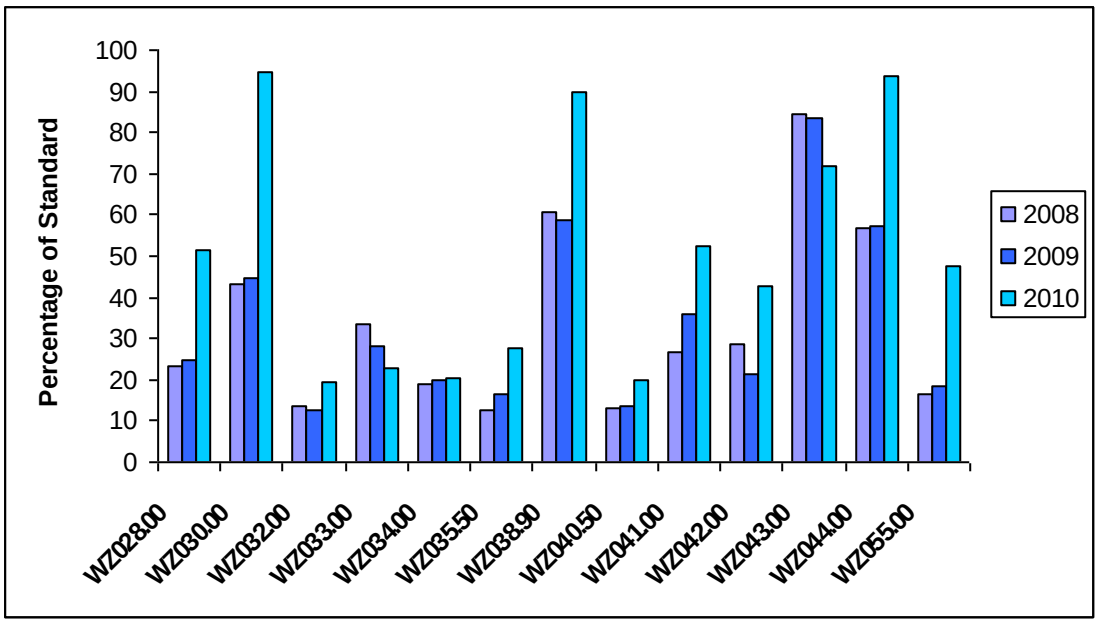
Station	Class	Adverse	Extra		Random		Total	Comments
		Closed	Closed	Open	Closed	Open		
WZ003.00	P		1		7		8	
WZ003.50	R			1	1	6	8	
WZ003.70	New-R			1		7	8	Created to monitor aquaculture site
WZ004.00	P		1		7		8	
WZ004.30	New-P		1		7		8	Created to monitor closure line
WZ005.00	A			1		7	8	
WZ005.90	R			1		7	8	
WZ006.00	R			1		7	8	
WZ007.00	R			1		7	8	
WZ007.40	New-R			1		7	8	Created to monitor head of cove
WZ007.80	P		1		7		8	
WZ008.00	P		1		7		8	
WZ009.00	A			1		7	8	
WZ009.50	A			1		7	8	
WZ010.50	New-A			1		7	8	Created to monitor area with no station
WZ011.00	P		1		7		8	
WZ012.00	A			1		7	8	
WZ013.00	A			1		7	8	
WZ014.00	A			1		7	8	
WZ014.50	New-P		1		7		8	Created to monitor area with no station
WZ015.00	P		1		7		8	
WZ015.50	P		1		7		8	
WZ016.00	R			1		7	8	
WZ017.00	R			1		7	8	
WZ017.50	New-R			1		7	8	Created to monitor closure line
WZ018.00	A			1		7	8	
WZ019.00	A			1		7	8	
WZ020.00	A			1		7	8	
WZ021.00	P		1		7		8	
WZ022.00	P		1		7		8	
WZ026.00	R			1		6	7	
WZ027.00	R			1		6	7	
WZ028.00	A			1		6	7	
WZ029.00	P		1		6		7	
WZ030.00	A			1		6	7	
WZ031.00	R			1		6	7	
WZ032.00	A			1		6	7	
WZ033.00	A			1		6	7	
WZ034.00	A			1		6	7	
WZ035.00	P		1		6		7	
WZ035.50	A			1		6	7	
WZ036.00	P		1		6		7	

Station	Class	Adverse	Extra		Random		Total	Comments
		Closed	Closed	Open	Closed	Open		
WZ038.80	CA				2	1	3	Changed status from P to CA 9/28/2010
	P				4		4	
WZ038.90	A	1		1		6	8	
WZ039.00	P		1		6		7	
WZ040.00	P		1		6		7	
WZ040.50	A			1		6	7	
WZ041.00	A			1		6	7	
WZ042.00	A			1		6	7	
WZ043.00	A			1		6	7	
WZ044.00	A			1		6	7	
WZ045.00	P		1		6		7	
WZ046.00	P		1		6		7	
WZ047.00	P		1		6		7	
WZ048.00	P				6		6	
WZ048.50	New-P				6		6	Created to monitor closure line
WZ049.00	P		1		6		7	
WZ054.00	P		1		6		7	
WZ055.00	A	1		1		6	8	

Figures 13 through 16 show the P90 trends during the open status over the past three years, for all stations in growing area WZ. 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 or restricted standard; any station showing the 2010 column on or above 100 percent does not meet the standard for the classification.

