



**GROWING AREA WV**

**Including Towns of: St George, Spruce Head, South Thomaston and Owls Head**

**Sanitary Survey Report**

**Report Date: May 18, 2010**

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**APPROVAL**

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Figure 1. Growing Area WV, with Active Water Stations

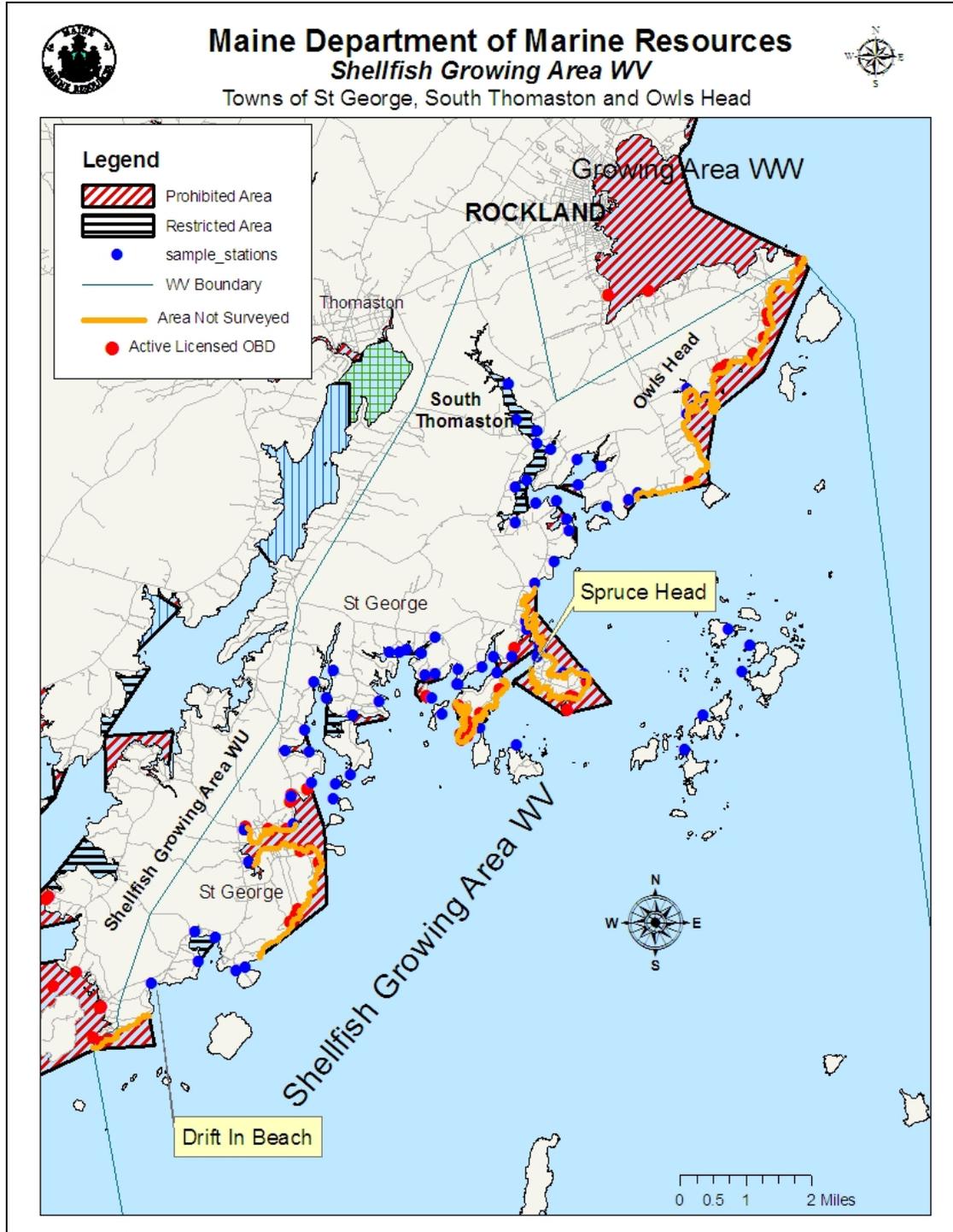
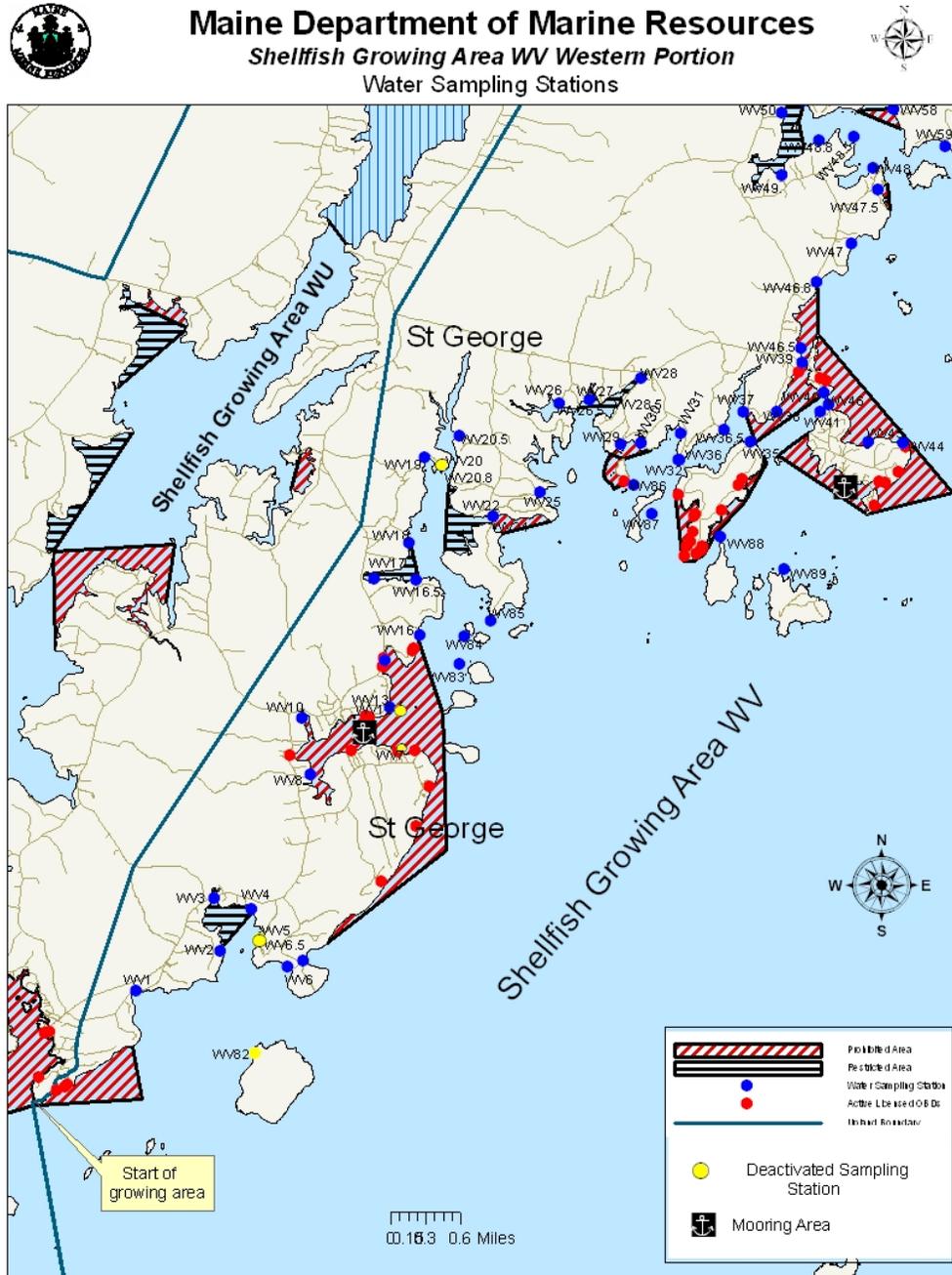




Figure 2. Active Sampling Stations, Western Portion of WV







## Executive Summary

This sanitary survey report for growing area WV is written in compliance with the requirements of the 2007 Model Ordinance and the National Shellfish Sanitation Program. This document combines information from an earlier shoreline survey (2003/2004) of the southern portion of the growing area (Drift In Beach to Spruce Head), with new survey information that was completed for the northern portion of the growing area in 2007 and 2008 (Spruce Head to Owls Head). Please refer to the map in Figure 1 for details on the areas surveyed.

Shellfish Growing Area WV covers the area from Marshall Point in the township of Port Clyde to the northeastern most point of Owls Head at Owls Head Light House. There are also numerous small islands located within the boundary of this growing area. Shellfish growing Area WV includes portions of the shoreline in the towns of St George, South Thomaston and Owls Head. The area includes the following townships within the towns of St George, South Thomaston and Owls Head: Port Clyde, Tenants Harbor, and Spruce Head.

All necessary closures were made immediately when pollution sources were identified during the shoreline survey. No new downward classification changes are being proposed at this time.

## Growing Area Description

Shellfish Growing Area WV covers the region from Marshall Point, Port Clyde to the northern tip of Owls Head (Figure 1). The growing area includes portions of the towns of St George, South Thomaston and Owls Head. The town of St George includes the villages of Port Clyde, Clark Island, Martinsville and Tenants Harbor. According to the 2000 census, the town of St George had a year round population of 2,580, the town of South Thomaston, which includes the village of Spruce Head had a year round population of 1,416 and the town of Owls Head had a year round population is 1,601. All of the towns in shellfish growing area WV are small and residential, with the population of each increasing during the summer months. There are no large industries, marinas or large tourist areas in this growing area. The main sources of income for this growing area include lobstering, construction and self employment businesses such as carpentry businesses and artist galleries. While there are no actual marinas in shellfish growing area WV, there are mooring areas that are used by the many local lobster boats. Cruising boats also frequent some of these areas during the summer months, with Tenants Harbor being the most popular mooring area used by cruising boats. There are no sewage treatment facilities in this growing area. The closest sewage treatment facilities to this growing area are located in the towns of Thomaston (growing area WU) and Rockland (growing area WW). The treatment plant outfalls from Thomaston and Rockland enter into water bodies away from the shores and waters of shellfish growing area WV. A detailed overview of this growing area is presented in Figures 2 and 3.

There are five aquaculture lease sites in this growing area. All of the lease sites are located in the Weskeag River. There is also a large conservation area in the upper Weskeag River. The Ralf Waldo Tyler Wildlife Management Area is a large marsh consisting of 618 acres that is owned and managed by the Maine Department of Inland Fisheries and Wildlife (IF&W). In



addition to the conservation area on the Weskeag River, shellfish growing area WV also has two state parks. The Owls Head Light State Park is located at the northern tip of the growing area in the town of Owls Head. This park consists of small hiking trails, beaches, and a lighthouse that is open to the public. Birch Point State Park is also located in the town of Owls Head. This park consists of small trails along the shore and a sandy beach. Both parks are open for daytime use only.

## History of Growing Area Reports and Classification

The classification changes that have taken place during the review period are shown on Table 1. All of the legal notices listed in table 1 are filed in the DMR Public Health Division, growing area WV "Legal Notices" file with the accompanying maps.

**Table 1. Classification Changes during Review Period 1996-2008**

Legal Notice #	Date	Activity
28 E	3/11/96	Area between Birch Point and the cove north of Spaulding Is., Owls Head reclassified from prohibited to approved due to updated survey information
28 B	3/11/96	Area between Dyer and Spaulding Islands reclassified from prohibited to approved due to updated survey information
28 B	12/6/96	Mouth of Weskeag River reclassified from prohibited to approved due to updated survey information
28 I	12/6/96	Portions of upper Weskeag River, Ballyhac Cove, and Nabby Cove reclassified from prohibited to approved due to updated survey information
28 G	3/3/97	Seavey Cove, St George reclassified from prohibited to approved due to updated survey information
28 D	3/3/97	North end of Long Cove, St George reclassified from prohibited to approved due to updated survey information
27 A	3/5/97	Portions of the western side of Wheeler Bay, St George reclassified from prohibited to approved due to updated survey information
28 H	4/1/97	Depuration harvest rescinded in Mosquito Harbor prior to potential upgrade to approved in future
28	6/17/97	Small cove on north side of Mosquito Head, St George reclassified from prohibited to approved due to updated survey information
28 H	6/17/97	Reduces size of prohibited area by reclassifying everything except small flat north of Mosquito Harbor bridge as approved due to updated survey information
28 I	10/1/98	Portions of the upper Weskeag River reclassified from prohibited to approved due to improved water quality and updated survey information
29 A & 29 C	5/5/99	Incorporates area previously described in 29C into notice 29A
27 A	11/23/99	The approved area in Wheeler Bay is enlarged due to an updated survey of the area
28 C	11/29/99	The north shore of Rackliff Island is reclassified from prohibited to approved due to an updated survey of the area
28 H	9/6/00	Drift In Beach, St George is reclassified from approved to prohibited due to poor water quality
29 A	12/8/00	Monroe and Sheep Island, Owls Head are reclassified from prohibited to approved due to updated survey information



Legal Notice #	Date	Activity
28 B	6/22/01	Waterman's Beach is reclassified from prohibited to approved due to improved water quality and updated survey and Pleasant Beach, South Thomaston is reclassified from approved to prohibited due to a malfunctioning septic system in the area
28 I	5/17/02	Portions of Weskeag River reclassified from approved to prohibited due to poor water quality
28 I	7/3/02	Closes Weskeag River due to pump station failure in Rockland
28 I	7/8/02	Reopens Weskeag River following closure on 7/3/02 (sewage spill)
28 I	10/4/04	Enlarges restricted area on Weskeag River and reconfigures closure line in Ballyhac Cove, Owls Head to better represent the closed area
27 A	7/28/05	Increases the size of prohibited area in Wheeler Bay and reclassifies a very small cove in the area from prohibited to approved
28 I	7/28/05	Enlarges the size of closed area on Weskeag River in Ballyhac Cove and along shore of Birch Pt. State park, in towns of S. Thomaston and Owls Head
28	5/4/06	Opens Southern Is., St George after OBD is removed
28 B	5/4/06	Opens Seal Cove, St George and Spruce Head
28	5/1/07	Combines areas, 28 and 28 H in one legal notice, reclassifies Mosquito Harbor as restricted and opens the south beach at Mosquito Head, St George
27 A	8/20/07	Enlarges size of restricted area in Wheeler Bay due to deteriorating water quality
28	8/20/07	Reclassifies Seavey Cove and a portion of Long Cove, St George as restricted due to deteriorating water quality
28 B	8/20/07	Enlarges size of closed area in Baum Bay, St George and S. Thomaston, due to deteriorating water quality
28	3/24/08	Closes Clark Cove, St George due to two malfunctioning septic systems
28 I	8/22/08	Closes Nabby Cove South Thomaston due to a malfunctioning septic system

This sanitary survey report includes the survey information that was collected from the southern portion of the growing area in 2003 and 2004. Although a sanitary survey report of the southern portion of shellfish growing area WV was completed in 2006, DMR staff felt that in order to simplify the timing of future report schedules, this report should combine the information about the entire growing area into one comprehensive document. In the past, this growing area was broken down into several smaller areas, and individual reports were written for each of these areas. The dates of these previous Sanitary Survey Reports are as follows:

- Drift In Beach to Mosquito Head: Surveyed 1997, Sanitary Survey Report written in 1997
- Islands between Port Clyde and Spruce Head: Surveyed 1994, Sanitary Survey report written in 1995
- Long Cove and Wheeler Bay, Surveyed 1996, Sanitary Survey written in 1996
- Wheeler Bay to Rackliff Island, Surveyed 1999, Sanitary Survey written in 1999



## Current Classification(s)

At the end of 2008, shellfish growing area WV was classified as:

**Approved**, 31 stations

**Restricted**, 20 stations

- Area No. 28 Marshall Pt. To Clark Is., St George, stations WV2, 3, and 4, Mosquito Harbor, station WV16.5, 17, and 18 Seavey Cove, WV20.8 and WV22 Long Cove, due to nonpoint pollution
- Area No. 27 A, Eastern Wheeler Bay, St George, stations WV26.5, WV27, WV28, and WV28.5, due to nonpoint pollution
- Area No. 28 I, Weskeag River, South Thomaston and Owls Head, stations WV49, 50, 50.5, 50.8, 52, 53, 54, and 55, due to point and nonpoint pollution

**Prohibited**, 24 stations

- Area No. 28 Marshall Pt. To Clark Is., St George, stations WV8, W10, 13, 14 and 24, due to elevated water quality and point sources (malfunctions and licensed OBDs), station WV24 due to two malfunctions nearby
- Area No. 27 A, Eastern Wheeler Bay, St George, stations WV29 and WV30, due to elevated water quality
- Area No. 28 B, Patten Point, St George to Thorndike Point, South Thomaston, Stations WV37, 38, 39, 40, 44, 45, 46, 46.5, and 47.5, stations WV39 and WV44 due to licensed OBDs, station WV47.5 due to old questionable septic systems, all other stations due to non-point pollution
- Area No. 28 I, Weskeag River, South Thomaston and Owls Head, stations WV57, 58 and WV60, station WV58 (previously) due to old septic systems, station WV60 due variability in water quality
- Area No. 28 E, Ash Pt. To Birch Pt., Owls Head, station WV61, closed due to lack of survey
- Area No. 29 A, Owls Head, stations 62.5, 63, 64, and 65, survey needs to be done and bad water quality at station WV64

There are also five new stations in growing area WV; these stations have less than 30 data points and do not have a classification assigned to them.

Please visit the DMR website to view legal notices:

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

## Current Management Plan(s) for Conditional Areas

There are no conditionally managed areas in shellfish growing area WV.



## Pollution Sources Survey

A critical control point in a successful shellfish sanitation program (preventing food borne illness associated with shellfish consumption) is identifying areas that have good sanitary quality. One component of a successful sanitary survey and subsequent proper classification of the growing area is the identification and evaluation of pollution sources which do or may impact the growing area. The identification and evaluation of pollution sources is known as the shoreline survey. The information obtained by conducting a thorough shoreline survey is valuable in determining, evaluating and documenting the location and direct or indirect impact of actual and potential pollution sources. Sources of bacteria may include septic systems, overboard discharges, municipal and industrial discharges of wastewater, illegal sewage discharge from boats and polluted stormwater runoff.

The following section of this Sanitary Survey Report, provide detailed descriptions of various pollution sources that were identified during the most recent sanitary survey field work. In each sub-section, a particular type of a pollution sources is listed, described and evaluated, and where applicable, is accompanied by maps and tables. The sources of pollution that are described in this report include: domestic waste, including private inground systems and OBDs, industrial pollution sources, marinas and mooring fields, non-point source pollution from streams, agricultural and domestic animal activity, wildlife and conservation/recreation areas.

The shoreline survey involves inspecting all dwellings within 500 feet of the shore. All forms of waste disposal systems are inspected to ensure that they are not malfunctioning and leaching into the surrounding waters. Information obtained during the shoreline survey is then entered into a DMR shoreline survey database where it can be updated with future survey information. Actual pollution sources include pollution sources with a known malfunction. Potential pollution sources include old or suspect systems that were not found to be malfunctioning at the time of the inspection, but should be visited with greater frequency to ensure that they are still functioning properly. All of the pollution sources have been reported to the local plumbing inspector responsible for each town.

All pollution sources are illustrated in Figures 4 and 5. Each actual pollution source is noted on each of the Figures as PS; with the corresponding number which can be cross referenced to Tables 2 through Table 4. Potential pollution sources are noted in each of the figures as PP, with the corresponding number shown on Tables 5 through Table 7. Active over board discharges in area WV are presented in Figures 9 and 10, and Table 8.

Dwellings along the shore in the area from Marshall Point Lighthouse to the southern mouth of Drift In Beach and in the outer harbor portion of Tenants Harbor were not inspected. The shoreline in the Marshall Point area is very bold with few shellfish resources. The Tenants Harbor region is not being considered for reclassification due to the numerous cruising boats that frequent the area and the many licensed overboard discharges. A large portion of Rackliff Island was not surveyed due to the number of licensed overboard discharges in the area. The region from Birch Point State Park north was also not surveyed due to the limited amount of



shellfish resources in the area. All of these areas are currently classified as prohibited. All of the areas that were not surveyed are illustrated in Figure 1.

There has been no new development on the smaller islands (from Whitehead Island south) in the study area. All of these islands are seasonally occupied, and utilize outhouses for their wastewater disposal. None of the islands have electricity or running water. Water is either collected off the roof into barrels or brought to the dwelling when it is occupied. Whitehead Island is a larger island in this portion of the study area that does have electricity supplied for the lighthouse on the island. The lighthouse building utilizes a combination of two outhouses which are located in a wooded area north of the lighthouse and a small in ground system which is located south of the lighthouse. There are also several small one room camps on the island, which utilize outhouse systems and solar outdoor shower stalls. The outhouses and shower stalls on all of the islands are well maintained and are located away from the shore. Southern Island was inspected to document the replacement of a licensed overboard discharge with a new in ground system.

Islands in the Muscle Ridge Island group were surveyed during the summers of 1999 and 2000. The survey of these islands will be updated in 2009 when the area is being sampled. Currently, the most elevated P90 score at any of the island stations in growing area WV is 11.6 FC/100ml.



Figure 4. Actual and Potential Pollution Sources, Southern Portion

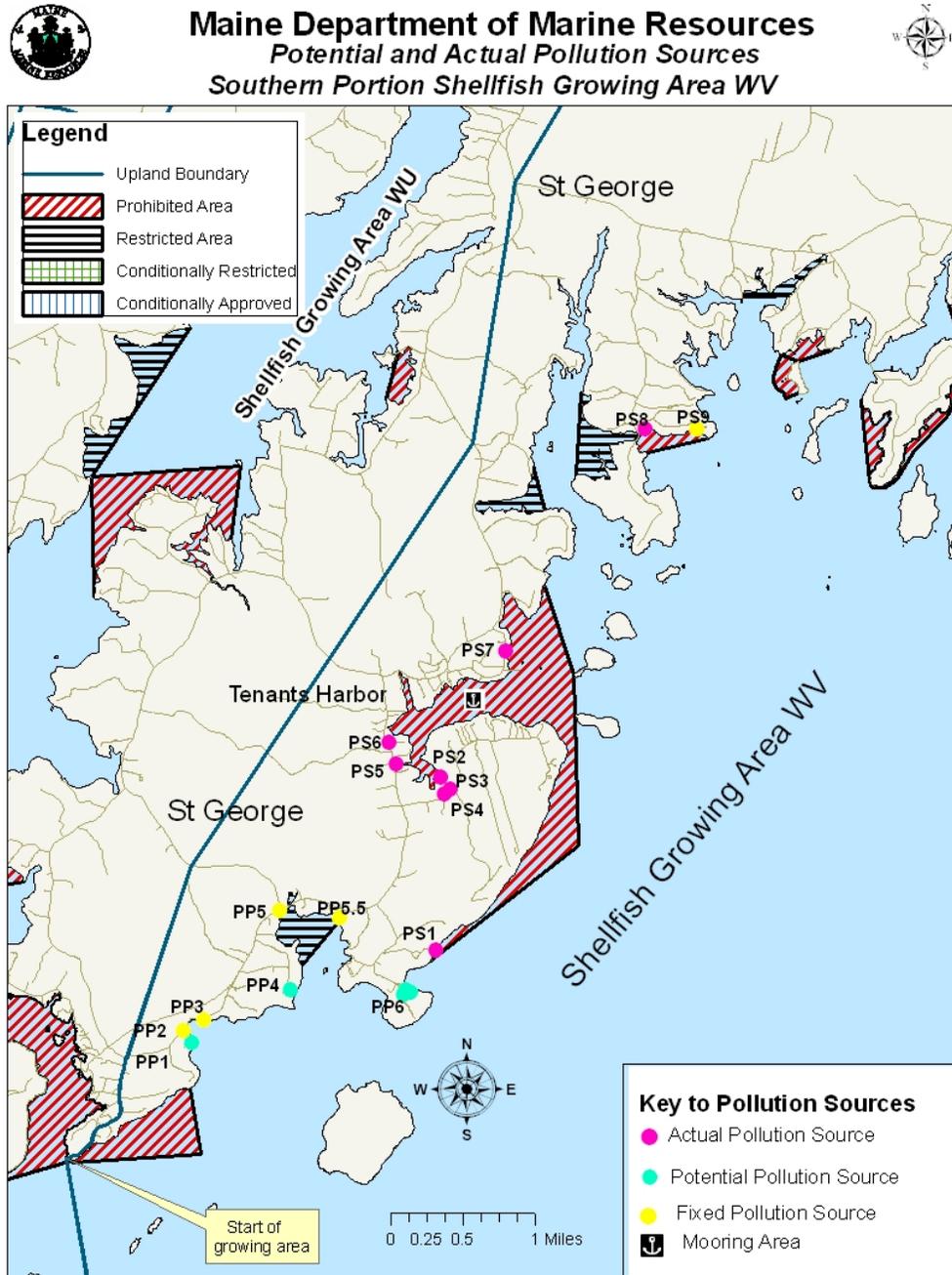
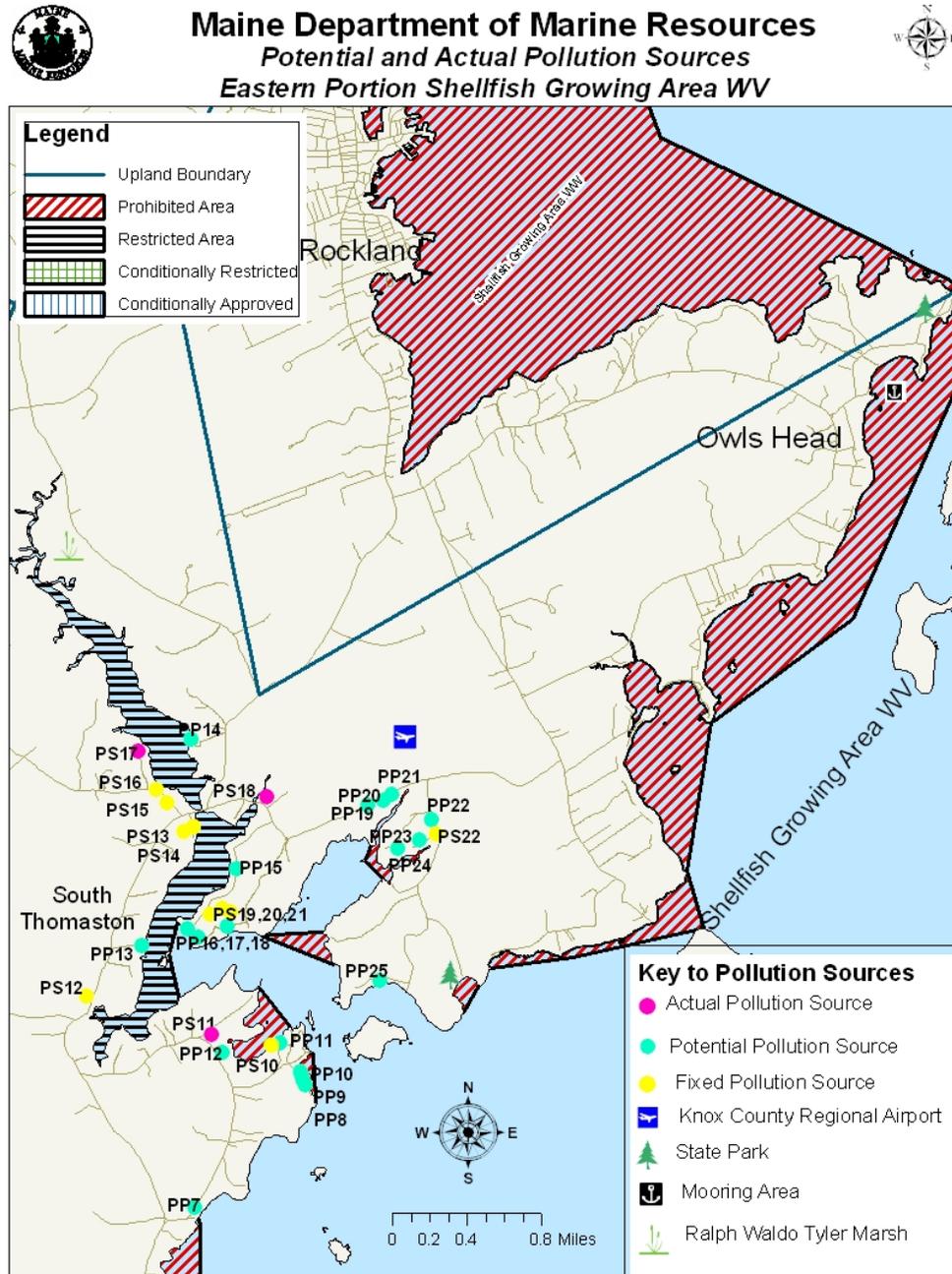




Figure 5. Actual and Potential Pollution Sources, Eastern Portion





### Domestic Waste

Tables 2-7 show all actual and potential pollution sources noted in shellfish growing area WV, originating from septic systems, outhouses, washing machine drains and septic overflows; locations of these pollution sources are noted in Figures 4 and 5. The pollution source numbers noted in the tables correspond with the pollution source numbers noted in the figures. The pollution sources are sorted by each town that falls within the boundary of the growing area. The corresponding remediation efforts are noted in the column titled “Remediated”; action taken to protect public health by DMR staff are noted in the last column of each table. Classification of the area surrounding each pollution source is noted in the Class column.

A total of 22 actual pollution sources were found and reported to towns; of these 9 have been fixed, 7 in Tenants Harbor are still unaddressed, 2 malfunctions are scheduled to be fixed in 2009, three systems are scheduled to be fixed in 2010, two washing machine drains need further documentation as to their status, and one dwelling is unoccupied and will be required to have new system installed prior to occupancy. A total of 25 potential pollution sources were identified. Potential pollution sources are sources that are reported to the local LPI to inspect and provide additional information to the department. Occasionally these systems are found to be an actual malfunction requiring replacement or repair. Five potential pollution sources required additional work.

**Table 2. Actual Pollution Sources Town of St George**

PS#	Type of Pollution	Actual/Potential Direct/Indirect	Remediated Yes/No	Class	Action Taken/Comments
PS1	septic malfunction	Actual/Direct	N	P	
PS2	bucket used as toilet	Actual/Direct	N	P	LPI visited, did not identify problem, area is prohibited
PS3	septic malfunction	Actual/Direct	N	P	House has been demolished, new system will go in when new house is built
PS4	septic malfunction	Actual/Indirect	N	P	New system has been designed, will be installed 2009
PS5	straight pipe unoccupied	Actual/Indirect	N	P	New system will be required prior to being occupied
PS6	septic malfunction	Actual/Indirect	N	P	New owner/revisit
PS7	wash machine drain	Actual/Indirect	N	P	LPI need to revisit to check status
PS8	septic malfunction	Actual/Indirect	N	P	Small Community Grant Money available. May replace system in 2010
PS9	septic malfunction	Actual/Indirect	Y	P	July 2008



**Table 3. Actual Pollution Sources Town of South Thomaston**

PS#	Type of Pollution	Actual/Potential Direct/Indirect	Remediated Yes/No	Class	Action Taken/Comments
PS10	septic malfunction	Actual/Direct	Y	P	Closure implemented in 2008; fixed in 2008
PS11	septic malfunction	Actual/Indirect	N	P	Scheduled to be remediated in 2010, >500 feet from shore
PS12	septic malfunction	Actual/Indirect	N	R	Scheduled to be remediated in 2010, >500 feet from shore
PS13	septic malfunction	Actual/Direct	Y	R	shared system – both dwellings hooked up Fixed in 2007
PS14	septic malfunction	Actual/Direct	Y	R	shared system – both dwellings hooked up Fixed in 2008
PS15	septic malfunction	Actual/Direct	Y	R	Fixed in 2007
PS16	wash mach drain	Actual/Indirect	?	R	LPI will check status
PS17	septic malfunction	Actual/Indirect	N	R	two dwellings share system, system will be fixed in 2009, across rd from shore, no drainage gully
PS18	wash mach drain	Actual/Indirect	?	R	LPI will check status
PS19	septic malfunction	Actual/Indirect	Y	R	Wastewater leaking out cement chamber Fixed 2008
PS20	septic malfunction	Actual/Indirect	Y	R	Fixed in 2008
PS21	septic malfunction	Actual/Indirect	Y	R	Fixed in 2008

**Table 4. Actual Pollution Sources Town of Owls Head**

PS#	Type of Pollution	Actual/Potential Direct/Indirect	Remediated Yes/No	Class	Action Taken/Comments
PS22	septic malfunction	Actual/Indirect	Y	P	Reported to LPI, dye tested; fixed 2008

**Table 5. Potential Pollution Sources Town of St George**

PP#	Type of Pollution	Actual/Potential Direct/Indirect	Remediated Yes/No	Class	Action Taken/Comments
PP1	tank only – was full	Potential/Indirect	N	A	reported to LPI, tank pumped
PP2	old, small, system too close to shore	Potential/Indirect	Y	A	Fixed in 2007, new system
PP3	old, small, system too close to shore	Potential/Indirect	Y	A	New system April 2008
PP4	overgrown system	Potential/Indirect	N	A	no odor or sign of breakouts noted upon revisit
PP5	potential	Potential/Indirect	Y	R	new system, April 2006



PP#	Type of Pollution	Actual/Potential Direct/Indirect	Remediated Yes/No	Class	Action Taken/Comments
	malfunction				
PP5.5	old, occasional odor	Potential/Indirect	Y	R	new system; October 2005
PP6	3 old systems	Potential/Indirect	N	A	no odor or sign of breakouts noted upon revisit, check this annually due to age of systems

**Table 6. Potential Pollution Sources Town of South Thomaston**

PP#	Type of Pollution	Actual/Potential Direct/Indirect	Remediated Yes/No	Class	Action Taken/Comments
PP7	wet system	Potential/Indirect	N	A	No problem noted upon revisit
PP8	possible septic overflow	Potential/Indirect	N	P	Have LPI check
PP9	old cess pool?	Potential/Indirect	N	P	Have LPI check
PP10	old cess pool or septic overflow	Potential/Indirect	N	P	Have LPI check
PP11	50 year old system	Potential/Indirect	N	P	House is directly above shore, erosion work was done 2008, needs dye test
PP12	old system	Potential/Indirect	N	R	No odor, dye tested no dye showed
PP13	possible septic overflow	Potential/Direct	N	R	Tank has line to gully above shore, no odor or wet areas observed, site is at station WV50, check gully when sampling
PP14	Wet Leach field	Potential/Indirect	N	R	Dye tested – no dye showed, owner was going to add more dirt
PP15	pipe to drainage	Potential/Indirect	Y	R	LPI visited- fixed 10/2/08
PP16	questionable system	Potential/Indirect	N	A	System has exposed pipes, Reported to LPI to inspect
PP17	slight odor	Potential/Indirect	N	A	LPI visited – no problem found
PP18	leachfield location unknown	Potential/Direct		A	House close to shore, recent dirt work, report to LPI
PP19	wet leachfield	Potential/Indirect	N	P	Reported to LPI
PP20	Old system	Potential/Indirect	N	P	Tank with two lines running west, revisit frequently
PP21	wash mach drain	Potential/Indirect	N	P	LPI will check status

**Table 7. Potential Pollution Town of Owls Head**

PP#	Type of Pollution	Actual/Potential Direct/Indirect	Remediated Yes/No	Class	Action Taken/Comments
PP22	Overgrown system	Potential/Indirect	N	R	Area overgrown and covered with garbage, leachfield unknown, Asked LPI to inspect
PP23	Possibly shared with	Potential/Indirect	N	R	Asked LPI to inspect – no problem found



PP#	Type of Pollution	Actual/Potential Direct/Indirect	Remediated Yes/No	Class	Action Taken/Comments
	malfunctioning system				
PP24	Overgrown system	Potential/Indirect	N	R	Area overgrown and covered with garbage, revisit occasionally, LPI checked no problem found
PP25	Wet system	Potential/Direct	N	A	Leach field wet but odorless and nothing visible on shore, revisit occasionally

### Licensed Overboard Discharges

There are 48 active licensed overboard discharges (OBDs) in growing area WV (Figures 6 & 7). 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 water body (the ocean, a river, or a stream) via an outfall pipe.

OBDs are licensed and inspected by the Maine Department of Environmental Protection. The DEP license standards for OBDs are presented in Appendix A. At each inspection, DEP looks for tags on each treatment unit identifying the service contractor and the last date of service. If an OBD is not properly maintained, or if the OBD malfunctions, it has the potential to directly discharge untreated wastewater to the shore; therefore, preventative closures are implemented surrounding every OBD. The size of each closure is determined based on a dilution, using on the permitted flow rate of the OBD, and the depth of the receiving water that each OBD discharges to; the fecal concentration used for this dilution calculation is  $1.4 \times 10^5$  FC/100ml. All



closures in shellfish growing area WV are of adequate size to protect public health (Table 8). The size of closures surrounding OBDs located in areas where the entire shoreline is classified as prohibited were not evaluated.



Figure 6. Active Licensed Overboard Discharges, Eastern Portion

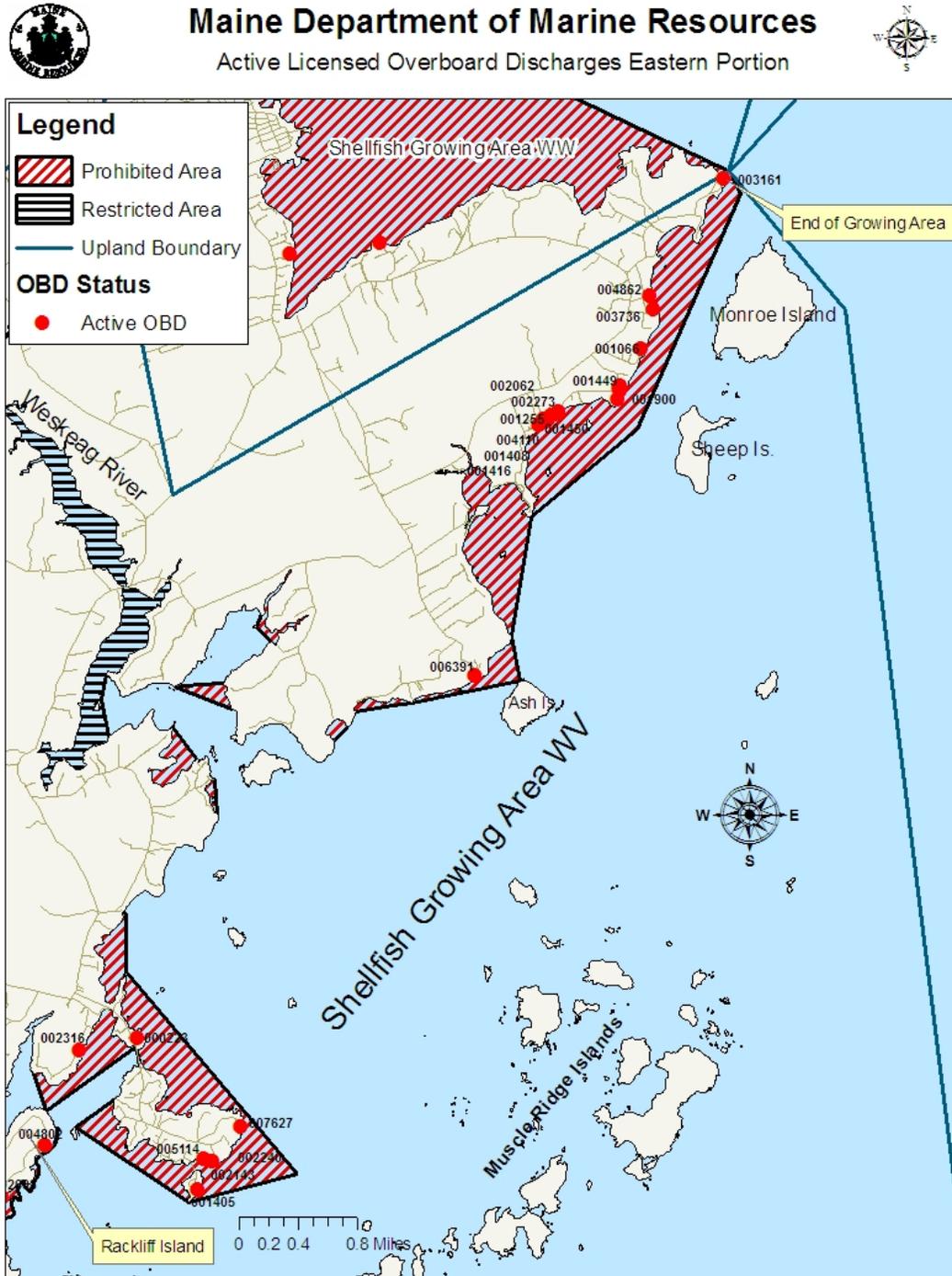
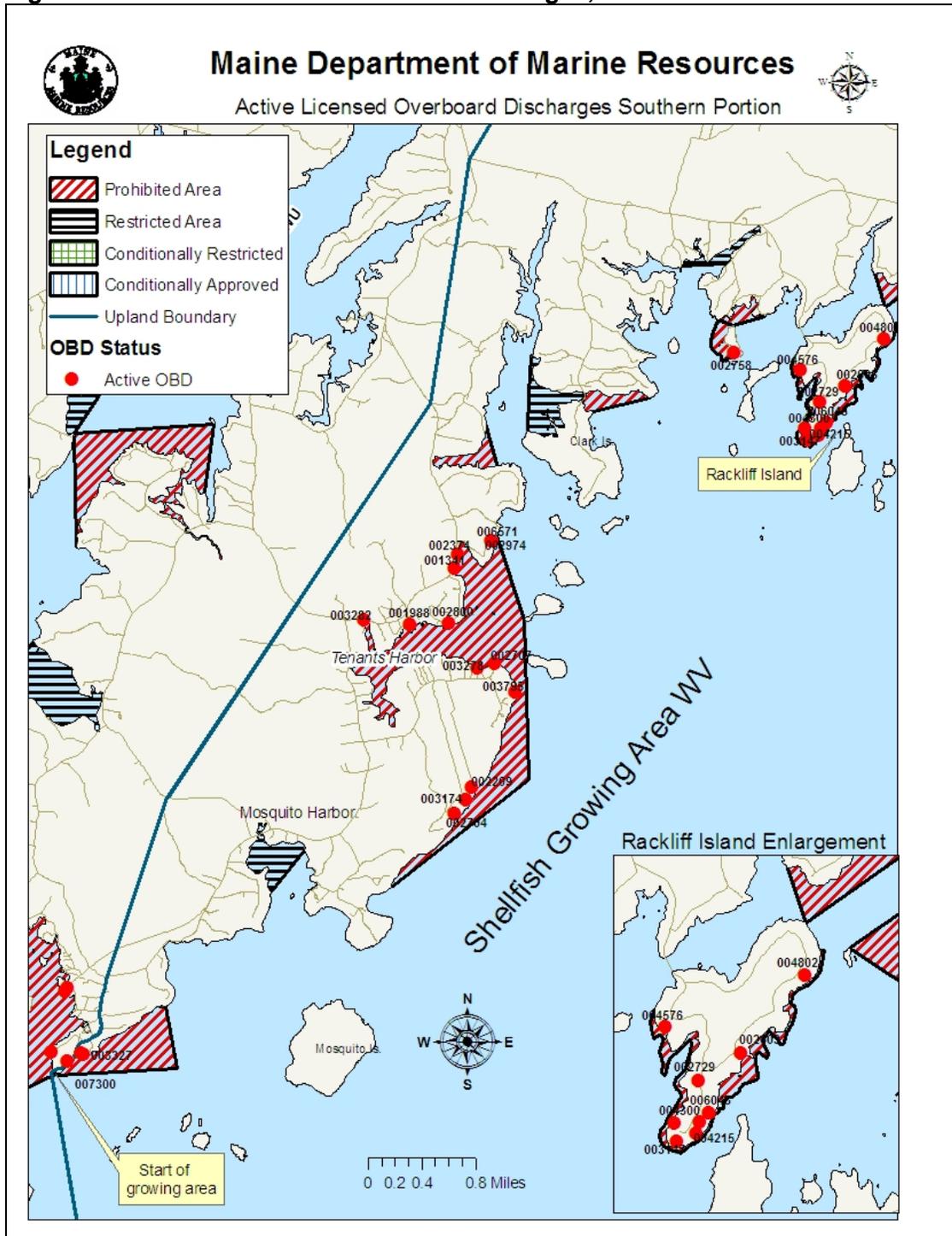