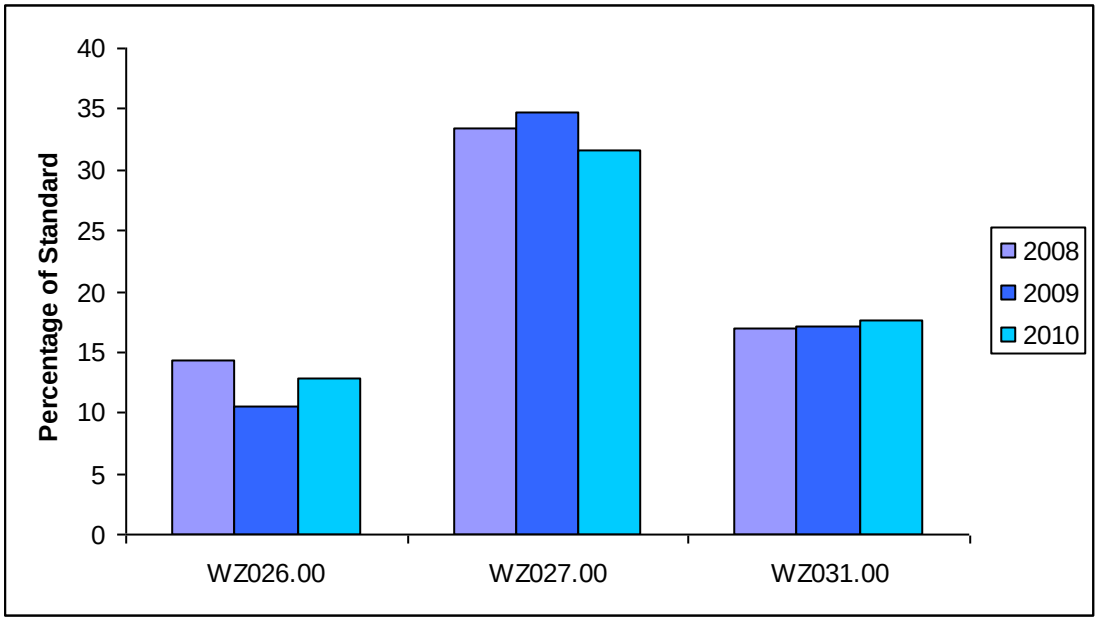
On North Haven, approved stations WZ 28, 30, 38.9, 41, 42, 44, and 55 all had deteriorating water quality scores (figure 13). Stations WZ 30, 38.9 and 44 are the most elevated in the group. All of these stations have water quality scores that are close to exceeding the P90 standard. At station WZ 30, there is one small seasonal dwelling that is approximately 150 feet from the shore. The dwelling is used very infrequently. There are no streams in the area. There is no logical explanation for the elevated scores in this area. At station WZ 38.9, the sample is collected alongside of a stone causeway that is frequented by a family of mink. Cormorants have also been seen in this area recently. The closest occupied dwelling is over 200 feet away. At station WZ44, there are no dwellings anywhere nearby. A small stream flows into the area at this site during wet weather conditions. This site may be impacted by wildlife.

Figure 13. P90 Trends, Approved Stations, North Haven



The trends for the restricted stations on North Haven (shown as percent of restricted standard, Figure 14) have remained the same for the past three years.

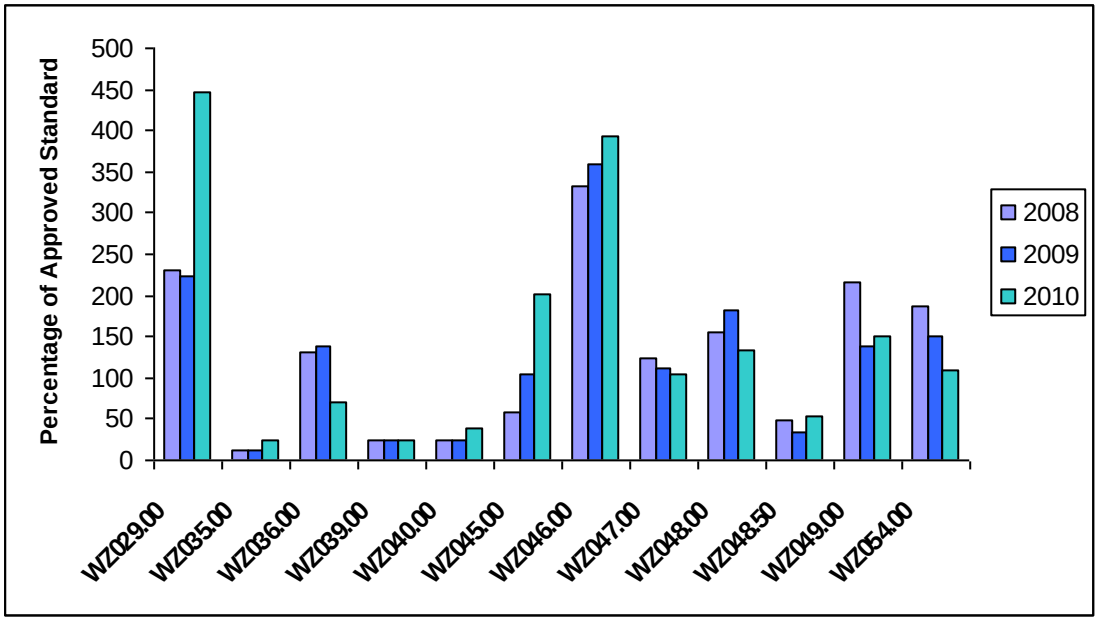
Figure 14. P90 Trends, Restricted Stations, North Haven



The majority of the trends for the prohibited stations (shown as percent of approved standard, Figure 15) have shown little change from previous years. The most notable stations are stations WZ29, 45, and 46. Station WZ29 has been the most elevated station on North Haven for several years. The area around this station has been repeatedly surveyed and no pollution

source has been identified. There is a stream that flows directly into the area where the station is sampled (S1WS29). This stream site was sampled three times in 2010 and once in 2008. The site received two relatively clean scores in 2010 and one elevated score in both 2008 and 2010. There is also a municipal pump station that borders on the edge of the stream. The town was asked to dye test the pump station. The dye test did not reveal any dye in the stream. At station WZ 45 there is a known septic malfunction that drains into a small stream and then directly overboard at the site of the sample station. This system has been reported to the town. At station WZ 46, there is a stream that flows into the area (S1WZ46) that was sampled three times in 2010 and once in 2008. This stream site received one elevated score in 2008 and two elevated scores in 2010. The dwellings in the area have been surveyed and no pollution sources were identified. The shoreline has been walked several times in recent years to determine if something was being overlooked. On all of these occasions, animal waste was visible in the wrack line (deer and raccoon) and raccoon tracks were visible all over the mudflat along with small dig holes where the raccoons had been digging clams. Stations WZ 35, 39, and 40, all have water quality scores that meet approved standards but will remain classified as Prohibited due to potential pollution sources in the immediate area. Station WZ 48.5, is actually in an open area but was classified as Prohibited due to the station having less than 30 samples (new station). The classification of this station will be updated in the database to reflect the proper classification.