Figure 7. Active Licensed Overboard Discharges, Southern Portion





**Table 8. Active Licensed Overboard Discharges**

DEP ID	Town	Flow	Status	Receiving Waters	Required Closure (Acres)	Actual Closure Area
4110	Owls Head	2700	Active	Fishermans Is. Passage	8.29	Entire Shore
6391	Owls Head	360	Active	Muscle Ridge Channel	1.58	
1449	Owls Head	300	Active	Muscle Ridge Channel	0.46	
2273	Owls Head	300	Active	Muscle Ridge Channel	0.92	
1408	Owls Head	300	Active	Muscle Ridge Channel	0.92	
1450	Owls Head	300	Active	Muscle Ridge Channel	0.92	
1255	Owls Head	300	Active	Muscle Ridge Channel	0.92	
2102	Owls Head	300	Active	Muscle Ridge Channel	0.61	
3067	Owls Head	300	Active	Muscle Ridge Channel	0.29	
1416	Owls Head	300	Active	Muscle Ridge Channel	0.92	
1900	Owls Head	800	Active	Muscle Ridge Channel	1.23	
3736	Owls Head	300	Active	Owls Hd. Harbor	0.46	
4862	Owls Head	300	Active	Owls Head bay	0.46	
1066	Owls Head	800	Active	Owls Head bay	1.23	
2062	Owls Head	300	Active	Penobscot Bay	0.92	
3161	Owls Head	300	Active	Penobscot Bay	0.23	
1405	South Thomaston	360	Active	Muscle Ridge Channel	0.28	Entire Shore
2240	South Thomaston	630	Active	Muscle Ridge Channel	0.48	
5114	South Thomaston	189	Active	Muscle Ridge Channel	0.29	
7627	South Thomaston	300	Active	Muscle Ridge Channel	0.46	
223	South Thomaston	400	Active	Penobscot Bay	0.77	
3174	St George	300	Active	Atlantic Ocean	0.26	Entire Shore
3326	St George	300	Active	Atlantic Ocean	0.31	
3327	St George	300	Active	Atlantic Ocean	0.31	
2704	St George	300	Active	Atlantic Ocean	0.31	
2374	St George	300	Active	Long Cove	1.15	>21.00
2974	St George	300	Active	Long Cove	0.66	
1341	St George	300	Active	Long Cove	1.15	
6571	St George	300	Active	Long Cove	0.66	
7300	St George	300	Active	Port Clyde Passage	0.31	>26
4215	St George	320	Active	Rackliff Bay	0.70	Entire Shore
3147	St George	300	Active	Rackliff Bay	0.58	
4576	St George	300	Active	Rackliff Bay	0.61	
2729	St George	1950	Active	Rackliff Bay	3.32	
4300	St George	360	Active	Rackliff Bay	0.50	



DEP ID	Town	Flow	Status	Receiving Waters	Required Closure (Acres)	Actual Closure Area
2316	St George	300	Active	Seal Harbor	1.84	Entire Shore
4802	St George	300	Active	Seal Harbor	0.92	
2603	St George	300	Active	Seal Harbor	1.15	
6044	St George	315	Active	Seal Harbor	0.97	
6043	St George	315	Active	Seal Harbor	1.21	
1988	St George	3500	Active	Tenants Harbor	5.97	Entire Shore
2800	St George	300	Active	Tenants Harbor	0.46	
2707	St George	300	Active	Tenants Harbor	0.92	
3282	St George	500	Active	Tenants Harbor	3.07	
3278	St George	300	Active	Tenants Harbor	0.84	
2209	St George	300	Active	Tenants Harbor	0.26	
3795	St George	400	Active	Tenants Harbor	0.61	
2758	St George	250	Active	Wheeler Bay	1.53	

### Agricultural Activities and Farms

Growing area WV animal farm activity is presented in Table 9 and Figure 8. The majority of the animal farms in Shellfish Growing Area WV are small backyard paddocks consisting of a few horses or sheep (Table 9). Farm sites that have impacted water quality are highlighted in yellow. Farm site AF1 is located in Mosquito Harbor. This site has two horses that graze in a pasture that borders on a stream (site 3S2) that flows into the head of Mosquito Harbor. Stream 3S2 is a small (3' wide by 4-12 inches deep) stream that flows intermittently. This site was sampled on December 11, 2007 and received a score of 900FC/100ml. Following this initial sample score attempts were made to sample the stream again; however the property owner chained off the access road and all access to the property was denied. A field agent from Inland Fisheries and Wildlife was contacted to discuss the property and required fencing setbacks. The field agent agreed to visit the property; however no changes have been made. Farm site AF7 is located in Wheeler Bay on the same property that sample station WV29 is collected. This farm site has a long, wet pasture area that partially floods during extreme high tides. The area is classified as prohibited. Farm site AF10 contained 16 cows in 2003 which grazed in a field and stream that bordered on the Weskeag River. A field agent from Department of Agriculture was contacted in 2004 to inspect the fencing around the pasture. He recommended that a new fence be installed along the drainage into the Weskeag. The fence was installed and the water quality data at station WV 49 has shown improvement with a current P90 score of 30.9. The farm has reduced the number of animals on site to four cows and it is no longer impacting water quality.

**Table 9. Animal Farms in Growing Area WV**

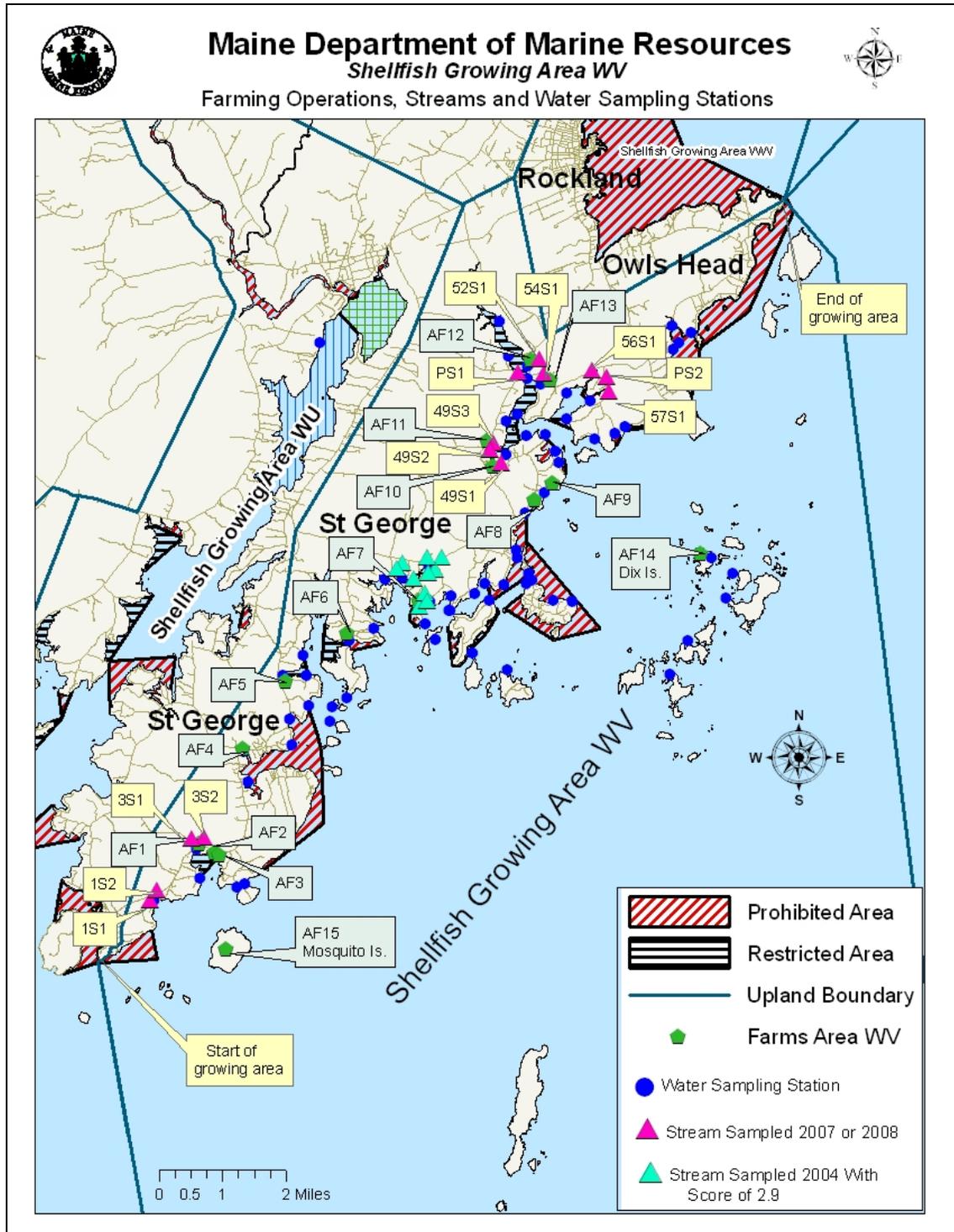
Site#	Town	Tax map #	Lot#	Animals Present	Distance from Shore or Stream	Classification	Comments
AF1	St George	33	17	2 Horses	15' from stream	restricted	Nearby Station WV3



Site#	Town	Tax map #	Lot#	Animals Present	Distance from Shore or Stream	Classification	Comments
AF2	St George	33	31	2 Horses	30'	restricted	Nearby Station WV4
AF3	St George	31	17	3 Horses	100'	restricted	Nearby Sta#4
AF4	St George	28	17	2 Horses	150'	prohibited	
AF5	St George	26	13	2 Horses	8' to pond	restricted	
AF6	St George	1	77	5 Horses	1000'	restricted	miniature horses
AF7	St George	17	13&10	1 Horse	50'	prohibited	Nearby station WV 29, wet site
				4 Cows			
				13 Chickens			
				2 Dogs			
AF8	S. Thomaston	5	20-2 &	2 Horses	400'	approved	Nearby Station WV 47
			22-2	1 Donkey			
AF9	S. Thomaston			? Sheep	100	approved	seasonal, not on site in 2008
AF10	S. Thomaston	10	14	4 Cows	30' from stream	restricted	Nearby Station WV 49
AF11	S. Thomaston	9?	27?	5 Horses	100' to stream	restricted	
AF12	S. Thomaston	15	7	2 Horses	150'	restricted	Nearby Station WV 52
AF13	S. Thomaston	15	34	2 Horses	500'	restricted	
				12 Ducks			
AF14	Undeclared territory-State			6 Sheep?	100'	approved	Dix Is.
AF15	St George	10	1	12 Sheep?	graze entire island	approved	Mosquito Is.



Figure 8. Streams and Farming Operations





**Non-Point Pollution from Stream**

In 2007, streams were sampled at 13 sites that were suspected of being problematic due to either nearby farm animal activity or proximity to a potential septic system malfunction in the area (Table 10). Additional stream data was collected in the eastern part of the growing area as part of the shoreline survey assessment for the 2008 Sanitary Survey of this portion of the growing area. Several streams were sampled in the middle of the growing area in 2004 that all received scores of 2.9 FC/100ml. The locations of these streams are noted on the stream map but they are not noted on the stream table. Stream 3S2 (score of 900 FC/100ml) abuts a horse farm that borders on the head of Mosquito Harbor. The stream appears to be impacted by run-off from the horse farm. Stream 3S1 also flows into this area but has not received elevated scores. The head of Mosquito Harbor is currently classified as restricted for shellfish harvest; this area is monitored by sampling station WV3. The water quality at this station currently meets approved standards with a P90 score of 34.7, and an approved standard of 43. This site was classified as approved in 2006 but became elevated and was reclassified on May 1, 2007 following a review of the area's P90 data. The area should remain classified as restricted, until it can be shown that the stream does not impact this area. The stream should be sampled several times over the course of the year and flow rate data should be collected to determine how large the closure area needs to be.

**Table 10. Stream and Pollution Source Samples (FC/100ml)**

Location	Date	Fecal FC/100ml	Remarks	Current Classification
1S1	12/11/07	7.3	24" culvert	A
1S1	7/8/08	220	stagnant, little flow	A
1S1	7/9/08	22		A
1S1	10/19/08	4		A
1S2	12/11/07	6		A
3S1	12/11/07	4		R
3S2	12/11/07	900	Horses nearby	R
49S1	8/6/08	180	No cows nearby stream on sample date	R
49S1	10/9/08	24	No cows nearby stream on sample date	R
49S2	8/6/08	33		R
49S2	10/8/08	9.1		R
49S3	8/6/08	220		R
49S3	10/8/08	48		R
PS1	8/6/08	134	pond drainage - culvert	R
PS1	10/8/08	12		R
52S1	8/6/08	14	trickle of flow dripping from marsh bank	R
52S1	10/8/08	8	trickle of flow dripping from marsh bank	R
54S1	8/6/08	42		R
54S1	10/8/08	12		R
56S1	8/6/08	156		P
56S1	10/8/08	28		P
PS2	10/8/08	>1600	Malfunction at drainage at Meadowbrook Lane	P
57S1	8/6/08	29		P



Location	Date	Fecal FC/100ml	Remarks	Current Classification
57S1	10/8/08	11		P

### Municipal Treatment Facilities

There are no municipal Treatment Facilities in Shellfish Growing Area WV. The closest treatment facility to this growing area is located in the town of Rockland in shellfish growing area WW. This facility is more than three miles away from the boundary of growing area WV.

### Industrial Discharges

The Town of Owls Head has a small municipal airport. The Knox County Regional Airport property borders on a drainage to Ballyhac Cove on the Weskeag River. The airport came under public scrutiny in recent years due to their plans to enlarge their aircraft parking area. Residents and environmentalists alike were concerned that an increase in the airport's capacity would allow an increased amount of airport by-product contaminants such as de-icing fluid, to reach the drainages that flow into the Weskeag River. Knox County Regional Airport follows guideline standards outlined in the EPA and DEP Spill Prevention Encounter Measures Control Plan. They have a groundwater well monitoring plan in place for monitoring five wells around the property. The wells are tested four times a year. The wells are monitored for gasoline, diesel, lead and an array of organic contaminants. So far, none of these tests have revealed any elevated levels of contamination. De-icing fluid was one contaminant that was specifically addressed in the Airport's license agreement. The fluid use is restricted to inside the airplane hangars and on one location of the parking area where control measures are in place to contain any spill immediately. De-icing fluid is only allowed to be used under extreme weather conditions.

In Sprucehead, Tenants Harbor, and Owls Head, there are several lobster buying stations. Nearby the lobster buying stations there are often mooring areas for the many lobster boats that fish these waters. The mooring areas are illustrated on the maps in Figures 4 and 5. All of the mooring areas are located in areas classified as prohibited.

Tenants Harbor has a new marine facility, managed by Lyman Morse of Thomaston that serves the cruising boats that come to the harbor. The facility provides fuel, water and limited dock space (up to 10 boats). It also has four moorings available for rent. The facility has an on shore toilet and shower available for use by dock customers. A portable pump out system is also available that utilizes a holding tank with alarm. Just south of the Lyman Morse facility is the Cod End restaurant, which has a fuel dock and 20 moorings available for cruising boats. Although Tenants Harbor is considered a "no discharge" harbor, it is not strictly enforced. This area is closed due to a combination of licensed overboard discharges (9), pollution sources in the inner harbor (5) and summer boating traffic. A marina calculation was done for Tenants Harbor to assure that the closure zone was large enough to protect public health. Based on a volume of 40 cruising boats (Lyman Morse and Cod End combined) each containing a minimum of two people, in a water depth of 18 feet, the required closure size is 51.5 acres. Tenants Harbor is currently in a closure zone of 621.4 acres.



## **Parks and Recreational Areas**

Owls Head Light State Park and Birch Point State Park are both located in Shellfish Growing Area WV. The Owls Head Light State Park is located at the northern tip of the growing area in the town of Owls Head. This park consists of small hiking trails, beaches, and a lighthouse that are open to the public. The park is open for daytime use only. State maintained outhouses are located nearby the public parking areas. The shores around the park are classified as prohibited due to an active licensed overboard discharge at the lighthouse.

Birch Point State Park is also located in the town of Owls Head. The park consists of small trails along the shore and a sandy beach and is open for daytime use only. State maintained outhouses are located near the public parking areas. The park has become a popular spot for people to walk their dogs. A sign at the entrance to the beach area states that dogs must be on a leash and dog owners must clean up after their dogs. The park does not have a full time park ranger on duty, and there is no enforcement of the dog activity at the beach. Dog waste can be seen all along the beach and along the approach to the beach. Before this area became a state park, and open to the public, water quality met approved standards. The area has intermittently elevated scores but currently meets approved standards with a P90 score of 32.8 and an approved standard of 39. This site should remain classified as prohibited, until it can be shown that the water quality in the area has stabilized and something is done to address the dog waste issue.

The Ralf Waldo Tyler Wildlife Management Area is a 618 acre marsh that is owned and managed by the Maine Department of Inland Fisheries and Wildlife (IF&W). This management area is located in the upper most portion of the Weskeag River in the town of South Thomaston and includes most of the upstream section of the Weskeag Marsh. The downstream section of the Weskeag estuary includes an additional 740 acres of salt marsh. The Weskeag Marsh ranks as the most productive shorebird site in the Muscongus Bay Region. IF&W is in the process of conducting marsh restoration work, by plugging old man-made ditches with an estimated 33 ditch plugs to prevent excessive drainage and allow the reestablishment of pool habitat on the marsh surface. They have also enlarged an undersized culvert under Buttermilk Lane to allow for more natural flow of seawater in the upper marsh. IF&W will be conducting pre and post-restoration monitoring of the marsh. The marsh is open to the public for daytime use and is a popular spot for bird enthusiasts.

## **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 (Stormwater Protection in Maine, 2009).



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 a 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. Currently, no towns within the boundary of growing area WV fall under Phase I or II of EPA's stormwater management program.

There are no structural stormwater management systems in shellfish growing area WV. Stormwater in this area would either percolate through the soil, with rates depending on soil type and depth above the bedrock layer; 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 WV water quality monitoring stations, as well as by collecting samples from selected streams after adverse weather conditions.

## Hydrographic and Meteorological Assessment

### Tides

Area WV is subject to a semidiurnal tidal cycle with two high tides and two low tides per day. In Tenants Harbor, which is located in the middle of the study area, the elevation of the mean high tide is 9.3 feet and the mean spring tide is 10.6 feet. Water movement along the immediate shore in this section of the coast is largely tidal. There are no large river systems in the area of study.

A tidal assessment was completed on all stations to determine if tidal stage (ebb vs. flood) affects the stations' geometric mean and P90 scores (Table 11). The assessment used all SRS and extra data points; collected between 2002 and 2008. Stations that show P90 or geometric mean impact at either tide stage are hi-lighted in yellow. The assessment also shows the number of samples collected at flood and ebb tide. Stations WV 28, 29, 30, 31, 32, 36, 48, 48.5, 49, 50, 50.5, 50.8 and 52 are located on tidal mud flats that flat out at low tide. These sites are therefore more frequently sampled during a higher tide stage. Three approved stations (WV 6, 26 and 36) showed P90 scores that differed by tide stage, with P90 scores exceeding the approved classification for a particular tide stage. Station WV6 exceeded the P90 standard on a flood tide, but not on an ebb tide. This site is located at Mosquito Head beach; it is very exposed to open ocean waters. The beach is a popular spot for people to walk their dogs, and dog waste can occasionally be seen along the seaweed wrack line in the upper part of the beach. The beach also has a lot of fine, decaying seaweed that frequently mixes with ocean waters upon sample collection. Samples collected during flood tides may be picking up some of the dog waste or decaying seaweed when the water washes over the wrack line on the beach. In contrast, stations WV 26 and 36 exceeded the P90 standard on ebbing tides. Station WV26 is



located at a narrow entrance to a cove that has marshland with streams flowing into it. On an ebb tide, all of the waters in the cove flow past this station. There are two dwellings that border on the shore in this area. Both of these properties had properly functioning septic systems at the time of the survey that are not impacting the water quality in the area. In order to get a more current view of the data, the tabulated data was run for station WV26 for the thirty most recent random samples (2004-2008). In this data grouping, the most elevated scores are a 150 FC/100ml collected on June 16, 2005, a 120 FC/100ml collected on March 26, 2007 and a score of 33 FC/100ml on July 16, 2007 that was collected on a flood tide. All of the remaining samples received good water quality scores. Station WV36 is located on the eastern side of the Rackliff Island causeway. There are no streams that drain into this area. Water flows through the causeway via two large culverts. No pollution sources were identified in this area. The cause of the elevated P90 scores during ebb tide stage is unknown. The tabulated data for this station for the years 2002-2008 revealed one elevated score during ebb tide of >1100 FC/100ml on July 23, 2003. When the tabulated data is run for the thirty most recent random samples (2004-2008), the most elevated scores are two scores of 43 FC/100ml. Both of these samples were collected in 2005 during an ebb tide stage. In 2005, all samples were being run using the A1 technique. During the time period when samples were run using the A1 technique, scores of 49 or greater were considered elevated. P90 scores at all other approved stations met the approved standard at both tide stages. While both of these stations appear to be impacted by an ebb tide stage, a further review of the data revealed that rainfall has an intermittent impact on the water quality in these areas.

Table 12 shows the thirty most recent samples collected for stations WV26 and WV36. The number of samples collected at each tide stage is shown along with the salinity and the percentage of samples with exceeding scores. Rainfall amounts are also shown illustrating the amount of rainfall having fallen within seventy-two hours prior to sample collection. The data suggests that rainfall is having an intermittent but unpredictable impact on the water quality at these stations. Station WV26 has one elevated score following 1.6 inches of rainfall (June 16, 2005) and one elevated score with very little rainfall. Both of these dates have low salinity values indicating the area was receiving a lot of fresh water. Station WV26 also had two clean scores following approximately one inch of rainfall (May 22, 06 and May 15, 07). At station WV36, none of the samples received elevated scores ( $\geq 49$  A1 method or  $\geq 31$  MF method). The most elevated scores for station WV36, in this data set are two scores of 43 FC/100ml (June 16, 2005 and December 11, 2005). Both of these dates are associated with heavy rainfall.



Table 11. Tidal Assessment, 2002-2008

Station	Class	Ebb Tide						Flood Tide					
		Count	GM	SDV	P90	Appd Std	Restr Std	Count	GM	SDV	P90	Appd Std	Restr Std
WV001.00	A	20	4.8	0.42	17.2	44	265	22	4.2	0.45	16.3	38	221
WV002.00	R	20	3.3	0.23	6.6	44	265	22	2.4	0.11	3.5	38	221
WV003.00	R	20	5.6	0.41	19.3	41	242	22	7.1	0.72	62.2	39	227
WV004.00	R	22	4.1	0.36	12.4	43	254	20	4	0.57	22.5	39	227
WV006.00	A	22	4.3	0.42	15.2	43	254	20	5	0.7	41.1	39	227
WV006.50	A	21	3.4	0.24	7.1	42	252	21	4.1	0.43	15.2	40	230
WV008.00	P	21	7.5	0.66	53.8	42	252	22	5.6	0.52	26.9	38	221
WV010.00	P	21	13.4	0.54	67.6	42	252	21	7.6	0.58	43.4	38	217
WV013.00	P	21	5.3	0.45	20.7	42	252	21	3.1	0.23	6.1	40	230
WV014.00	P	21	5.6	0.45	21.4	42	252	21	4.4	0.54	22.4	40	230
WV016.00	A	23	3.5	0.36	10.6	41	242	19	2.6	0.11	3.7	41	239
WV016.50	R	23	4	0.57	22.6	41	242	20	2.7	0.15	4.3	41	242
WV017.00	R	22	6.8	0.85	88.2	41	240	20	4.1	0.63	27.7	41	242
WV018.00	R	24	3.6	0.52	17.7	41	238	19	2.8	0.14	4.3	42	247
WV019.00	A	22	4.8	0.38	15.2	43	254	20	4.2	0.51	19.8	39	227
WV020.50	A	21	4.6	0.45	18	42	244	21	4.3	0.38	13.5	41	237
WV020.80	R	5	1.9	0	1.9	31	163	4	1.9	0.01	2	31	163
WV022.00	R	22	6.7	0.7	53.9	42	247	20	4.5	0.51	21	40	235
WV024.00	P	21	3.9	0.38	12.5	42	252	21	6.7	0.66	47.7	40	230
WV025.00	A	24	4.8	0.52	23	42	244	18	4.1	0.5	18.3	41	236
WV026.00	A	16	9.3	0.74	85	42	247	26	4	0.33	11	41	237
WV027.00	R	16	9.7	0.69	76.4	42	247	26	6.5	0.62	42.5	41	237
WV028.00	R	11	10.9	0.9	166.2	41	240	30	6.4	0.52	29.7	40	235
WV028.50	R	2	1.9	0.01	2	31	163	7	3.5	0.36	10.5	31	163
WV029.00	P	14	12.2	0.89	178.3	42	252	27	7.3	0.71	60.7	41	239
WV030.00	P	14	21	1.15	666.8	41	241	28	6.6	0.66	47.7	41	241
WV031.00	A	14	4.5	0.44	17.3	41	241	28	4.5	0.57	24.5	41	241



Station	Class	Ebb Tide						Flood Tide					
		Count	GM	SDV	P90	Appd Std	Restr Std	Count	GM	SDV	P90	Appd Std	Restr Std
WV032.00	A	16	4.3	0.48	18.4	42	247	26	4	0.42	14.2	41	237
WV035.00	A	16	4.7	0.49	20.6	42	247	26	3.5	0.29	8.4	41	237
WV036.00	A	16	6.8	0.75	63.5	42	247	26	3.4	0.26	7.6	41	237
WV036.50	A	7	3.3	0.44	13	35	194	12	2.4	0.19	4.3	33	180
WV037.00	P	18	6.7	0.69	52.8	41	236	24	3.2	0.27	7.2	42	244
WV038.00	P	18	8.9	0.81	101	41	236	24	3.3	0.23	6.8	42	244
WV039.00	P	19	5.2	0.47	21.3	40	232	23	6.6	0.49	28.6	41	242
WV040.00	P	20	3.5	0.33	9.5	41	242	22	3.5	0.3	8.6	41	240
WV041.00	A	19	4.8	0.5	21.4	40	232	23	3.7	0.37	11.6	41	242
WV044.00	P	23	5.1	0.48	21.6	40	236	19	4.5	0.67	34.3	42	247
WV045.00	P	24	4.5	0.65	32.1	40	232	18	3.8	0.44	14.1	43	253
WV046.00	P	23	3.6	0.34	10.2	40	230	19	2.9	0.23	5.9	43	255
WV046.50	P	23	6.1	0.69	48.9	39	224	19	5.2	0.46	21	43	255
WV046.80	A	28	4.3	0.47	17.9	40	236	14	5.2	0.6	32.1	42	252
WV047.00	A	17	3.5	0.51	16.2	36	202	26	4.8	0.52	23.4	45	273
WV047.50	P	16	2.7	0.32	7.2	34	189	9	3	0.2	5.6	39	228
WV048.00	A	14	6.8	0.4	23.3	40	230	29	4	0.31	10.2	41	243
WV048.50	A	13	3.5	0.25	7.6	39	226	30	4.3	0.3	10.6	42	249
WV048.80	A	13	3.4	0.31	9	36	206	18	4.2	0.36	12.4	39	228
WV049.00	R	12	7.2	0.68	56.4	42	244	30	6.3	0.52	30	40	235
WV050.00	R	14	7	0.67	52.4	40	230	29	5.6	0.54	27.7	41	243
WV050.50	R	11	8.1	0.77	82.6	41	240	30	7.6	0.61	47	41	239
WV050.80	R	17	10.2	0.87	139.9	40	233	28	6.8	0.57	37.3	42	252
WV052.00	R	16	10.8	0.74	98.7	40	229	28	6.7	0.49	28.8	42	252
WV053.00	R	17	4.8	0.66	34.4	40	233	27	6.9	0.51	31.9	42	250
WV054.00	R	20	10.4	0.77	105.2	40	235	23	7	0.53	34.5	42	249
WV055.00	R	22	6.5	0.69	51.3	40	233	21	4.3	0.37	13	42	252
WV056.00	A	23	5	0.42	17.6	40	236	20	8.5	0.51	39.3	41	242
WV057.00	P	22	12.1	0.83	143.7	39	227	21	7.5	0.7	60.5	42	252



Station	Class	Ebb Tide						Flood Tide					
		Count	GM	SDV	P90	Appd Std	Restr Std	Count	GM	SDV	P90	Appd Std	Restr Std
WV058.00	P	26	6.7	0.46	26.9	41	237	17	3	0.21	5.6	42	250
WV059.00	A	25	4	0.33	11	41	240	18	3.1	0.38	9.7	42	244
WV060.00	P	29	7.3	0.71	61.4	41	238	14	3.7	0.39	12.3	42	252
WV061.00	P	30	3.3	0.27	7.5	40	235	13	3.1	0.2	5.8	44	260
WV062.50	P	30	5.1	0.57	27.7	40	235	11	5.8	0.44	21.7	43	254
WV063.00	P	30	6	0.61	37.7	40	235	12	6.9	0.55	36.8	42	244
WV064.00	P	28	7.8	0.71	64.3	40	230	16	10.8	0.9	157.3	43	257
WV065.00	P	22	3.4	0.32	9	38	221	20	6.5	0.65	46	44	265
WV077.00	A	18	2.7	0.15	4.4	39	228	23	2.8	0.15	4.5	42	249
WV078.00	A	17	3.2	0.3	8.1	39	225	24	2.6	0.1	3.5	42	251
WV079.00	A	17	2.9	0.21	5.5	39	225	24	2.9	0.18	4.9	42	251
WV080.00	A	17	2.6	0.11	3.6	39	225	24	2.8	0.18	4.8	42	251
WV081.00	A	17	2.6	0.15	4.1	39	225	24	2.7	0.14	4.2	42	251
WV083.00	A	16	2.4	0.08	3.2	41	238	25	2.5	0.09	3.3	41	240
WV084.00	A	16	2.5	0.09	3.3	41	238	25	2.7	0.26	6.1	41	240
WV085.00	A	16	2.6	0.14	4	41	238	25	2.6	0.12	3.8	41	240
WV086.00	A	16	3.4	0.5	15.2	41	238	25	3.3	0.28	7.8	41	240
WV087.00	A	15	2.8	0.26	6.3	40	235	26	3	0.28	7.2	41	242
WV088.00	A	16	2.4	0.09	3.1	40	229	25	2.5	0.09	3.4	42	246
WV089.00	A	16	2.4	0.09	3.1	40	229	25	2.5	0.09	3.4	42	246



**Table 12. 2004-2008 Tide and Rainfall Impact, Stations WV26 and WV36**

Station	Sample Date	Tide	Count at tide stage	Salinity	Score	% exceeding	Method	72 Hour Rainfall
WV026.00	08-Jul-04	Ebb	7	30	11	29	A1COL	0.16
	16-Jun-05			10	150		A1COL	1.6
	14-Dec-05			32	<3		A1COL	0.06
	22-May-06			28	3.6		A1COL	0.94
	16-Oct-06			31	<2		MFCOL	0
	29-Jan-07			31	6		MFCOL	0.02
	26-Mar-07			20	120		MFCOL	0.12
	05-Sep-07	32	2	MFCOL	0			
	26-Jan-04	Flood	10	30	<3	10	A1COL	0.01
	08-Apr-04			31	<3		A1COL	0.38
	05-Aug-04			32	3.6		A1COL	0.17
	15-Mar-05			28	3.6		A1COL	0.43
	21-Nov-05			31	<3		A1COL	0
	03-Apr-06			32	<3		A1COL	0.05
	28-Nov-06			30	<2		MFCOL	0
	15-May-07			26	8		MFCOL	1.27
	16-Jul-07			30	33		MFCOL	0.84
	19-May-08			28	<2		MFCOL	0.1
	14-Jul-08	High	1	30	6		MFCOL	0
	17-Feb-04	High Ebb	2	33	<3		A1COL	0
	28-Sep-05			31	<3		A1COL	0.51
	28-Aug-06	High Flood	5	31	6		MFCOL	0.68
	22-Jan-08			30	2		MFCOL	0
	18-Mar-08			30	<2		MFCOL	0.38
	02-Sep-08			31	<2		MFCOL	0
	27-Oct-08			31	5.5		MFCOL	0.3
	31-Oct-07	Low	1	26	20		MFCOL	0.1
	10-May-04	Low Ebb	2	20	3.6		A1COL	0
18-Jul-06	28			23		A1COL	0	
28-Jul-05	Low Flood	1	29	3.6		A1COL	0.62	
WV036.00	17-Feb-04	Ebb	9	32	<3		A1COL	0
	08-Jul-04			30	<3		A1COL	0.16
	16-Jun-05			26	43		A1COL	1.6
	11-Dec-05			29	43		A1COL	2.44
	14-Dec-05			32	<3		A1COL	0.06
	22-May-06			30	<3		A1COL	0.94
	16-Oct-06			31	<2		MFCOL	0
	29-Jan-07			32	<2		MFCOL	0.02
	05-Sep-07			32	4		MFCOL	0
	26-Jan-04	Flood	11	30	<3		A1COL	0.01



Station	Sample Date	Tide	Count at tide stage	Salinity	Score	% exceeding	Method	72 Hour Rainfall
	08-Apr-04			31	<3		A1COL	0.38
	10-May-04			32	<3		A1COL	0
	05-Aug-04			32	3.6		A1COL	0.17
	15-Mar-05			32	<3		A1COL	0.43
	28-Jul-05			30	9.1		A1COL	0.62
	03-Apr-06			32	3.6		A1COL	0.05
	18-Jul-06			32	3.6		A1COL	0
	28-Nov-06			30	20		MFCOL	0
	16-Jul-07			30	6		MFCOL	0.84
	31-Oct-07			34	<2		MFCOL	0.1
	18-Mar-08			30	<2		MFCOL	0.38
	02-Sep-08	High	3	31	2		MFCOL	0
	27-Oct-08			32	2		MFCOL	0.3
	28-Sep-05	High Ebb	3	30	3.6		A1COL	0.51
	29-May-07			30	2		MFCOL	0.14
	14-Jul-08			30	2		MFCOL	0
	28-Aug-06			30	12		MFCOL	0.68
	15-May-07	High Flood	4	26	2		MFCOL	1.27
	22-Jan-08			32	<2		MFCOL	0
	19-May-08			28	2		MFCOL	0.1



### Rainfall

Rainfall can affect water quality by contributing to increased over-land run-off as well as to higher flow rates in streams. As these fresh water sources enter the marine system, they are mixed with salt water. Any pollution transported by these fresh water sources may be diluted throughout the mixing process (assuming that the salt water itself is not contaminated with fecal matter). The ratio of salt/fresh water dilution to achieve approved water quality standards is largely determined by the volume of the fresh water entering the marine system, the concentration of the pollutant in the fresh water source and the depth of the receiving salt water body. The amount of precipitation that occurs along the coast is monitored by numerous rain gauges, many of which report directly to DMR. Table 13 shows monthly rainfall amounts reported at the West Rockport, Maine rain station from 1996 to 2008. The minimum, average and maximum rainfall values (from 1914 to 2008) are shown in the last rows of the table; monthly record rainfall amounts occurring between 1996 and 2008 are noted in red font. Months during which flood closures were promulgated (after rain events with rainfall of >2 inches in 24 hours) are hi-lighted in yellow; the total number of flood closures for the year is shown in the last column. 2005 had the highest cumulative rainfall on record, with a total rainfall amount of 77.47 inches, and nine flood closures in 2005. No historical flood data was available prior to 2005.

**Table 13. Rainfall Amounts Reported at West Rockport 1996-2008**

Year	Jan	Feb	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	# Flood closures
1996	6.77	3.91	3.64	7.11	4.99	3.15	7.52	0.46	8.74	3.26	2.28	8.96	60.79	
1997	5.34	2.68	4.60	6.29	3.63	3.19	1.73	3.87	2.77	1.51	5.04	3.47	44.12	
1998	6.97	6.40	5.31	4.42	4.38	5.57	2.07	2.39	1.72	8.99	3.13	1.50	52.85	
1999	8.37	3.76	7.35	0.46	3.88	2.84	1.54	3.43	9.02	6.08	3.64	3.42	53.79	
2000	5.27	3.06	4.47	5.89	4.12	3.48	3.81	1.37	2.96	4.59	4.69	1.05	44.76	
2001	1.69	3.51	6.89	0.83	1.50	5.15	2.31	0.41	3.22	1.42	3.37	3.89	34.19	
2002	3.80	3.00	4.13	4.59	4.67	4.46	1.87	1.33	6.68	5.79	5.35	4.68	50.35	
2003	1.35	3.14	2.53	2.34	4.18	3.20	1.14	1.76	4.08	6.74	2.98	4.81	38.25	
2004	0.53	2.31	1.78	3.12	5.01	2.17	4.15	5.94	3.00	3.85	4.69	3.58	40.13	
2005	3.38	3.61	5.04	13.04	9.86	3.04	2.04	3.34	2.90	17.49	6.50	7.23	77.47	9
2006	4.18	4.20	1.25	2.92	7.60	10.05	4.75	3.12	3.34	9.72	6.41	3.70	61.24	2
2007	3.60	3.00	7.44	10.22	2.93	2.65	3.21	3.46	4.04	7.43	6.82	6.05	60.85	4
2008	4.62	8.91	6.70	6.49	2.05	3.00	3.52	4.40	11.40	3.09	5.62	6.02	65.82	4
<b>MIN</b>	0.53	0.51	0.17	0.46	0.23	0.61	0.38	0.22	0.24	0.00	1.50	1.05	29.53	
<b>AVG</b>	4.10	3.63	4.23	4.36	4.02	3.51	3.17	3.00	3.97	4.43	5.19	4.55	48.06	
<b>MAX</b>	12.50	8.91	11.80	13.04	9.86	10.05	12.19	8.30	15.26	17.49	16.50	9.38	77.47	

The impact of rainfall (cumulative total of >0.5 inches within 72 hours of collection) on P90 scores of WV stations is presented in Table 14. Four approved stations had P90 scores that exceeded the NSSP approved standard. These stations are hi-lighted in yellow and show the greatest impact from rainfall.