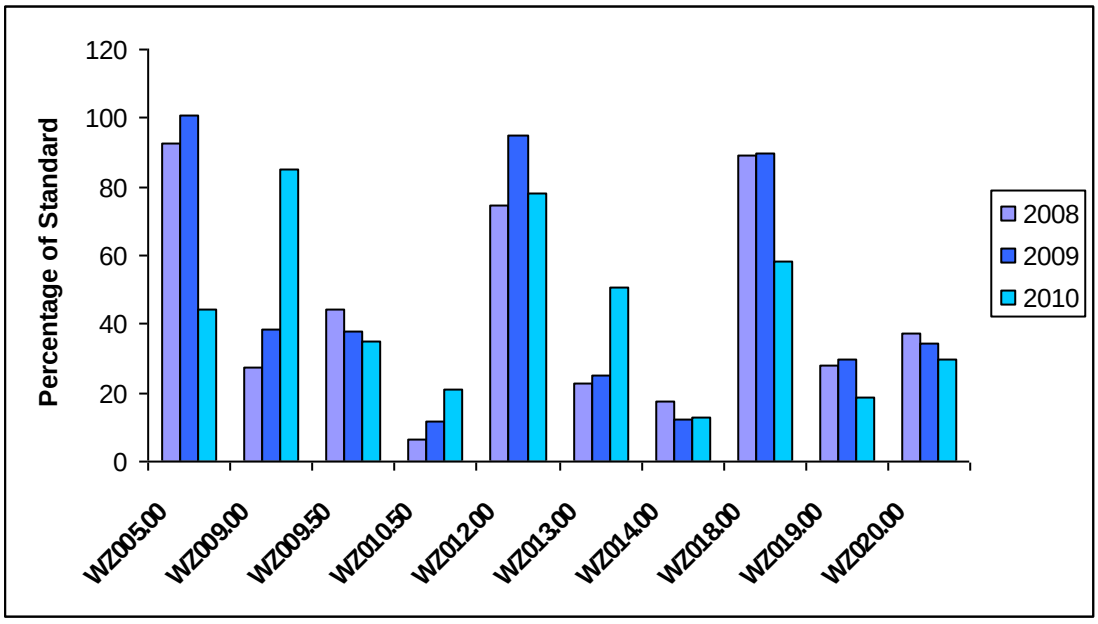
Figure 15, P90 Trends, Prohibited Stations, North Haven



Stations WZ 3 – 22 are located on Vinalhaven. The stations showing the greatest impact in the approved station trend chart (Figure 16) are stations WZ 9 and 13. Station WZ 9 has had deteriorating water quality for each of the last three years. The dwelling at this site installed a new septic system in 2005. The system has a tank with a lift station located within ten feet of the

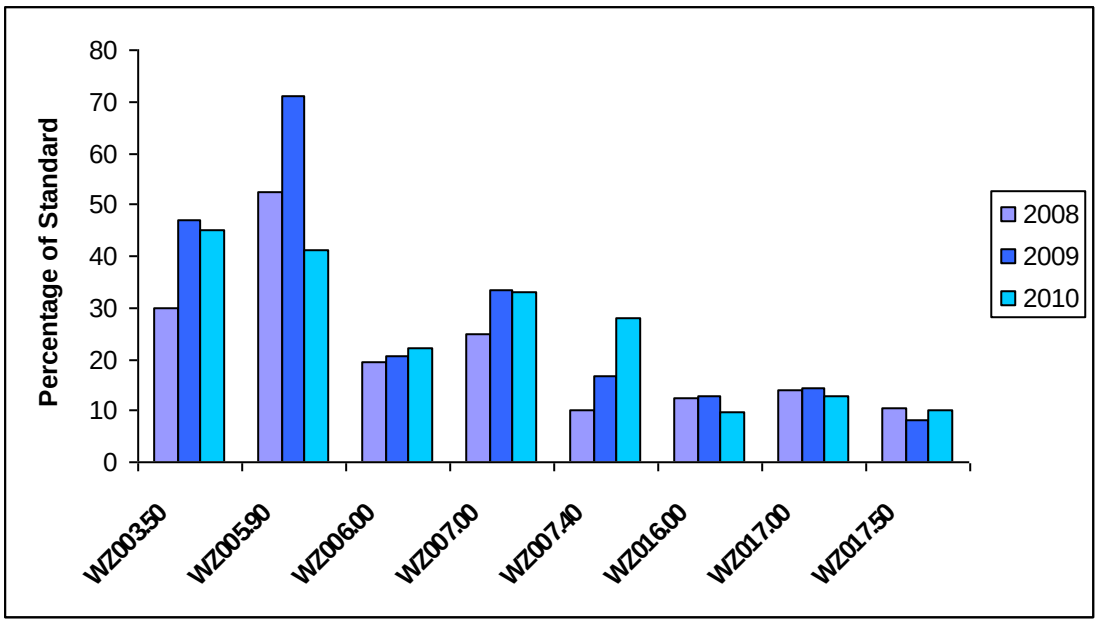
shore. Septic waste is pumped to a raised bed system on the back side of the house. It is possible that wastewater may be overflowing or leaking out of the tank. No problems were noted at the time of the survey. At station WZ13, there are two dwellings. Both of the dwellings are located away from the shore. The sample is taken from a dock that is located in deep water. There is a very small stream that only flows during extremely wet weather. It is possible that sea birds landing on the dock may be impacting the water quality. The trends for the remaining approved stations have either shown little changes in water quality or have shown improvement.

Figure 16. P90 Trends, Approved Stations Vinalhaven



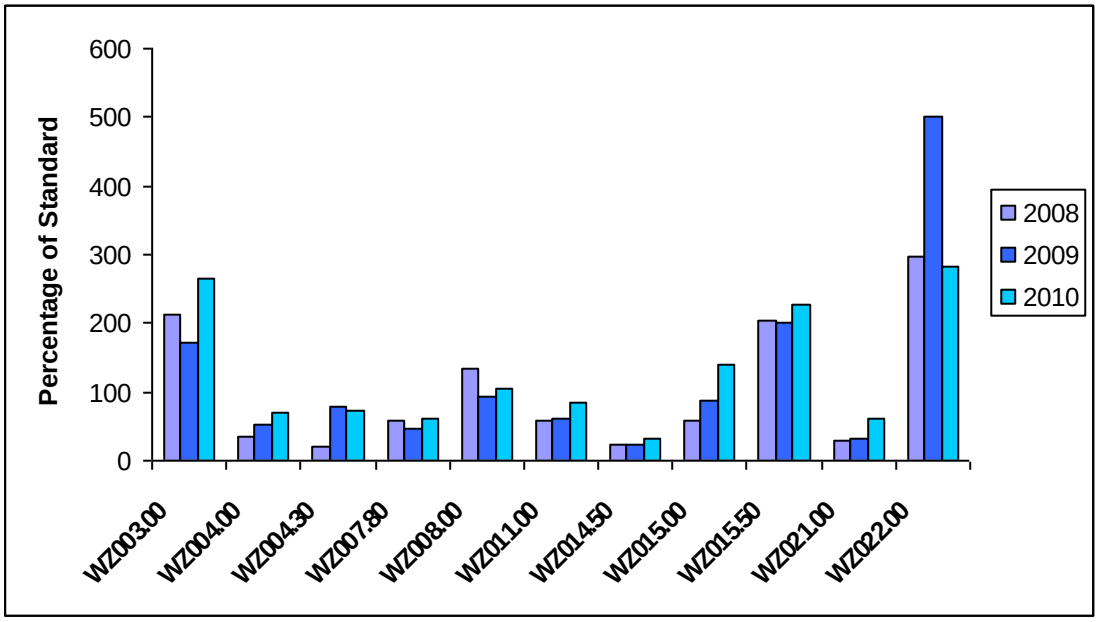
The trends for the restricted stations on Vinalhaven (Figure 17), remained similar to past years. Station WZ 5.9 has shown an improvement over past year's data but still does not meet approved standards. Stations WZ 16, 17 and 17.5 all currently meet approved standards and have remained pretty stable. These stations will be reviewed for a possible upgrade from restricted to approved. No pollution sources were identified in any of these areas.