**Table 14. Rainfall Impact, Cumulative rainfall of >0.50 inches, 2000- 2008**

Station	Class	Count	MFCOUNT	GM	SDV	MAX	P90	Appd_Std	Restr_Std
WV001.00	A	17	2	6.5	0.44	43	24.3	46	279
WV002.00	R	17	2	3.3	0.23	23	6.6	46	279
WV003.00	R	17	3	14.7	0.74	620	133.2	45	269
WV004.00	R	17	2	7.1	0.63	460	47	46	279
WV006.00	A	18	2	5.8	0.6	240	35.1	46	280
WV006.50	A	18	2	5.4	0.37	43	16.8	46	280
WV008.00	P	18	3	22.9	0.78	1200	234.7	45	270
WV010.00	P	17	3	17.5	0.61	136	107.9	45	269
WV013.00	P	17	2	4.4	0.41	93	15.1	46	279
WV014.00	P	17	2	5.3	0.38	86	16.8	46	279
WV016.00	A	17	2	3.9	0.36	72	11.7	46	279
WV016.50	R-boundary with A	17	2	7.8	0.76	1200	77.3	46	279
WV017.00	R	17	2	9.9	0.95	>1600	168.2	46	279
WV018.00	R-boundary with A	18	2	4.9	0.59	740	29.3	46	280
WV019.00	A	17	1	6.5	0.51	150	30.4	47	289
WV020.50	A	17	2	7.2	0.51	72	33.7	46	279
WV022.00	R	17	1	7.7	0.6	240	47.1	47	289
WV024.00	P	17	1	8	0.72	340	70.1	47	289
WV025.00	A	16	3	7.8	0.58	102	44	44	267
WV026.00	A	15	3	8.6	0.69	460	68.1	44	265
WV027.00	R	15	3	13.6	0.74	1100	125.9	44	265
WV028.00	R	15	4	21.5	0.81	1200	250.2	43	254
WV029.00	P	15	3	25.3	0.91	>1600	397.8	44	265
WV030.00	P	15	3	30.3	1.09	>1600	797.8	44	265
WV031.00	A	15	3	10.4	0.74	>1600	97.1	44	265
WV032.00	A	15	3	5.4	0.45	75	21.2	44	265
WV035.00	A	15	3	5.7	0.5	93	26.2	44	265
WV036.00	A	16	3	8.9	0.7	1100	73.6	44	267
WV037.00	P	15	3	8.1	0.69	240	65.9	44	265
WV038.00	P	15	3	7.5	0.76	1200	74	44	265
WV039.00	P	15	4	6.5	0.48	93	28.3	43	254
WV040.00	P	15	3	5.3	0.41	43	18.6	44	265
WV041.00	A	15	4	6.9	0.52	43	33.8	43	254
WV044.00	P	15	3	8.8	0.76	1100	86.8	44	265
WV045.00	P	15	3	13.2	0.79	460	143.2	44	265
WV046.00	P	15	3	5.1	0.42	43	18.4	44	265
WV046.50	P	15	4	6.1	0.57	75	34.9	43	254
WV046.80	A	15	3	7	0.6	149	43.8	44	265
WV047.00	A	15	3	5.8	0.51	240	27.6	44	265



Station	Class	Count	MFCOUNT	GM	SDV	MAX	P90	Appd Std	Restr Std
WV047.50	P	6	3	3.8	0.47	35	16.2	38	221
WV048.00	A	14	4	7.2	0.48	73	31.1	42	252
WV048.50	A	15	3	6.6	0.49	93	29.3	44	265
WV048.80	A	6	4	8.4	0.44	43	32.1	36	199
WV049.00	R	15	4	20	0.75	460	194.9	43	254
WV050.00	R	15	4	22.1	0.68	460	173.1	43	254
WV050.50	R	14	2	23.2	0.78	1100	245	45	274
WV050.80	R	13	1	33	0.89	1100	479.7	47	286
WV052.00	R	14	2	25.2	0.7	460	206.8	45	274
WV053.00	R	14	2	15.8	0.66	460	114.7	45	274
WV054.00	R	14	2	35.1	0.64	460	245.1	45	274
WV055.00	R	14	2	13.8	0.77	1200	141.3	45	274
WV056.00	A	12	3	8.8	0.54	93	46.1	43	257
WV057.00	P	15	3	24.2	0.81	460	278.8	44	265
WV058.00	P	15	3	5.8	0.42	43	20.5	44	265
WV059.00	A	15	3	3.4	0.23	16	6.9	44	265
WV060.00	P	14	3	7.1	0.55	43	37	44	263
WV061.00	P	15	3	5.4	0.34	43	15.3	44	265
WV062.50	P	15	3	8.4	0.63	440	56.5	44	265
WV063.00	P	14	3	10.4	0.53	93	52.5	44	263
WV064.00	P	13	3	15.9	0.8	743	175.1	44	260
WV065.00	P	12	3	5.5	0.58	240	31.5	43	257
WV077.00	A	11	5	2.4	0.11	3.6	3.5	39	227
WV078.00	A	11	5	2.5	0.1	4	3.5	39	227
WV079.00	A	11	5	2.9	0.19	9.1	5.3	39	227
WV080.00	A	11	5	2.5	0.11	4	3.5	39	227
WV081.00	A	11	5	2.5	0.11	3.6	3.5	39	227
WV083.00	A	11	5	2.4	0.08	2.9	3.1	39	227
WV084.00	A	11	5	2.4	0.1	3.6	3.3	39	227
WV085.00	A	11	5	2.6	0.17	7.3	4.3	39	227
WV086.00	A	11	5	5	0.64	240	34.7	39	227
WV087.00	A	11	5	4.3	0.55	93	22.6	39	227
WV088.00	A	11	5	2.4	0.1	3.6	3.3	39	227
WV089.00	A	11	5	2.8	0.31	23	7.3	39	227

A further assessment of rainfall and seasonal impact was completed for the five stations that exceeded their P90 standard. These assessments considered individual fecal scores using data collected over the six years (2003-2008 data range) for each potentially impacted station in comparison to the cumulative rainfall and the season. The last six years worth of data was used in order to reflect the most recent pollution impact. Based on the approved standard of the year of sample collection, a score of 49 or higher is considered elevated for data up to the year 2006 when samples began being run using the membrane filtration method. Once the membrane filtration method was used, a score of 31 and higher is considered elevated and was hi-lighted in the table and discussed.



Station WV 16.5 received one elevated score over the six years (2003-2008 data range, Table 15). A score of 1200 FC/100ml occurred on August 8, 2007 following 1.87" of rainfall. Four samples were collected following > 1 inch of rainfall. Each of these samples received a clean score. The data suggest that the impact of rainfall on this station is intermittent and not predictable.

**Table 15. Station WV 16.5, Rainfall and Seasonal Assessment**

Rainfall Range	Cumulative Rainfall	Date Sampled	SAL%	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
0	0	8/26/03	32								<3				
	0	2/2/04	30		<3										
	0	4/12/04	30				<3								
	0	7/18/06	30							<3					
	0	10/16/06	31										<2		
	0	11/28/06	29											<2	
	0	1/22/08	32	<2											
	0	5/14/08	27					<2							
	0	7/9/08	30							<2					
	0	8/27/08	31								<2				
.01-.50	0.01	7/9/03	30							3.6					
	0.02	6/29/05	30						<3						
	0.02	2/21/07	30		<2										
	0.02	9/25/07	32									<2			
	0.05	4/3/06	32				<3								
	0.05	6/12/07	29						10						
	0.08	5/23/07	29					<2							
	0.09	1/13/04	31	<3											
	0.22	5/16/05	29					<3							
	0.24	10/19/08	32										<2		
	0.35	12/10/07	30												<2
	0.38	3/17/08	30			2									
	0.39	6/23/03	30						<3						
0.39	8/18/04	30								3.6					
.51-1.0	0.54	5/17/04	31					<3							
	0.57	2/14/05	30		<3										
	0.66	3/28/05	30			<3									
	0.68	8/28/05	30							9.1					
	0.7	4/14/03	30				<3								
	0.73	7/12/05	30							3					
	0.85	1/7/03	30	<3											
	0.94	5/22/06	28					9.1							
1.01-1.50	1.02	8/15/05	30								3.6				
	1.32	7/26/04	30							9.1					
	1.43	8/16/04	30								3.6				



Rainfall Range	Cumulative Rainfall	Date Sampled	SAL%	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
	1.5	10/1/03	32										<3		
1.51-2.0	1.87	8/8/07	28								1200				

Station WV26 received three elevated scores in the time period from 2003 to 2008 (Table 16). This station received a score of 120 FC/100ml in March of 2007 following 0.12 inches of rainfall, a score of 33 FC/100ml following 0.84 inches of rainfall in July of 2007, and a score of 150 FC/100ml in June of 2005 following 1.6 inches of rainfall. This station has received three clean scores following an inch or more of rainfall. The data suggest that the impact of rainfall on this station is intermittent and not predictable.

**Table 16. Station WV26, Rainfall and Seasonal Assessment**

Rainfall Range	Cumulative Rainfall	Date Sampled	SAL%	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
0	0	8/25/03	30								<3				
	0	2/17/04	33		<3										
	0	5/10/04	20					3.6							
	0	11/21/05	31											<3	
	0	18-Jul-06	28							23					
	0	9/5/07	32									2			
	0	1/22/08	30	2											
	0	9/2/08	31										<2		
0.01-0.50	0.01	1/26/04	30	<3											
	0.02	1/29/07	31	6											
	0.05	4/3/06	32				<3								
	0.06	12/14/05	32												<3
	0.1	1/21/03	30	<3											
	0.1	6/18/03	31						23						
	0.1	10/31/07	26										20		
	0.1	5/19/08	28					<2							
	0.12	3/26/07	20			120									
	0.16	08-Jul-04	30							11					
	0.17	8/5/04	32								3.6				
	0.3	10/27/08	31										5.5		
	0.38	4/8/04	31				<3								
	0.38	3/18/08	30			<2									
0.43	3/15/05	28			3.6										
0.51-1.0	0.51	9/28/05	31									<3			
	0.62	7/28/05	29							3.6					
	0.68	8/28/06	31								6				
	0.8	23-Jul-03	31							3.6					
	0.84	16-Jul-07	30								33				
	0.94	5/22/06	28					3.6							



Rainfall Range	Cumulative Rainfall	Date Sampled	SAL%	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
1.01-1.50	1.26	3/4/03	32			<3									
1.01-1.50	1.27	5/15/07	26					8							
	1.5	9/30/03	30									23			
>1.51	1.6	6/16/05	10							150					

Station WV31 received one elevated score in the period from 2003-2008 (Table 17). A score of >1600 FC/100ml occurred in May of 2007 following 1.27 inches of cumulative rainfall. However, the site also received a score of 2.9 FC/100ml following 1.27 inches of rainfall in March of 2003 and two scores of 23 FC/100ml following 1.5 and 1.6 inches of cumulative rainfall. The data suggest that the impact of rainfall on this station is intermittent and not predictable.

**Table 17. Station WV31, Rainfall and Seasonal Assessment**

Rain Range	Cumulative Rainfall	Date Sampled	SAL%	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
0	0	9/25/03	30								3.6				
	0	2/17/04	32		<3										
	0	5/10/04	31					<3							
	0	11/21/05	30											3.6	
	0	7/18/06	31							<3					
	0	9/5/07	32									<2			
	0	1/22/08	31	2											
	0	9/2/08	30									<2			
0.01-0.50	0.01	1/26/04	30	<3											
	0.02	1/29/07	31	<2											
	0.05	4/3/06	32				<3								
	0.06	12/14/05	32												3.6
	0.1	1/21/03	30	<3											
	0.1	6/18/03	31						<3						
	0.1	10/31/07	33										6		
	0.1	5/19/08	28					2							
	0.14	5/29/07	28					<2							
	0.16	8-Jul-04	30							<3					
	0.17	5-Aug-04	32								<3				
	0.3	10/27/08	31										5.5		
	0.38	8-Apr-04	30				<3								
	0.38	3/18/08	30			<2									
0.43	3/15/05	32			<3										
0.51-	0.51	9/28/05	30									<3			



Rain Range	Cumulative Rainfall	Date Sampled	SAL%	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1.0	0.62	28-Jul-05	30							<3					
	0.68	8/28/06	31								14				
	0.8	23-Jul-03	31							15					
	0.84	16-Jul-07	30							18					
	0.94	5/22/06	26					<3							
1.01-1.50	1.27	3/4/03	31			<3									
	1.27	5/15/07	26					>1600							
	1.5	9/30/03	30									23			
>1.51	1.6	6/16/05	28						23						

Station WV36 received one elevated score 1100 FC/100ml in its dataset since 2003 (Table 18). This score occurred after .8 inches of rainfall had occurred within 72 hours of collection. An additional seven samples were collected after rainfall of greater than 0.8 inches; these samples yielded scores that did not exceed the variability standard. The data suggests that the impact of rainfall on this station is intermittent and not predictable. No seasonal trends were observed.

**Table 18. Station WV36, Rainfall and Seasonal Assessment**

Rain Range	Cumulative Rainfall	Date Sampled	SAL%	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
0	0	7/25/03	31								7.3				
	0	2/17/04	32		<3										
	0	5/10/04	32					<3							
	0	7/18/06	32							3.6					
	0	11/28/06	30											20	
	0	9/5/07	32									4			
	0	7/14/08	30							2					
	0	1/22/08	32	<2											
	0	9/2/08	31									2			
0.01-0.50	0.01	1/26/04	30	<3											
	0.02	1/29/07	32	<2											
	0.05	4/3/06	32				3.6								
	0.06	12/14/05	32												<3
	0.1	1/21/03	30	<3											
	0.1	6/18/03	31						<3						
	0.1	10/31/07	34										<2		
	0.1	5/19/08	28					2							
	0.14	5/29/07	30					2							
	0.16	7/8/04	30							<3					
	0.17	8/5/04	32								3.6				



Rain Range	Cumulative Rainfall	Date Sampled	SAL%	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0.3	10/27/08	32										2		
	0.38	4/8/04	31				<3								
	0.38	3/18/08	30			<2									
	0.43	3/15/05	32			<3									
	0.47	10/16/06	31										<2		
0.51-1.0	0.51	9/28/05	30									3.6			
	0.62	28-Jul-05	30							9.1					
	0.68	9/28/06	30								12				
	0.8	7/23/03	31							1100					
	0.84	7/16/07	30							6					
	0.94	5/22/06	30					<3							
1.01-1.50	1.27	3/4/03	32			<3									
	1.27	5/15/07	26					2							
	1.5	9/30/03	30									3.6			
1.51-2.0	1.6	6/16/05	26						43						
>2.00	2.44	12/11/05	29											43	

Station WV56 received three elevated scores in the time period from 2003 to 2008 (Table 19). A score of 93 FC/100ml occurred on July 18, 2006; no precipitation had occurred within 72hours of sample collection. A score of 93 FC/100ml after one inch of cumulative rainfall occurred on February 15, 2005; the salinity of this sample was low (5 ppt), suggesting a significant fresh water impact. A score of 56 FC/100ml occurred following 0.9 inches of cumulative rainfall on September 6, 2006. Three clean scores also occurred at this site following  $\geq 1.07$  inches of cumulative rainfall, suggesting that rainfall impact is intermittent and not predictable. Stream site 56S1 is sampled at the head of this cove and stream site 57S1 is across the cove from the sample site. Both of these streams were sampled in August and October of 2008. Stream 56S1 received an elevated score of 150 FC/100ml in August and a score of 28 FC/100ml in October. A badly malfunctioning septic system was identified (2007) that flowed into a drainage entering into stream site 57S1. This system was fixed in 2008. It is likely that following heavy rainfall wastewater from this system entered the cove.

**Table 19. Station WV56, Rainfall and Seasonal Assessment**

Rain Range	Cumulative Rainfall	Date Sampled	SAL%	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
0	0	10/25/04	30										3.6		
	0	3/24/05	3			<3									
	0	6/27/05	30						9.1						
	0	12/6/05	30												9.1
	0	7/18/06	30							93					
	0	11/28/06	30											8	



Rain Range	Cumulative Rainfall	Date Sampled	SAL%	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0	2/26/07	31		<2										
	0	4/23/07	26				<2								
	0	1/23/08	32	<2											
	0	9/2/08	30									<2			
0.01-0.50	0.01	11/29/05	24											9.1	
	0.01	10/16/06	30										<2		
	0.01	9/26/07	30									26			
	0.01	7/14/08	30							2					
	0.03	8/28/03	32								<3				
	0.35	9/22/03	30									<3			
	0.06	7/30/03	32							14					
	0.06	9/30/04	30									7.3			
	0.06	5/19/08	28					2							
	0.07	1/20/04	30	3.6											
	0.08	7/1/03	31								<3				
	0.08	6/12/07	29						10						
	0.17	3/17/08	28			4									
	0.2	4/25/06	30				<3								
	0.23	3/8/04	31			9.1									
	0.27	12/10/07	30												2
	0.32	22-Jul-04	30								23				
	0.32	8/1/05	30									<3			
	0.39	8/15/07	32								4				
	0.41	4/26/04	12				15								
0.51-1.0	0.67	10/28/08	30										7.3		
	0.73	8/28/06	29								42				
	0.9	9/6/06	30									56			
	1	2/15/05	5		93										
1.01-1.50	1.07	4/1/03	30				<3								
	1.6	4/26/05	31				9.1								
>1.51	1.63	10/27/03	30										9.1		

**Winds**

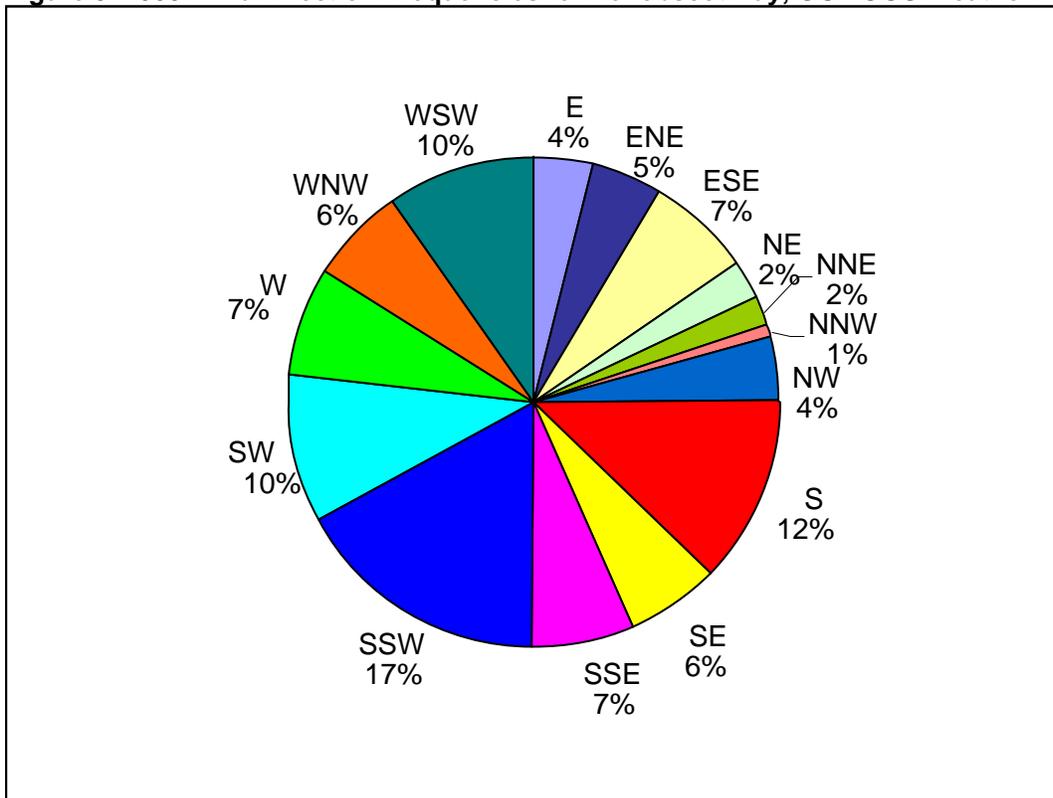
Wind direction data has been recorded at the time of sample collection since 2005 and is now being collected at each station at the time of sample collection. Wind speed is not being noted. Wind directions can vary greatly throughout the day, and among the stations. Stations that are located in long narrow coves often have little to no wind impact, due to the protected nature of the cove. Stations located in more open areas tend to be impacted by ocean breezes. The time of the day that the station is sampled can also impact the amount of wind reported. Samples



collected in the early morning hours often are collected during calm wind conditions. Since there are no sewage treatment facilities, major industries, or large point sources of pollution located along the shores of this growing area, it is unlikely that wind direction would have a significant impact on major pollution dispersal within this growing area.

Figure 9 illustrates the 2008 daily average wind directions for Penobscot Bay (GOMOOS weather buoy data system, 363 days). Each wind direction is expressed as a percentage of total days for the year. In 2008, the wind was predominantly from the southerly direction. The least frequent wind direction was north northwest. A predominantly southern wind direction would push ocean waters into the growing area.

**Figure 9. 2008 Wind Direction Frequencies for Penobscot Bay, GOMOOS Weather Buoy Data**



### River Discharge

The Weskeag River is the only river system located along the immediate shores of this growing area. Although the Weskeag is called a “river”, much of the area flats out at low tide. The aerial photo in Figure 10 illustrates the lower portion of the Weskeag River at low tide. The mouth of the river is shown in the lower left corner and the bridge over the river is in the upper right corner of the image. The bridge is located in the town center in the area of greatest



development on the river; nearby stations WV52, WV53 and WV54 which are classified as restricted.

The upper Weskeag River is shown in Figure 11 (low tide). The bridge can be seen in the lower left corner and a portion of the Ralf Waldo Tyler Wildlife Management Area is visible in the upper right corner.

At low tide, the waters of the Weskeag River drain out leaving a very narrow channel. During flood tides, the area is replenished with ocean waters. Pollution impact along the river comes from dwellings with known septic malfunctions, farms bordering on streams entering the river and wildlife. The Weskeag River drains into ocean waters in the area west of the Muscle Ridge Islands. Stations at the mouth of the river include station WV47.5 and WV59. Both of these stations currently have P90 scores that meet approved standards.



Figure 10. Lower Weskeag River





Figure 11. Upper Weskeag River



### Summary

The majority of the shore in shellfish growing area WV borders on open ocean and receives good water circulation. The Weskeag River is the only river system in this growing area. The Weskeag is a very small and shallow river system that receives its greatest pollution impact from malfunctioning septic systems bordering on its immediate shores, wildlife and farms bordering on streams that flow into the river. Two malfunctions (PS11 and PS12) are still on the list to be fixed. Pollution source 11 is located >500 feet from the shore. This site borders on a prohibited area. Pollution source 12 borders on a restricted area and is also located >500 feet from the shore. Two washing machine drains need further documentation from the LPI as to its present status (PS 16 and PS 18). The shore in these areas is classified as restricted.

Four stations showed impact following rainfall. These stations include WV16.5, 26, 31, 36, and 56. All of these stations were further assessed to see if there was a known rainfall amount that impacted the score and if the scores might become more elevated during a particular season (years 2003-2008). All of these stations showed an intermittent rainfall impact and no seasonal impact.

At the present time the shellfish classifications in shellfish growing area WV are appropriate. No changes in classification are being proposed at this time. When the 2009 Annual Review of shellfish growing area WV is written the area will be reviewed and the status of all potential and



actual pollution sources will be documented with the local plumbing inspector for each town. Changes in classification may be proposed at that time.

## Water Quality Review and Discussion

Table 20 lists all active stations in Growing Area WV, with their respective Geomean and P90 calculations for 2008. Please refer to Appendix B for a key to interpreting the headers on the columns of Table 1. The approved and restricted standards for each station are also displayed in Table 18. These standards will fluctuate yearly as a result of the DMR transition from a most probable number (MPN) fecal coliform test method to a membrane filtration (MF) method and are dependent on the number of samples analyzed by MPN versus MF. The total number of data points used in the calculations is displayed in the Count column and includes both MPN and MF values. The number of data points analyzed by MF is displayed in the MFCNT column. This fluctuating standard will cease when all 30 data points have been analyzed by the MF method.

All approved and restricted stations, met their NSSP classification standard in 2008. There are thirty-two stations classified as restricted or prohibited that meet the approved standard (Table 21). Ten of these stations will be reviewed for possible reclassification at the end of the 2009 season (these stations are hi-lighted in Tables 20 and 21). Stations WV 24, 50.5 and 54 are located in the vicinity of known pollution sources and cannot be upgraded in classification until the pollution sources are remediated. Stations WV 22, 28, 37, 38, 49, 50, 52, 53, 55, and 58 are currently meeting the approved standard are not located near known pollution sources. These stations will be further assessed for an upward classification upgrade. These assessments will be completed after the 2009 season, and presented in the next annual report for this growing area.

**Table 20. Geomean and P90 Scores, Growing Area WV, 2003-2008**

STATION	CLASS	CNT	MFCNT	GM	SDV	MAX	P90	APPD_STD	RESTR_STD
WV001.00	A	30	15	3.5	0.36	43	10.1	39	221
WV002.00	R	30	15	2.6	0.14	7.3	3.9	39	221
WV003.00	R	30	17	5.8	0.56	620	30.6	38	212
WV004.00	R	30	15	3.6	0.39	43	11.4	39	221
WV006.00	A	30	15	3.6	0.42	93	12.2	39	221
WV006.50	A	30	15	3.7	0.38	43	11.4	39	221
WV008.00	P	30	17	7.4	0.68	240	54.4	38	212
WV010.00	P	30	17	8.8	0.55	136	45.1	38	212
WV013.00	P	30	15	4.2	0.41	58	14.1	39	221
WV014.00	P	30	15	5.0	0.54	220	24.4	39	221
WV016.00	A	30	15	2.9	0.32	72	7.3	39	221
WV016.50	R- boundary	30	15	3.6	0.53	1200	16.9	39	221
WV017.00	R	30	15	6.3	0.89	>1600	86.6	39	221
WV018.00	R- boundary	30	15	3.3	0.49	740	14.1	39	221



STATION	CLASS	CNT	MFCNT	GM	SDV	MAX	P90	APPD_STD	RESTR_STD
WV019.00	A	30	15	3.7	0.34	70	10.3	39	221
WV020.50	A	30	15	5.0	0.48	72	20.5	39	221
WV020.80	NEW 8/20/07	9	9	1.9	0.01	2	2.0		
WV022.00	R	30	15	4.7	0.57	440	25.4	39	221
WV024.00	P	30	15	4.2	0.48	340	17.1	39	221
WV025.00	A	30	15	3.9	0.49	102	16.4	39	221
WV026.00	A	30	15	5.2	0.51	150	23.1	39	221
WV026.50	NEW 8/20/07	9	9	3.1	0.32	11	8.1		
WV027.00	R	30	15	6.8	0.58	660	38.1	39	221
WV028.00	R	30	16	5.9	0.52	130	27.2	38	217
WV028.50	NEW 8/20/07	9	9	3.1	0.34	15	8.5		
WV029.00	P	30	14	9.0	0.80	>1600	96.5	40	226
WV030.00	P	30	15	9.7	0.94	>1600	154.7	39	221
WV031.00	A	30	15	4.3	0.57	>1600	23.2	39	221
WV032.00	A	30	15	4.1	0.48	240	16.7	39	221
WV035.00	A	30	15	3.5	0.33	23	9.4	39	221
WV036.00	A	30	15	3.7	0.38	43	11.4	39	221
WV036.50	NEW 12/14/05	19	15	2.8	0.31	23	6.9	34	185
WV037.00	P	30	15	3.8	0.47	93	15.1	39	221
WV038.00	P	30	15	4.2	0.56	1200	21.8	39	221
WV039.00	P	30	16	5.0	0.43	60	17.6	38	217
WV040.00	P	30	15	3.1	0.26	24	6.6	39	221
WV041.00	A	30	16	3.7	0.39	43	11.7	38	217
WV044.00	P	30	15	3.6	0.37	43	10.6	39	221
WV045.00	P	30	15	3.7	0.54	150	18.3	39	221
WV046.00	P	30	15	3.2	0.32	43	8.2	39	221
WV046.50	P	30	16	4.9	0.54	102	23.9	38	217
WV046.80	A	30	15	3.7	0.46	240	14.3	39	221
WV047.00	A	30	15	3.2	0.31	43	7.8	39	221
WV047.50	NEW 8/1/05	24	15	2.9	0.29	35	6.8	37	205
WV048.00	A	30	16	4.2	0.34	23	11.5	38	217
WV048.50	A	30	15	3.7	0.28	43	8.4	39	221
WV048.80	A	30	16	3.9	0.35	43	11.0	38	217
WV049.00	R	30	16	5.4	0.45	93	20.1	38	217
WV050.00	R	30	16	5.1	0.52	240	23.4	38	217
WV050.50	R	30	15	6.2	0.59	240	35.5	39	221
WV050.80	R	30	15	6.0	0.55	93	30.5	39	221
WV052.00	R	30	15	5.5	0.49	93	23.5	39	221
WV053.00	R	30	15	4.4	0.46	93	16.7	39	221
WV054.00	R	30	15	6.2	0.54	93	30.4	39	221



STATION	CLASS	CNT	MFCNT	GM	SDV	MAX	P90	APPD_STD	RESTR_STD
WV055.00	R	30	15	3.7	0.33	43	9.6	39	221
WV056.00	A	30	16	6.9	0.52	93	32.0	38	217
WV057.00	P	30	16	8.8	0.80	460	92.0	38	217
WV058.00	P	30	15	4.2	0.39	62	13.0	39	221
WV059.00	A	30	15	3.3	0.32	23	8.5	39	221
WV060.00	P	30	15	5.1	0.63	1200	32.8	39	221
WV061.00	P	30	15	3.1	0.23	11	6.1	39	221
WV062.50	P	30	15	4.9	0.54	440	23.7	39	221
WV063.00	P	30	16	5.4	0.58	240	29.7	38	217
WV064.00	P	30	16	7.6	0.77	1440	73.8	38	217
WV065.00	P	30	15	3.9	0.49	240	16.7	39	221
WV077.00	A	30	15	2.8	0.18	10	4.6	39	221
WV078.00	A	30	15	2.6	0.18	15	4.5	39	221
WV079.00	A	30	15	2.8	0.23	9.1	5.5	39	221
WV080.00	A	30	15	2.7	0.18	15	4.6	39	221
WV081.00	A	30	15	2.6	0.17	9.1	4.3	39	221
WV083.00	A	30	15	2.4	0.10	3.6	3.2	39	221
WV084.00	A	30	15	2.6	0.25	43	5.4	39	221
WV085.00	A	30	15	2.5	0.13	7.3	3.6	39	221
WV086.00	A	30	15	3.3	0.43	240	11.6	39	221
WV087.00	A	30	15	3.0	0.33	43	7.8	39	221
WV088.00	A	30	15	2.4	0.10	3.6	3.2	39	221
WV089.00	A	30	15	2.4	0.10	3.6	3.2	39	221

Table 21. Stations Meeting the NSSP Approved Standard, but Classified as Restricted or Prohibited

Sta.#	Class	Proposed for upgrade? Y/N	Reason not proposed for reclassification
WV2	R	N	end of closure line- boundary station
WV3	R	N	variability in data, possible horse waste impact
WV4	R	N	end of closure line
WV13	P	N	washing machine drain
WV14	P	N	OBD
WV16.5	R	N	end of closure line
WV18	R	N	end of closure line
WV22	R	Y	
WV24	P	N	Will be proposed when Pollution source is fixed
WV27	R	N	water quality variability



Sta.#	Class	Proposed for upgrade? Y/N	Reason not proposed for reclassification
WV28	R	Y	
WV37	P	Y	
WV38	P	Y	
WV39	P	N	OBD
WV44	P	N	OBD
WV45	P	N	expired survey, limited resource
WV46	P	N	expired survey, limited resource
WV46.5	P	N	expired survey, limited resource
WV49	R	Y	
WV50	R	Y	
WV50.5	R	N	Will be proposed when Pollution source is fixed
WV50.8	R	N	will be proposed for end of closure line in 2009
WV52	R	Y	
WV53	R	Y	
WV54	R	N	washing machine drain
WV55	R	Y	
WV58	P	Y	
WV60	P	N	variability in data, dog waste impact
WV61	P	N	expired survey
WV62.5	P	N	expired survey
WV63	P	N	expired survey
WV65	P	N	expired survey

All stations that were active at the beginning of 2008 were sampled at least 6 times following the systematic random sampling (SRS) schedule (Table 22 and Appendix E). At some stations, additional samples were collected under adverse conditions and data was used to reopen the area following a flood closure.



Table 22. Sampling Effort for 2008

Station	Class	Adverse	Random		Total	Comments
		Closed	Closed	Open		
WV001.00	A			6	6	
WV002.00	A			6	6	
WV003.00	R			6	6	
WV004.00	A			6	6	
WV006.00	A			6	6	
WV006.50	A			6	6	
WV008.00	P		6		6	
WV010.00	P		6		6	
WV013.00	P		6		6	
WV014.00	P		6		6	
WV016.00	A			6	6	
WV016.50	A	6		6	12	Flood Station
WV017.00	R			6	6	
WV018.00	A	4		6	10	Flood Station
WV019.00	A	6		6	12	Flood Station
WV020.50	A			6	6	
WV020.80	R			6	6	
WV022.00	R			6	6	
WV024.00	A			2	6	Reclassified from approved to prohibited due to malfunction 3/24/08
	P		4			
WV025.00	A			6	6	
WV026.00	A			6	6	
WV026.50	R			6	6	
WV027.00	R			6	6	
WV028.00	P		6		6	
WV028.50	R			6	6	
WV029.00	P		6		6	
WV030.00	P		6		6	
WV031.00	A	6		6	12	Flood Station
WV032.00	A	2		6	8	
WV035.00	A			6	6	
WV036.00	A			6	6	
WV036.50	A			6	6	
WV037.00	A	6		6	12	Flood Station
WV038.00	P		6		6	
WV039.00	P		6		6	
WV040.00	P		6		6	
WV041.00	A			6	6	
WV044.00	P		6		6	
WV045.00	P		6		6	



Station	Class	Adverse	Random		Total	Comments
		Closed	Closed	Open		
WV046.00	P		6		6	
WV046.50	P		6		6	
WV046.80	A			6	6	
WV047.00	A			6	6	
WV047.50	P		6		6	
WV048.00	A			6	6	
WV048.50	A	4		6	10	Flood Station
WV048.80	A			6	6	
WV049.00	R			6	6	
WV050.00	R			6	6	
WV050.50	R			6	6	
WV050.80	R			6	6	
WV052.00	R			6	6	
WV053.00	R			6	6	
WV054.00	R			6	6	
WV055.00	R			6	6	
WV056.00	A			6	6	
WV057.00	P		6		6	
WV058.00	P		6		6	
WV059.00	A			6	6	
WV060.00	P		6		6	
WV061.00	P		6		6	
WV062.50	P		6		6	
WV063.00	P		6		6	
WV064.00	P		6		6	
WV065.00	P		6		6	
WV077.00	A			6	6	
WV078.00	A			6	6	
WV079.00	A			6	6	
WV080.00	A			6	6	
WV081.00	A			6	6	
WV083.00	A			6	6	
WV084.00	A			6	6	
WV085.00	A			6	6	
WV086.00	A			6	6	
WV087.00	A			6	6	
WV088.00	A			6	6	
WV089.00	A			6	6	

Figures 12-14 show water quality trends for stations classified as approved and stations meeting the approved standard that will be reviewed in 2009 for possible reclassification; with the P90 shown as a percentage of the approved standard for each year's data set. During the transition from MPN to MF data points, each year the approved standard will be lower than the



previous 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 P90s are expressed as a percentage of the approved standard. Stations with trend percents approaching or over 90% are at risk of downward classification and require further assessment.

In Figure 12, stations WV16, 20.5, 48.5, 56, and 59 are showing an upward trend (deteriorating water quality). At stations WV 16, 48.5, and 59 the upward trend is very slight. There are no known pollution sources nearby these sites and there are also no streams nearby. At stations WV20.5 and 56 the upward trend is more pronounced. No pollution sources were identified at either of these sites. Both of these stations are located on large flats that have streams flowing onto the flat that may be impacting the water quality. Station WV56 is located on Ballyhac Cove on the Weskeag River. Two streams (56S1 and 57S1) and a pollution source site were sampled in this area. The pollution source sample identified a malfunctioning septic system that was flowing directly into a drainage that flows into Ballyhac Cove (site PS2 score of 1,700 FC/100ml). This system has been replaced with a new system (fall 2008). The stream samples at site 56S1 received scores of 156 and 28 FC/100ml. The scores at stream site 57S1 were 29 and 11 FC/100ml. The water quality at station WV 56 will be reviewed in 2009 to see there has been any improvement in the data results.

**Figure 12. Area WV P90 Scores, Approved Stations (expressed as the percent of the approved standard), 2006-2008**

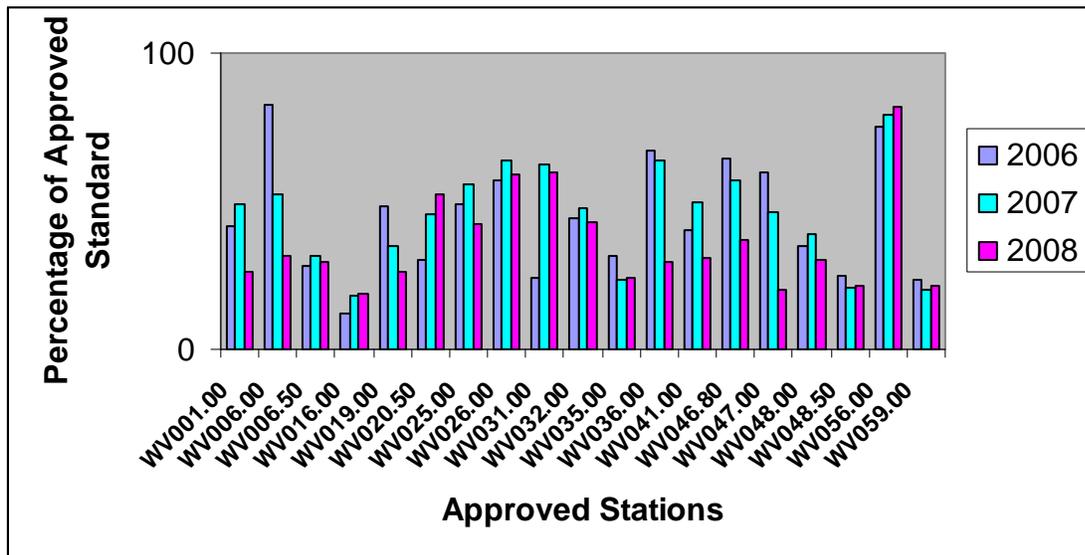


Figure 13 shows the P90 trends for all of the approved stations that are sampled at island locations. All of these stations have continued to receive extremely good P90 scores. Station WV 86 appears to have slightly more elevated scores than the rest of the stations in this grouping. The current P90 score at this site is 11.



Figure 13. Area WV P90 Scores, Island Stations WV77-WV89, (expressed as the percent of the approved standard), 2006-2008

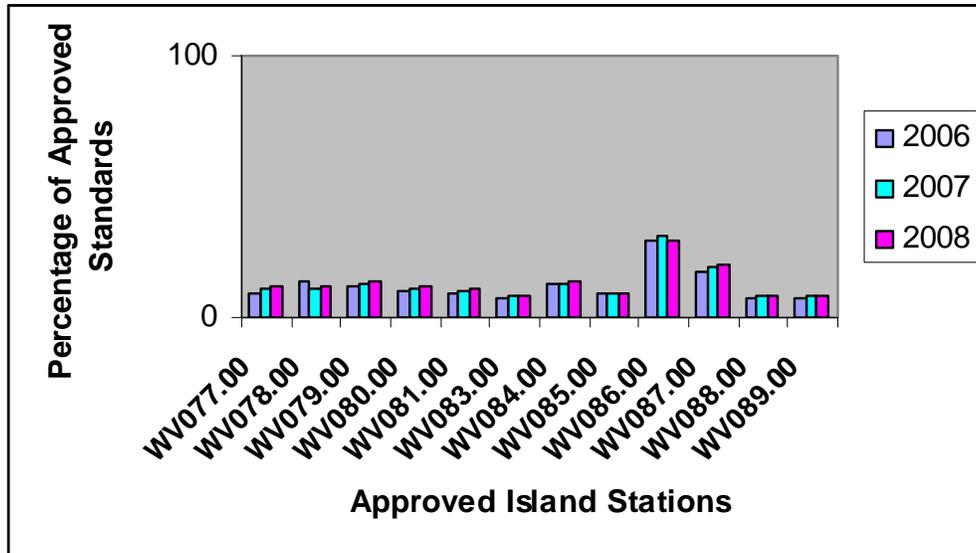
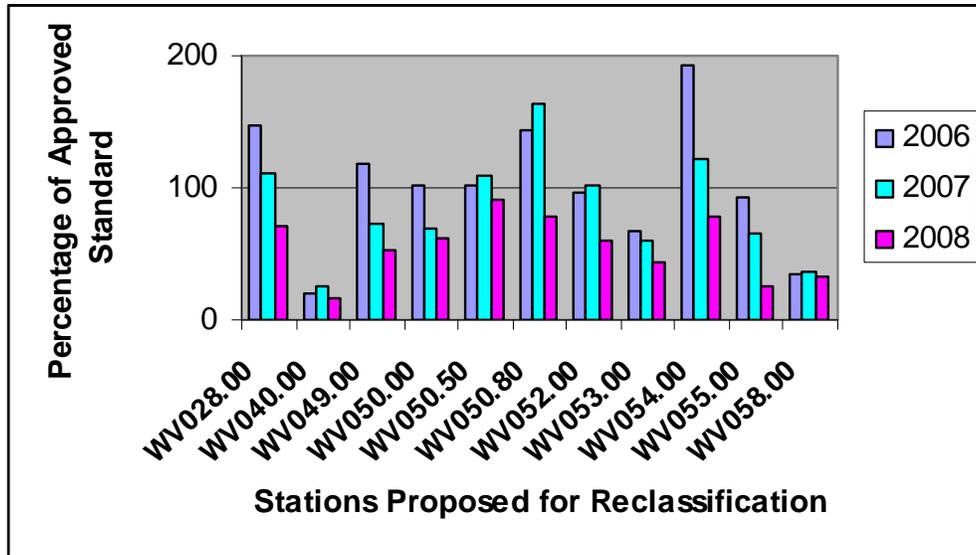


Figure 14 shows the stations that will be reviewed in the 2009 report for possible reclassification. Several of these sites have pollution sources that have not yet been fixed. At sampling station WV28 the water quality is showing improvement. A property near the sample site formerly contained a variety of domestic ducks and chickens (20+ birds). The birds roamed all over the marsh and swam in the cove. The property is now unoccupied and water quality has improved. The water quality at station WV 49 has also improved. A farm at this site formerly allowed their cows to graze in a stream flowing into the Weskeag River near the sample site. The Department of Agriculture was contacted to assess the situation. The farmer placed fencing all along the stream to keep the cows out. Water quality has improved and now meets approved standards. North of station WV50 three malfunctioning septic systems with discharges to the river were replaced with new in ground systems in 2008. These systems would have impacted water quality at stations WV 50, 52, 53, 54, and 55. All of these stations showed improvement in 2008.



Figure 14. Area WV P90 Scores, Stations Proposed for Reclassification (expressed as the percent of the approved standard), 2006-2008



### Water Quality Classification Determination

Several of the stations in shellfish growing area WV have P90 scores that meet approved standards but are not classified as approved. Many of these stations will not be considered for upward reclassification either because they have known pollution sources nearby that are still waiting to be fixed or there is enough variability in the sample results that it is likely that the site would not be able to maintain the new classification. Stations that are being considered for reclassification include: WV28, WV40, WV49, WV50, WV50.5, WV52, WV53, WV54, WV55, and WV58. Six of these stations have water quality scores that have been improving each year for the past three years (Figure 14). Stations WV40, 50.5, 50.8, and 52 have shown more variability in the data results. No areas are being recommended for reclassification at this time. If the pollution sources have been fixed by the end of the 2009 sampling season, these sites will be reevaluated for upward classification at that time.

Approved stations 20.5 and 56 are showing an upward trend (deteriorating water quality) in their scores but are still meeting approved standards. These sites will also be reassessed in the 2009 report. No downward classification changes are required or recommended at this time.