Figure 17. P90 Trends, Restricted Stations, Vinalhaven



The trends for the prohibited stations (Figure 18), are shown as the percent of the approved standard. In this grouping, stations WZ 4, 4.3, 7.8, 11, 14.5 and 21 all meet the approved standard. Station WZ 4 has had deteriorating water quality each of the last three years. The water quality at station WZ 4.3 appears to have stabilized however this station is in a Prohibited area that was not able to be surveyed when the rest of the island was surveyed. Station WZ 7.8 also appears to have stabilized. This section of shore was not surveyed during the 2009 survey of the island. Station WZ 11 was proposed for reclassification in the 2009 Annual Review of Growing Area WZ however the reclassification did not take place. It was decided that the area should be sampled for another year to be certain that the water quality in the area had stabilized. This site should be reclassified. Station WZ 14.5 is a new station that currently has 26 samples. There is an outhouse at this site that is located too close to the shore. After the outhouse has been relocated and the station has been sampled 30 times, this are should be reclassified.

Figure 18. P90 Trends, Prohibited Stations Vinalhaven



Water Quality Discussion and Classification Determination

Growing area WZ has continued to have poor water quality scores in many of the areas. It is likely that at least some of this variability is due to the large deer population and the increasing raccoon population on both islands. Several sites could be proposed for a seasonally Conditionally Approved classification with a closed season during the summer months however many of these areas are inaccessible for sampling during the winter months due to the roads being chained off or not plowed. Two areas on Vinalhaven are being proposed for upgrades to Approved a result of the recent shoreline survey and improving water quality scores. On North Haven, one area is being proposed for an upgrade to approved due to licensed overboard discharges being removed in the area. A prohibited area on the east side of the island (between North Haven and Burnt Island) is being enlarged due to a potential septic overflow.

Smith Cove and Seal Bay, Vinalhaven

The water quality at Smith Cove and Seal Bay (Figure 19) has improved and currently meets approved standards (Table 17). This area was classified as prohibited on May 10, 2007 due to deteriorating water quality scores. The shore in this area is very sparsely developed. It is not known why the area received the elevated scores which necessitated the closure. No pollution sources were identified during the recent shoreline survey of the area. Three sample stations monitor the water quality in this area (WZ 16, 17 and 17.5). Station WZ 17.5 is a new station that was added in 2007 to monitor the end of the new closure line. This station now has a total of 26 samples. The P90 trends for stations WZ 16 and 17 have shown improving trends for each of the last four years. The P90 trends for station WZ 17.5 showed an improving trend in 2009 and an upward (deteriorating) trend in 2010; however, this station has a very good P90 score of 16.4. Pivot tables were completed for each of the stations to determine if the stations are

impacted by rainfall or season (tables 18 – 20). In each of the pivot tables, rainfall values of an inch or more are highlighted in light blue. P90 scores that were at or above the 90th percentile are highlighted in yellow. Each of the stations has received two or three elevated scores. The majority of the elevated scores are spread out over several years and aren't associated with a particular season. Several of the elevated scores occurred following greater than an inch of rainfall; however, there are several dates where greater than an inch of rainfall occurred and the water quality score was not impacted suggesting that rainfall has an intermittent impact on the water quality in the area. The data in the pivot tables suggests that the area has received occasional elevated scores that are not associated with a particular pollution event or season but may be associated with wildlife. This area is recommended to be reclassified as Approved for shellfish harvest.

Figure 19, Proposed Classification Upgrade in Smith Cove and Seal Bay, Vinalhaven