### Aquaculture/Wet Storage Activity

All of the aquaculture sites in shellfish growing area WV are located on the Weskeag River; there are a total of six aquaculture leases (Figure 3, Table 23). The WES UR and the HAM1 and HAM2 sites are operated by the same individual. All of the oysters from the WES UR sites



must be relayed to one of the HAM sites where they are required to stay for a two week period prior to going to market. Relayed oysters are required to be tested prior to being moved to the approved site and after they have been at the approved site for a minimum of a two week period. The restricted WES BC site contains an upweller for growing oyster seed.

**Table 23. Aquaculture Lease Sites, Weskeag River**

Lease Site	Location	Species	Cultivation Technique	Origin and Expiration Dates	Acreage	Class	Comments
WES UR	Upper Weskeag	oyster soft clam northern quohog	bottom suspended	10/5/2000 – 10/4/2010	7.14	R	Relay to HAM1 or HAM2
WES UR	Upper Weskeag	oyster soft clam northern quohog	bottom suspended	10/5/2000 – 10/4/2010	7.14	R	Relay to HAM1 or HAM2
WES BC	Weskeag	oyster	suspended	7/28/2004 – 7/27/2014	.994	R	Seed Oyster / Upweller
WES BC	Weskeag	oyster	suspended	7/28/2004 – 7/27/2014	.994	A	
HAM1 08	SW Ballyhac Cove, Weskeag	oyster	shellfish raft	7/14/2008 – 12/31/2008	.01	A	LPA for ½ raft
HAM2 08	SW Ballyhac Cove, Weskeag	oyster	shellfish raft	7/14/2008 – 12/31/2008	.01	A	LPA for ½ raft

Additional information on aquaculture lease sites in growing area WV is available at:

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

## Conclusion

Currently, all of the stations in shellfish growing area WV are supporting their NSSP classification. Ten stations have water quality scores that meet the approved standard, but are not being proposed for reclassification at this time. These stations will be reviewed when the 2009 report of the area is written. Stations with deteriorating water quality (WV20.5 and WV56) will be reassessed at that time as well. No classification changes are being recommended at this time. All actual and potential pollution sources will be discussed with the local plumbing inspectors responsible for the area prior to any area being recommended for reclassification.

In the coming review year, stream 3S1 will be sampled under various conditions to evaluate its impact on the water quality in Mosquito Harbor.



## References

Gulf of Maine Ocean Observing System; Penobscot Bay; <http://www.gomoos.org/gnd/> accessed on 1/20/2010

DEP Bureau of Land and Water Quality, Stormwater Program  
<http://www.maine.gov/dep/blwq/docstand/stormwater/index.htm>,



## Appendix A. DEP Overboard Discharge License Conditions

OBD license conditions for less than 2,000 gallons per day

Effluent Characteristic	Discharge Limitations	
	Monthly <u>Average</u>	Daily <u>Maximum</u>
Flow		as licensed
5-Day Biochemical Oxygen Demand (BOD)	30 mg/L	50 mg/L
Total Suspended Solids (TSS)	30 mg/L	50 mg/L
Settleable Solids		0.1 ml/L
Fecal coliform Bacteria	15col/100ml	
pH	The pH of the effluent shall not be less than 6.0 or greater than 8.5	

OBD license conditions for more than 2,000 gallons per day

Effluent Characteristic	Discharge Limitations					
	Monthly <u>Average</u>			Daily <u>Maximum</u>		
Water Classification	SB/SC	B	C	SB/SC	B	C
Flow	As licensed					
5-Day Biochemical Oxygen Demand (BOD)	30 mg/L			50 mg/L		
Total Suspended Solids (TSS)	30 mg/L			50 mg/L		
Settleable Solids	report only			0.1 ml/L		
<input type="checkbox"/> Fecal coliform Bacteria per 100ml. or <input type="checkbox"/> Eschericia coli Bacteria per 100ml.	15col /100ml	64col /100ml	142 col /100ml.	50 col /100ml.	427 col /100ml.	949 col /100ml.
Residual Chlorine	chlor: 1.0 mg/L dechlor: 0.1 mg/L					
pH	The pH of the effluent shall not be less than 6.0 or greater than 8.5 at any time					

Tables courtesy of Maine DEP



## Appendix B. Key to Water Quality Table Headers

Station = water quality monitoring station

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

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

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

Geo\_Mean = means the antilog (base 10) of the arithmetic mean of the sample result logarithm (base 10).

SDV = standard deviation

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

P90 = 90<sup>th</sup> percentile

APPD\_STD = the 90<sup>th</sup> percentile, at or below which the station would meet approved criteria in the absence of pollution sources or poisonous and deleterious substances.

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



**Appendix C. Growing Area WV 2008 SRS Data**

Station	Date	Collect	Tide	Temp	Sal	Strat	ADV	Stat	CL	MFCOL	WIND
WV001.00	01/22/08	EXT	HF	-2	32	R	-	O	A	<2.0	S
	03/17/08	EXT	H	1	30	R	-	O	A	<2.0	NE
	05/14/08	EXT	E	8	29	R	-	O	A	<2.0	NE
	07/09/08	FP	F	16	30	R	-	O	A	<2.0	S
	08/27/08	EXT	H	12	32	R	-	O	A	2	CL
	10/19/08	FP	F	8	32	R	-	O	A	<2.0	NE
WV002.00	01/22/08	EXT	H	-3	32	R	-	O	A	<2.0	S
	03/17/08	EXT	H	1	30	R	-	O	A	<2.0	NE
	05/14/08	EXT	E	8	29	R	-	O	A	<2.0	NE
	07/09/08	FP	F	16	30	R	-	O	A	<2.0	S
	08/27/08	EXT	H	13	32	R	-	O	A	<2.0	NE
	10/19/08	FP	F	8	32	R	-	O	A	<2.0	NE
WV003.00	01/22/08	EXT	H	-4	30	R	-	O	R	<2.0	S
	03/17/08	EXT	H	2	30	R	-	O	R	<2.0	NE
	05/14/08	EXT	E	9	28	R	-	O	R	<2.0	NE
	07/09/08	FP	F	25	30	R	-	O	R	6	S
	08/27/08	EXT	HE	13	31	R	-	O	R	13	CL
	10/19/08	FP	F	7	32	R	-	O	R	6	NE
WV004.00	01/22/08	EXT	H	-6	32	R	-	O	A	<2.0	SW
	03/17/08	EXT	H	1	30	R	-	O	A	<2.0	NE
	05/14/08	EXT	E	8	29	R	-	O	A	<2.0	NE
	07/09/08	FP	F	24	30	R	-	O	A	2	S
	08/27/08	EXT	HE	13	31	R	-	O	A	7.3	NE
	10/19/08	FP	F	7	32	R	-	O	A	2	NE
WV006.00	01/22/08	EXT	H	-3	32	R	-	O	A	<2.0	SW
	03/17/08	EXT	H	1	30	R	-	O	A	<2.0	NE
	05/14/08	EXT	E	8	28	R	-	O	A	<2.0	NE
	07/09/08	FP	F	22	30	R	-	O	A	2	SW
	08/27/08	EXT	HE	13	32	R	-	O	A	4	N
	10/19/08	FP	F	7	32	R	-	O	A	8	NE
WV006.50	01/22/08	EXT	H	-1	32	R	-	O	A	<2.0	SW
	03/17/08	EXT	H	1	30	R	-	O	A	<2.0	NE
	05/14/08	EXT	E	8	29	R	-	O	A	<2.0	NE
	07/09/08	FP	F	17	30	R	-	O	A	<2.0	S
	08/27/08	EXT	HE	13	32	R	-	O	A	<2.0	N
	10/19/08	FP	F	7	32	R	-	O	A	2	NE
WV008.00	01/22/08	EXT	H	-2	32	R	-	C	P	<2.0	SW
	03/17/08	EXT	H	1	30	R	-	C	P	<2.0	NE
	05/14/08	EXT	E	10	28	R	-	C	P	<2.0	NE
	07/09/08	FP	F	20	30	R	-	C	P	<2.0	S
	08/27/08	EXT	HE	13	31	R	-	C	P	6	N



Station	Date	Collect	Tide	Temp	Sal	Strat	ADV	Stat	CL	MFCOL	WIND
	10/19/08	FP	HF	8	32	R	-	C	P	<2.0	NE
WV010.00	01/22/08	EXT	H	-2	14	R	-	C	P	2	SW
	03/17/08	EXT	HE	1	28	R	-	C	P	<2.0	NE
	05/14/08	EXT	E	10	23	R	-	C	P	<2.0	CL
	07/09/08	FP	F	22	30	R	-	C	P	12	SW
	08/27/08	EXT	HE	13	31	R	-	C	P	15	CL
	10/19/08	FP	HF	8	29	R	-	C	P	<2.0	NE
WV013.00	01/22/08	EXT	HE	-2	32	R	-	C	P	<2.0	SW
	03/17/08	EXT	HE	1	30	R	-	C	P	<2.0	NE
	05/14/08	EXT	E	11	28	R	-	C	P	<2.0	CL
	07/09/08	FP	F	16	30	R	-	C	P	2	SW
	08/27/08	EXT	HE	14	32	R	-	C	P	16	N
	10/19/08	FP	HF	7	32	R	-	C	P	<2.0	NE
WV014.00	01/22/08	EXT	HE	-2	32	R	-	C	P	<2.0	SW
	03/17/08	EXT	HE	1	30	R	-	C	P	<2.0	N
	05/14/08	EXT	E	11	29	R	-	C	P	<2.0	NE
	07/09/08	FP	F	20	30	R	-	C	P	2	SW
	08/27/08	EXT	E	14	31	R	-	C	P	<2.0	N
	10/19/08	FP	HF	7	32	R	-	C	P	<2.0	NE
WV016.00	01/22/08	EXT	HE	-2	32	R	-	O	A	<2.0	SW
	03/17/08	EXT	HE	1	30	R	-	O	A	<2.0	N
	05/14/08	EXT	HE	8	28	R	-	O	A	<2.0	NE
	07/09/08	FP	F	16	30	R	-	O	A	<2.0	SW
	08/27/08	EXT	E	13	32	R	-	O	A	<2.0	CL
	10/19/08	FP	HF	7	32	R	-	O	A	<2.0	NE
WV016.50	01/22/08	EXT	HE	-2	32	R	-	O	A	<2.0	CL
	03/17/08	EXT	HE	0	30	R	-	O	A	2	N
	05/14/08	EXT	HE	9	27	R	-	O	A	<2.0	NE
	07/09/08	FP	F	18	30	R	-	O	A	<2.0	SW
	08/27/08	EXT	E	15	31	R	-	O	A	<2.0	CL
	10/19/08	FP	HF	8	32	R	-	O	A	<2.0	NE
WV017.00	01/22/08	EXT	HE	-3	32	R	-	O	R	<2.0	CL
	03/17/08	EXT	HE	2	30	R	-	O	R	<2.0	CL
	05/14/08	EXT	HE	10	28	R	-	O	R	<2.0	CL
	07/09/08	FP	F	20	30	R	-	O	R	2	CL
	08/27/08	EXT	E	15	31	R	-	O	R	<2.0	CL
	10/19/08	FP	HF	7	32	R	-	O	R	<2.0	NE
WV018.00	01/22/08	EXT	HE	-2	32	R	-	O	A	<2.0	SW
	03/17/08	EXT	HE	2	30	R	-	O	A	<2.0	N
	05/14/08	EXT	HE	8	28	R	-	O	A	<2.0	NE
	07/09/08	FP	F	16	30	R	-	O	A	<2.0	SW
	08/27/08	EXT	E	14	32	R	-	O	A	<2.0	NE
	10/19/08	FP	HF	8	32	R	-	O	A	<2.0	NE
WV019.00	01/22/08	EXT	HE	-4	28	R	-	O	A	<2.0	SW



Station	Date	Collect	Tide	Temp	Sal	Strat	ADV	Stat	CL	MFCOL	WIND
	03/17/08	EXT	HE	2	28	R	-	O	A	<2.0	N
	05/14/08	EXT	HE	10	28	R	-	O	A	<2.0	CL
	07/09/08	FP	F	22	30	R	-	O	A	13	SW
	08/27/08	EXT	E	16	31	R	-	O	A	<2.0	CL
	10/19/08	FP	H	8	32	R	W	O	A	2	CL
WV020.50	01/22/08	EXT	E	-3	30	R	-	O	A	<2.0	SW
	03/17/08	EXT	E	2	28	R	-	O	A	<2.0	N
	05/14/08	EXT	H	10	27	R	-	O	A	<2.0	CL
	07/09/08	FP	F	22	30	R	-	O	A	12	-
	08/27/08	EXT	E	14	30	R	-	O	A	<2.0	CL
	10/19/08	FP	H	8	31	R	-	O	A	<2.0	CL
WV020.80	01/22/08	EXT	E	-3	32	R	-	O	R	<2.0	SW
	03/17/08	EXT	E	2	30	R	-	O	R	<2.0	N
	05/14/08	EXT	H	9	28	R	-	O	R	<2.0	CL
	07/09/08	FP	HF	19	30	R	-	O	R	2	-
	08/27/08	EXT	E	15	32	R	-	O	R	<2.0	NE
	10/19/08	FP	H	8	31	R	-	O	R	2	CL
WV022.00	01/22/08	EXT	E	-3	30	R	-	O	R	<2.0	SW
	03/17/08	EXT	E	2	30	R	-	O	R	<2.0	N
	05/14/08	EXT	H	10	28	R	-	O	R	<2.0	CL
	07/09/08	FP	HF	26	30	R	-	O	R	<2.0	-
	08/27/08	EXT	E	15	31	R	-	O	R	<2.0	NE
	10/19/08	FP	H	8	32	R	-	O	R	2	CL
WV024.00	01/22/08	EXT	E	-2	32	R	-	O	A	<2.0	SW
	03/17/08	EXT	E	2	30	R	-	O	A	<2.0	N
	05/14/08	EXT	H	8	28	R	-	C	P	<2.0	CL
	07/09/08	FP	HF	20	30	R	-	C	P	2	-
	08/27/08	EXT	E	14	32	R	-	C	P	<2.0	CL
	10/19/08	FP	H	8	32	R	-	C	P	6	NE
WV025.00	01/22/08	EXT	E	-2	32	R	-	O	A	<2.0	SW
	03/17/08	EXT	E	2	30	R	-	O	A	<2.0	N
	05/14/08	EXT	HE	8	28	R	-	O	A	<2.0	N
	07/09/08	FP	HF		30	R	-	O	A	<2.0	-
	08/27/08	EXT	E	15	32	R	-	O	A	<2.0	CL
	10/19/08	FP	HE	8	32	R	-	O	A	<2.0	CL
WV026.00	01/22/08	LL	HF	-2	30	R	-	O	A	2	W
	03/18/08	EXT	HF	1	30	R	-	O	A	<2.0	CL
	05/19/08	FP	F	10	28	R	-	O	A	<2.0	W
	07/14/08	MLP	H	18	30	R	-	O	A	6	CL
	09/02/08	EXT	HF	14	31	R	-	O	A	<2.0	SE
	10/27/08	EXT	HF	10	31	R	P	O	A	5.5	CL
WV026.50	01/22/08	LL	HF	-2	31	R	-	O	R	<2.0	W
	03/18/08	EXT	HF	0	30	R	-	O	R	2	CL
	05/19/08	FP	F	10	28	R	-	O	R	<2.0	W



Station	Date	Collect	Tide	Temp	Sal	Strat	ADV	Stat	CL	MFCOL	WIND
	07/14/08	MLP	H	17	30	R	-	O	R	11	CL
	09/02/08	EXT	HF	17	30	R	-	O	R	4	E
	10/27/08	EXT	HF	9	31	R	P	O	R	2	CL
WV027.00	01/22/08	LL	HF	-2	32	R	-	O	R	<2.0	W
	03/18/08	EXT	HF	0	30	R	-	O	R	<2.0	CL
	05/19/08	FP	F	10	28	R	-	O	R	<2.0	W
	07/14/08	MLP	H	18	30	R	-	O	R	29	CL
	09/02/08	EXT	HF	16	30	R	-	O	R	<2.0	E
	10/27/08	EXT	HF	9	31	R	P	O	R	660	CL
WV028.00	01/22/08	LL	HF	-2	26	R	-	C	P	<2.0	W
	03/18/08	EXT	H	0	27	R	-	C	P	<2.0	NE
	05/19/08	FP	F	12	27	R	-	C	P	<2.0	W
	07/14/08	MLP	H	18	30	R	-	C	P	8	CL
	09/02/08	EXT	HF	16	30	R	-	C	P	<2.0	E
	10/27/08	EXT	HF	10	30	R	P	C	P	4	CL
WV028.50	01/22/08	LL	HF	-2	30	R	-	O	R	<2.0	W
	03/18/08	EXT	H	-1	30	R	-	O	R	<2.0	NE
	05/19/08	FP	F	10	28	R	-	O	R	<2.0	W
	07/14/08	MLP	HE	18	30	R	-	O	R	6	CL
	09/02/08	EXT	HF	15	30	R	-	O	R	<2.0	E
	10/27/08	EXT	H	9	30	R	P	O	R	15	CL
WV029.00	01/22/08	LL	HF	-2	32	R	-	C	P	2	W
	03/18/08	EXT	H	0	30	R	-	C	P	<2.0	CL
	05/19/08	FP	HF	10	28	R	-	C	P	4	W
	07/14/08	MLP	HE	18	30	R	-	C	P	42	CL
	09/02/08	EXT	HF	18	30	R	-	C	P	2	NE
	10/27/08	EXT	H	9	31	R	P	C	P	8	CL
WV030.00	01/22/08	LL	HF	-2	32	R	-	C	P	<2.0	SW
	03/18/08	EXT	H	-1	30	R	-	C	P	<2.0	CL
	05/19/08	FP	HF	10	28	R	-	C	P	<2.0	W
	07/14/08	MLP	HE	18	30	R	-	C	P	8	CL
	09/02/08	EXT	HF	16	31	R	-	C	P	4	E
	10/27/08	EXT	H	10	31	R	P	C	P	16	CL
WV031.00	01/22/08	LL	HF	-2	31	R	-	O	A	2	SW
	03/18/08	EXT	H	-1	30	R	-	O	A	<2.0	N
	05/19/08	FP	HF	10	28	R	-	O	A	2	W
	07/14/08	MLP	HE	19	30	R	-	O	A	10	CL
	09/02/08	EXT	H	16	30	R	-	O	A	<2.0	E
	10/27/08	EXT	H	10	31	R	P	O	A	5.5	CL
WV032.00	01/22/08	LL	H	-2	32	R	-	O	A	<2.0	SW
	03/18/08	EXT	H	0	30	R	-	O	A	<2.0	N
	05/19/08	FP	HF	10	28	R	-	O	A	2	W
	07/14/08	MLP	HE	17	30	R	-	O	A	<2.0	S
	09/02/08	EXT	H	17	31	R	-	O	A	<2.0	NE



Station	Date	Collect	Tide	Temp	Sal	Strat	ADV	Stat	CL	MFCOL	WIND
	10/27/08	EXT	H	10	31	R	P	O	A	8	CL
WV035.00	01/22/08	LL	H	-2	32	R	-	O	A	<2.0	CL
	03/18/08	EXT	H	0	28	R	-	O	A	<2.0	N
	05/19/08	FP	HF	7	28	R	-	O	A	<2.0	CL
	07/14/08	MLP	HE	16	30	R	-	O	A	13	CL
	09/02/08	EXT	H	15	30	R	-	O	A	2	SE
	10/27/08	EXT	H	10	31	R	P	O	A	9.1	E
WV036.00	01/22/08	LL	H	-2	32	R	-	O	A	<2.0	CL
	03/18/08	EXT	H	0	30	R	-	O	A	<2.0	CL
	05/19/08	FP	HF	8	28	R	-	O	A	2	CL
	07/14/08	MLP	HE	18	30	R	-	O	A	2	S
	09/02/08	EXT	H	18	31	R	-	O	A	2	NE
	10/27/08	EXT	H	10	32	R	P	O	A	2	SE
WV036.50	01/22/08	LL	H	-2	32	R	-	O	A	<2.0	SW
	03/18/08	EXT	HE	0	28	R	-	O	A	<2.0	NE
	05/19/08	FP	HF	7	28	R	-	O	A	<2.0	W
	07/14/08	MLP	HE	17	30	R	-	O	A	<2.0	S
	09/02/08	EXT	H	14	30	R	-	O	A	<2.0	NE
	10/27/08	EXT	H	10	32	R	P	O	A	4	E
WV037.00	01/22/08	LL	H	2	32	R	-	O	A	<2.0	SW
	03/18/08	EXT	HE	1	30	R	-	O	A	<2.0	NE
	05/19/08	FP	H	8	28	R	-	O	A	<2.0	W
	07/14/08	MLP	E	17	30	R	-	O	A	46	S
	09/02/08	EXT	H	15	31	R	-	O	A	24	E
	10/27/08	EXT	HE	10	31	R	P	O	A	2	CL
WV038.00	01/22/08	LL	H	2	32	R	-	C	P	<2.0	SW
	03/18/08	EXT	HE	1	28	R	-	C	P	<2.0	NE
	05/19/08	FP	H	8	28	R	-	C	P	6	W
	07/14/08	MLP	E	16	30	R	-	C	P	2	S
	09/02/08	EXT	H	15	30	R	-	C	P	<2.0	E
	10/27/08	EXT	HE	10	32	R	P	C	P	2	E
WV039.00	01/23/08	LL	E	0	31	R	-	C	P	6	S
	03/18/08	EXT	HE	1	30	R	-	C	P	<2.0	CL
	05/19/08	FP	H	8	28	R	-	C	P	4	W
	07/14/08	MLP	E	18	30	R	-	C	P	31	SW
	09/02/08	EXT	H	14	31	R	-	C	P	<2.0	NE
	10/27/08	EXT	HE	10	31	R	P	C	P	<2.0	CL
WV040.00	01/22/08	LL	H	0	32	R	-	C	P	2	SW
	03/18/08	EXT	HE	1	30	R	-	C	P	<2.0	NE
	05/19/08	FP	H	9	28	R	-	C	P	<2.0	W
	07/14/08	MLP	E	16	30	R	-	C	P	<2.0	SW
	09/02/08	EXT	H	13	30	R	-	C	P	<2.0	CL
	10/27/08	EXT	HE	10	31	R	P	C	P	<2.0	CL
WV041.00	01/22/08	LL	H	1	32	R	-	O	A	<2.0	SW