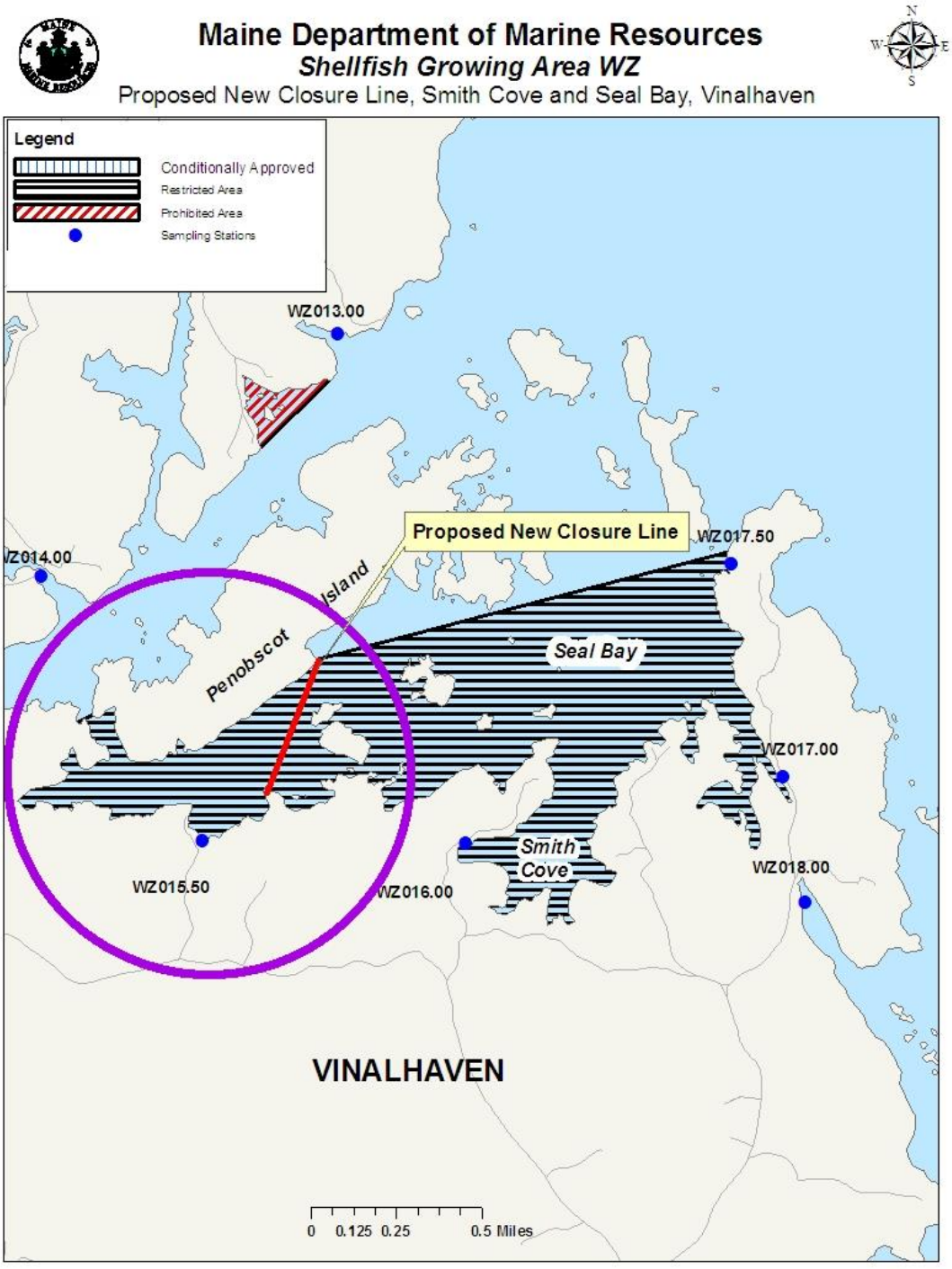


Table 19, Current P90 Scores, Smith Cove and Seal Bay 2006-2010

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WZ016.00	R	30	28	3.9	0.47	88	16.1	31	169	8/8/2006
WZ017.00	R	30	28	3.8	0.58	1100	21.8	31	169	7/26/2006
WZ017.50	R	26	26	3.8	0.48	72	16.4	31	163	5/16/2007

Figure 20, P90 Trends Shown as Percent of Approved Standard

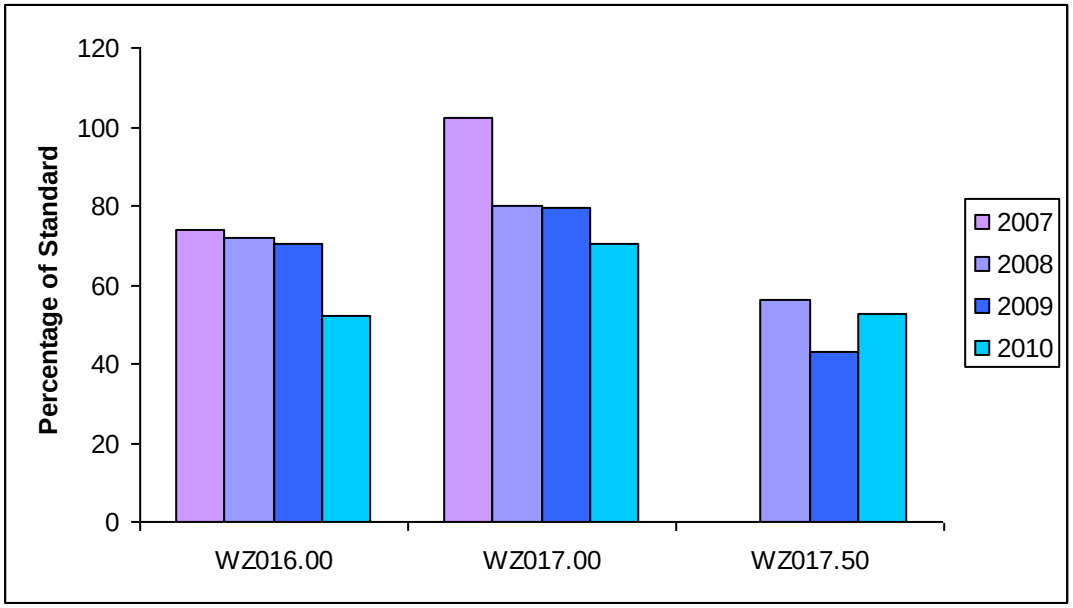


Table 20, Station WZ 16, Pivot Table 2003-2010

Rain Day 3	Rain Day 4	Date	Tide	Sal	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	4/17/2003	HE	29			2.9								
0.74	0.76	5/29/2003	HE	30				2.9							
1.14	1.14	6/16/2003	HF	31					3.6						
0.02	0.29	7/15/2003	HF	30						9.1					
0.14	0.14	8/13/2003	H	31							23				
0.25	0.25	9/25/2003	E	31								7.2			
0	0	4/20/2004	H	30			2.9								
0.48	0.48	6/23/2004	F	30					9.1						
0.96	0.96	7/19/2004	HF	30						240					
	1.07	8/17/2004	H	30							2.9				
0	0	9/15/2004	H	32								2.9			
	0.1	10/6/2004	L	31									2.9		
1.57	1.57	4/25/2005	HE	30			2.9								
2.46	3.11	5/25/2005	HF	15				23							
0.1	0.54	6/20/2005	E	28					2.9						

Rain Day 3	Rain Day 4	Date	Tide	Sal	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	7/21/2005	HE	30						43					
1.54	1.54	8/31/2005	E	30							43				
0.13	0.13	9/22/2005	F	32								9.1			
0.82	1.12	6/27/2006	HE	30					2.9						
1.7	no data	7/26/2006	HF	30						3.6					
no data	no data	8/8/2006	HE	30							15				
no data	no data	8/15/2006	F	30							3.6				
	0.2	9/13/2006	F	31								2			
2.26	2.26	10/24/2006	F	24									88		
0	0	6/26/2007	E	30					1.9						
0	0	8/29/2007	H	32							4				
0.2	0.2	9/17/2007	F	31								2			
0	0	10/3/2007	F	32									4		
1.01	1.01	11/27/2007	F	31										10	
no data	no data	12/12/2007	HF	30											1.9
0	0	1/29/2008	F	30	1.9										
0	0	3/25/2008	F	28		1.9									
0	0	5/21/2008	HF	30				1.9							
0.46	0.46	7/21/2008	F	30						8					
0	0	9/3/2008	F	32								1.9			
0.61	0.61	11/4/2008	F	32										2	
0.54	0.54	5/13/2009	F	30				1.9							
0	0	5/27/2009	F	29				1.9							
	0.34	7/21/2009	H	28						2					
0.04	0.67	8/4/2009	HE	30							26				
0	0	9/22/2009	F	30								1.9			
no data	no data	10/19/2009	HE	30									76		
0.59	0.59	4/13/2010	H	28			1.9								
0	0	6/15/2010	F	30					6						
0.8	0.97	7/27/2010	HF	30						4					
0.01	0.01	8/24/2010	H	31							1.9				
0.59	0.59	9/15/2010	F	32								1.9			
0	0	10/12/2010	F	32									11		
1.88	2.81	10/29/2010	F	30									3.6		
no data	no data	12/7/2010	HE	32											2