Station	Date	Collect	Tide	Temp	Sal	Strat	ADV	Stat	CL	MFCOL	WIND
	03/18/08	EXT	HE	1	29	R	-	O	A	<2.0	CL
	05/19/08	FP	H	9	29	R	-	O	A	<2.0	W
	07/14/08	MLP	E	16	30	R	-	O	A	8	SW
	09/02/08	EXT	HE	14	30	R	-	O	A	<2.0	NE
	10/27/08	EXT	HE	10	32	R	P	O	A	<2.0	CL
WV044.00	01/22/08	LL	H	1	32	R	-	C	P	<2.0	SW
	03/18/08	EXT	HE	1	28	R	-	C	P	<2.0	NE
	05/19/08	FP	H	7	30	R	-	C	P	<2.0	W
	07/14/08	MLP	E	14	30	R	-	C	P	16	SW
	09/02/08	EXT	HE	14	30	R	W	C	P	<2.0	CL
	10/27/08	EXT	HE	10	32	R	P	C	P	<2.0	NE
WV045.00	01/22/08	LL	HE	1	32	R	-	C	P	<2.0	CL
	03/18/08	EXT	E	0	28	R	-	C	P	<2.0	NE
	05/19/08	FP	HE	7	30	R	-	C	P	<2.0	W
	07/14/08	MLP	E	13	30	R	-	C	P	<2.0	SW
	09/02/08	EXT	HE	14	30	R	-	C	P	<2.0	NE
	10/27/08	EXT	HE	11	32	R	P	C	P	<2.0	NE
WV046.00	01/22/08	LL	HE	1	32	R	-	C	P	<2.0	CL
	03/18/08	EXT	E	1	28	R	-	C	P	<2.0	NE
	05/19/08	FP	HE	7	30	R	-	C	P	<2.0	W
	07/14/08	MLP	E	17	30	R	-	C	P	<2.0	CL
	09/02/08	EXT	HE	16	30	R	-	C	P	<2.0	E
	10/27/08	EXT	HE	10	32	R	P	C	P	4	NE
WV046.50	01/22/08	LL	HE	-2	32	R	-	C	P	<2.0	CL
	03/18/08	EXT	E	1	28	R	-	C	P	<2.0	CL
	05/19/08	FP	HE	8	28	R	-	C	P	<2.0	W
	07/14/08	MLP	E	14	30	R	-	C	P	6	CL
	09/02/08	EXT	HE	17	30	R	-	C	P	<2.0	NE
	10/27/08	EXT	HE	10	32	R	P	C	P	24	CL
WV046.80	01/22/08	LL	HE	-1	32	R	-	O	A	8	SW
	03/18/08	EXT	E	2	29	R	-	O	A	<2.0	CL
	05/19/08	FP	HE	8	28	R	-	O	A	<2.0	W
	07/14/08	MLP	E	18	30	R	-	O	A	<2.0	CL
	09/02/08	EXT	HE	17	30	R	-	O	A	<2.0	NE
	10/27/08	EXT	E	10	32	R	P	O	A	14	CL
WV047.00	01/22/08	LL	HE	-1	32	R	W	O	A	<2.0	SW
	03/18/08	EXT	E	1	28	R	-	O	A	<2.0	CL
	05/19/08	FP	HE	7	28	R	-	O	A	<2.0	W
	07/14/08	MLP	E	16	30	R	-	O	A	<2.0	SW
	09/02/08	EXT	HE	17	30	R	-	O	A	<2.0	NE
	10/27/08	EXT	E	10	32	R	PW	O	A	4	CL
WV047.50	01/22/08	LL	HE	0	32	R	-	C	P	<2.0	SW
	03/18/08	EXT	E	2	28	R	-	C	P	<2.0	CL
	05/19/08	FP	HE	7	29	R	-	C	P	<2.0	W



Station	Date	Collect	Tide	Temp	Sal	Strat	ADV	Stat	CL	MFCOL	WIND
	07/14/08	MLP	E	17	30	R	-	C	P	<2.0	SW
	09/02/08	EXT	HE	16	30	R	-	C	P	<2.0	NE
	10/27/08	EXT	E	10	32	R	P	C	P	3.5	CL
WV048.00	01/23/08	EXT	F	-5	31	R	-	O	A	2	NW
	03/17/08	LL	H	0	26	R	-	O	A	6	N
	05/19/08	EXT	F	11	28	R	-	O	A	<2.0	W
	07/14/08	FP	HE	18	30	R	W	O	A	4	CL
	09/02/08	LL	F	16	31	R	-	O	A	<2.0	NE
	10/28/08	FP	E	8	31	R	-	O	A	<2.0	NE
WV048.50	01/23/08	EXT	HF	-2	32	R	-	O	A	4	NW
	03/17/08	LL	H	0	28	R	-	O	A	3.6	N
	05/19/08	EXT	F	9	28	R	-	O	A	<2.0	W
	07/14/08	FP	HE	15	30	R	-	O	A	4	S
	09/02/08	LL	F	14	30	R	-	O	A	<2.0	NE
	10/28/08	FP	E	8	30	R	-	O	A	2	SE
WV048.80	01/23/08	EXT	HF	-2	31	R	-	O	A	<2.0	NW
	03/19/08	FP	E	2	29	R	-	O	A	<2.0	CL
	05/19/08	EXT	F	11	28	R	-	O	A	<2.0	W
	07/14/08	FP	HE	13	30	R	-	O	A	4	CL
	09/02/08	LL	F	15	30	R	-	O	A	<2.0	NE
	10/28/08	FP	E	8	30	R	-	O	A	3.6	CL
WV049.00	01/23/08	EXT	HF	-4	28	R	-	O	R	2	NW
	03/17/08	LL	H	0	16	R	-	O	R	2	N
	05/19/08	EXT	HF	11	27	R	-	O	R	<2.0	CL
	07/14/08	FP	HE	16	30	R	-	O	R	2	CL
	09/02/08	LL	F	17	31	R	-	O	R	4	NE
	10/28/08	FP	E	8	30	R	W	O	R	<2.0	CL
WV050.00	01/23/08	EXT	HF	-1	31	R	-	O	R	<2.0	CL
	03/17/08	LL	H	1	26	R	-	O	R	<2.0	N
	05/19/08	EXT	HF	11	28	R	-	O	R	<2.0	CL
	07/14/08	FP	E	15	30	R	-	O	R	<2.0	CL
	09/02/08	LL	F	17	31	R	-	O	R	<2.0	NE
	10/28/08	FP	E	8	29	R	-	O	R	46	SE
WV050.50	01/23/08	EXT	HF	-2	30	R	-	O	R	<2.0	CL
	03/17/08	LL	H	0	24	R	-	O	R	<2.0	N
	05/19/08	EXT	HF	10	27	R	-	O	R	<2.0	CL
	07/14/08	FP	H	20	30	R	-	O	R	<2.0	SE
	09/02/08	LL	F	17	30	R	-	O	R	<2.0	NE
	10/27/08	FP	E	8	28	R	-	O	R	10	NE
WV050.80	01/23/08	EXT	HF	-3	25	R	-	O	R	<2.0	NW
	03/17/08	LL	HE	0	24	R	-	O	R	<2.0	N
	05/19/08	EXT	HF	12	24	R	-	O	R	<2.0	W
	07/14/08	FP	H	20	30	R	-	O	R	<2.0	CL
	09/02/08	LL	H	17	30	R	-	O	R	<2.0	NE



Station	Date	Collect	Tide	Temp	Sal	Strat	ADV	Stat	CL	MFCOL	WIND
	10/27/08	FP	HE	8	30	R	W	O	R	4	NE
WV052.00	01/23/08	EXT	H	-3	29	R	-	O	R	<2.0	NW
	03/17/08	LL	H	0	28	R	-	O	R	4	N
	05/19/08	EXT	HF	12	28	R	-	O	R	<2.0	W
	07/14/08	FP	H	20	30	R	-	O	R	<2.0	CL
	09/02/08	LL	H	16	31	R	-	O	R	<2.0	NE
	10/27/08	FP	HE	8	30	R	-	O	R	3.8	CL
WV053.00	01/23/08	EXT	F	-3	30	R	-	O	R	2	NW
	03/17/08	LL	H	1	28	R	-	O	R	3.6	N
	05/19/08	EXT	HF	11	28	R	-	O	R	<2.0	SW
	07/14/08	FP	E	15	30	R	-	O	R	2	SW
	09/02/08	LL	F	15	30	R	-	O	R	9.1	NE
	10/27/08	FP	HE	9	30	R	-	O	R	<2.0	CL
WV054.00	01/23/08	EXT	H	-4	28	R	-	O	R	8	CL
	03/17/08	LL	HE	1	24	R	-	O	R	<2.0	N
	05/19/08	EXT	H	14	26	R	-	O	R	<2.0	CL
	07/14/08	FP	E	19	30	R	-	O	R	<2.0	S
	09/02/08	LL	F	16	30	R	-	O	R	3.6	NE
	10/27/08	FP	HE	9	28	R	-	O	R	3.6	NE
WV055.00	01/23/08	EXT	H	-3	30	R	-	O	R	<2.0	NW
	03/17/08	LL	HE	0	26	R	-	O	R	<2.0	N
	05/19/08	EXT	H	12	28	R	-	O	R	<2.0	CL
	07/14/08	FP	E	15	30	R	-	O	R	<2.0	S
	09/02/08	LL	HF	15	30	R	-	O	R	2	NE
	10/27/08	FP	HE	8	30	R	-	O	R	2	NE
WV056.00	01/23/08	EXT	H	-1	32	R	-	O	A	<2.0	CL
	03/17/08	LL	HE	1	28	R	-	O	A	4	N
	05/19/08	EXT	H	12	28	R	-	O	A	2	S
	07/14/08	FP	E	17	30	R	-	O	A	2	S
	09/02/08	LL	HF	17	30	R	-	O	A	<2.0	NE
	10/28/08	FP	E	9	30	R	-	O	A	7.3	CL
WV057.00	01/23/08	EXT	H	-5	30	R	-	C	P	<2.0	CL
	03/17/08	LL	HE	0	20	R	-	C	P	4	N
	05/19/08	EXT	H	12	28	R	-	C	P	<2.0	CL
	07/14/08	FP	E	16	30	R	-	C	P	2	CL
	09/02/08	LL	HF	17	30	R	-	C	P	<2.0	NE
	10/28/08	FP	E	8	30	R	-	C	P	<2.0	CL
WV058.00	01/23/08	EXT	HE	-1	32	R	-	C	P	<2.0	NW
	03/17/08	LL	HE	0	28	R	-	C	P	4	N
	05/19/08	EXT	H	9	29	R	-	C	P	<2.0	S
	07/14/08	FP	E	15	30	R	-	C	P	<2.0	S
	09/02/08	LL	HF	16	30	R	-	C	P	<2.0	NE
	10/28/08	FP	E	8	30	R	-	C	P	18	SE
WV059.00	01/23/08	EXT	HE	-1	32	R	-	O	A	<2.0	CL



Station	Date	Collect	Tide	Temp	Sal	Strat	ADV	Stat	CL	MFCOL	WIND
	03/17/08	LL	E	1	30	R	-	O	A	<2.0	CL
	05/19/08	EXT	H	9	30	R	-	O	A	<2.0	S
	07/14/08	FP	E	14	30	R	-	O	A	<2.0	CL
	09/02/08	LL	HF	15	30	R	-	O	A	<2.0	CL
	10/28/08	FP	HE	9	30	R	-	O	A	<2.0	SE
WV060.00	01/23/08	EXT	HE	-1	31	R	-	C	P	<2.0	CL
	03/19/08	FP	E	2	29	R	-	C	P	<2.0	S
	05/19/08	EXT	HE	9	30	R	-	C	P	<2.0	S
	07/14/08	FP	E	14	30	R	-	C	P	<2.0	CL
	09/02/08	LL	HF	15	30	R	-	C	P	<2.0	CL
	10/28/08	FP	HE	9	30	R	-	C	P	2	SE
WV061.00	01/23/08	EXT	HE	-1	31	R	-	C	P	<2.0	CL
	03/17/08	LL	E	0	28	R	-	C	P	2	CL
	05/19/08	EXT	HE	8	30	R	-	C	P	<2.0	S
	07/14/08	FP	E	14	30	R	-	C	P	<2.0	CL
	09/02/08	LL	HF	15	30	R	-	C	P	<2.0	NE
	10/28/08	FP	HE	8	31	R	-	C	P	11	SE
WV062.50	01/23/08	EXT	HE	-1	31	R	-	C	P	<2.0	CL
	03/17/08	LL	E	0	28	R	-	C	P	<2.0	N
	05/19/08	EXT	HE	9	30	R	-	C	P	<2.0	S
	07/14/08	FP	E	16	30	R	-	C	P	<2.0	S
	09/02/08	LL	H	17	31	R	-	C	P	<2.0	NE
	10/28/08	FP	HE	8	31	R	-	C	P	2	SE
WV063.00	01/23/08	EXT	E	-1	31	R	-	C	P	2	CL
	03/17/08	LL	E	0	28	R	-	C	P	<2.0	N
	05/19/08	EXT	HE	9	30	R	-	C	P	<2.0	S
	07/14/08	FP	E	15	30	R	-	C	P	6	S
	09/02/08	LL	H	16	30	R	-	C	P	<2.0	NE
	10/28/08	FP	HE	9	30	R	-	C	P	<2.0	CL
WV064.00	01/23/08	EXT	E	-1	31	R	-	C	P	<2.0	NW
	03/17/08	LL	E	0	26	R	-	C	P	2	CL
	05/19/08	EXT	E	12	29	R	-	C	P	<2.0	S
	07/14/08	FP	E	16	30	R	-	C	P	<2.0	S
	09/02/08	LL	H	15	30	R	W	C	P	2	CL
	10/28/08	FP	HE	9	31	R	-	C	P	4	E
WV065.00	01/23/08	EXT	E	-1	31	R	-	C	P	<2.0	NW
	03/17/08	LL	E	0	28	R	-	C	P	<2.0	CL
	05/19/08	EXT	E	13	28	R	-	C	P	<2.0	S
	07/14/08	FP	E	14	30	R	-	C	P	2	SE
	09/02/08	LL	H	14	30	R	-	C	P	<2.0	CL
	10/28/08	FP	HE	9	31	R	-	C	P	<2.0	E
WV077.00	03/18/08	FP	HE	2	28	R	-	O	A	<2.0	N
	04/14/08	FP	E	4	26	R	-	O	A	3.6	NW
	07/01/08	FP	E	10	30	R	-	O	A	<2.0	S



Station	Date	Collect	Tide	Temp	Sal	Strat	ADV	Stat	CL	MFCOL	WIND
	07/28/08	FP	E	12	32	R	-	O	A	<2.0	SW
	08/18/08	FP	F	11	31	R	B	O	A	<2.0	S
	10/27/08	FP	E	7	30	R	-	O	A	<2.0	NE
WV078.00	03/18/08	FP	HE	2	28	R	-	O	A	<2.0	N
	04/14/08	FP	E	4	24	R	-	O	A	<2.0	NW
	07/01/08	FP	E	10	31	R	-	O	A	<2.0	S
	07/28/08	FP	E	13	32	R	-	O	A	4	SW
	08/18/08	FP	F	11	31	R	-	O	A	<2.0	S
	10/27/08	FP	E	7	31	R	-	O	A	<2.0	NE
WV079.00	03/18/08	FP	HE	1	28	R	-	O	A	<2.0	N
	04/14/08	FP	E	4	26	R	-	O	A	<2.0	NW
	07/01/08	FP	E	10	30	R	-	O	A	2	S
	07/28/08	FP	E	13	32	R	-	O	A	3.6	SW
	08/18/08	FP	F	10	31	R	-	O	A	<2.0	S
	10/27/08	FP	E	7	30	R	-	O	A	<2.0	NE
WV080.00	03/18/08	FP	HE	2	28	R	-	O	A	<2.0	N
	04/14/08	FP	E	4	26	R	-	O	A	<2.0	NW
	07/01/08	FP	E	13	30	R	-	O	A	<2.0	S
	07/28/08	FP	E	13	32	R	-	O	A	4	SW
	08/18/08	FP	F	11	32	R	-	O	A	<2.0	CL
	10/27/08	FP	E	7	31	R	-	O	A	2	NE
WV081.00	03/18/08	FP	HE	2	30	R	-	O	A	<2.0	N
	04/14/08	FP	E	3	27	R	-	O	A	<2.0	NW
	07/01/08	FP	E	9	31	R	-	O	A	<2.0	S
	07/28/08	FP	E	11	32	R	-	O	A	<2.0	SW
	08/18/08	FP	F	10	32	R	-	O	A	2	S
	10/27/08	FP	E	8	31	R	-	O	A	<2.0	NE
WV083.00	03/18/08	FP	E	2	30	R	-	O	A	<2.0	N
	04/14/08	FP	E	4	30	R	-	O	A	<2.0	NW
	07/01/08	FP	E	13	31	R	-	O	A	<2.0	S
	07/28/08	FP	LE	14	32	R	-	O	A	2	SW
	08/18/08	FP	HF	11	31	R	-	O	A	<2.0	S
	10/27/08	FP	E	8	31	R	-	O	A	2	NE
WV084.00	03/18/08	FP	E	2	30	R	-	O	A	<2.0	N
	04/14/08	FP	E	3	30	R	-	O	A	<2.0	NW
	07/01/08	FP	E	12	30	R	-	O	A	<2.0	S
	07/28/08	FP	LE	14	32	R	-	O	A	<2.0	SW
	08/18/08	FP	HF	12	32	R	-	O	A	<2.0	S
	10/27/08	FP	E	7	30	R	-	O	A	<2.0	NE
WV085.00	03/18/08	FP	E	2	30	R	-	O	A	<2.0	N
	04/14/08	FP	E	4	30	R	-	O	A	<2.0	NW
	07/01/08	FP	E	13	32	R	-	O	A	<2.0	S
	07/28/08	FP	E	15	32	R	-	O	A	2	SW
	08/18/08	FP	HF	13	31	R	-	O	A	<2.0	S



Station	Date	Collect	Tide	Temp	Sal	Strat	ADV	Stat	CL	MFCOL	WIND
	10/27/08	FP	E	8	30	R	-	O	A	<2.0	NE
WV086.00	03/18/08	FP	E	3	30	R	-	O	A	<2.0	N
	04/14/08	FP	E	4	30	R	-	O	A	<2.0	NW
	07/01/08	FP	E	15	30	R	-	O	A	<2.0	S
	07/28/08	FP	E	16	31	R	-	O	A	<2.0	SW
	08/18/08	FP	HF	14	31	R	-	O	A	2	S
	10/27/08	FP	E	8	30	R	-	O	A	<2.0	NE
WV087.00	03/18/08	FP	E	3	30	R	-	O	A	<2.0	N
	04/14/08	FP	E	3	28	R	-	O	A	<2.0	NW
	07/01/08	FP	E	15	30	R	-	O	A	<2.0	S
	07/28/08	FP	E	15	32	R	-	O	A	<2.0	SW
	08/18/08	FP	HF	14	31	R	-	O	A	<2.0	CL
	10/27/08	FP	E	8	31	R	-	O	A	<2.0	NE
WV088.00	03/18/08	FP	E	2	30	R	-	O	A	<2.0	N
	04/14/08	FP	E	3	30	R	-	O	A	<2.0	NW
	07/01/08	FP	E	10	30	R	-	O	A	<2.0	S
	07/28/08	FP	E	12	32	R	-	O	A	<2.0	SW
	08/18/08	FP	F	12	31	R	W	O	A	<2.0	S
	10/27/08	FP	E	7	31	R	-	O	A	<2.0	NE
WV089.00	03/18/08	FP	E	3	30	R	-	O	A	<2.0	N
	04/14/08	FP	E	3	28	R	-	O	A	<2.0	NW
	07/01/08	FP	E	11	30	R	-	O	A	<2.0	S
	07/28/08	FP	E	12	32	R	-	O	A	<2.0	SW
	08/18/08	FP	F	12	32	R	-	O	A	<2.0	S
	10/27/08	FP	E	8	31	R	-	O	A	2	NE