Table 21, Station WZ 17, Pivot Table 2003-2010

Rain Day 3	Rain Day 4	Date	Tide	Sal	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	4/17/2003	HE	30			2.9								
0.74	0.76	5/29/2003	HE	30				3.6							
1.14	1.14	6/16/2003	HF	31					9.1						
0.02	0.29	7/15/2003	HF	30						3.6					
0.14	0.14	8/13/2003	H	31							93				
0.25	0.25	9/25/2003	E	30								23			
0	0	4/20/2004	H	31			2.9								
1.11	1.14	5/24/2004	F	30				23							
0.48	0.48	6/23/2004	F	30					9.1						
0.96	0.96	7/19/2004	HF	31						2.9					
0.25	1.07	8/17/2004	H	30							9.1				
0	0	9/15/2004	H	32								15			
1.57	1.57	4/25/2005	HE	28			2.9								
2.46	3.11	5/25/2005	H	10				93							
0.1	0.54	6/20/2005	E	30					2.9						
0	0	7/21/2005	HE	30						9.1					
1.54	1.54	8/31/2005	E	31							9.1				
0.13	0.13	9/22/2005	F	32								23			
no data	no data	5/30/2006	HF	30				2.9							
0.82	1.12	6/27/2006	HE	30					2.9						
1.7	no data	7/26/2006	HF	30						3.6					
no data	no data	8/8/2006	HE	30							1100				
0	0.2	9/13/2006	F	32								1.9			
0.53	0.53	10/4/2006	E	31									2		
0	0	6/26/2007	E	30					1.9						
0	0	8/29/2007	H	32							2				
0.2	0.2	9/17/2007	F	32								1.9			
0	0	10/3/2007	F	32									1.9		
1.01	1.01	11/27/2007	HF	30										7.3	
no data	no data	12/12/2007	F	25											2
0	0	1/29/2008	F	31	1.9										
0	0	3/25/2008	F	28		1.9									
0	0	5/21/2008	HF	30				1.9							
0.46	0.46	7/21/2008	F	30						8					
0	0	9/3/2008	F	32								1.9			
0.61	0.61	11/4/2008	F	32										2	
0.54	0.54	5/13/2009	F	30				2							
0	0	5/27/2009	F	29				1.9							
	0.34	7/21/2009	HE	28						10					
0.04	0.67	8/4/2009	HE	30							2				
0	0	9/22/2009	F	30								1.9			
no data	no data	10/19/2009	HE	29									35		
0.59	0.59	4/13/2010	HE	26			1.9								

Rain Day 3	Rain Day 4	Date	Tide	Sal	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	6/15/2010	F	30					1.9						
0.8	0.97	7/27/2010	HF	30						20					
0.01	0.01	8/24/2010	H	30							11				
0.59	0.59	9/15/2010	F	32								4			
0	0	10/12/2010	F	32									1.9		
1.88	2.81	10/29/2010	F	30									10		
no data	no data	12/7/2010	HE	32											2.8

Table 22, Station WZ 17.5 Pivot Table 2007-2010

Rain Day 3	Rain Day 4	Date	Tide	Sal	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.56	0.56	5/16/2007	HE	29				2							
0	0	6/26/2007	E	30					1.9						
0.18	0.18	8/6/2007	LF	31							1.9				
0	0	8/29/2007	H	32							2				
0	0	10/3/2007	LF	32									7.3		
no data	no data	12/12/2007	HF	29											16
0	0	1/29/2008	LF	31	1.9										
0	0	3/25/2008	F	30		1.9									
0	0	5/21/2008	HF	30				1.9							
0.46	0.46	7/21/2008	HF	30						6					
0	0	9/3/2008	F	32								2			
1.3	1.3	11/19/2008	LF	31										72	
0.54	0.54	5/13/2009	F	28				1.9							
0	0	5/27/2009	F	29				1.9							
0	0.34	7/21/2009	HE	28						1.9					
0.04	0.67	8/4/2009	HE	30							1.9				
0	0	9/22/2009	F	30								2			
no data	no data	10/19/2009	HE	32									16		
0.59	0.59	4/13/2010	HE	26			1.9								
0	0	6/15/2010	F	30					2						
0.8	0.97	7/27/2010	HF	30						1.9					
0.01	0.01	8/24/2010	H	31							4				
0.59	0.59	9/15/2010	LF	32								2			
0	0	10/12/2010	F	32									20		
1.88	2.81	10/29/2010	F	25									46		
no data	no data	12/7/2010	HE	30											10

Zeke Point, Vinalhaven

Zeke Point is located on the north shore of Vinalhaven and is an arm of Calderwood Point (Figure 21). This area was proposed (and approved) for reclassification to approved in 2009 but was never reclassified. Following the completion of the 2009 report, it was decided that it would be a good idea to collect an additional years worth of data to be sure that the water quality had stabilized prior to reclassification. There are no dwellings or point sources nearby station WZ11. The closest dwelling is approximately a half a mile away from the sample site at the southern tip of Zeke's Point. An overboard discharge was removed from this property in 2004 and replaced with an in-ground septic system. The P90 scores for WZ 11 have remained below the approved standard from 2007 through 2010 (Tables 21-24). No pollution sources were identified during the recent survey of the area. The proposed closure line for the Zeke's Point area should go from the tip of Hopkins Point; Vinalhaven to the northern tip of Zeke's Point, Vinalhaven and continue to the southern tip of Fish Point, North Haven (Figure 20). The line is drawn this way to provide room for the closure zone around the licensed overboard discharges on Iron Point, North Haven (required closure zone of 3.4 acres for all three OBDs). The proposed closure zone area would be 2,384 acres which covers both shores of the Fox Islands Thorofare and Waterman Cove (west of Fish Point).

Table 23, Current P90 Score at Station WZ 11, 2006-2010

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WZ011.00	P	30	27	4.5	0.59	120	26.6	32	173	6/27/2006

Table 24, 2009 P90 Score, Station WZ11 2004-2009

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WZ011.00	P	30	19	4.3	0.54	93	21.5	36	203	10/6/2004

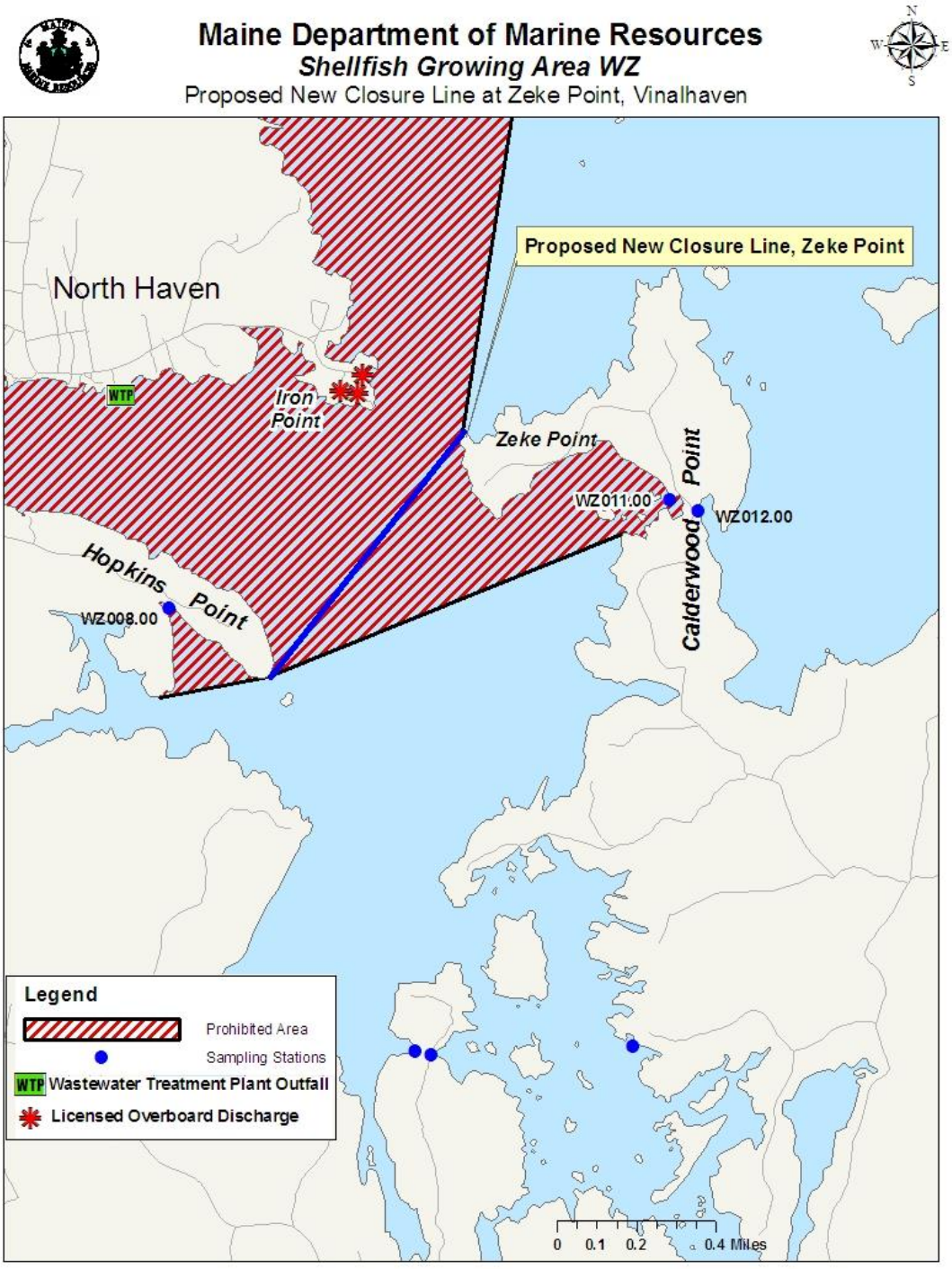
Table 25, 2008 P90 Score Station WZ 11, 2003-2008

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WZ011.00	P	30	13	4.8	0.53	93	23	40	230	9/25/2003

Table 26, 2007 P90 Score, Station WZ 11, 2003-2007

Station	Class	Count	MFCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WZ011.00	P	29	7	5.5	0.51	93	25.1	43	258	4/17/2003

Figure 21, Proposed Upgrade at Zeke Point



Pulpit Harbor (southwest corner)

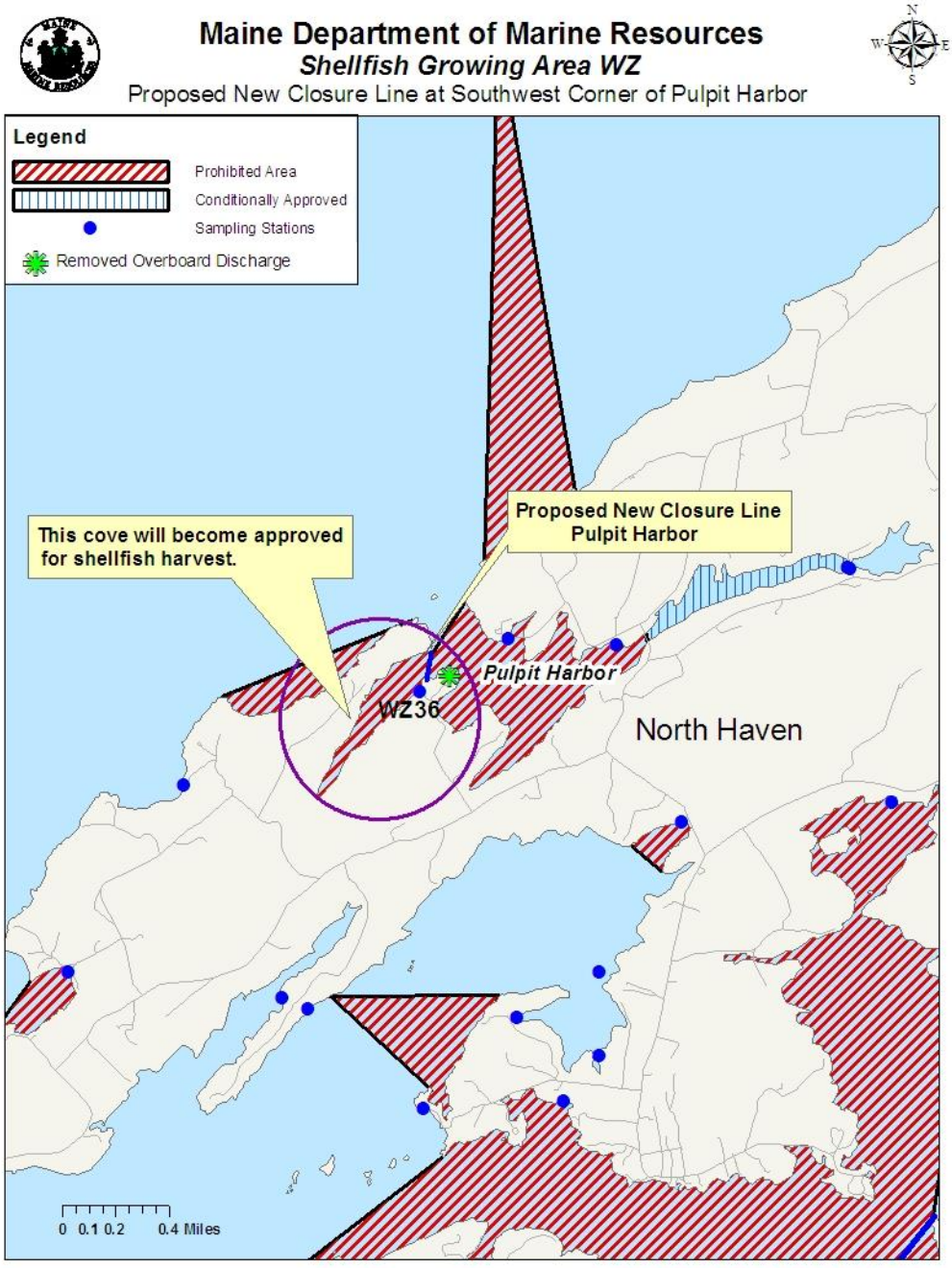
The southwest corner of Pulpit Harbor, North Haven is meeting approved standards and has recently (2008) had a large licensed overboard discharge system that serviced five dwellings removed. The removed discharge had a design flow of 2700 gallons per day. The five dwellings that were previously connected to the overboard discharge are now connected to four replacement in ground septic systems. One system is shared by two dwellings. This area is monitored by station WZ 36. The current P90 score at this station is 22.8 FC/100 ml. The P90 trend (Figure 15) for this site has shown a distinct downward trend in 2010 (improving water quality). A seasonal and rainfall impact table was done (Table 27) to determine if the area is impacted by rainfall or a particular season. The table shows that the majority of the elevated scores occurred between the years 2003 and 2006, with one elevated score occurring in 2007. There have been no elevated scores since the fall of 2007. Rainfall is associated with one elevated score (29 September 2003) and although all of the elevated scores occurred between the months of May and September, no elevated scores occurred during the months of June and August which suggests a weak seasonal impact. This area is recommended to be reclassified as Approved for shellfish harvest.

Table 27, Season and Rainfall Impact, station WZ36, 2003-2010

Rain 3	Rain 4	Date	Tide	Sal	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.45	1.75	27-May-03	E	30				2.9							
0	0	30-Jun-03	HE	31					9.1						
0.12	0.29	29-Jul-03	HE	31						2.9					
0.03	0.03	27-Aug-03	HE	30							43				
1.38	1.38	29-Sep-03	HF	31								93			
1.38	1.38	09-Dec-03	HE	30											7.3
0.4	0.64	06-Apr-04	HE	22			2.9								
1.14	1.26	06-May-04	H	30				2.9							
0.01	0.03	10-Jun-04	L	29					2.9						
0.9	0.9	15-Jul-04	E	31						7.2					
0.2	0.2	30-Aug-04	HE	30							23				
0.02	0.02	27-Sep-04	E	30								3.6			
0	0	21-Apr-05	E	28			3.6								
0.18	1.85	09-May-05	H	30				9.1							
0.2	0.2	06-Jun-05	E	30					2.9						
0.03	0.03	07-Jul-05	H	29						93					
0.14	0.14	22-Aug-05	HF	30							3.6				
0.88	0.88	29-Sep-05	E	30								3.6			
No Data	No Data	30-May-06	HF	24				1100							
0.82	1.12	27-Jun-06	HF	22					23						
1.7	1.7	26-Jul-06	HE	28						43					
0.33	0.33	15-Aug-06	F	29							2.9				
0.65	0.65	20-Sep-06	E	28								160			
0.53	0.53	04-Oct-06	LE	30									24		
0	0	31-Jan-07	E	32	2										

Rain 3	Rain 4	Date	Tide	Sal	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	27-Mar-07	LE	27		1.9									
1.37	1.39	21-May-07	F	30				2							
0.53	0.53	18-Jul-07	F	30						2					
0.63	0.63	10-Sep-07	HE	30								40			
0.24	0.24	14-Nov-07	H	31										2	
0.2	0.2	26-Mar-08	F	25		1.9									
0	0	19-May-08	HF	28				4							
1.18	1.18	18-Jun-08	H	29					2						
0.46	0.46	21-Jul-08	HF	28						1.9					
0	0	03-Sep-08	F	31								1.9			
0	0	03-Nov-08	F	30										2	
0.39	0.42	09-Mar-09	E	30		1.9									
0.54	0.54	12-May-09	HF	24				1.9							
0	0	26-May-09	H	28				2							
0.34	0.41	20-Jul-09	LE	26						1.9					
0.04	0.04	05-Aug-09	HE	27							28				
0	0	22-Sep-09	HF	30								1.9			
0.32	0.32	26-Apr-10	LE	28			1.9								
0	0	14-Jun-10	E	28					1.9						
0.8	0.8	28-Jul-10	HF	28						8					
0.01	0.01	25-Aug-10	E	31							3.6				
0	0	06-Oct-10	E	30									6		
1.05	1.05	26-Oct-10	HF	26									22		
No Data	No Data	07-Dec-10	E	29											2

Figure 22. Proposed Pulpit Harbor Reclassification



Aquaculture/Wet Storage Activity

There are no wet storage facilities in shellfish growing area WZ.

Aquaculture activity in Growing Area WZ consists of three active lease sites. Two of these leases are located on Vinalhaven, and are for raising eastern oysters (*Crassotrea virginica*) using the suspended method. These leases will expire in 2017.

The other lease site is located on North Haven and is also used to cultivate *Crassotrea virginica* on the bottom and suspended. This lease expires in 2013.

Additional information on these lease sites/LPAs can be found at the DMR website:

http://www.maine.gov/dmr/aquaculture/leaseinventory/penobscotbay.htm

Recommendation for Future Work

The DMR will continue to collect some winter data to assure that the area is sampled and properly classified for shellfish harvest. If enough winter data is able to be collected, areas may be proposed for a conditionally approved classification based on season. Islands in the growing area should be revisited to assure that the survey information is still accurate.

Appendix A. Key to Water Quality Table Headers

Station = water quality monitoring station

Class = classification assigned to the station; prohibited (P), restricted (R), conditionally restricted (CR), conditionally approved (CA) and approved (A).

Count = the number of samples evaluated for classification, must be a minimum of 30.

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

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

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

P90 = 90th percentile

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

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